A SHIPBUILDING HISTORY

1750-1932

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1750  1932

A Record of the Business founded, about 1750, by Alexander Stephen at Burghead, and subsequently carried on at Aberdeen, Arbroath, Dundee and Glasgow

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"They built great ships and sailed them" sounds most brave
Whatever arts we have or fail to have . . .

JOHN MASEFIELD.

Four-masted barque "Carradale."

One of the last of the sailing-ships built by Alexander Stephen & Sons, Ltd. 1889.

ILLUSTRATIONS

ILLUSTRATIONS—*continued.*

Foreword

HISTORY is but dry stuff, and a personal history is of interest to few beyond the small circle concerned, unless—and this is the reason or excuse for this book—the history touches the lives and careers of others, or records the march of events as mirrored in the career of the person or firm whose history is related.

This book is frankly a record of one firm, collected while the evidence is still available, and while some events at least are still fresh in the minds of those who participated; but as, in view of the period covered, it is in miniature a history of the development of a great British industry, it is hoped that it will be found interesting by other men and other firms, particularly those who have had ships built at Linthouse.

May, 1932.

WILLIAM STEPHEN

FARMER IN KINNEDDAR, ABOUT 1690–1761.

WILLIAM STEPHEN, 1720–1799.
Farmer in Kinneddar.

ALEXANDER STEPHEN, 1722–1793.
Started Shipbuilding in Burghead about 1750

WILLIAM STEPHEN, 1759–1838.
Apprentice to his uncle in 1777 in Burghead.
Shipbuilder in Aberdeen.

WILLIAM STEPHEN,
1790–1829.
Shipbuilder in Arbroath.

ALEXANDER STEPHEN,
1795–1875.
Shipbuilder in Aberdeen, Arbroath,
Dundee and Glasgow.

WILLIAM STEPHEN,
1826–1894.
Shipbuilder in Dundee.

ALEXANDER STEPHEN,
1832–1899.
Kelvinhaugh & Linthouse.

JOHN STEPHEN,
1835–1917.
Kelvinhaugh & Linthouse.

MAUD STEPHEN,
m. GEO. SCOTT MACLELLAN

ALEXANDER EDWARD STEPHEN,
Linthouse.
Chairman 1917–1929.

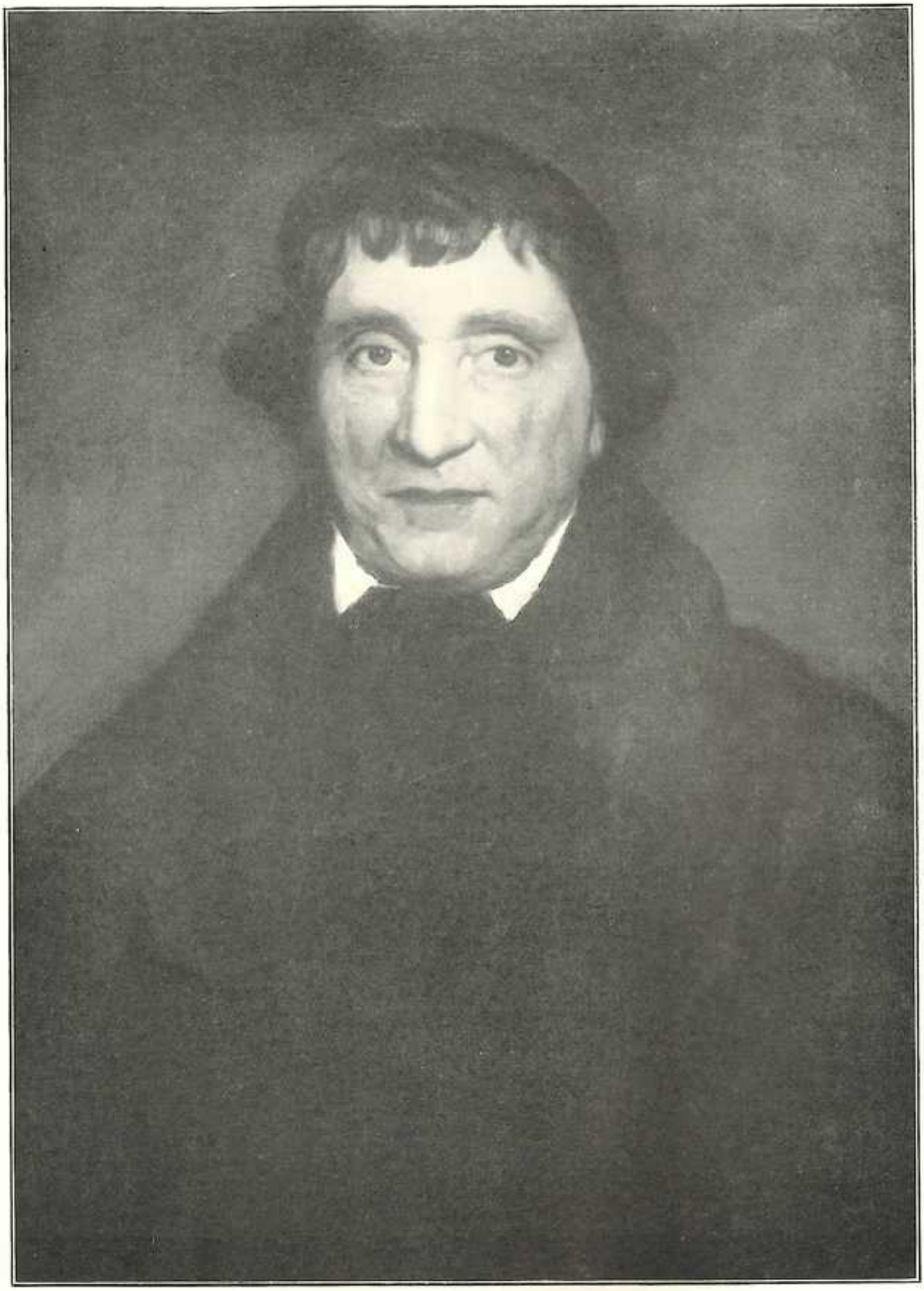
FREDERIC JOHN STEPHEN,
Linthouse.
Present Chairman.

ALEXANDER STEPHEN MACLELLAN,
Present Director.

ALEXANDER MURRAY STEPHEN,
Present Director.

JOHN GRAEME STEPHEN
Present Director.

A SHIPBUILDING HISTORY



William Stephen, 1759-1838.
Burghead and Aberdeen.

CHAPTER ONE

1750—1850

From Kinneddar to Dundee

As once, long since, when all the docks were filled
With that sea beauty man has ceased to build. . . .

MASEFIELD.

GLANCING through the earliest records of the Stephens, one discovers that "John Steven, farmer, in Kinnedore, Parish of Drainie," married Elspet Wilson in 1689, while his brother, "Alexander, farmer in Ardifet, matrimonially contracted with Katherine Russel in 1683." Both farms are still in existence, and bear their original names, though now spelt "Kinneddar" and "Ardivot."

John Steven was succeeded at Kinneddar by his son, William, born in 1690. William had two sons, William, born in 1720, a farmer at Kinneddar, and Alexander, who began building ships at Burghead, probably about 1750, or soon after the '45 Rebellion, which ended at Culloden, not far from Drainie. This may be regarded as the beginning of the shipbuilding business of the Stephens, known first as "Alexander Stephen," then as "William Stephen & Sons," and finally as "Alexander Stephen & Sons." Little is known of the Burghead establishment, which probably confined itself to the construction of small coasting and fishing vessels.

The second William, who, being carried off by the Jacobite Army, was an unwilling spectator of the battle, shortly afterwards married Isobel Edward of Stotfield, the old name for Lossiemouth, and appears to have moved to Aberdeen. With the removal, sometime in the seventeen-fifties, this branch of the family severed their direct connexion with Kinneddar, their home for more than a hundred years. The farm, situated about a mile south-west of Lossiemouth, owes its name to the fact that until the 16th century the sea flowed inland right up to Spynie, leaving Kinneddar, "a point between the waters." Mary Queen of Scots is said to have sailed up to Spynie, where the ruins of the Bishop's Palace are still standing. Close by, on the north, once stood the Abbey of Kinneddar, of which nothing now remains save the graveyard, and

even this was despoiled of most of its older stones during the Great War. During recent alterations to the Stotfield Hotel one of the front door steps was found to be a gravestone, possibly commemorating one of the old farmers of Kinneddar.

The third William, third son of the second William, was born at Footdee, Aberdeen, in 1759, and is the only one of his family about whom much is known. Both his diary and portrait are in existence, and from these a great deal may be gleaned.

The diary he calls "A short account of some passages in my life, with my different views of religion. Also some account of my experience and the Lord's dealings with me in providence and grace." It is mostly taken up with descriptions of his religious feelings and struggles with his own backslidings. In a long dedication to his children, he explains that his object in this composition was to let the knowledge of his experiences serve as a guide to them, and ends by expressing a fear lest they should be separated in the next world. "O that I and my partner on the day of accounts may have the unutterable pleasure, and the distinguished honour, to appear before Thee with all our little ones, saying, 'Here are we and the children thou hast given us.'" He describes his father as "like men in general, when young, careless and sinful, but was brought to the Lord when about thirty years of age."

In 1777 his father sent young William back to Burghead to be apprenticed to his uncle, Alexander. In his diary the new apprentice records surprise at finding that although the latter was an elder of the Kirk, he cursed and swore freely in the shipyard!

In 1787 William returned to Aberdeen and entered into the following agreement with James Cochar, whose business in shipbuilding descended to his son-in-law, Alexander Hall, whose family have made it one of the leading firms in Aberdeen.

ABERDEEN, 10TH OCTOBER 1787.

SIR, I DO HEREBY OBLIGE MY SELF TO PAY YOU THE FEE OF THREE POUND STERLING MONEY FOR TEACHING ME THE ART OF SHIP DRAFTING AS YOU PRACTICE IT YOURSELF, THE ONE HALF WHEN ENTERED TO SAID DRAFTING AND THE OTHER WHEN I CAN LAY DOWN A DRAFT BY MY SELF.

I ALSO BIND MY SELF TO TEACH NO OTHER PERSON THE SAME UNDER THE FINE OF TEN POUND STERLING MONEY.

I ACKNOWLEDGE TO HAVE RECEIVED YOUR LETTER AGREEING TO THESE TERMS AND TO RENEW THEM ON STAMP PAPER WHEN REQUIRED.

SIR, I AM YOURS

(SIGNED) WILLIAM STEPHEN

After this preparation he determined to establish a branch of the business in Aberdeen, where he began building in 1793.

For the first few years he found things very difficult, but later began to prosper, and persuaded his uncle Alexander to leave Burghead and join him in Aberdeen. Alexander, however, left one of his sons behind him to carry on the Burghead business, and this yard appears to have been still under the control of Alexander junior in 1826.

By 1813 William had established at Footdee what was, for those days, quite a substantial business as a shipbuilder, employing over thirty men. During the few years preceding this date he had built ten wooden ships, mostly brigs, with the exception of the ship *Elizabeth*. He found English oak better than Aberdeenshire, and so imported a certain amount from the Thames; American oak was also extensively utilized. He also helped to build the new pier from the headland on the north side of the harbour, and owned one or two ships which he managed himself, including the *Bolivar* and *Unicorn*.

In the same year he took up on his slip the ship *Oscar*, lengthening the vessel by cutting her in two and building in sixteen feet amidships, a feat that the other shipbuilders had declared to be impossible! Unfortunately, on leaving the harbour, she went ashore on Girdleness and was lost with almost all hands.

During the Napoleonic Wars his eldest son, William, was captured and held prisoner by the French. After his release, in 1814, the latter did not join the family in Aberdeen, but leased a yard for himself, at Arbroath.

Old William Stephen owed his success largely to the considerate way in which he treated his hands. A letter, describing his methods of gaining their goodwill, says that the other shipbuilders found it difficult to understand how he obtained so much work from his men.

Twice a week, during very hot weather, he would order the brewery to send a cask of ale to the yard, to be distributed during working hours. He was firmly convinced that it was highly dangerous for a man, when warm, to drink cold water. On one occasion he ordered a bottle of whisky and a bucket of water to be brought into the yard, and proceeded to mix each man a drink with his own hands. Once, when a ship went ashore on Belhelvie sands, William set out to salve the vessel, arranging to lodge his men at a farm-house for the night, in charge of a foreman. Before he left, he greatly astonished the farmer's wife by inspecting each man's bed to see that it was provided with sufficient clothing!

Not content with care of the body, he also undertook to safeguard the soul, and would often go up to the shed during the men's dinner-hour to give them a short religious address. Sometimes he had not

finished when the bell rang, and the men would move off to begin work. This was not at all to William's liking, and he often called them back with a " Na, na, lads, you're in my time now—stay where you are." Then he would keep them listening to him for another quarter of an hour or more. Occasionally the apprentices attempted to prolong this welcome extension of the dinner-hour by asking awkward questions and quoting relevant portions of the Scriptures, but as a rule he was not to be drawn. At least one apprentice remembered these hours with affection, for, on his death-bed, years later, in another part of the country, he made a friend promise to tell William Stephen that though James Smart had been one of his most mischievous apprentices, he had derived great benefit from this teaching and his last message to Mr. Stephen was " not to give up speaking to his men although they should use him as ill as he had done."

In 1824, Alexander, the second son, who had joined his father in the Aberdeen yard some years before, commenced keeping a yard-diary, which he continued for over thirty years. In this he records not only the work of the yard, but also various domestic events.

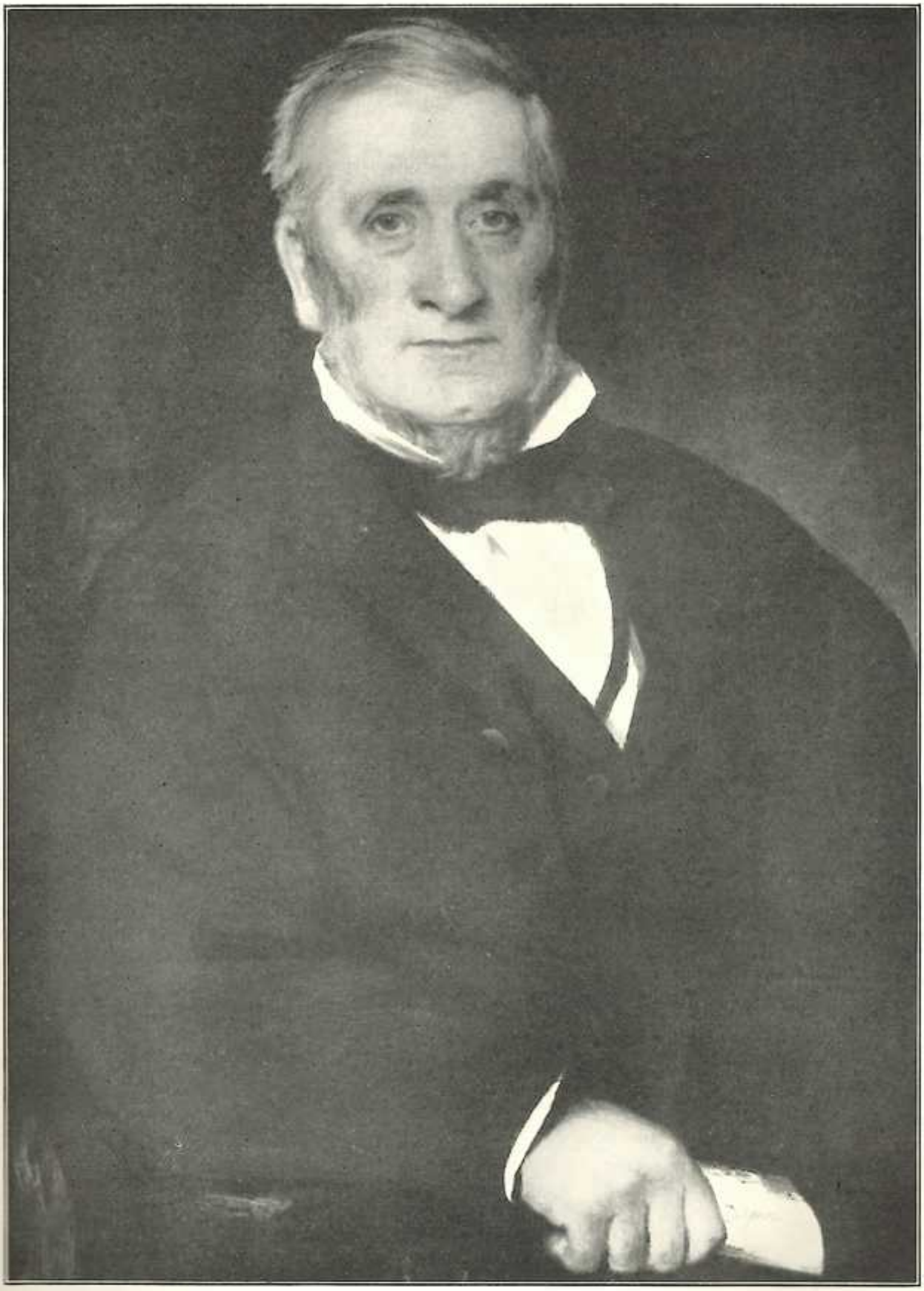
In the early 'twenties trade was good, but about 1825 it commenced to decline. While the Aberdeen yard contrived to keep its head above water, the son at Arbroath became involved in difficulties and William, senior, was forced to sign a bond making himself responsible for the debts of William, junior.

1826 was a disastrous year for the family. The brig *Unicorn*, commanded by William's youngest son, James, was lost with all hands off Balankelly, on the Irish coast, while on a voyage to Trieste. Of two other sons, whose business in Aberdeen failed, one died and the other emigrated to Canada.

Finally, the Arbroath yard lost a lawsuit and the creditors took it over, calling upon William Stephen to implement his bond. Unable to do this in full, he was declared bankrupt on 1st January, 1828, at the age of sixty-nine.

His Aberdeen business was taken over by his son, Alexander, and the name of the firm, which had been changed to " William Stephen & Sons," reverted again to " Alexander Stephen & Sons." Alexander not only took charge of the business at Aberdeen, but also shouldered his father's debts, the Arbroath yard, and the responsibility of a lawsuit that was pending. He finally paid off the debts over a period of seven years, and settled up for the lawsuit, which he lost in the Court of Session in 1832.

Meanwhile, the eldest son, after his failure at Arbroath, died and was buried there, his own blacksmiths making a most elaborately-bound



Alexander Stephen, 1795-1875.
Aberdeen—Arbroath—Dundee—Kelvinhaugh.

coffin, proof against the depredations of the body-snatchers.

Shortly after his bankruptcy, old William Stephen and his wife moved to Edinburgh, where they stayed with their son John, who looked after them for about ten years, though they paid frequent visits to Aberdeen and Arbroath until 1838, when John died. It is recorded that after his funeral in Aberdeen the mail-coach was snowed up, and the Arbroath party had to walk most of the way home.

Old William Stephen then moved to Arbroath, but did not survive the change very long. He too died in 1838, on 21st November, and was buried in the family burial ground in Footdee churchyard, Aberdeen. His life was eventful, but rather tragic, in that the success he won was entirely undermined by the failures of his family, and he was obliged to spend the last ten years of his life as a guest of one of his younger sons. We gather that he bore his misfortunes with gentleness and resignation. His wife, apparently, had at first some difficulty in forgiving him for his failure; but, in a later letter from Edinburgh, John declares that she appeared to be showing more affection for his father. The old lady, who had a somewhat sharp-featured face, was probably rather trying. However, those of his family who remained were very much attached to the old shipbuilder, especially John, who was devoted to his father. While in Edinburgh John had his parents' portraits—which are still extant—painted, on commission for Alexander, who paid six guineas for the pair.

We have already seen how Alexander came to take over his brother William's yard at Arbroath, in 1829. Deciding, apparently, that it was too much for him to run the two yards single-handed, he relinquished the one in Aberdeen. As it was then customary for shipbuilders to lease their yards, leaving a yard did not always involve selling; the Stephen yard at Footdee was thus leased, from year to year, at an annual rental of seventy pounds.

Finally, in 1830, Alexander moved to Arbroath, where he carried on a continually-expanding business, taking over, soon after his removal, the yard of a Mr. Blair, who had failed in the trade.

In 1824 the Aberdeen yard employed 18 journeymen, 8 apprentices, 2 sawyers and 2 blacksmiths—a total of thirty hands. In 1830, when Alexander moved to Arbroath, the number had fallen to twenty-five, but rose to thirty again in 1834, and to forty-eight in 1843, when he left Arbroath. In those days the wages varied from 13/6 to 15/- a week on new work, and from 16/- to 20/- on repair-work. As a result of the Napoleonic Wars trade was still very bad, the lowest point being touched about 1832. In 1826 the number of shipbuilders in Aberdeen fell from ten to eight, each of whom had two ships on stocks, unsold, while every

year until 1835 is described as a very dull one for shipbuilding. After this date it improved, especially on the west coast, where a number of steamboats were being built. As many workmen were in consequence attracted to the Clyde yards, the east coast builders were obliged to raise their wages. Prices of ships at this period ranged from about £10 to £11 10s. per gross ton.

The Arbroath yard was continually being improved by additions, such as steam-engines to drive the saws, and a new joiners' shop. In 1840 Alexander moved his family into a large new house at Lady Loan, overlooking the yard; this residence is still standing. The year following this removal was shadowed by the tragic death of his small daughter, Elizabeth, who was killed by a circular-saw while playing in the shipyard.

In 1840 trade again declined and remained at low ebb for the following three years, causing several yards to fall vacant in Dundee. In 1842 Alexander Stephen, undismayed by the depression, took over the lease of one of the Dundee yards, moving his business thither in 1843.

One reason for leaving Arbroath was the new railway, which passed through the back yard. Although compensation was paid for the ground thus utilized, the innovation naturally made the yard rather inadequate. It is curious to recall that the local residents won an action prohibiting the railway directors from running trains on Sunday.

During the twelve years at Arbroath Alexander built thirty-two ships, though the greater part of his trade consisted of repair-work, which included the restoration of the Inchcape Bell boat.

At Burghead, Aberdeen and Arbroath the ships built were almost entirely small coasting vessels, ranging up to about 150 tons, for trading in the North Sea; the majority of these were for local owners, who often bought the ships when building on the stocks. But at Arbroath several larger vessels, of from two hundred to four hundred tons, were built, including several for Glasgow owners.

One of the most important sides of the business was the purchase of timber, and for this purpose Alexander bought the brig *Leipzig*, of 223 tons measurement, at Hull, in 1838, for £1,550. Captain Barron was engaged for her, but arrived drunk! She made voyages chiefly to the Baltic, St. Petersburg and Archangel, for Russian woods, to Moulmein for teak, and also to the Black Sea.

A picture of the *Leipzig* entering Naples Bay now hangs in the firm's office. Apparently the captain had recovered, as he is seen on the quarter-deck, looking very smart in a top hat!

In 1841 this vessel was taken on the slip at Arbroath, cut in two and lengthened by 13 feet. She continued to make successful voyages,

carrying timber, until at least 1851, and her owner declares that he saved much money in this manner.

Holidays in those days were regulated by the old Saints' days, a survival of Roman Catholic festivals, and some by even older traditions. New Year's Day was not observed on 1st January, but on 12th January, which is described as "Old New Year's Day," while "Old Christmas Day" was observed on 6th January. Between 1830 and 1842 these two old holidays were replaced by one or two "play-days," given on 1st or 2nd January. Old St. Thomas's Day, or St. Thomas's Market, on 20th July, was also kept as a holiday, while the two sacramental Fast Days on the Thursday before the spring and autumn Communion Services were always observed. A curious point is that while Christmas was kept in Aberdeen, no notice was taken of either Christmas Day or Easter at Arbroath!

Work was also suspended on various public holidays and days of prayer, such as the Reform Bill Procession, in 1832, the Fast Day decreed by the Church, owing to the threatened disruption, in 1841, and the Queen's Fast Day, for the failure of the crops, in 1847.

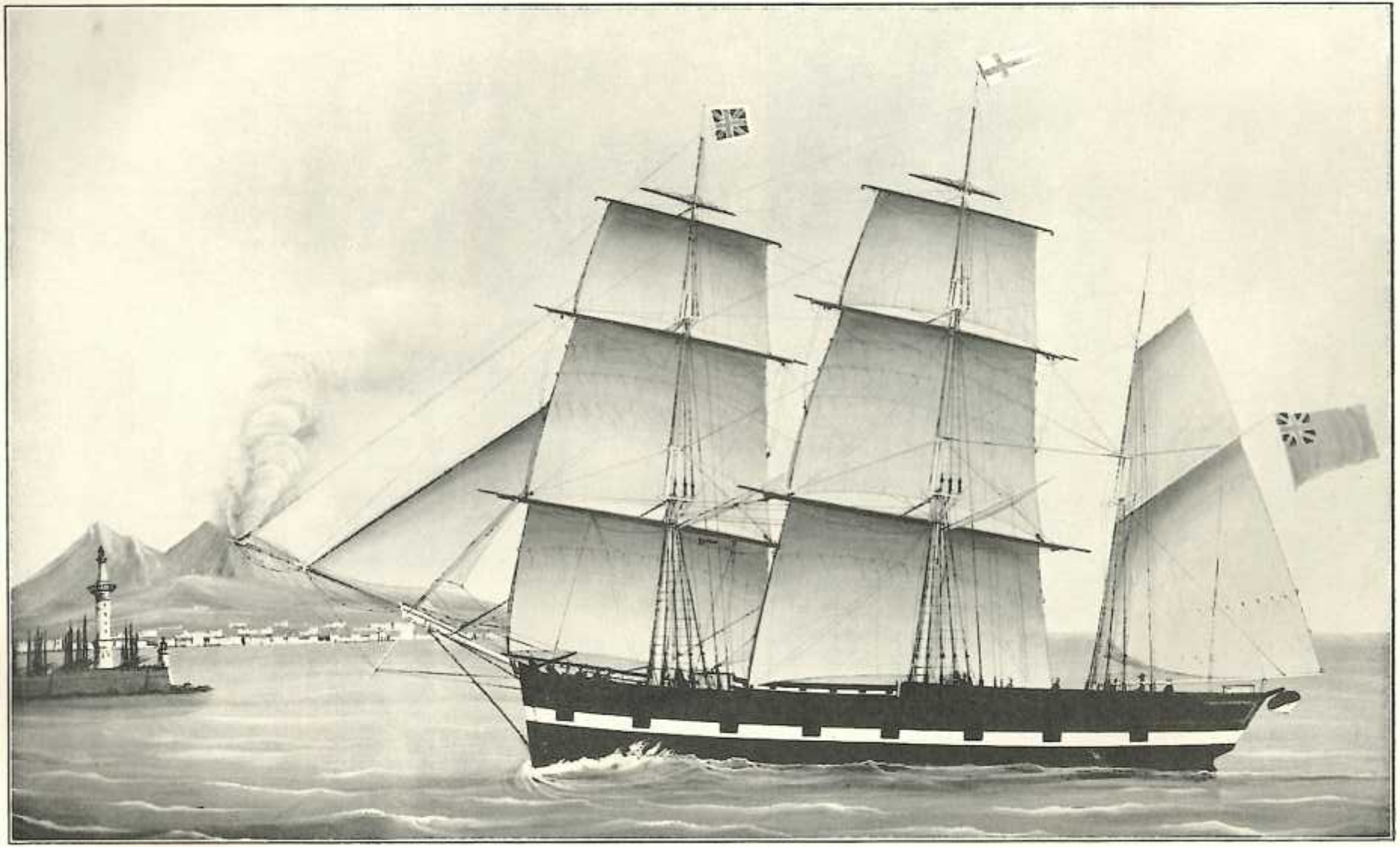
Launches were regarded as very important occasions, a "play-day" being always given on the day afterwards, until 1840, when this practice ceased. An amusing incident concerns a launch in 1830, when Alexander Stephen records that, returning from a day's business trip to Aberdeen, he was astonished, not to say angry, to find the foreman had launched a ship on his own initiative! This seems somewhat surprising to-day, as the launching of such small ships is now regarded as a comparatively simple matter.

Apprenticeship was considered exceptionally important, and the proportion of apprentices to journeymen was very large. As a matter of interest, a copy of the indenture of Alexander Stephen, as apprentice to his father, is given:

INDENTURE
'TWIXT
ALEXANDER STEPHEN
AND
WILLIAM STEPHEN
1809.

IT IS CONTRACTED, FINALLY ENDED AND AGREED UPON, BETWIXT ALEXANDER STEPHEN, SON OF WILLIAM STEPHEN, SHIP CARPENTER, IN FOOTDEE, WITH CONSENT OF HIS FATHER ON THE ONE PART, AND THE SAID WILLIAM STEPHEN ON THE OTHER PART, AS FOLLOWS, VIZ.: THE SAID ALEXANDER STEPHEN WITH CONSENT FORESAID HEREBY FEES AND CONDUCES HIMSELF AS AN APPRENTICE AND SERVANT TO THE SAID WILLIAM STEPHEN, HIS FATHER, FOR LEARNING THE BUSINESS OF A SHIP

CARPENTER, AND THAT FOR THE SPACE OF SEVEN FULL AND COMPLEAT YEARS FROM AND AFTER THE TWENTY-FOURTH DAY OF NOVEMBER, ONE THOUSAND EIGHT HUNDRED AND SEVEN, WHICH IS HEREBY DECLARED TO HAVE BEEN THE COMMENCEMENT OF HIS APPRENTICESHIP, NOTWITHSTANDING THE DATE HEREOF, DURING WHICH SPACE THE SAID ALEXANDER STEPHEN BINDS AND OBLIGES HIMSELF FAITHFULLY, HONESTLY, AND CONSTANTLY TO SERVE THE SAID WILLIAM STEPHEN, AND NOT TO ABSENT HIMSELF FROM HIS SAID SERVICE AT ANY TIME BY NIGHT OR BY DAY, WEEK DAY OR SABBATH DAY, WITHOUT LIBERTY ASKED AND GIVEN UNDER THE PENALTY OF PAYING HIS SAID MASTER THREE SHILLINGS STERLING OR SERVING HIM TWO DAYS AT THE EXPIRY HEREOF, FOR EACH DAY'S ABSENCE IN HIS MASTER'S OPTION: TO ABSTAIN FROM ALL GAMING, DRINKING, AND ALL IMMORAL AND DEBAUCHED COMPANY, DURING HIS APPRENTICESHIP: HIS MASTER'S LAWFUL SECRETS TO CONCEAL, PREVENT HIS LOSS, AND PROMOTE HIS INTEREST TO THE UTMOST OF HIS POWER. AND THE FORESAID ALEXANDER STEPHEN, THE APPRENTICE, HIS HONESTY, FIDELITY SURE REMAINING AT HIS SERVICE AND IMPLEMENTING AND PERFORMING THE WHOLE PREMISES ALEXANDER MARR, SHIP CARPENTER IN FOOTDEE, AND WILLIAM CLARK, IRON MONGER, IN ABERDEEN, BIND AND OBLIGE THEMSELVES CONJUNCTLY AND SEVERALLY AS CAUTIONEERS, SURETIES, AND FULL DEBTORS, FOR, AND WITH THE SAID ALEXANDER STEPHEN FOR THE WHICH CAUSES; AND ON THE OTHER PART, THE SAID WILLIAM STEPHEN BINDS AND OBLIGES HIMSELF TO TEACH AND INSTRUCT THE SAID ALEXANDER STEPHEN, THE APPRENTICE, IN THE BUSINESS OF A SHIP CARPENTER AND SHIP BUILDER AS PRACTISED BY HIM; AND FURTHER TO MAINTAIN AND UPHOLD THE SAID ALEXANDER STEPHEN AT BED AND BOARD DURING HIS APPRENTICESHIP; LASTLY, BOTH PARTIES BIND AND OBLIGE THEMSELVES TO IMPLEMENT AND PERFORM THE PROMISES TO EACH OTHER, UNDER THE PENALTY OF TWENTY POUNDS STERLING, TO BE PAID BY THE PARTY FAILING TO THE PARTY PERFORMING, OR WILLING TO PERFORM BY AND ALLOW PERFORMANCE, AND FOR THE MORE SECURITY, THEY CONSENT TO THE REGISTRATION HEREOF IN THE BOOKS OF COUNCIL AND SESSION, OR OTHERS COMPETENT, THEREIN TO REMAIN FOR PRESERVATION; AND, IF NEEDFUL, THAT LETTERS OF WARNING ON SIX DAYS CHARGE AND ALL OTHER EXECUTION NEEDFUL MAY PASS AND BE DIRECT HEREON IN FORM AS APPEIRS. AND THERETO CONSTITUTE THEIR PROCURATORS, ETC. IN WITNESS WHEREOF THEY HAVE SUBSCRIBED THESE PRESENTS WROTE UPON PAPER DULY STAMPED BY JOHN DUTHIE, ADVOCATE IN ABERDEEN, AS FOLLOWS, viz., BY THE SAID ALEXANDER STEPHEN, WILLIAM STEPHEN AND ALEXANDER MARR, AT FOOTDEE, THE FOURTH DAY OF JULY, ONE THOUSAND EIGHT HUNDRED AND NINE YEARS, BEFORE WITNESSES JOHN McKENZIE, VINTNER, IN FOOTDEE, AND THE SAID JOHN DUTHIE



"Leipzig" entering Naples Bay.

Owned by the Stephens for many years and used to bring home timber for the shipyard.

Kinneddar Farm in the parish of Drainie, by Lossiemouth.

AND BY THE SAID WILLIAM CLARK, THE FIFTH DAY OF JULY AND YEAR AFORESAID ONE THOUSAND EIGHT HUNDRED AND NINE BEFORE WITNESSES DAVID STEPHEN, APPRENTICE TO THE SAID WILLIAM CLARK AND THE SAID JOHN DUTHIE.

(SGD.) JOHN DUTHIE, WITNESS.
JOHN McKENZIE, WITNESS.
DAVID STEPHEN, WITNESS.
JOHN DUTHIE, WITNESS.

(SGD.) ALEXR. STEPHEN.
WM. STEPHEN.
ALEXR. MARR.
WILLM. CLARKE.

THIS IS TO CERTIFY THAT ALEX. STEPHEN WITHIN MENTIONED HATH SERVED OUT THE WITHIN MENTIONED TIME OF SEVEN YEARS IN A REGULAR AND ATTENTIVE MANNER—BOTH AS TO THEOREY AND PRACTICE FOR WHICH HE IS HEREBY DISCHARGED BY ME HIS FATHER THIS SECOND DAY OF JANRY. EIGHTEEN HUN. AND FIFTEEN.

(SGD.) WM. STEPHEN.

The usual weekly rates of pay for apprentices varied from 5/- in the first year to 7/- in the fifth. As long ago as 1833, pay day was changed from Saturday to Friday, upon which day it remained for many years.

A curious custom, celebrated in the shipyards at this period, was that known as "Washing the apprentices' heads." The master of the yard presided at the somewhat roughly performed ceremony, which can hardly have been very pleasant for the victims, who were expected to give a guinea to be divided among the other apprentices. On one occasion the water used must have been too hot, for an unfortunate boy's head was scalded, though his companions refused to admit their blame.

The shipwrights, or carpenters, who formed a large proportion of the men employed, were early grouped into a strong trade union, the Aberdeen branch being established in January, 1825. The strength of this branch was early apparent, as the masters were soon compelled to combine in order to present a united front to the union.

The Dundee branch, which was also of considerable strength, formed the idea of running a yard of its own. In 1831 its members were taking the idea seriously, as Alexander Stephen offered to sell them his slip-gear. By 1847 their plans had matured and fifteen union carpenters formed the Tay Shipbuilding Company. But this attempt did not survive for very long. It is curious to note that when a trade union or a body of workmen in an industry, such as shipbuilding, make an attempt to compete with private enterprise, the result is almost always a failure. The Dundee branch also objected to carpenters from other

districts working in the city, and struck to enforce their objection. It was finally settled that strangers should be allowed to work for five months without joining the union.

Another difficulty with which masters and men were faced in those days was the Press Gang. Ships' carpenters were particularly suitable for the Royal Navy and the best place to find them was naturally in the vicinity of the various shipyards. On one occasion the Gang raided the Arbroath yard for certain men, and searched the place thoroughly without success. When they had gone Alexander Stephen crossed over to the large steam box (used for steaming ships' planks), from which a gentle trickle of steam was still issuing, and, flinging open the door, exclaimed, "Ye can come out now, lads!". The wanted men crawled out, none the worse for their steaming!

When Alexander left Arbroath he handed over the lease of the yard to his nephew, William, the only son of his brother William, founder of the Arbroath business. Young William made quite a successful start, and in three or four years had repaid his uncle four hundred pounds of the money he had been obliged to borrow. By 1850 William was able to buy Alexander's house at Arbroath for £750, but in 1857 he died suddenly, at the age of thirty-nine.

When Alexander Stephen moved to Dundee, in 1843, trade was at a very low ebb and new ships practically unsaleable. He had already been forced to commission and run for himself one of his own ships, the *Britannia*, of 370 tons. The rent of the Dundee yard was £150 a year; £550 was paid for the engine shop and buildings.

Undaunted by the general depression, Alexander at once proceeded to reorganize the new yard, erecting fresh sheds and a joiners' shop. Fortunately he made a good beginning with repair-work and was able to find purchasers for two of the ships on the stocks. By the end of 1844 trade was reviving and he had from fifty to seventy men employed.

Alexander had now three ships at sea, the *Leipzig*, *Whitby* and *Britannia*. The two former were used chiefly for importing timber, while the latter made several voyages to India and Burma. In 1846 he sold the *Britannia* and also the *Whitby*. Later he purchased the *Alexander*, which he sold in 1850.

By 1845 shipbuilding had improved and repair-work was plentiful. The boom continued until September, 1847, when an 8 per cent. bank rate and a good crop stopped trade and brought freights down. Wages rose as high as 21/- and 24/- after the six-week strike in 1846, but fell again to 19/- and 21/- in 1847. As a result of this strike, the masters decided to make fuller use of apprentices and foremen.

During these years the yard was further improved by the installation

of a 12 h.p. engine and a new shed, 180 feet in length, built over one of the berths to give cover to the ship building below. This shed, the second of its type in the kingdom (the other being at Smith's yard, on the Tyne), was erected at a cost of £450. Another instance of enterprise was the purchase, in 1844, of a floating dock, which must have been one of the first of its kind.

Although shipbuilding languished during 1848 and 1849 the depression did not prevent further extensions in the yard, of which a new seven-years' lease at £170 had been taken. A brick counting-house and a dwelling-house were built, also a shed 120 feet long, with a moulding loft above.

Larger ships were now built, the two most important being the *Asia* and *Europe*, both vessels of nearly 600 tons. The former was constructed by Alexander on his own account.

In 1850, although trade was still difficult, a new office and smiths' shop were commenced, while more ground was added to the yard between Marine Parade and Victoria Dock. Repair-work, however, was still good, and, with his sons beginning to learn the business, Alexander Stephen began to visualize a new yard on the west coast. The Dundee venture having prospered rapidly, his active mind was again alert for further developments.

CHAPTER TWO

1850—1870

Kelvinhaugh and Dundee

. . . grander things than all the art of towns,
Their tests are tempests, and the sea that drowns.

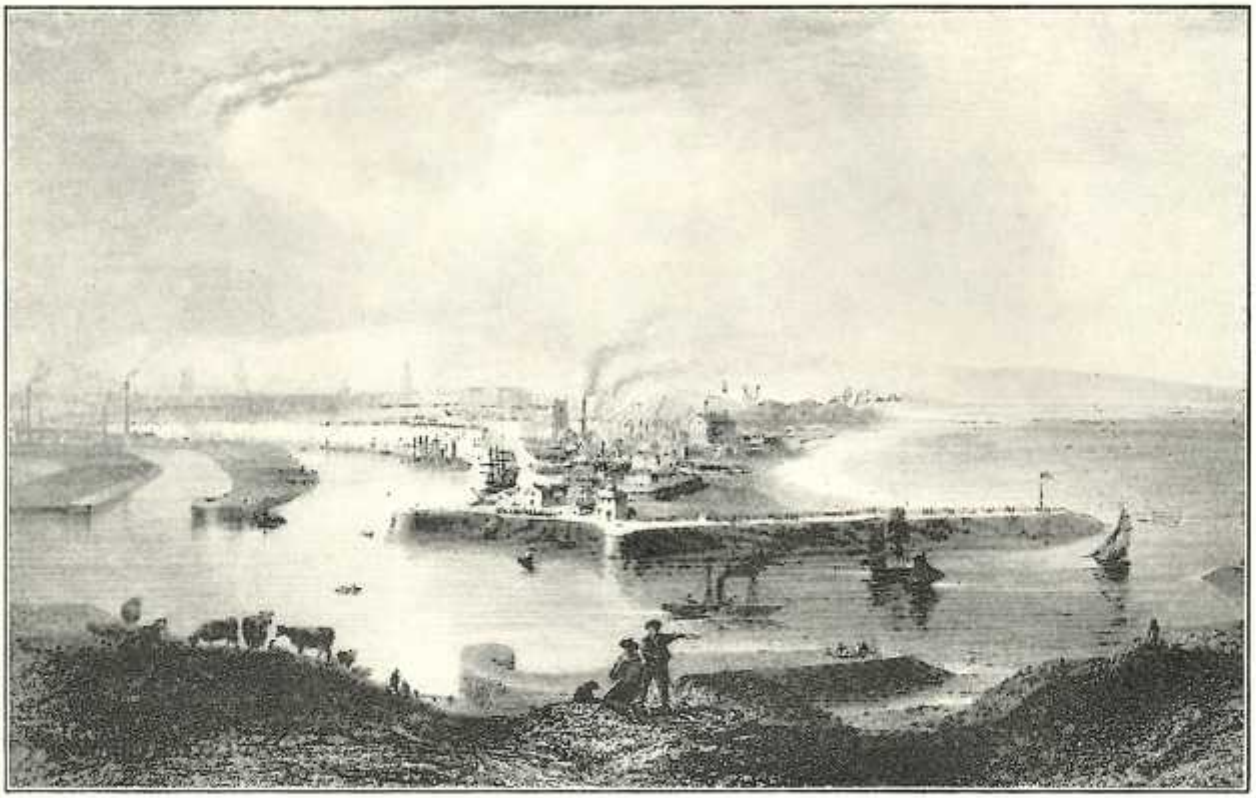
MASEFIELD.

IN 1850, Alexander Stephen conceived the idea of establishing a new yard on the Clyde, where the advance of the steam-engine and the use of iron had given a great impetus to shipbuilding. His eldest son, William, who was now old enough to shoulder the responsibility of the old yard under his father's guidance, was to remain at Dundee, while James and Alexander, the younger sons, were to go to Glasgow with their father, and eventually take a share in this new yard.

Accordingly, on 6th April, 1850, Alexander Stephen arranged a lease of the Kelvinhaugh yard from Robert Black for twenty years from May, 1851, Black agreeing to put down a slip capable of taking ships of eight hundred tons. The rent was £850 and seven per cent. of the outlay on the slip. William was sent to Stettin, Sussex, and Gloucester, to make contracts for timber for the new venture, and, early in 1851, the whole family, of whom there were originally eighteen, with the exception of William, moved to Glasgow.

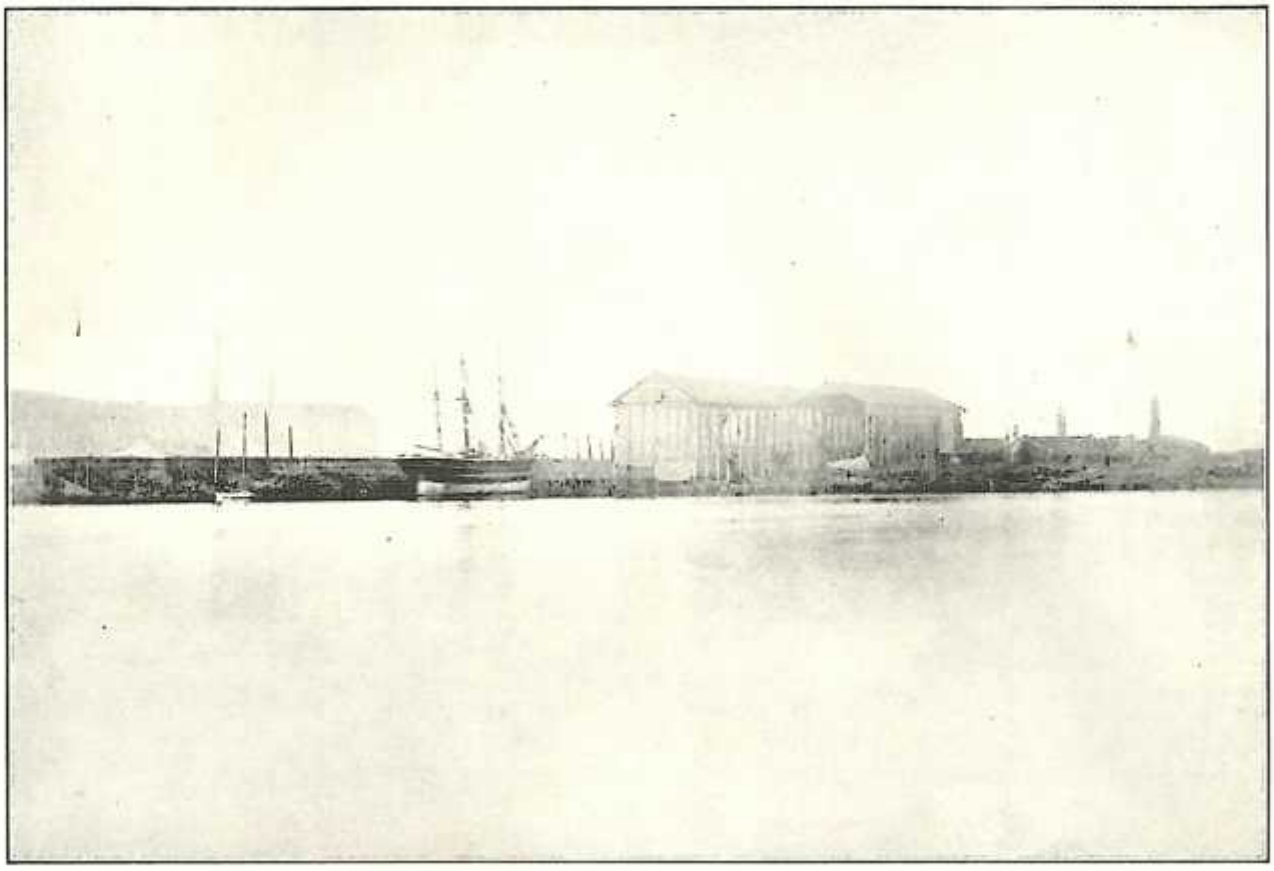
In the autumn of 1850, a few months before the Stephens moved to the Clyde, the Dundee Yard launched the *Amazon*, a vessel of 800 tons, intended to class 14 years. She was by far the largest and highest-grade vessel built on the Tay up to that time, and the first ship in Scotland built under a roof by a private builder. Apropos the latter fact it should be recalled that in 1849 Alexander Stephen had built one of the first covered berths in Scotland, erecting a large shed over the slipway on which the ships were built. Shortly after its erection he invited Mr. Smith, of Smith's Dock, who was the only other owner of a covered berth in the kingdom, to inspect the installation at Dundee.

The launch of the *Amazon* attracted a large number of notable visitors for whom a special platform was erected. The *Dundee Advertiser* for



Old print of Aberdeen.

Entrance to the Port of Dundee.



Kelvinhaugh.

September, 1850, tells us that the vessel took the water "amidst a more than usual concourse of spectators, amongst whom we observed the Right Hon. Lord and Lady Kinnaird and family, the Hon. Mr. and Lady Maria Ponsonby, Mr. Harry West, Sir John Ogilvy, Bart., George Duncan, Esq., M.P., etc. It is also recorded that the sum of £20 18s. 10½d. was collected for the Dundee Industrial School on this occasion.

Shortly after her launch, the *Amazon* was purchased for the East Indian trade by Messrs. Somes of London, for whom another vessel, some fifteen feet longer, was being constructed about the same time.

Of the two Kelvinhaugh yards one, styled the front yard, faced down the river, while the other, termed the back yard, looked across the Clyde towards the entrance which now leads to the Princes Dock. The front yard and the slip dock were at the eastern end of Yorkhill Wharf, where now lie the steamers of the Anchor Line; the back yard is now represented by the west end of the western basin of the Queen's Dock. The engine-house operating the bridge at the entrance to the latter stands almost on the site of the original offices, which comprised an upper floor containing a communicating suite including the counting house, private room and drawing office, and a ground floor occupied by the rivet store, and space for storing cordage for rigging new ships and repairing older vessels on the slip.

Directly across the road from the offices stood a three storey stone building containing, on the ground floor, a boiler-house, slip and yard engine-house, saw mill and front yard smiths' shop. The first floor housed a joiners' shop and finishing shop, while the upper floor was used as a moulding loft. In the front yard were two large shipbuilding sheds for building vessels under cover, so that work was not hindered by bad weather. In all, there were four permanent building berths in the front yard, one vessel in each shed, one at the foot of the old shed and the other on the offside of the slip next to the riverside road leading to Pointhouse. A fifth berth was made by laying down new construction on the upper part of the slip. This was frequently done when the Firm handled numerous orders at high speed—as during the American Civil War, when the *Fergus* and *Dare* were built there in record time for running the blockade. The pioneers of the now famous Anchor Line were built in the front yard—*Cora Linn* and *Ailsa Craig* in 1859 and 1860 respectively, then the *Roma* in 1864, and the *Hibernia*, *Valetta* and *Venezia* in 1865, the *Columbia* and *Arcadia* in 1866, and the *Europa* in 1867.

The back yard, which had two building berths, making seven in all, contained all the frame bending blocks, service boards, plate rolls,

keel-plate bending machinery, punching and shearing machinery, countersinking drills, main smithy, spar shed, boatbuilding shed, block shop and large store for timber in the log. All iron masts and yards were made there. As the punching machines could not all be placed under cover for belt drive, many were installed separately outside and driven by their own steam-engines. To the north of the back yard a large piece of ground was taken in for further timber storage.

For the first year at Kelvinhaugh, Alexander Stephen concentrated chiefly on repair-work, and in eight months' time had forty ships on the slip, but in August, 1852, the first vessel was begun and given the number "One." Although trade was slack at the time, wages being 16/6 and 19/6, Alexander Stephen closes his summary of the year's work with the characteristically progressive decision—"Settled to commence iron shipbuilding."

Here the diaries of Alexander Stephen, senior, cease and those of his son, Alexander, begin. The latter do not give such full details of the whole business for the first few years, being almost entirely confined to the records of the Kelvinhaugh branch.

To appreciate the significance of Alexander Stephen's decision regarding iron shipbuilding, one should recall the storm of criticism and opposition aroused by the introduction of iron into the shipyards. At first many owners refused to admit that iron-built vessels would float, and declared that they must sink immediately they left the ways. When these arguments were proved groundless they could hardly believe their eyes, and even then they were slow to acknowledge the advantages of the new material, which was destined to advance the construction and efficiency of all vessels by the close of the nineteenth century. Looking back on that time, and remembering the deeply rooted prejudices that had to be overcome before the use of iron became general, one appreciates the feelings of Alexander Stephen, senior, as he penned the words that were to mark another milestone in the Firm's history. Behind the entry one senses many a heated discussion between the far-sighted master of Kelvinhaugh and his less progressive associates.

One of the chief incentives to the use of iron lay in the fact that wooden vessels were not strong enough to withstand the vibration of the screw-propeller, which began to oust the old-fashioned paddle-wheels in the early days of steam. An additional incentive was the encouraging approval of Lloyd's, whose underwriters soon began to make concessions in favour of iron-built vessels.

When the use of iron became general even the more conservative owners were forced to admit its superiority over wood. Iron-built ships were obviously not only lighter and easier to handle, and thus

more economical to run, but had also a far greater cubic capacity than their wooden predecessors, as their sides were seldom more than half-an-inch thick, as against the twelve-inch sides of the wooden ships. As iron-built ships passed into service their strength and safety were amply demonstrated. It was found, for example, that they could travel for many days with their cargoes on fire, a feat impossible to their oaken forerunners. It was also proved that they stood far less risk of foundering when they ran aground, or collided with other ships. Even so, one finds that as late as 1860 the Government refused to sanction the transport of mails in iron vessels.

In 1852 the first ship, the *Typhoon*, was launched at Kelvinhaugh. She was an iron sailing-ship of dimensions 190 ft. length by 32 ft. 6 ins. beam, with a depth of 22 ft. 6 ins. from main deck to top of keel. She was a fully-rigged, three-masted sailing-ship with clipper bow and a single deck all fore and aft, with a forecastle and poop. The captain's and passengers' accommodation was arranged in the poop in cabins on each side of a large central dining space, and the crew in the forecastle forward. On deck she had three small cargo hatches and a galley, or caboose, abaft the foremast, a hand capstan abaft the mainmast and a long boat stowed amidships.

In the following year three ships were launched, and thereafter the number increased annually for several years. In launching vessels in the front yard no drags were necessary, as the ground formed a natural bend in the river—they were simply let go and brought up by their own anchors dropped from the catheads once they were free from the standing ways. But in the back yard it was a more delicate problem, as the launching was straight across the river, which was then very narrow, with muddy banks. Piles of logs were used as drags, the ships' chains being attached to them, then rove through large iron snatch blocks fixed to wooden piles driven into the ground, the other end of the cables being led up through the hawsepipes of the vessel, then several turns round the windlass. Such launches were always successful as, after dragging the logs up to the iron blocks, the ship was held fast and could go no further.

During 1854, the Firm constructed the iron paddle steamer, *William McCormick*, for the Liverpool and Londonderry trade. The side-lever engines for this vessel, which were placed with Messrs. Randolph Elder & Company, then in Centre Street, Glasgow, and now the Fairfield Shipbuilding & Engineering Company, were that firm's first essay in marine engineering. In passing it may be mentioned that the late Mr. William Esplen, founder of the firm of Messrs. William Esplen & Sons, Consulting Engineers and Naval Architects, Liverpool

and London, was for some time chief engineer of this steamer.

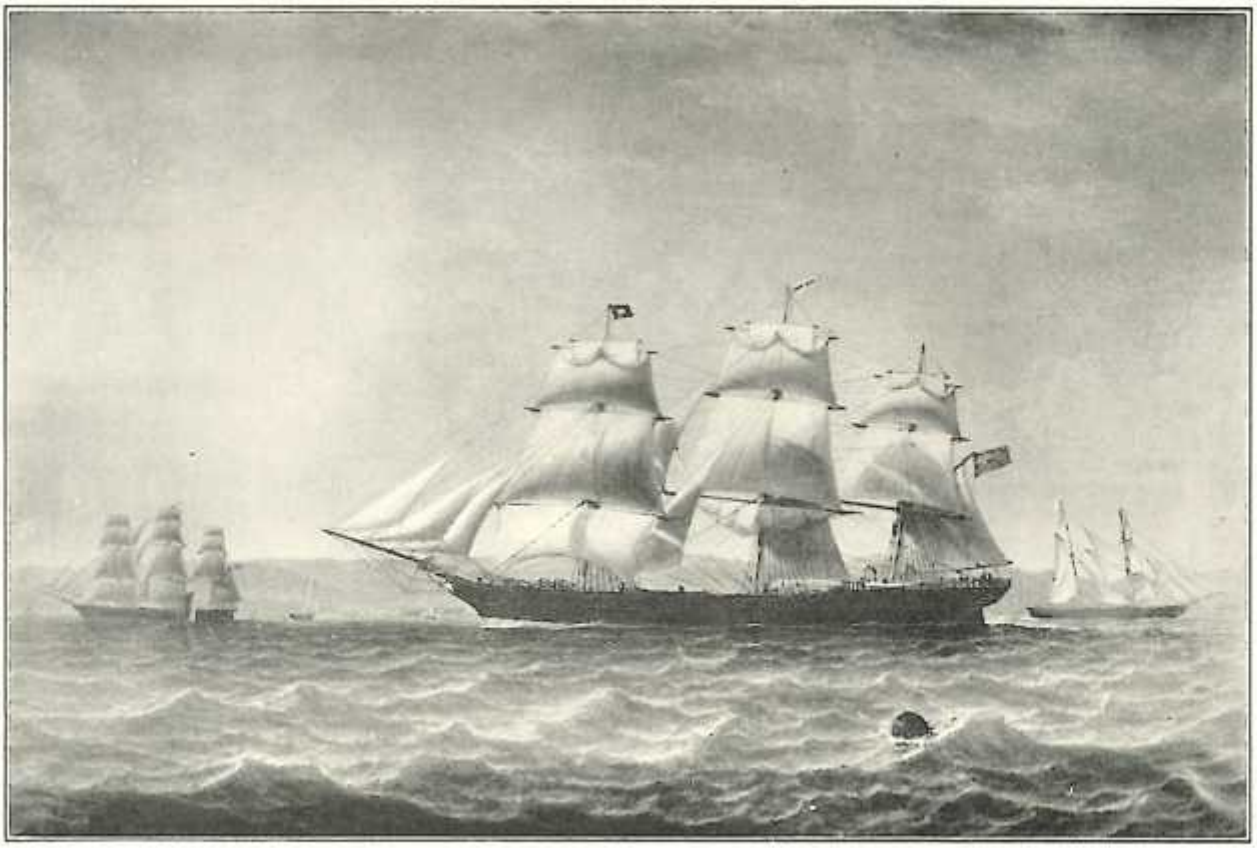
Another interesting vessel built during the same period was the iron sailing-ship, *John Bell*, of 1,208 tons, for Bell Brothers, of Glasgow. After trading as a sailing-ship for many years she was acquired by Messrs. James & Alexander Allan, who lengthened her, converted her into a screw steamer, and installed passenger accommodation. Thus transformed, and rechristened the *St. Patrick*, she became one of their pioneer steamers to Quebec and Montreal. As the Allan Line grew in importance, larger and more powerful steamers were added to keep the fleet abreast of the times, so the *St. Patrick*, together with other older vessels of the Line, became obsolete and was withdrawn after establishing the success of steam on this route. The *St. Patrick's* engines and boilers, together with her passenger accommodation, were taken out and she was reconverted into a sailing ship. After sailing in the same trade under the Allan flag for many years she was eventually sold to German owners. Undoubtedly a staunch and well-built vessel of her time, she profitably carried the flag of her new owners for many years after her conversion.

At this period the firm owned four vessels, the *Pestonjee Bomanjee*, the *White Eagle*, the *Storm Cloud*, sold in 1862, and the *Wallace*.

The severe gale of 1856 caused extensive damage to the Clyde shipyards, several half-built ships being almost floated away. Messrs. Todd & McGregor are stated to have lost £18,000 in two building slips destroyed during the storm.

Though the year 1856 was an unlucky one for the Stephens on the Clyde, September '56 saw the firm at Dundee launch the large wooden East Indiaman, *Eastern Monarch*, the fifth ship built by them for Messrs. Somes' East India Service, and the largest ship of her class, A1 fourteen years at Lloyd's, built in this country up to that date, excepting the *Schomberg*.

The building of the *Eastern Monarch* occupied fourteen months. Her length between perpendiculars from back of sternpost to forepart of stem on deck, was 239 ft.; and overall 266 ft.; extreme breadth, 40 ft. 3 ins., and depth of hold 24 ft. 9 ins. The tonnage, or old builders' measurement, was 1,849, and she carried 2,600 tons deadweight altogether. Her lower masts and decks were all of teak, as well as the lower deck planking. She was timbered with English oak and teak, the timbers being knit together with a double crossed series of diagonal iron straps, which gave great strength to the body of the vessel; the beams were strapped in the same way. She had three decks—poop, main and lower, and 50 tons of copper were used in her construction. Her full complement of hands was sixty, including the captain, four mates, boatswain and



"Arriero." "John Lidgett." *The first composite ship.* 1862. "Arima."

eight midshipmen. She had accommodation for seventy-five first-class passengers and from five to six hundred troops.

On her launch day Dundee was like a great fairground, all the aristocracy from the surrounding countryside being present. To prevent overcrowding in the yard a charge was made for admission and the proceeds, which amounted to £21 1s. 6d., divided among the charitable institutions of the city. After the launch Alexander Stephen, senior, presided over a great banquet, which must have been an exceedingly lengthy affair, as the toast-list contained eighteen toasts, to all of which there was a reply. In the evening a ball was held, one quadrille being performed to the tune "Eastern Monarch," specially composed for the occasion by Mr. Thomson. After being handed over, and loaded for her first voyage, and before leaving the English Channel, the *Eastern Monarch* received a visit of inspection from Queen Victoria, the only inspection of a new merchant vessel ever performed by Her Majesty.

But, despite her auspicious inauguration, the *Eastern Monarch* was doomed to an untimely and dramatic end. Returning from her maiden voyage, in 1859, with troops and a large cargo of general merchandise, the vessel was totally destroyed by fire, off Spithead. Fortunately, however, no lives were lost in the disaster, though it naturally created a considerable sensation throughout the country at the time.

The financial crisis of 1857, following on the Crimean War and other events, made business very difficult and led to the failure of many leading merchants. Undaunted, however, by the general atmosphere of depression, the Stephens, on the Clyde, were building the famous wooden sailing-ship *Tyburnia*, of 1,027 tons, for Messrs. Somes of London, for their noted line of Eastern clippers.

This splendid vessel had a remarkable career, and in 1884, twenty-seven years after she was built, was chartered by the Pleasure Sailing Yacht Company, for a trip to various ports at the rate of a guinea per head per day—an enterprise which may be regarded as the beginning of ocean cruising in liners, so popular at the present time.

On arriving at Madeira she was anchored near the Loo Battery in the quarantine ground and ballasted with goods, such as cement, etc., which might yield a profit at the different ports visited. Owing to a misunderstanding with the Portuguese customs authorities, on account of their system of extortion, her commander, Captain Kennaley, was informed that his ship would be seized and confiscated. Whereupon he replied that if the Portuguese officers attempted to board the *Tyburnia* they would be flung overboard! The Military Governor then gave orders to fire upon the vessel when she tried to leave her moorings. Captain Kennaley, who had successfully run the American blockade

thirteen times between 1864 and 1865, was unperturbed by this threat, and, being assured of the confidence of his passengers, made sail at 8.40 a.m. the following morning, when on seeing the yacht's head go round, the fort fired two blank charges. As soon as the *Tyburnia* was under way the fort fired at her with ball, carrying away some ropes on the bowsprit. In spite of the continuous firing, which dashed spray over those on board, no lives were lost, although the passengers, both ladies and gentlemen, declined to go below. The British Ensign was dipped as each shot went singing past, and the *Tyburnia* proceeded swiftly to Barbadoes. This grand old ship was latterly owned in Australia, where she was often seen discharging lumber. About 1890, thirty years after she was built, she sailed to Townsville, Queensland, to take up her last resting-place as a hulk for transhipment of cargo, and it is quite possible that she may still be thus employed.

In 1858, Alexander Stephen, senior, made an agreement with his sons, James and Alexander, by which they took over the Kelvinhaugh business, repaying him over a number of years. During the following year, James Stephen left the Firm, which was carried on for some years solely by Alexander Stephen, junior.

In 1861, his younger brother, John, became a partner in the business and Charles Connell, head foreman shipwright and latterly yard manager, resigned to commence shipbuilding on his own account, and founded the now famous firm of Charles Connell & Company, of Scotstoun. It is amusing to find that although Alexander Stephen, commenting on Connell's resignation, writes: "I do not think he will succeed," a pencilled note on the opposite page, inserted many years later, states that "Connell died in 1898 leaving over £300,000."

At this time there was some talk of the Firm buying one of the Scotts' yards, at Greenock, eventually sold in 1862, partly to Caird & Company, and partly to McNab & Company. Meanwhile, another branch of the Scotts had moved to their present dockyard. Wood's yard, at Port Glasgow, was also under consideration, and Alexander Stephen, senior, was contemplating sites for a new yard at Troon, Maryport, Workington, Chepstow, Barrow or on the north-east coast of England.

The following year witnessed an important advance in the history of the Firm. Most of the vessels built at Kelvinhaugh up to this date had been of iron, only one or two being of wood. But in 1862 Alexander Stephen, junior, was granted a patent for composite construction and, commencing with the *John Lidgett*, of 770 tons, with iron frames and wooden planking, built many ships to his own system. The Admiralty showed great interest in his method and paid many visits of inspection to Kelvinhaugh, which was also visited by the the Under Secretary of State.

Composite Vessels

Composite vessels were practically unknown to the Clyde before the Stephens undertook their construction. Although the principle was quite an old one, and therefore familiar to the Clyde builders, few of them cared to assist its development. Yet, for long voyages the merits of the composite construction for the moderate-sized vessels of the time were unquestionable, and this fact the Firm was not slow to realize.

One of the greatest objections to iron vessels for long voyages lay in their liability to get foul on the bottom ; and the removal of the barnacles that adhered to the iron was a labour of considerable difficulty. Wooden vessels were liable to an objection of a similar nature, being afflicted with a worm that ate into the planking and seriously impaired their safety. But by the construction of composite ships, having bottoms sheathed with copper or yellow metal, both disadvantages were removed, the poisonous nature of the metal preventing the adherence of barnacles, and enabling the vessel to make her way with greater smoothness through the water.

When composite ships became popular the steam-driven frame-saws could not cut enough planking to keep the shipwrights supplied, so the Firm employed hand-sawyers to supplement them. These men worked in pits formed by the piled logs, cross-beams being placed on the top of the pit to receive the logs for sawing. After being lined off into planks, they were cut up by two men, one operating the hand-saw on the top, while the other stood below.

In 1862 an order was received for a very fast tea-clipper, and the full-rigged auxiliary screw steamer, *Sea King*, later to become the notorious Confederate cruiser, *Shenandoah*, was constructed, on the same principle as the *John Lidgett*, and launched at Kelvinhaugh in August, 1863. The career of this famous vessel is so remarkable that it has been described in full in another chapter of this volume.

In the same year, 1863, in answer to the demand for blockade runners for the American Civil War, the paddle steamers *Fergus* and *Dare* were built in the record time of six weeks, the former doing 20½ knots on trial. The following year witnessed the trial trip of the *Luzon*, for Ker Bolton & Company, the vessel visiting various Firth of Clyde seaside resorts and taking up the owners and builders before doing her trials. During 1864 the Firm also put together the paddle steamers, *Lake Ontario*, and *Bay of Kandy*, for Messrs. J. & A. Allan for the Canadian Lakes service in connexion with their fleet of Montreal clippers. The steamers were taken asunder, packed and shipped by the Allans' own vessels, re-erected and completed on the shores of the lake, and became the pioneers of

the lake steamers. Two years later the third steamer, *Topsy*, was similarly constructed and shipped.

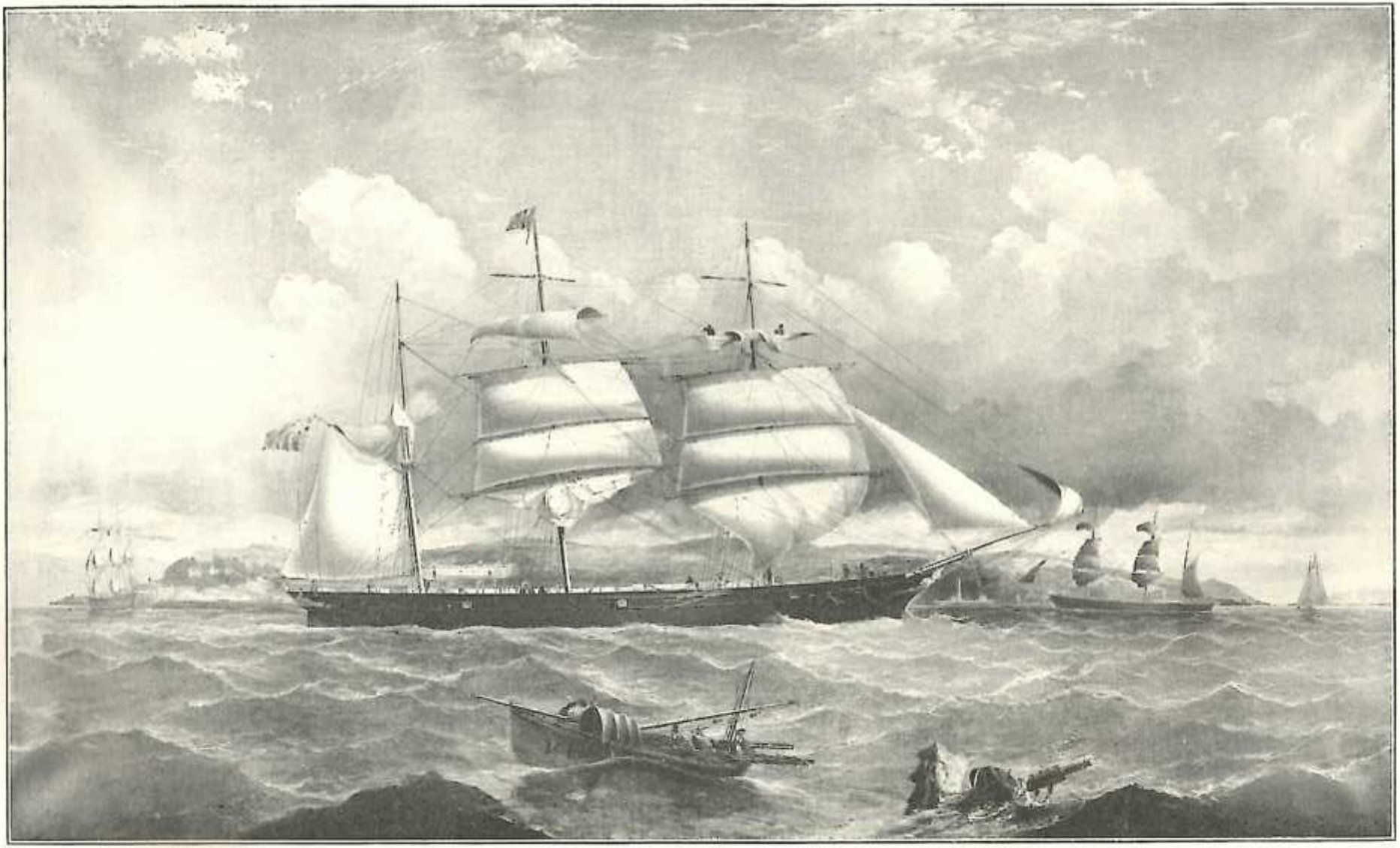
Another interesting vessel built during this period, for Messrs. Henry Bath & Sons, of Swansea, was the full-rigged iron auxiliary ship, *Zeta*, of 734 tons, built in 1865. She was the first ordinary trading ship to navigate the Straits of Magellan, at the southern extremity of South America, a feat that prompted the Pacific Steam Navigation Company to run their steamers direct from Liverpool to Chili by this route in 1867. While negotiating the Straits, the *Zeta* fell in with the *Lookout*, an American vessel that had been boarded by Fuegan Indians, and towed her through. During the Chilian and Spanish War, the *Zeta* was chased by the Chilian steamer *Covodonga*, but managed to land her passengers, who went overland to Valparaiso. Next day the *Zeta* was chased by a Spanish frigate, but finally escaped capture by running into the same port.

A little later the Firm built the composite barque, *Kappa*, of 516 tons, for the same owners for their copper ore trade. The carriage of copper ore in sailing-ships being an exceedingly difficult problem, owing to the excessive concentration of weight due to the high specific gravity of the copper, this vessel had to be arranged with large trunks formed of stout timber planks, securely fitted together and strongly shored between its sides and back of planking running fore and aft in the hold of the ship.

At this period the yard was employing almost a thousand men, and in 1863 carpenters' wages rose from 27/- to 30/- per week. Joiners were getting from 22/- to 26/- according to quality. In 1864 the joiners received an advance of 3/-, while the carpenters were increased to 36/-. 1865 opened with a whole year's work on hand, but later, owing to shipbuilding slackening off, the carpenters were reduced from 36/- to 30/-. Piecework was first introduced and applied to riveters and platers in 1869.

In 1866, twenty-four shipbuilding and engineering firms formed an association, which was a forerunner of the Clyde Shipbuilders' Association. In the same year Charles Scott of Greenock failed, and nineteen of his apprentices were taken on at Kelvinhaugh.

One of the most notable vessels constructed during the 'sixties was the iron sailing ship, *Abeona*, of 980 tons, built in 1867 for Messrs. Allan's clipper line of sailing-ships between the Clyde and Montreal. She proved herself the fastest clipper in the trade, making the passages with great regularity in from twelve to fourteen days from port to port, and often overhauling and passing steamers. Her commander, Captain Tannock, was recognized as the most capable master of his day in the Atlantic trade. The *Abeona* formed one of the Allan Line clippers for many years, until sailing-ships were ousted from the trade by modern



"Carmelita."
1865.

steamers. She was then sold, along with other older vessels of the Line, and was afterwards employed in the East India trade. Her splendid record was ultimately closed in September, 1900, when she was lost on Thunderbolt Reef, Cape of Good Hope, thirty-three years after she was built.

Two extremely interesting and unusual vessels were constructed about this time. The first, ordered early in 1868, was for Mr. Lamont, of Knockdow, Argyll, brother of the Chief of Clan Lamont, who required a small wooden ship for Polar exploration. Mr. Lamont eventually published a very interesting volume dealing with the vessel's various cruises.

The second vessel was even more unusual. In 1869 Messrs. Antony Gibbs & Sons, London, contracted with the Firm on behalf of Señor Geromino Costa, of Puna, Peru, for an iron sailing schooner, dimensions 48 ft. x 10 ft. 6 ins. x 6 ft. deep to top of floors, for trading on Lake Titicaca, Peru, which is the highest body of water in the world, about 120 miles long and between 35 and 45 miles broad. Señor Costa's instructions were that no single piece, save the spars, was to be longer than 18 feet, nor more than 150 lbs. in weight, as mule-back was the only method of conveyance up the steep gradient leading to the lake. The schooner, which was named the *Aurora Del Titicaca*, was built in the back yard, being completely fitted up, masted, rigged and sails bent. After being all carefully marked she was taken asunder, packed, and sent round to Liverpool, where she was shipped to Peru. On arrival everything was successfully transported up to the lake and reconstructed at the lakeside.

The year 1867 brought misfortune to the Dundee business, the whole yard, including two ships on stocks, being totally destroyed by fire, the damage being estimated at well over £20,000. The *Dundee Advertiser*, recalling the disaster in its issue of December, 1868, says: " The building yard belonging to this firm—one of our principal shipbuilders—was unfortunately destroyed by fire on 8th October, 1867, when two fine vessels, one a composite and the other intended for the whale fishing—were totally destroyed; indeed, so destructive was the fire that it scarcely even left the iron frames of the composite vessel. Their building sheds, machinery and everything connected with their business, was also totally destroyed. The consequence is that this firm has not launched any vessels during the year now ending, as they have been busily employed building new sheds, erecting new machinery, etc. But having got these completed some time ago, they have now a fine composite sailing vessel of about 600 tons register to Class 17 A1 at Lloyd's, nearly ready for

launching; and are also commenced to another composite vessel of about 88 tons register, also to class 17 years A1 at Lloyd's."

Meanwhile, with the increase in the size of vessels following the introduction of iron into shipbuilding, the Kelvinhaugh yard, which was only on lease, was proving far too restricted. During 1867 there was some talk of the Firm taking Todd & McGregor's, or Denny's yard, while in 1868 Mr. Alexander Stephen, junior, paid a visit to Barrow-in-Furness in search of a new site for the business. Later in the year he became interested in the Linthouse estate and, as an alternative, another site down the river on the Shieldhall estate. Finally, towards the close of the year, he purchased the Linthouse estate from the trustees of Mr. Rowan, for the sum of £32,000, obtaining possession early in 1869. As soon as the Firm took over the new estate work was commenced in laying it out as a shipyard.

The lease of Kelvinhaugh expired in May, 1871, and the last ship to leave the yard was the *Lima*, launched in November, 1870. After the yard was vacated by the Firm, the slip was leased by Aitken & Mansell, in 1872, and ultimately the present Queens Dock was excavated on the site of the back yard. The remainder of the front yard and slip dock was occupied by Shearer & Sons until further alterations to the river front resulted in the Yorkhill quays, where present-day Anchor liners are moored on the site of the berths of their old-time sisters.

Between 1863 and 1869 the yearly totals of vessels launched were as follows:

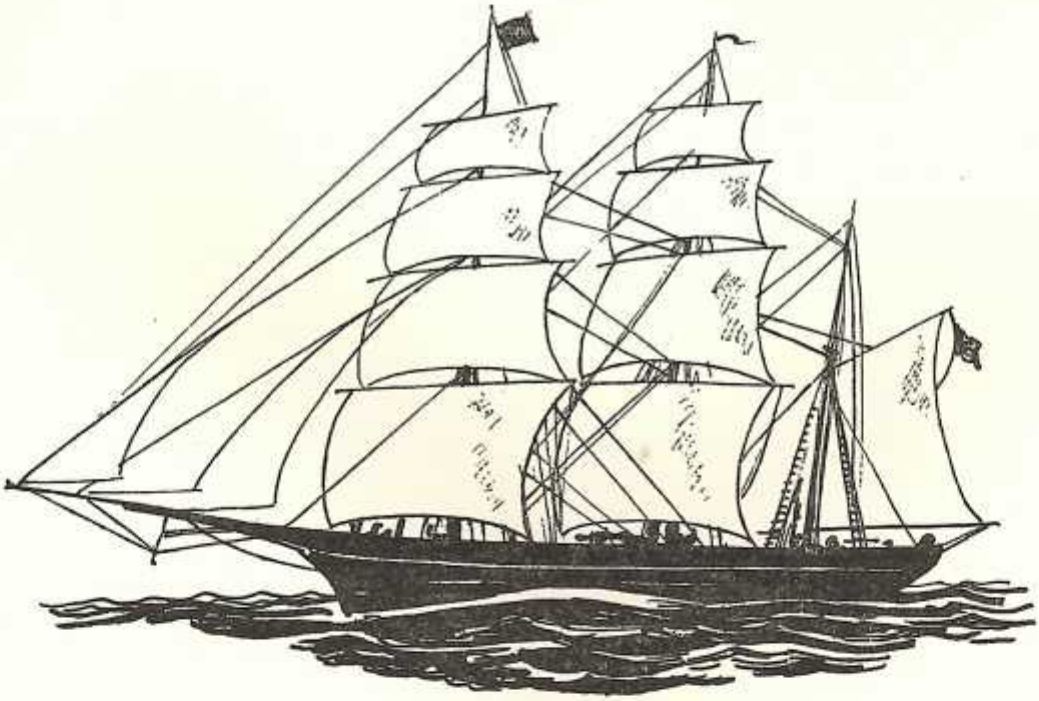
1863	.. .. ..	11 vessels
1864	.. .. ..	14 „
1865	.. .. ..	24 „
	(including 7 iron, 5 composite, and 12 Bombay barges).	
1866	.. .. ..	9 vessels
1867	.. .. ..	13 „
1868	.. .. ..	10 „

In 1869, just prior to leaving the "Haugh," eighteen vessels, amounting to 13,535 tons, were launched—a very fine year's work. In all, 147 vessels were constructed at Kelvinhaugh.

With the resources at the Firm's disposal the output was phenomenal, considering the variety of the work, which included iron sailers, iron screw steamers, composite sailers and composite screw steamers, etc. There were frequently two launches per month, and 1869 was brought in by launching three vessels in January—the composite barque,

Singapore, being launched on New Year's Day, to the strains of the "Haugh" brass band, composed largely of the Firm's apprentices.

In addition to all this new construction, the Firm carried on, simultaneously, a continuous succession of repair-work, the slipway being kept busy practically day and night, carrying out work of all descriptions, such as painting and repairing iron vessels, stripping the copper from wooden ships, re-caulking and re-coppering, etc. Enormous quantities of copper sheathing and bolts were used month by month.



CHAPTER THREE

The Cruise of the "Shenandoah"

White, quiet sails from the grim icy coasts,
That bear the battles of the whaling hosts.

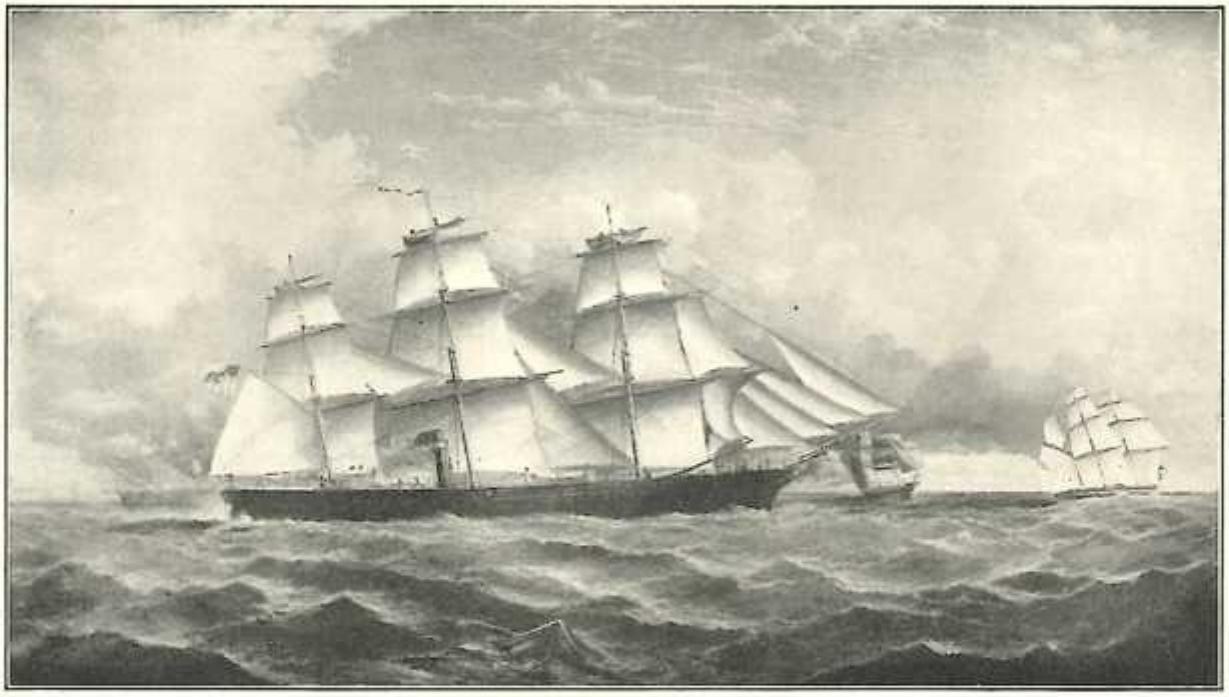
ANON.

ONE of the most interesting vessels constructed by the Stephens was undoubtedly the composite steamship, *Sea King*, alias the notorious Confederate cruiser, *Shenandoah*. The history of her transformation from an innocent tea-clipper to a crack war vessel, the terror of the Yankee whalers and successor of the dreaded *Alabama*, is indeed "stranger than fiction."

The first news of her comes from the *North British Daily Mail* of 18th August, 1863, which informs us that: "Yesterday, Messrs. A. Stephen & Sons launched from their new shipbuilding shed at Kelvinhaugh, another of their wood and iron combination ships. This vessel is a fine screw steamship of about 1,200 tons, and to class A1 13 years at Lloyd's. She is named the *Sea King*, and is, we understand, the first screw steamship built on the principle of iron frames and wooden planking, and also the first steamer that has been specially constructed for the China trade, having been built with the view of competing with the fastest ships in the trade direct from China to London, in bringing home the first teas of the season."

Her speed, obtained on trial, was 11 knots, and her dimensions and constructional details were as follows: 220 ft. long between perpendiculars by 36 ft. beam by 20 ft. 6 ins. depth of hold, and of 1,018 tons gross register. She had iron frames, floors and deck beams tied together with iron sheerstrake, stringer plates and diagonal iron ties on the outside of the iron frames and of the deck beams, binding the iron framework well together, over which she was planked with elm and teakwood six inches thick, firmly secured to the iron frames with copper bolts.

She was fitted with a set of simple compound steam-engines of 200 H.P., two boilers, telescopic funnel, and a two-bladed propeller arranged for lifting up into a well under the poop when under sail alone. She was rigged as a full three-masted sailing-ship, having a large spread of canvas, and was beautifully finished off in teakwood on deck. She had



"Shenandoah."
Successor to the "Alabama."
1863.

a full poop aft, containing a dining-saloon, state-rooms and captain's and officers' quarters. Her crew was housed in the top gallant forecastle, while a large deckhouse between the fore and mainmasts contained rooms for her petty officers, galley, etc.

* * * * *

While fitting out on the north side of the river, at Finnieston, she attracted the agents of the Federal Government of North America, on the lookout for crack war cruisers. Before she could pass into their hands, however, she was chartered by the British Government to carry troops to the first Maori War. Having landed men and munitions in New Zealand, she proceeded to China, via Sydney. From Shanghai she made various trips to Hong Kong, Swatow and Woosang—ostensibly to take in tea for her homeward journey. During all this latter period, however, she was being watched by officials of the Confederate Government, and when she sailed for England she had a lieutenant of the Confederate Navy aboard.

Arriving in London, after a very fast passage of seventy-nine days, she managed to discharge her cargo, dry-dock, and load an ample supply of coal, for an assumed voyage to Bombay, without arousing the suspicions of the British authorities. She was now commanded by Captain Corbett, who was completely advised as to her future, and carried the necessary documents for her transference on the high seas, beyond British jurisdiction. Thus prepared, she set sail for Madeira, where she was to meet the *Laurel*, bearing her munitions and supplies.

The latter, which left Liverpool on 9th October, 1864, carried, in addition to arms and equipment, Lieutenant Waddell, the *Sea King's* future commander, accompanied by a party of picked officers and men who had sailed with him in the late C.S.S. *Alabama*. She also carried an extra quota of hands to augment the *Sea King's* crew after her transfer to the Confederate service.

The *Laurel* dropped anchor in Funchal Bay, Madeira, on 16th October. After sending her papers ashore to the customs, she proceeded to take in coal, keeping a sharp lookout the while for the *Sea King*. The latter, with a nice sense of drama, appeared at midnight on the 18th, and having discreetly displayed her signal lamps, steamed slowly away to the north. Next day she reappeared, with signal flags flying, and the *Laurel*, having received her papers, stood to sea in pursuit.

Both vessels dropped anchor off Las Desertas, where the *Sea King* was handed over to the Confederate Government and re-named the *Shenandoah*. As soon as the official formalities were complete, the *Laurel* was lashed alongside and proceeded to transfer sufficient stores, equipment and ammunition for a fifteen months' cruise. Lieutenant Waddell

then attempted to recruit members of the English crew which had brought out the *Sea King*, but, despite his eloquence, only twenty-three out of fifty-five of the vessel's original crew volunteered.

Her transfer completed, the *Shenandoah* hoisted her new colours and weighed anchor, "throwing out to the breeze the flag of the South, and demanding a place upon that vast ocean without fear or favour."

* * * * *

Once afloat, under the able direction of Lieutenant Waddell, the *Shenandoah* soon assumed the appearance of an active cruiser on the war-path. Her main decks had to be cleared of obstructions before the battery could be mounted on the carriages, and gun ports cut out of the bulwarks, fighting bolts driven and gun-tackles prepared before the battery could be used. All these alterations, usually carried out in a navy-yard before a vessel is commissioned, were undertaken on the high seas, beyond reach of assistance or shelter in case of attack.

Lieutenant Waddell, assisted by his officers, led the skeleton crew in accomplishing a vast deal of labour, and four days after she had been commissioned, the guns were all on their carriages and two ports had been cut on either side of the deck. The fighting-bolts were found eventually in a barrel of beef, while it soon became obvious that the gun-tackles had never been put aboard! As the absence of the latter rendered the battery useless, there was nothing to be done but hope that the first prize would supply the deficiency.

Meanwhile, for all their innocence, the guns looked very threatening, and with the deck cleared it was now possible to intimidate a prospective capture with Enfield rifles. Once the deck was ship-shape, Waddell proceeded to investigate accommodation below, where the removal of coal from the 'tween decks had left ample space to berth two hundred men.

* * * * *

On 27th October, the *Shenandoah* entered upon her first chase, which proved to be the *Mogul*, of London. Immediately afterwards she over-hauled another British vessel. Having thus tested her paces, her Commander felt that it would be difficult to find her superior under canvas, a great consolation for lack of crew and equipment.

She had now reached a position where vessels outward bound from the west might be expected, and her prospects of a capture brightened as she worked her way towards the line.

A few days later she chased, captured and scuttled the American barque, *Alina*, of Searsport, bound for Buenos Ayres with railroad iron. She was on her first voyage, thoroughly equipped and valued at 9,500 dollars. She furnished blocks for the gun-tackles, cotton

canvas for sailmaking, and other supplies. Six of the crew signed on with the *Shenandoah*, bringing her complement to twenty-nine. Her capture made a marked difference to the atmosphere aboard the cruiser; though work still pressed heavily, they were now gathering strength from the enemy's vessels, and the cry, "Sail ho!" was always greeted with enthusiasm.

The next prize, taken on 3rd November, was the American schooner, *Charter Oak*, of Boston, bound for San Francisco with a mixed cargo. Captain Gilman, his wife, her sister and son, were given Lieutenant Waddell's cabin; their personal luggage was respected and they messed at the wardroom table. A statement made later by Captain Gilman, in a New York paper, acknowledged the kindness he received as a prisoner.

The *Charter Oak*, which was valued at 15,000 dollars, was fired late in the afternoon, the *Shenandoah* standing by until after dark to see that she was entirely consumed. The method of destroying a prize depended largely upon the nature of her cargo. When freighted like the *Alina*, it was best to scuttle, *i.e.*, knock a hole in her side a few feet below her water-line from inboard. The vessel would then sink rapidly, leaving only a few scraps of wreckage floating. It more frequently happened, however, that fire was utilized; indeed, there was often no alternative to the latter method, however much it may be condemned. It was better to fire a prize than leave it so disabled as to be useless, yet formidable enough to endanger navigation.

Six days later, the *Shenandoah* again took the offensive, chasing and burning the barque *D. Godfrey*, of Boston, bound for Valparaiso with a cargo of beef and pork. She was an old vessel and easily consumed; six of her crew joined the *Shenandoah*, increasing her quota to thirty-five.

Next day the Danish brig, *Anna Jane*, was sighted, and agreed to take over the prisoners from the *Alina* and *Charter Oak*, for which service Waddell presented her captain with a chronometer, a barrel of beef and some bread!

The next capture was the American brig, *Susan*, Hanson master, of New York, bound for the Rio Grande with coal. She was very old, leaked badly, and was the slowest sailer Waddell had ever seen. Her captain seemed pleased with his misfortune, while several of her crew gladly signed on with the *Shenandoah*.

November 11th brought the cruiser her first night-chase, which proved to be the American clipper, *Kate Prince*, with a neutral cargo of coal; she was ransomed on bond for 40,000 dollars with regret, as her crew of twenty-one all showed a keen desire to join the Confederate service.

The same day saw the capture of the American barque, *Adelaide*, owned

by Pendergast Brothers, of Baltimore, and sailing under Buenos Ayrean colours. Though her captain could produce no bill of sale, he swore that he had been assured of the transaction. She was just being prepared for destruction by fire when an officer handed Lieutenant Waddell a letter, directed to her consignee at Rio, the contents of which led him to countermand her demolition. She was sailing under an assumed flag and her owners had greatly wronged her captain by not informing him of her true nationality. Her destruction was only prevented by sheer accident, and she was bonded for 24,000 dollars.

Just before crossing the line, the *Shenandoah* captured the American schooner, *Lizzie M. Stacey*, of Boston, bound for Honolulu; she was new and fast and would have made an excellent cruiser had the *Shenandoah* been able to spare the men to form a crew.

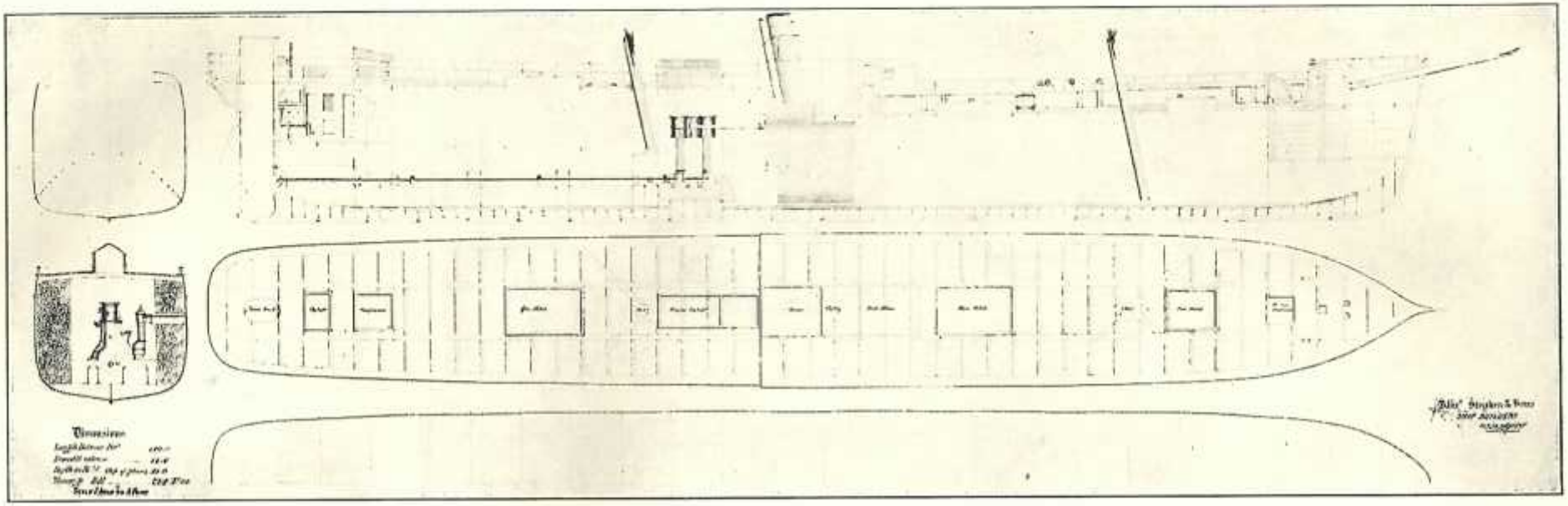
* * * * *

The *Shenandoah's* course now lay south, along the coast of Brazil. Nothing of interest occurred until the first week in December, when the New Bedford whaler, *Edward*, valued at 20,000 dollars, was captured and burned. She was well fitted and the cruiser lay alongside for two days taking aboard her stores and equipment. Her crew were landed north-west of Tristan da Cunha, where they were found later by the Federal gunboat, *Dacotah*, on the lookout for the *Shenandoah*.

Shortly after leaving Tristan da Cunha the propeller-shaft of the *Shenandoah* was found to be seriously damaged. As Capetown was the only place, short of Melbourne, where repairs could be effected, Waddell decided to cross the Indian Ocean under sail. Crossing the meridian of Greenwich on 12th December, she ran into a fresh gale, which threw her somewhat off her course, and spoilt the preparations for a Christmas dinner prepared from spoils from the various prizes.

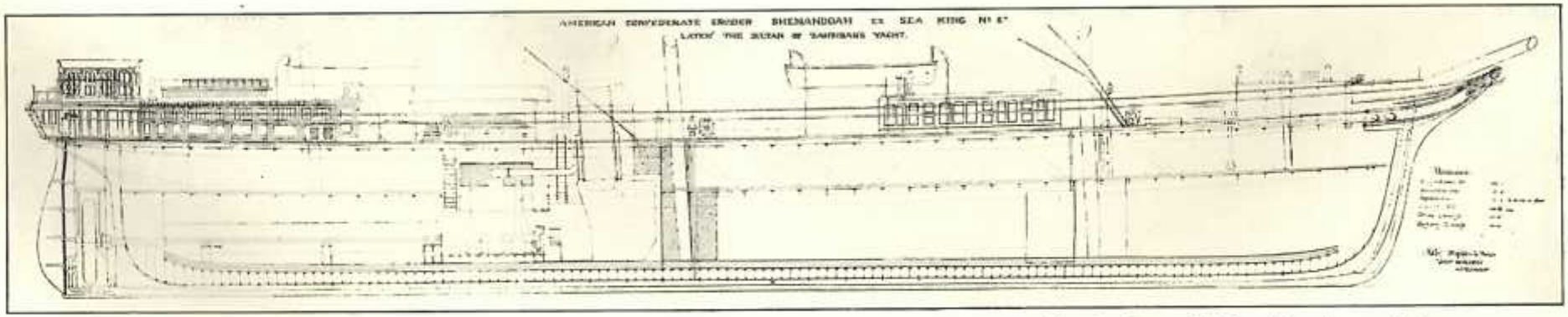
The next vessel sighted, on 29th December, was the *Delphine* of Bangor, bound for Akyab, after rice for the Federal armies. When her captain heard that his vessel would be destroyed, he declared that his wife was far too ill to be moved aboard the *Shenandoah*; however, the ruse failed when the invalid was found to be in the best of health and spirits. After her crew and passengers had been transferred, the *Delphine* was put before the wind in flames; she was valued at 25,000 dollars.

After calling at the island of Amsterdam in search of American whalers, only to find that haven deserted, the *Shenandoah* attempted to make the whaling ground off Cape Leeuwin, but was foiled by bad weather. She was then put under steam, despite her damaged propeller-shaft, as it was imperative that she reached Melbourne in time to communicate with the mail-steamer leaving there on 26th January. Cape Otway was made on the 25th, and soon afterwards the cruiser dropped anchors in



"Cora Linn" and "Ailsa Craig."

Iron ships of 234 tons each. Built at Kelvinhaugh, 1859—the first ships for the Anchor Line.



American Confederate cruiser, "Shenandoah," ex "Sea King," later the Sultan of Zanzibar's yacht.

Hobson's Bay, amid cheers from the crowds aboard the surrounding liners.

Despite her reception the *Shenandoah* experienced considerable opposition in Australia. Not only did the hostile faction ashore make every effort to entangle her commander in legal difficulties, but the Governor and his council treated the vessel with the utmost discourtesy. Upon receiving several letters threatening the destruction of the cruiser, Lieutenant Waddell applied to the police, requesting protection for his vessel, which lay helpless on the patent slip. The Superintendent of Police immediately issued orders forbidding any citizen to aid or assist the *Shenandoah*, and dispatched a large force of police and military to take possession of the slip and prevent the launch of the cruiser.

Lieutenant Waddell was naturally indignant, and when the Superintendent came aboard with a search-warrant, he was told, politely but firmly, that if the Victoria Government attempted to press the search the *Shenandoah* would be defended at every risk to life. Again, Waddell's applications for the issue of arrest warrants for eighteen men who had been induced to desert by the American Consul were all refused.

On 17th February, however, the *Shenandoah* steamed out of Hobson's Bay, having left the patent slip two days earlier without official interference. Her deserters had been replaced by 42 volunteers, a force almost sufficient to meet all her requirements. Before she sailed a newspaperman came aboard to secure copies of the correspondence between the Government and Lieutenant Waddell, a request gladly granted as the latter was anxious that the whole affair should be made public.

* * * * *

Unfavourable winds, and a need to nurse her coal, prevented the *Shenandoah* from visiting the whaling-grounds of the Middleton, Lord Howe and Norfolk Islands, after leaving Australia. Even had such a call been possible, her sojourn off Melbourne had spoilt her chances, as the South Pacific whaling-fleet, being warned of her arrival, had scattered to safer waters.

Shortly after sighting Drummond Island, about 21st March, she fell in with a trading-schooner, which gave her information regarding the whalers in Lea Harbour, Island of Ascension. Stimulated by these tidings the *Shenandoah* spread her wings and made off with a fine trade wind, arriving at the islands towards the end of March. Negotiating the reefs under the guidance of an English pilot, she appeared like a bolt from the blue amid the astonished whalers. Four vessels were captured—the *Edward Carey*, of San Francisco, valued at 15,000; the *Hector*, New Bedford, 35,000 dollars; the *Pearl*, New London, 10,000 dollars; and the *Harvest*, New Bedford, 35,000 dollars. This capture also included many valuable charts giving information regarding the navigation of

the Pacific Islands, the Okhotsk and Behring Seas and the Arctic Ocean.

On 13th April, after the vessels had been burned on the shoals and 130 disappointed whalers put ashore, the *Shenandoah* stood to sea again. Her commander now shaped her course east of the Los Jardines, Grampus and Margaret Islands, with the object of intercepting vessels bound for San Francisco and the western ports from the China coast. After haunting this path without success for several days, she was thrown considerably out of her course by violent typhoons.

By 17th May, however, she was north of the parallel of 40 degrees and 45 degrees north; on the 20th the snow-capped Kuriles were sighted, and a day later she steamed into the Okhotsk Sea and ran along the coast of Kamchatka. Though continually harassed by gales and ice, she attempted to make the whaling ground off Green Island, but became seriously ice-locked on several occasions. Her only capture during the cruise was the whaler *Abigail*, of New Bedford, valued at 18,000 dollars. Leaving the Okhotsk Sea on 14th June, she entered the North Pacific and steamed into the Behring Sea, making Cape Navarin on the 21st. Next day she overhauled and burned the whalers, *William Thompson* and *Euphrates*—aggregate value 83,000 dollars. The former was the largest whaling vessel out of New Bedford.

On the following day the whalers *Milo*, *Sophia Thornton* and *Jirch Swift* were captured. The captain of the first-named, which was ransomed on bond for 46,000 dollars on condition she transferred the prisoners to San Francisco, informed Lieutenant Waddell that the American War was over, but could furnish no documentary evidence of the fact. While the *Shenandoah* was engaged with the *Milo*, the *Thornton* and *Swift* made a bold dash for freedom; both were eventually captured, though the latter took three hours to overhaul. The aggregate value of the *Thornton* and *Swift* was 132,000 dollars.

The *Shenandoah* then captured and burned the brig *Susan Abigail*, carrying Californian papers and dispatches from San Francisco, and valued at 6,500 dollars. Among her papers were some stating that President Davis had issued a proclamation announcing that the war would be carried on with renewed vigour. Waddell questioned her captain as to the military situation in America, but he was unable to say more than that the North had the advantage. As three of his crew joined the *Shenandoah* it was clear that they did not believe the war to be over.

On 25th June the *Shenandoah* chased and captured the *General Williams*, of New London, valued at 44,740 dollars. On the 26th she overhauled and burned five Yankee whalers, and ransomed the sixth for 30,000 dollars. The burned vessels comprised the *W.C. Nye*, valued at 32,000 dollars; the *Nimrod*, 30,000; *Catherine*, 26,000,; *Isabella*, 38,000; and

the *Gipsey*, 34,000. All prisoners were put aboard the ransomed vessel, *General Pike*, for San Francisco.

Thus in forty-eight hours the *Shenandoah* had taken prizes to the value of 235,500 dollars, more than 200,000 dollars of which were destroyed.

But an even greater triumph was in store. On 27th June, she surprised eleven New England whaling ships in East Cape Bay. The confusion created when she stole into their midst, hoisted the Confederate colours and despatched armed boats to take possession of the whalers may be well imagined. Many of their captains were the worse for drink, and "some swore their sympathy for the South, while others spoke incoherently of cruiser, fire and insurance." The following vessels were captured:

Ship ..	*James Maury*	..	Ransomed	..	37,000 dollars
„ ..	*Hillman*	..	Burned	..	33,000 „
„ ..	*Nassau*	..	Burned	..	40,000 „
„ ..	*Brunswick*	..	Burned	..	16,000 „
„ ..	*Isaac Howland*	..	Burned	..	75,000 „
„ ..	*Nile*	..	Ransomed	..	41,000 „
Barque	*Waverley*	..	Burned	..	62,000 „
„	*Martha*	..	Burned	..	30,000 „
„	*Favourite*	..	Burned	..	58,000 „
„	*Covington*	..	Burned	..	30,000 „
„	*Congress*	..	Burned	..	55,300 „

Within eleven hours the *Shenandoah* had bonded and destroyed enemy property to the value of 478,100 dollars, and a few hours after their discovery, nine of the above ships were in flames. Their crews, taken collectively, amounted to 336 men. From this fleet the *Shenandoah* received nine privates, all intelligent men used to handling firearms—a fact which confirmed Waddell's opinion that the South continued to hold its own, as such men would hardly have volunteered for a lost cause.

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After running a gauntlet of fog and ice to the west of St. Lawrence, Lieutenant Waddell decided to make for more open waters. Leaving Behring Sea, he pressed on to the Aleutian Isles, and boldly negotiating the Amukta Pass in a thick fog, slipped gratefully into the North Pacific. The *Shenandoah* then hastened over to the coasts of California and Mexico, in search of steamers running between Panama and San Francisco. She then took the north wind which sweeps down California, running parallel with the land and keeping a sharp lookout for enemy warships.

On 2nd August she overhauled and boarded the British barque, *Barraconta*, Liverpool bound, from San Francisco. This vessel supplied her with papers announcing the surrender of the Southern Generals and

the capture of President Davis. The mood in which this news was received may be gathered from the following extract from the *Shenandoah's* log-book: "Having received by the barque *Barraconta* the sad intelligence of the overthrow of the Confederate Government, all attempts to destroy the shipping or property of the United States will cease from this date, in accordance with which the First Lieutenant, William C. Whittle, Junior, received the order from the commander to strike below the battery and disarm the ship and crew."

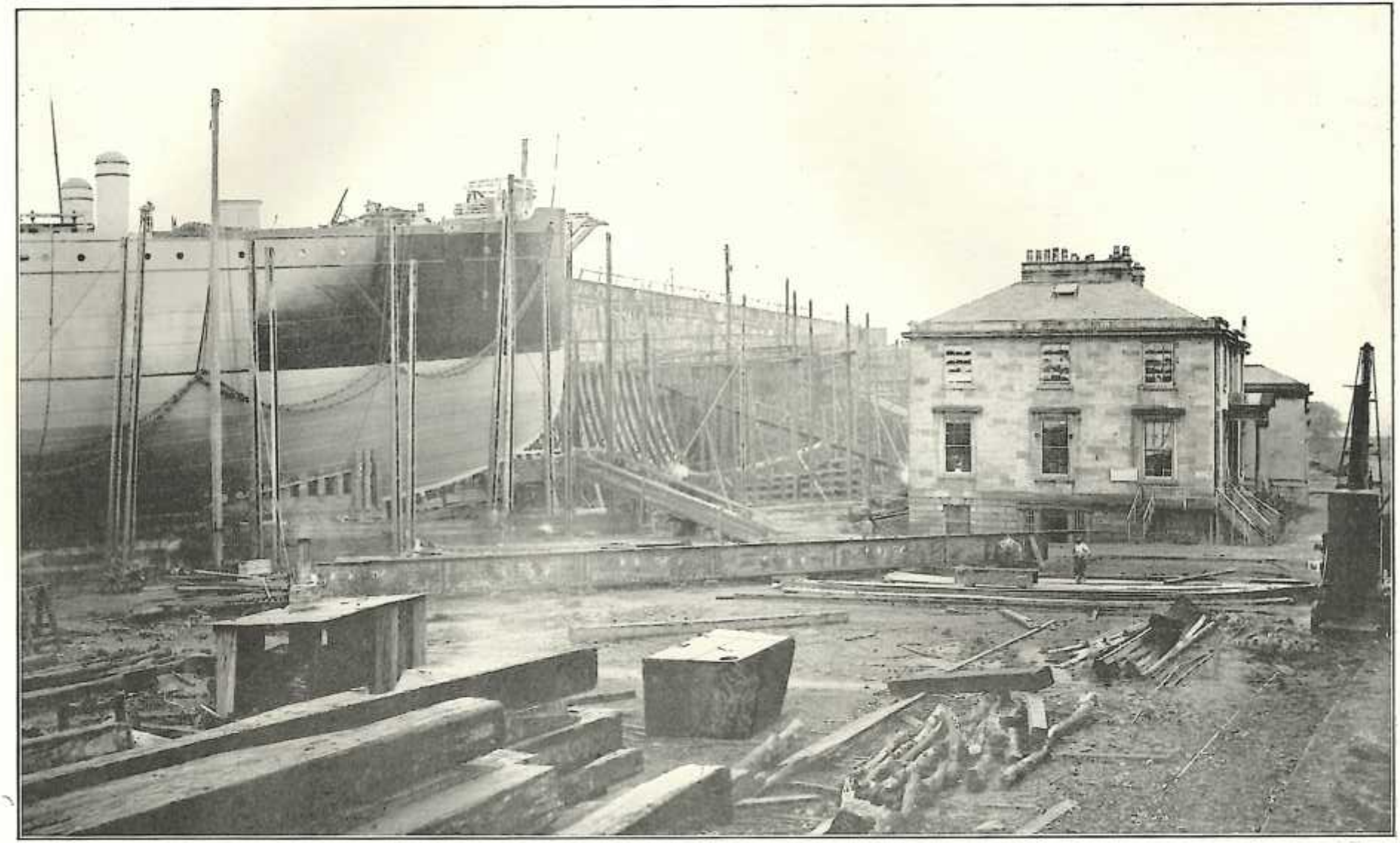
Her career as a warship being over, Lieutenant Waddell decided to run the *Shenandoah* into some European port, which involved a passage of some 17,000 miles with considerable risk of pursuit by American cruisers. When she reached the parallel of Cape Town, certain of her officers petitioned Waddell to put her into that port rather than risk capture in the North Atlantic. At the same time he received a further communication stating that five of her officers and seventy-one of her crew entirely supported his decision to run the vessel to France or England.

She crossed the line on October 11th, and entered St. George's Channel on the morning of 5th November, just 122 days from the Aleutian Islands, having sailed 23,000 miles without sighting land! Next day she steamed up the Mersey, under the Confederate flag, and anchored near H.M.S. *Donegal*. After being visited by an officer from the latter, who gave him official news of the termination of the American War, Lieutenant Waddell addressed a communication to the Secretary of State for Foreign Affairs, formally surrendering the *Shenandoah* to the British Government for the United States.

Next day a gunboat came alongside and made fast to the cruiser, while Customs officials took possession. The *Shenandoah* and all on board were held by the authorities until 8th November, when her entire crew was unconditionally released. The vessel was then handed over to the American Consul by the British Admiralty.

Some years later, the *Shenandoah* was acquired by the Sultan of Zanzibar, for cruising and trading purposes. The *Dundee Evening Telegraph* for November, 1879, commenting on her passing, says: "An historical vessel has passed away in the Sultan of Zanzibar's yacht, once famous as the dreaded Confederate cruiser *Shenandoah*. This once splendid craft is the last of the celebrated fleet of screw steamers which was fitted out by the Government of Jefferson Davis to prey upon and sweep from the seas the maritime commerce of the Northern States . . . for fourteen years she has survived the dangers of a perilous coast trade, and the neglect which characterizes Oriental seamanship—a striking testimony to her merit as a magnificent specimen of British shipbuilding."

Linthouse Mansion House and Grounds
About 1825.



Linthouse, with the "Ethiopia" and the Old House. 1873.

CHAPTER FOUR

1870—1900

Linthouse and Dundee

Familiar steamers, too, majestic steamers,
Shearing Atlantic roller-tops to streamers.

MASEFIELD.

THE Linthouse estate was situated about a mile down the river from Kelvinhaugh, on the southern bank of the Clyde, opposite Whiteinch. It extended to thirty-two acres of well-laid-out grounds studded with trees, with the fine old mansion of Linthouse in the centre. The mansion was an excellent example of Adam's architecture with many fine decorative details inside and out, and although the old house was demolished at the end of the War, its graceful porch and stairway have been preserved and erected in Elder Park at the request of the Glasgow Corporation.

The estate carried with it various rights, including that of salmon fishing in the Clyde; this privilege is still in force, although there appears to be no record of salmon caught.

The local rates at the time of removal were considerably less than at the present time, the Burgh of Glasgow being rated at 2/2, while Linthouse, which was just outside the boundary, was rated at 1/1 in the £. The properties were also assessed on a very much lower basis. In 1870, however, the assessment of Linthouse was fixed at £1,000 per annum, and that of Fairfield at £3,000. In the following year, the assessor proposed to assess Linthouse at £3,500 for the year.

On the other hand, there were little or no facilities, as the tram-lines from Glasgow terminated about a mile from Linthouse. Later, in 1873, the facilities were in some measure improved, as the Firm laid down lines on the Govan Road, to continue the tramways into the yard. This line ran through the shops down to the river, with branches to the various departments, so that the transport of materials was considerably improved, although horses were still the only form of motive power, and remained in use until towards the end of the century. They were stabled at the east side of the yard, in the building which is now the plumbers' office,

until the Firm decided to contract with the North British Railway Company for their traction horses.

A rowing-boat ferry had been established in 1861 in the vicinity of Linthouse for cross-river passengers, and this was not replaced by a steam ferry until 1891, when the small steamers, familiarly known as "Cluthas," ran between Linthouse and the Broomielaw, calling at various stages on both sides of the river, and providing the main means of communication for the industries on the river banks. The river trip on the "Cluthas" cost one penny, and the cross-river fare was one farthing. Later, in 1905, the steam passenger ferry was augmented by a steam vehicular ferry which is still running.

All the material, including the iron and steel plates, had to be carted in horse-drawn trucks or lorries from Govan station, and in addition to the distance from the city there were no suitable dwellings for the workers within reach of Linthouse. At this period the Firm was employing close on 2,000 men and it was anticipated that another thousand would be needed when the new yard was completed. It was evident, therefore, that the difficulty could only be overcome by the Firm erecting dwelling-houses on their own estate and, as the ground was considerably larger than necessary for shipbuilding purposes, the block of tenements now known as "Linthouse Buildings" was erected to accommodate some 120 families.

Meanwhile the conversion of the estate into a shipbuilding yard was rapidly approaching completion. The mansion was utilized as an office, with the the basement converted to a rivet and general store, and the billiard room to the model-makers' shop. This arrangement, with the head office in the heart of the yard, with ships growing up on all sides of it, lasted for many years until more space was required for the increasing business, and the present building was erected in 1913–14.

The old mansion was used as a canteen during the War, being demolished shortly afterwards, leaving the space clear for building the larger ships of the present day.

While the mansion was being converted into an office, the other buildings were erected and machinery installed. The joiners' shop was built of brick in three storeys on the same lines as the shop at Kelvinhaugh, with the ground floor fitted as a spar shed and main machinery or power station, the second storey for the joiners' shop, and the top storey forming the draughting loft lighted from the roof. This building, measuring 265 ft. by 65 ft., is situated at the west end of the yard, and is still used for its original purposes with some slight changes due to the alterations in methods of construction.

The platers' shed extended along the middle of the yard, 500 ft. in length and 200 ft. broad, with its open front facing the building berths. This shed was divided into four 50 ft. bays, with a roof supported on heavy iron columns. It is remarkable that, in spite of new methods and increasing size of ships, this shed has proved admirable both in size and position; a large part of it is still in use after sixty-two years, while the remainder was only taken down in 1923, to allow a modern, well-lighted shed to be erected.

The machinery in this platers' shed was arranged to be driven by belting from the main shaft carried overhead for the full length of the shed from the main engine under the joiners' shop. To quote from a contemporary description:

> In the centre of the shed was a chimney-stack 100 ft. in height, into which the smoke from the furnaces was condensed by underground flues. Throughout this and the adjoining smiths' shop there were 640 feet of iron shafting for driving the machinery, the motive-power being supplied by an engine of 80 horse-power, constructed on the high-pressure condensing system. In the smithy, which opened out of the platers' shed, there were 80 smiths' hearths and three steam hammers.

Even as the shipyard approached completion, it was increasingly clear that sailing-ships were doomed to be supplanted by steamers, and a further bold step was decided upon.

In 1871 a start was made with engine and boiler shops at Linthouse, there being ample room in the estate for every possible extension. Mr. Ebenezer Kemp, from Gourlay's of Dundee, joined the Firm as engineering partner and took an active part in the development of marine engines until his retiral shortly before 1892. He was succeeded by A. E. Stephen, who was the first of the family to become head of the engineering department.

The engine shop, which was ready for occupation by midsummer 1872, measured 200 ft. by 220 ft., the height of the ceiling being 40 ft. A contemporary description states that it was "designed on the most approved principles, the roof being supported on a series of cast-iron columns, each of which measures 3 ft. in width by 18 ft. in height. As indicating the quantity of iron required for these columns, we may mention that 32 of them weigh six tons each, while the other three, to which machines are attached, weigh nine tons respectively. The roof is divided into three bays, eleven columns supporting each bay, and is entirely constructed of glass. On each slope of either bay there are 18 ft. of glass—a fact which will be better understood when we state that there are altogether 26,000 square feet of glass used in the construction of the roof. On the north and south sides of the building there are wings, each 18 ft. in height by 60 ft. in width on one side, and 30 ft. on the

other. There are two high-pressure engines for driving the machinery. Each engine is bolted on to the stronger pillars at the western extremity of the building. Both engines are of the same size and power, and each has two cylinders, one high and the other low pressure, measuring respectively ten and fourteen inches diameter, with a stroke of two feet. The machinery, which is now in course of being installed, will be entirely new, and is supplied by Whitworth, Fairbarn & Halse, in England, by Craig & Donald, Johnston, and other well-known makers. Among the mechanical appliances perhaps the most notable is a universal drilling machine, with a 22 ft. horizontal and a 15 ft. vertical stroke. In number and variety the machines will compare with any shop on the Clyde. There are 18 turning lathes, 2 large boring machines, 2 radial drilling machines, 3 planing machines, 1 slotter, and other appliances used for engineers' purposes. As for the new boiler shop, it is just on the eve of completion. It measures 180 ft. long by 120 ft. in breadth and is constructed in harmony with the larger building just described. To the top of the roof the height of the shop will be 40 ft. The central bay is 50 ft. in width, and there is a large wing measuring 60 ft. by 18 ft. The roof is supported on columns 30 ft. apart, and the columns, as in the case of the adjoining building, weigh six tons each."

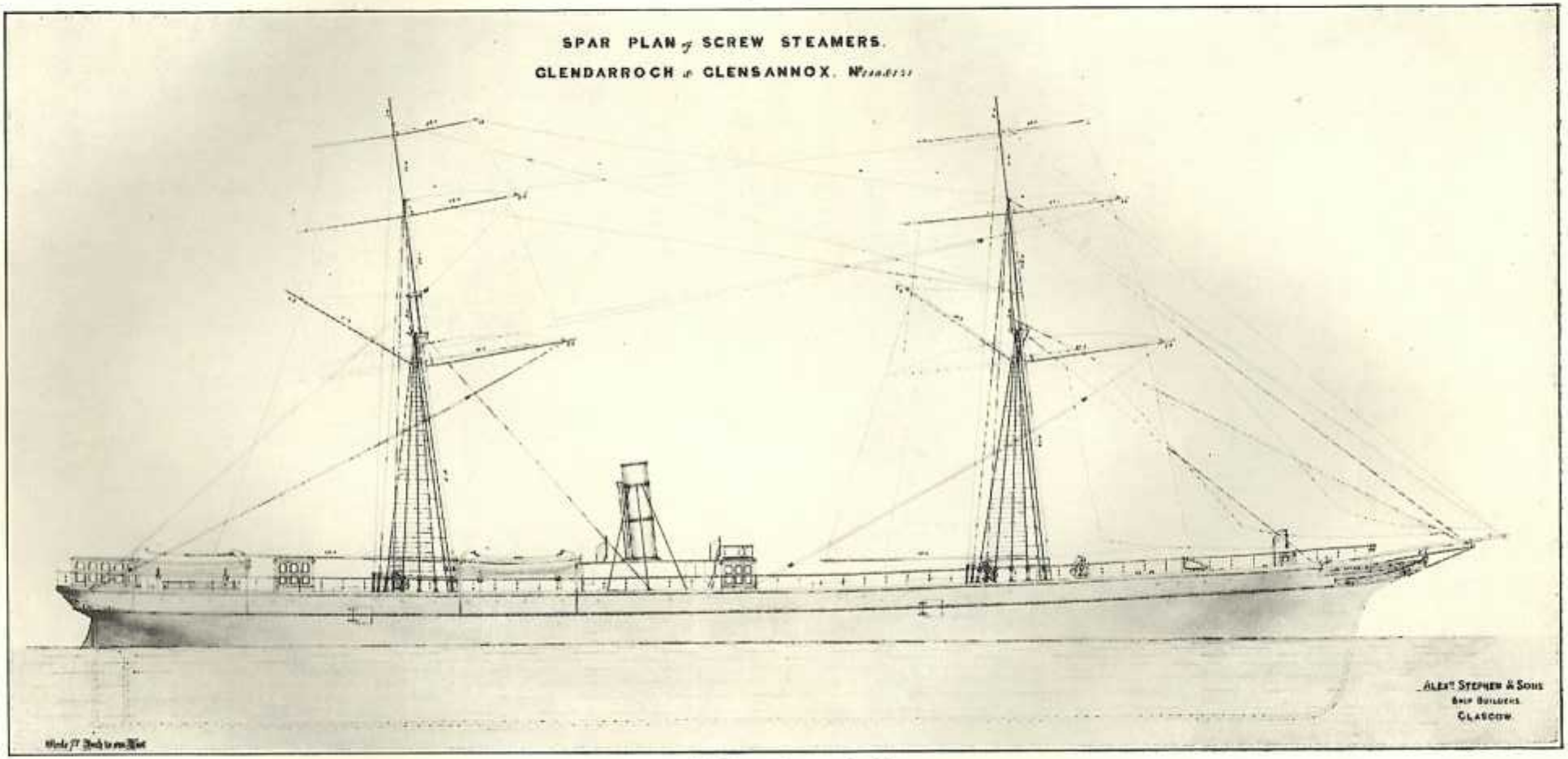
During 1872 heavier machines, including an hydraulic riveting machine, were also installed in the engine and boiler shops, and the first set of engines and boilers constructed and put aboard the S.S. *Nelusko* prior to her launch in January, 1873. The horse-power of this machinery was 250.

In the same year, the crane facilities at Glasgow harbour being limited to one crane at Finnieston, on the other side of the river, a large overhead travelling crane was erected over the building-berths to place engines and boilers on board before launching. The engines and boilers were taken down on the railway between two of the building-berths, where the crane lifted and carried them along, then lowered them into the vessel for which they were intended. The girders of the crane were of iron and the supporting posts of wood, the latter being eventually replaced by tubular riveted iron pillars.

As the girders and the crane traversed the vessels at a very considerable angle, the length of unsupported girder was so long that it had to be shored up from the ground right through ships that were building in its way. The travelling portion of the crane carried its own steam-boiler and hoisting-engine, which made it very heavy, its weight being about 90 tons, while the heaviest lift was about 32 tons. Towards the end of the life of the crane, as the boilers were naturally growing larger and heavier, several were placed on board and tubed inside the ships to save

Linthouse from across the River, showing overhead crane, about 1875.

Linthouse, 1915.



"Glendarroch."

A steamer of 1,509 *tons for Wm. Ross & Co., the first ship built at Linthouse, in* 1870.

weight. This crane, which was considerably in advance of its time, enabled the Firm to get their ships to sea very shortly after they were launched. On one occasion a steamer sailed a week after she was launched, with 4,000 tons of cargo on board!

During the early 'nineties, however, it became evident that the crane was becoming too small, as no ship over 48 ft. beam could be launched between the pillars. The girders were gradually shortened, and the crane was completely taken down about 1895. Some of the pillars were then converted into derrick posts and are still doing good service in that capacity, the excellent iron of their construction being apparently impervious to corrosion. In 1895 the new 130-ton crane at Princes Dock was first put into operation, and was used thereafter for the installation of the Firm's machinery.

After the business was transferred to Linthouse it may be convenient to divide the Firm's productions into two periods—one from 1870 to the close of the nineteenth century, the other from 1900 to the present day. Of the two hundred and thirty-five ships built during the former period sixty were sailers and one hundred and seventy-five steamers. Sailing-ships were built in large numbers for the first eight years, during which forty-one out of eighty-two vessels were sailers. In the succeeding fourteen years, however, only nineteen sailers were built, the last being the four-masted barque *Afon Cefni*.

The first vessel launched at Linthouse in 1870 was the steamer *Glendarroch*, 1,509 tons gross, for Messrs. William Ross & Company. A large party attended the launch, which was followed by a luncheon. In the evening over a thousand employees and their wives were invited to a concert and dance in the Queen's Rooms. The celebrations lasted until daybreak, and it is recorded that no work was done on the following day!

The *Glendarroch* was an iron screw steamer of dimensions 265 ft. length by 33 ft. beam by 24 ft. 8½ ins. from spar deck to top of floors, with a gross tonnage of 1,509. She was flush decked fore and aft with a clipper bow and was fully rigged with two masts, yards and sails.

Her accommodation was on the lines of the sailing-ships, with her captain and passengers below the spar deck aft, and in cabins on each side of a central saloon. The engineers and officers were berthed amidships, and the crew in the forecastle below the spar deck forward.

She had three cargo holds served by steam winches working the wooden booms, and her machinery was amidships, with one compound engine and two double-ended cylindrical boilers, and a small donkey boiler, all built by John & James Thomson of the Finnieston Engine Works, Glasgow.

In 1870 a contract was also taken for lengthening the ship *Juno*, owned by J. & P. Hutchison, by cutting her in two and building in a portion amidships. The same year the Dundee yard built three wooden screw ships for the Newfoundland seal fishing, and launched the *Cheops*, a 1500 ton iron steamer for its own account.

The following year, 1871, saw Linthouse honoured by a visit from the Emperor of Brazil, who had expressed a wish to attend the launch of one of the three ships building for the Rio de Janeiro-Para service. The Firm received only two days' notice of the Imperial intentions, and the launching ways were not completed. An Emperor, however, could not be disappointed, so the preparatory work was undertaken at high pressure and completed in the two days. It is not surprising that the launch was unsuccessful, as the *Para* stuck half-way down the ways, to the chagrin of the shipbuilders. The Emperor, however, was greatly pleased at his success in starting the vessel on her way to the ocean, and in 1873, after the three ships had proved their value, conferred the title of Knight Officer of the Rose on Alexander Stephen, the head of the Firm in Glasgow. The *Para* was put into the water two days after her unsuccessful launch.

In 1872 an order was received for five Trans-Atlantic passenger-ships for the Hamburg Trans-Atlantic Company, later merged in the Hamburg-Amerika Linie, and a good deal of business was being done with Germany at this time, more than half the vessels building being for German owners.

One of the outstanding vessels constructed during this year was the *California*, of 3,400 tons and 500 H.P., carrying 150 first-class and 900 third-class passengers, for the Anchor Line's Trans-Atlantic service. It is interesting to recall that this Company, then known as Messrs. Handyside & Henderson, purchased Todd & McGregor's yard at Meadowside for £200,000 during this period. This shipbuilding branch of the Anchor Line ultimately became D. & W. Henderson Ltd.

Although orders fell off considerably during 1872, owing to the rise in the prices of materials, business was very brisk during the following year, orders being almost turned away. In 1873 the wages bill was about £2,000 per week, joiners' hours being reduced from 54 to 51 per week, and carpenters' wages raised from 7d. to 7½d. per hour.

In 1873 Linthouse was visited by the German Minister of Marine, who inspected the S.S. *Herder*, building for the Hamburg-America Company. A few years later, in 1875, Linthouse entertained the son of the American President, Ulysses Grant.

1873 was also marked by the final retirement of Mr. Alexander Stephen, Senior, who gave up active connexion with the Dundee Yard in favour of his son, William. Prior to his retirement Mr. Stephen had conceived

the idea of building a large steamer for his own use, an idea that eventually materialized in 1872 as the S.S. *Cyphrenes*. Her dimensions were as follow:

Length	.. .. ..	300.0 feet
Breadth	.. .. ..	34.1 „
Depth	.. .. ..	25.5 „
Tonnage Net	.. ..	1,280 tons
„ Gross	.. ..	1,972 „
„ Under deck	.. ..	1,290 „

She was fitted with two compound inverted direct-acting engines of 250 H.P., having cylinders 40 ins. x 71 ins. diameter x 39 ins. stroke, surface condensing, by Messrs. John Elder & Company of Glasgow. Mr. Stephen traded the *Cyphrenes* on his own account, making a contract with H.M. Government to carry mails between Sydney and San Francisco for twelve months, and receiving £1,500 for her services. He was an early pioneer on this route and must have been one of the first to take a contract with a steamer for this mail service.

The maiden voyage of the *Cyphrenes*, in 1874, was marked by a very tragic occurrence. Mr. Stephen had placed his son, Samuel, a certified Master Mariner, in command, and, as the latter had been but recently married, it was arranged that his wife should travel east with him to take up the Charter. The *Cyphrenes* duly proceeded, but, while running down Channel, the captain disappeared overboard; when this was noticed no trace of him could be seen. The chief officer put into Plymouth to report the fatality to the owner, while Mrs. Samuel Stephen returned home to Kirriemuir.

Curiously enough, in the same year, the Firm at Linthouse built two ships, the *Bruce* and the *Euro*, for Mr. Darling and Captain Osborne, who with them inaugurated the Union Steamship Company of New Zealand, which now holds the mail contract between Sydney and San Francisco, originally held by the *Cyphrenes* as described above.

In 1874 the Firm was so busy that deliveries began to fall behind and several owners protested. Carpenters' wages were increased to 8d. per hour, but later, owing to high costs, business commenced to decline. In April the Hamburg Trans-Atlantic Company was obliged to ask for credit; although this was granted, the Company was forced to relinquish one of the vessels building for it at the end of the year.

Some very interesting experiments were made during this year with a patent propeller, which at first failed to give the guaranteed speed. As there was only one dry dock on the Clyde at that time, it was impossible to obtain dock accommodation for the trial, so the ship had to be beached at the head of Holy Loch, where the propeller blades were altered, enabling her to obtain her speed quite easily.

Launch of the *Lochee*

For one of the outstanding events of this period we must take another side-glance at Dundee. During the time when iron was generally adopted for shipbuilding, William Stephen, concentrating his entire energies on this new constructive material, produced some of the finest vessels of the day. The first and largest of this class was the famous *Lochee*, pioneer ship of the Dundee Clipper Line, and holder of the record time for the Calcutta to Dundee voyage.

The launch of the *Lochee* took place at Dundee in August, 1874. The torrential rain which accompanied the event did little to damp the enthusiasm of the citizens, who gathered in great force to cheer the vessel as she took the water. The largest sailing-ship launched on the Tay up to that time, she measured 1,820 tons and her dimensions were as follow:

Length	..	..	257 feet
Breadth	..	..	30 „
Depth of hold	..	..	23 „ 5 inches

She was built under special survey, to the highest requirements of Lloyd's, and classed 100 A1 for twenty years. Her model was that of a medium clipper, combining the promise of high speed with immense carrying capacity, and great power under canvas. Her masts, lower yards and lower topsail yards were of iron; her rudder, in addition to the usual tiller, was fitted with patent screw steering gear. At the time of her launch she was commanded by Captain A. B. Hearn, late of the *Royal Alfred* of Liverpool, and carried a crew of fifty hands.

After the launch a number of the leading citizens assembled to partake refreshments in a loft adjoining the yard. When the *Lochee* herself had been duly toasted, Mr. John Sharp gave "Prosperity to Messrs. Alexander Stephen & Sons, the builders." Responding, Mr. William Stephen declared his pride in being the builder of the pioneer vessel of the fleet.

To appreciate the enthusiasm aroused by the launch of the *Lochee*, it should be remembered that for some years prior to 1874 most of the jute manufactured in Dundee had been brought from Calcutta by London, Liverpool or Glasgow-owned vessels. From time to time surprise was expressed that the merchants of Dundee, who were responsible for the cargoes, did not have their own ships to carry them; but to build even a few vessels of the class required for the Calcutta trade was no small undertaking, and considerations other than the mere ability to furnish homeward freights had to be taken into account. By 1874, however, considerable progress had been made towards the foundation of a Dundee Clipper Line, and by July of that year contracts had been placed with builders in Dundee and Glasgow for six vessels, in addition

"Piako."
New Zealand Shipping Co.
1876.

to the *Lochee*. Each was to be full-rigged, about 1,500 tons register, classed 100 A1 at Lloyds, and registered under the Passenger Act. It was estimated at the time that the cost of these vessels would be between £270,000 and £300,000.

The following year brought Linthouse considerable trouble with the Hamburg Trans-Atlantic Company, which had already been forced to cancel one of its vessels. Various points of dispute arose over this and other ships, and eventually the case went before the Court of Session, where the Germans were defeated. The vessel relinquished was later sold to the Peninsular & Oriental Steam Navigation Company.

The Spring of 1875 was shadowed by the sudden death, at the age of eighty, of Alexander Stephen, senior. Mr. Stephen, who had visited his son's shipyard at Dundee on the Tuesday, and appeared quite well until Friday morning, passed quietly away at "Corona," his residence in Broughty Ferry, on Saturday, 24th April.

His death caused a great deal of concern throughout Scottish shipping circles, as he had been an enterprising member of the trade in four different ports for over half a century. For several years he had sat at the Dundee Harbour Board, in whose proceedings he took great interest, being occasionally a caustic critic of what he considered engineering blunders. Like most successful men he was ever ready to avail himself of improvements, and allowed neither habit nor prejudice to delay the adoption of any change that he considered was for the better. He was one of the first to use hollow ways for launching, and also one of the first private shipbuilders to adopt the system, established in the Royal Dockyards, of building vessels of a high class under sheds. When the use of steel became general he built many fine ships of this material, and though he died in 1875 there were still, fifty years later, in 1925, a round dozen vessels of his construction in Lloyd's Register. Mr. Stephen, together with his son, William, also took a leading part in the revival of the whaling-trade in Dundee, details of which will be found in the following chapter.

Commenting on his death, *The Dundee Advertiser* declared that "Dundee loses in Mr. Stephen a man of immense energy, extraordinary perseverance and force of will, and a worthy representative of the class of business man whose enterprise and shrewdness have more than doubled its wealth and population during the past generation."

During 1876, the year in which the Firm's application for a place on the Admiralty Lists, both for ships and engines, was granted, the Linthouse yard had the highest tonnage output and launched more ships than any other builder on the Clyde. One of the most interesting launches of the year was that of the *Nepaul*, a vessel of 3,600 tons, 600 H.P.,

carrying 200 first-class and 50 third-class passengers, for the Peninsular & Oriental Steam Navigation Company.

The same year, Barclay Curle & Company moved their yard down the river from Stobcross to a position opposite Linthouse and just above the yard that the Wingates had run for many years, but which had recently failed.

1877 was disturbed by considerable industrial friction, work on the Clyde being greatly hampered by a carpenters' strike which, although it extended over six months, brought no increase to the workers concerned.

Towards the end of the decade the Stephens had won a high reputation for first-class vessels, and were able to obtain better prices than many of their competitors. In 1878, as orders were scarce, they were just about to lay down some vessels for their own account when, after negotiations with Mr. Cayzer, of Cayzer, Irvine & Company, they received an order for four ships for his new company. The Firm agreed to take shares in this venture, which was largely initiated by Mr. Cayzer and Mr. John Muir, of James Finlay & Company, and was latterly known as the Clan Line. The first ship for the new Line was the *Clan Alpine*, built at Linthouse and launched at the end of '78. During the following year Mr. Cayzer, experiencing some difficulty in arranging finance for the company, approached the builders for extended terms; these being arranged, the young company was able to tide over its troubles until more prosperous times.

Between 1878 and 1879 the first twin-screw steamers, *Houssa*, 544 tons and *Fantee*, 166 tons, were constructed for Messrs. Alexander Miller Brothers & Company. But it was not until the close of the century, in 1899, that the next steamer of this type, the *Montezuma*, of 7,345 tons, was launched for Messrs. Elder, Dempster & Company.

About this period, when steel was being first considered in conjunction with iron, an extra price was asked for its use in most quotations. It is amusing to recall now that, as in the case of iron, many shipowners were at first dubious regarding its use, being unable to appreciate the advantages that the saving in weight would give. Apparently the importance of deadweight was not so supreme then as it is in these days.

As trade was somewhat slack at this time, and there were differences in the hours worked in the various shipyards, the hours of work on the Clyde were increased from 51 to 54 per week. At the same time, possibly as a result of the French Government's duty on foreign-built ships, orders were scarce and one builder in Dumbarton failed. Towards the close of 1878, however, trade revived and the Firm was second in the Clyde output for the year, orders being received from many shipowners,

including Messrs. Florio of Palermo, afterwards merged in the Navigazione Generale Italiano.

In 1880 orders, including one for four Clan Line ships, were so numerous that the Firm was forced to refuse to tender for new vessels. But work did not advance so rapidly as might have been expected, as is often the case in more prosperous times—though it was noted that the men worked much harder during the week before the New Year holiday, in order to make better pay. The head of the Firm, commenting on this fact, declared that "If workmen would work all the year round as they do this week it would make a great deal of difference, both to themselves and to the yard."

During the first year of the new decade a start was made with the addition of another bay to the boiler-shop, and various machines were added to the engine-house. Meanwhile, the Dundee business was building two vessels for the London, Perth & Dundee Shipping Company.

1881 commenced with 31,000 tons of work on hand, this figure rising in a few months to 40,000 tons. Carpenters' wages were increased to 31/6 per week and over two thousand hands were employed. A visitor inspecting the yard during the year was moved to christen it "The International," as ships were building simultaneously for Germany, Belgium, Italy, America, England and Scotland.

But, despite the general atmosphere of prosperity, work was delayed by various disturbances, including a strike at the iron works and a joiners' strike in the shipyards. In the latter instance there was rioting and police assistance had to be sought; bitter complaints were made regarding the tyrannical attitude of the trade unions.

An outstanding disappointment of the year was the loss of the barque, *Helenslea*, owned by the Firm, and sunk off Rock's Point, in a collision with the Cunard mail steamer, *Catalonia*, after the latter had left Queenstown. An iron vessel, of 1,197 tons, launched in 1880, the *Helenslea* had only just completed her maiden voyage.

Midsummer, 1883, was clouded by the *Daphne* disaster, which created a painful sensation in shipping circles, as well as among the general public. Prior to this date shipbuilders had worked largely by "rule of thumb" and past experience, the present methods of calculating the stability and similar characteristics of vessels being generally unknown at that time. The importance of such calculations was dramatically brought home to the trade when the *Daphne*, built to order of the Laird Line, Glasgow, for their Irish trade, capsized at her launch.

Launched on 3rd July, she had an unusually large number of workmen on board as her owners were eager to have her finished for the Glasgow Fair holidays. Her engines were placed on board before the launch,

and her boilers were to have been installed immediately afterwards. On reaching the water, however, she floated perfectly, then rolled over on her side and sank! Over a hundred men, most of whom were trapped inside the holds, engine-rooms and cabins in which they had been working, were drowned, for although divers were sent down immediately, they could render very little assistance. It was not until about ten days later that the vessel was partially moved, and almost three weeks before she was docked.

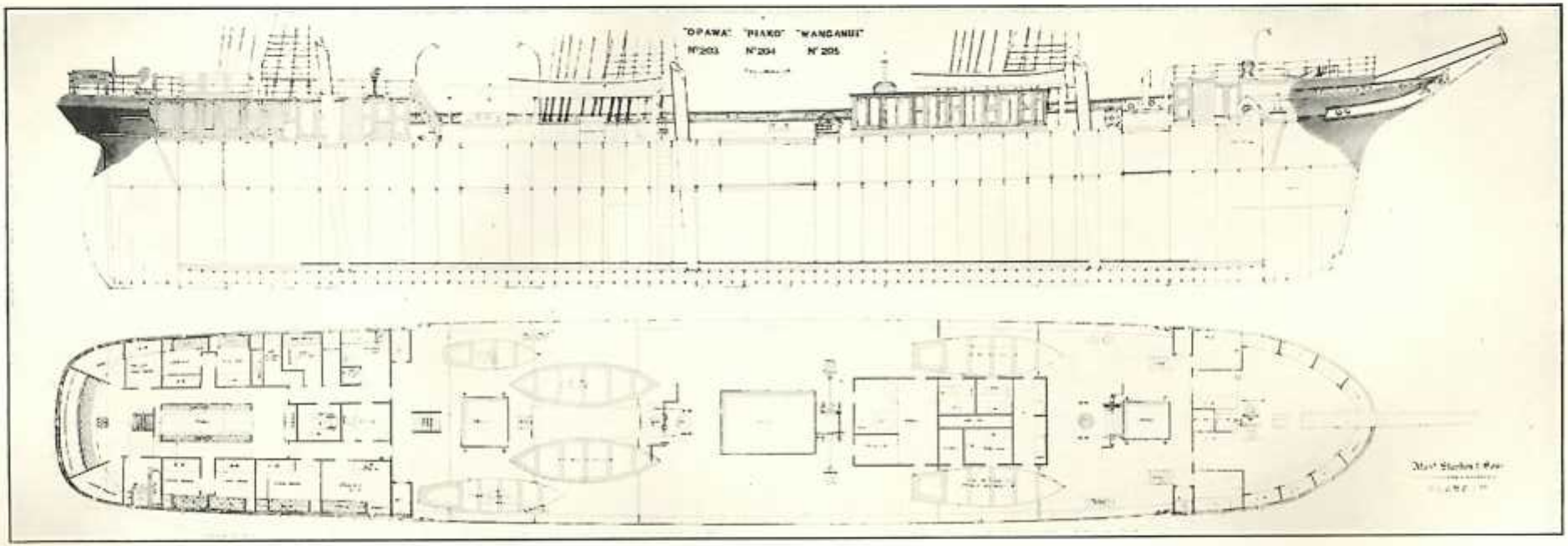
The Government appointed a special Commission of Enquiry (headed by Sir Edward J. Reed, K.C.B., F.R.S., M.P.), which took evidence in public for four or five days at the Court House, Glasgow. After some weeks the Commission issued a printed report, some seventy-three pages in length, with plans and diagrams, the gist of which was that as no shipbuilders had previously estimated the stability of ships before launching, the Firm should be completely exonerated. It was also shown that the *Daphne* had a certain amount of positive stability, but that some external force must have inclined her until this vanished. Evidence was given by most of the leading shipbuilders on the Clyde and elsewhere, including a well-known French builder, and a leading consulting-architect, who later became the first professor of naval architecture at Glasgow University.

Other accidents of a similar nature occurred about the same date, but in most cases the ships lay over on their sides, and, as their side-openings were closed, did not capsize completely, as in the case of the ill-fated *Daphne*, which had large cattle-doors. Since this fatality builders have always estimated the stability of vessels so that it is unlikely such a disaster could occur again.

Meanwhile, a public subscription, to help the dependents of the 124 men who had lost their lives in the catastrophe, was opened; the widespread interest aroused is shown by the fact that the sum subscribed reached a total of £30,000. The fund was administered by a committee of Glasgow's leading citizens. At the next launch at Linthouse, the Firm was presented with an illuminated address, expressing the sympathy of their staff and workmen upon the misfortune of the disaster.

Apropos the subject of launching, it is interesting to recall that steel wires were at this time gradually replacing the chains that had previously been used in attaching drag-weights to the vessels. In 1883 one also finds that shipwrights' wages were advanced to 36/- per week.

The following year orders fell off somewhat and business was slack. During this year the Firm constructed its first set of triple expansion engines, previous engines having all been of the compound type. 1884 was also marked by the passing of the two half-yearly sacramental fast-days



"Opawa," "Piako," "Wanganui."

Sailing-ships of 1,075 tons each. The first ships built at Linthouse, in 1876, for the New Zealand Shipping Co. The names "Piako" and "Opawa" were repeated at Linthouse for the same company in 1920 and 1931.

in the west of Scotland, which were abandoned when it was found that they were becoming public holidays rather than religious festivals.

During the last days of the year Messrs. Maclay & McIntyre negotiated the contract for their first vessel, which was only signed during the first days of the New Year as the owners' partnership dated from 1st January, 1885. Their confidence in the Firm was so great that they proposed to exercise no supervision, leaving the details of the ship entirely in the hands of the builders.

Throughout the greater part of the years 1884–6, orders were scarce and the works were on short time until early in 1887. Up to 1886 the total tonnage launched by the Firm on the Clyde is given as, Kelvinhaugh—93,000 tons, Linthouse—232,000 tons, making a total value of roughly six and a half million pounds, of which about three million pounds was spent in wages in the Firm's works. In this year no less than three different owners, who had five ships in all on order, were unable to continue their payments, and the Firm had to take over the vessels and sell them. Three were sold to Christopher Furness, of West Hartlepool, who was just starting the business which has since become world-famous as Furness, Withy & Company. The first of these vessels were the *Ulunda* and the *Damara*, which were put on the trade to Canada, and proved so successful that Mr. Furness returned to order a further vessel the following year.

The new edition of Lloyd's Universal Register, published in 1886, showed 193 ships built by the Stephens on the Clyde, apart from those constructed on the east coast; 181 built by Barclay, Curle & Company; 169 by Denny; and 163 by Elder & Company, now the Fairfield Shipbuilding & Engineering Company.

During these years, when sailing vessels were being built alongside steamships, the proportions of the former were very similar to those of present-day ships, but the steamers, to the modern idea, were extremely narrow—some being as little as 10–11 beams to length. Striking exceptions to this rule were the steamers *Wardha* and *Warora*, built in 1887, which were 350 ft. and 47 ft. beam, and were considered of extraordinary breadth at the time.

In the year 1888, Mr. Mackie, who had been the Firm's chief draughtsman for several years, resigned to commence the business of Mackie & Thomson, who subsequently became well known as shipbuilders in Govan, and famous for their trawlers, of which they built many excellent examples. Mr. Saxton White, who was later Managing Director of Armstrong Whitworth's Yard, preceded Mr. Mackie as chief draughtsman at Linthouse, while Mr. George Brown, who has since founded his own firm at Greenock, was an apprentice under both. It is amusing

to recall in passing that Mr. Saxton White once settled a dispute with a German owner's superintendent, on a trial trip, by a good stand-up fight, with coats off and no gloves, on the poop of the vessel.

The close of the decade was marked by considerable industrial unrest, which hastened the formation of the Clyde Shipbuilders' Association. About this time, too, the secretary of the Firm, Alexander Scott, and the yard manager, Robert MacMaster, were made junior partners.

An interesting little vessel built in 1890 was the *Boston*, for the Boston-Yarmouth service between the United States and Nova Scotia. This little ship, which attained a speed of over 18¼ knots, was the fastest sea-going single-screw mercantile vessel of her size afloat at the time. In 1891, the *State of California* was constructed for the States Line, which went into liquidation before the vessel was completed; the company was later bought up by the Allan Line, which eventually merged in the Canadian Pacific Line. During the same year Christopher Furness formed Furness, Withy & Company, the first order for a new ship reaching Linthouse within a few days of the company's formation.

1892 witnessed several events that emphasized the passing of the older order and the advent of a new era—the most tragic being the accidental death of Mr. Ebenezer Kemp, who had been associated with the Firm as engineering partner since the opening of the Linthouse Yard. Mr. Kemp's patent boiler, embodying an economizer placed on top of the boiler, which was fitted in the *Caloric*, 1888, was really the forerunner of some modern boiler installations.

April, 1892, saw the launch of the last of the ocean-going merchant-clippers built by the Firm—the *Afon Cefni*, a four-masted steel barque of 2,066 tons, built for Messrs. Hughes & Co. of Menai Bridge. Her dimensions were 275 ft. B.P. by 41 ft. beam by 25 ft. 3½ ins. depth, and she had two wooden decks, the main deck being sheathed with yellow pine. Meanwhile, the old yard at Arbroath, scene of so many experiments and achievements, being useless for the advanced methods of the new decade, was rapidly falling into a state of ruin.

In September, 1893, William Stephen of Dundee, who had been on a short tour of the Highlands, was taken suddenly ill on his homeward journey, and died at his sister's residence, in Grantown-on-Spey, at the age of sixty-seven. His death was naturally a great shock to members of the family in Dundee and Broughty Ferry, as well as to his numerous friends and acquaintances in British shipping circles.

We have already seen how William Stephen, who had been born in Arbroath and educated at St. Andrews, was apprenticed to his father at an early age, and was able to take over the management of the Dundee Yard when Alexander Stephen began shipbuilding on the Clyde, at

Kelvinhaugh. His father's trust was amply justified, as William took an active part in the development of the business from the very outset of his career. He proved an adept at his trade, and the vessels turned out from the greatly extended yard at Marine Parade were some of the finest of their time. The excellence of the ships constructed under his direction attracted the attention of shipowners throughout the kingdom, especially those of London and the south, including Messrs. J. &. F. Somes, owners of the ill-fated *Eastern Monarch*, for whom he built almost exclusively for several years. When iron was introduced into the shipyards he took up the new method of construction with immediate success, and the business developed so rapidly that the yard at Marine Parade had to be enlarged upon several occasions. During his earlier management he obtained orders from the Dundee Clipper Line for such notable vessels as the *Lochee*, *Duntrune*, *Glamis*, *Southesk* and *Maulesden*. The latter made a remarkably fast passage of sixty-nine days from the Clyde to Australia, in 1883, beating the *Cutty Sark*, *Loch Torridon* and other famous ships.

When Alexander Stephen, retiring from Kelvinhaugh in 1857, rejoined his son, William, in Dundee, their mutual interest in the whaling trade contributed largely to the revival of that industry. Thus, while his brothers, Alexander, James and John, were establishing the Linthouse business, William Stephen was upholding the family tradition in Dundee. When his father died, in 1875, he took over the complete control of the Dundee yard, which he had managed since the former's retirement from active direction in 1873.

In addition to his many first-class Arctic vessels, dealt with elsewhere in this volume, William Stephen owned a number of larger vessels of his own construction, including the *Corona*, *Earl of Dalhousie*, *Woodlark*, *Helenslea*, *Thetis*, *Eudora*, *Galena* and *Melita*, several of which were sold by auction after his death. It should be noted that there were two *Helensleas*, the second built after the loss of the first, in 1881, and two *Thetis*, one a sailing-ship, the other a whaler, sold to the United States.

William Stephen was always very keen that his vessels should be fast, and invariably put the finishing touches to the models with his own hands. As a rule all his clippers were well up to time, and were noted throughout the trade for their fast passages. The *Earl of Dalhousie*, the first four-master sailed by Mr. Stephen on his own account, once accomplished the passage from San Francisco to Hull in 103 days, while the little *Woodlark* ran across from Newcastle, N.S.W., to Valparaiso in thirty-five days!

Shortly after the death of William Stephen, the Dundee yard, the advancement of which had been his life's work, was sold by the trustees,

in 1894, to the Dundee Shipbuilders' Company, which included a number of the Firm's old foremen and staff among its shareholders. Under this title the yard was carried on until 1906. The last vessel built by the Firm at Dundee, during 1894, was the 3000-ton sailing-ship *Pitlochry*.

After the yard changed hands the vessels built therein were chiefly smaller craft, such as trawlers, etc., a notable exception being Scott's famous Antarctic vessel, the *Discovery*, built during the last year of the nineteenth century. The last ship constructed by the Dundee Shipbuilders' Company was the *Adventure*, for Harvey's of St. John's. The first of a new type of sealing vessel, she was built of iron, specially strengthened, and was much larger than the older wooden type, being intended for general trading when the fishing season was over. As she proved successful, several still larger vessels of her type were built in other Scottish shipyards.

Unfortunately, however, the building of the *Adventure* proved a considerable loss to the Dundee Shipbuilders' Company, which, being hampered already through lack of money, was obliged to go into liquidation in 1906. The yard was afterwards taken over by Craggs, who carried it on until 1920. It is now partly occupied by Bell & Sime, timber merchants.

* * * * *

To return to Linthouse. In 1893 the Firm built Messrs. F. C. Strick & Company's first steamer, the *Arabistan*, while, during the same year, a very curious incident occurred in connexion with the *Kanawha*, which was launched undamaged, although 24 ft. of her forward upmaking was left behind.

Throughout the 'nineties Linthouse was closely connected with the business ventures of Sir Christopher Furness. In 1896 an order was received from the Wilson & Furness, Leyland Line—a company in which Sir Christopher Furness, Mr. Ellerman and the Wilsons of Hull, were associated; the first ship built for this Line was the *Alexandra*, which proved most successful. The following year Sir Christopher Furness tried to interest the Firm in the erection of a dry dock for repair-work, while in 1898 he sold two ships he had on order, before they were launched, to the Hamburg-Amerika Line.

The close of the century was marked by the passing of Alexander Stephen, senior, on 19th May, 1899. Mr. Stephen had but recently retired from active participation in the business, handing over a part of his share in the Firm to his sons, Alexander Edward and Frederic John, who had already been partners since 1887. The opening of 1900 saw the Firm converted into a limited liability company, the first chairman being John Stephen, younger brother of the late senior partner.

Alexander Stephen, 1832-1899.
Dundee—Kelvinhaugh—Linthouse.

Alexander Stephen, senior, who had been the driving force behind the Kelvinhaugh business, and the initiator of its transference to and expansion at Linthouse, had served his apprenticeship in Dundee. On leaving Edinburgh University he had decided to become an engineer, but the full responsibility of the Glasgow business being thrust upon him at an early age, he had little time to pursue his earlier ambition.

In spite of the large amount of work he accomplished for his own firm, Alexander Stephen was able to undertake a great deal of public responsibility. When school boards were established, he became the first chairman of the Govan School Board, which had under its jurisdiction all the western side of Glasgow. This post he held for twelve years, during which most of the present school buildings were built or begun. When the Glasgow and west of Scotland technical college was formed, he was elected first chairman of the governors, among whom was Sir William Thompson, afterwards Lord Kelvin, who took a very great interest in the institution.

In 1881 he was elected Lord Dean of Guild of the City of Glasgow, being the first shipbuilder to hold this ancient office, which entails a great deal of public work, and a seat on the town council. In 1887, when preparations for a Glasgow Exhibition were being made, he was persuaded to accept the chairmanship of one of the most important committees, to which he gave a considerable amount of time. He also took a leading part in church and philanthropic work, and for many years was a well-known figure at the Free Church Assembly.

When the Clyde Shipbuilders' Association was formed in 1888, he was elected its first president, a post which was also held by his son, Fred, early in the present century.

Mention has already been made of his patent construction of composite ships, which was very popular for a time, but the part of his work in which he took the most pride was the making of models for his ships. Originally the lines for the vessels were taken from these models, which therefore gave the whole shape and character to the ships. For years he made every model with his own hands, and often declared that he thought he had made models representing a greater tonnage than anyone else in the world. Only hard work, coupled with great business ability, could have enabled him to achieve so much. Although several times invited to stand for Parliament for the Govan and other divisions, he always refused.

Alexander Stephen was related, upon his mother's side, to Count Barclay de Tolly, the Scottish General who, being in command of the Russian Armies in 1814, laid the foundations of Napoleon's disastrous debacle in the Retreat from Moscow.

Throughout the latter part of the last century Linthouse was kept

thoroughly up to date in every way, new machinery being constantly installed to enable the Firm to forward its policy of progress. In 1895 hydraulic plant was installed throughout, while in the following year all the machines were converted to electric-drive, a great improvement to the layout of the yard, as it enabled the punching and other machines to be placed to suit the work instead of being tied to the main line of shaft.

About 1899 Fred Stephen, the present chairman, invented a new countersinking machine, now used in shipyards throughout the world. Prior to this invention, countersinking was done with a fixed drill and the plate had to be shifted for every hole by a squad of five or six men. With the new machine the plate is stationary, and the drills are moved to countersink all the holes on each plate. As one handle actuates all the movements required—slewing, raising and lowering the drill, and moving in and out—the economy in time is considerable, fully a month being saved on an average-sized vessel. The Firm made the first two machines, then sold the drawings and patterns to Messrs. Hetherington, of Manchester, who manufactured it under the name of Stephen & Carter's Patent.

In closing this chapter dealing with the Firm's progress between 1870 and 1900, a few notes on the changing tendencies of the industry, as reflected in the yard's records, may prove of interest. During this thirty-year period, nearly half a million tons of shipping was launched by the Firm—to be exact, 236 ships totalling 491,991 tons. There is ample evidence of a world tendency to increase the size of vessels. For the first ten years the average size was 1,260 tons; in the second decade 2,000 tons, and in the third decade 3,500 tons, while the average size for the last three years of the century was 5,000 tons.

During the 'seventies a shipbuilder thought nothing of launching a ship a month; thus, in 1876 fifteen ships were launched with a total of 17,000 tons, while in 1898 only six vessels were launched, but their total tonnage was 30,000—representing, with their more elaborate fittings and machinery of higher power, far more than *twice* as much work as the fifteen ships of the earlier date.

CHAPTER FIVE

The Dundee Whalers

These splendid ships, each with her grace, her glory,
Her memory of old song or comrade's story,
Still in my mind the image of life's need,
Beauty in hardest action, beauty indeed.

MASEFIELD.

THE part played by the Stephens in the revival of the Scottish whaling industry, during the latter half of the nineteenth century, forms one of the most stirring chapters in the Firm's history. To Alexander Stephen and his son, William, belonged in a large degree the credit of re-establishing the whaling and sealing trades in Dundee.

Although not the originators of the idea of applying steam to whaling vessels, they were among the first builders to appreciate its importance to the industry. An experiment with Baillie Clark's *Tay*, which had been fitted with an auxiliary screw propeller, having had encouraging results at the Davis Strait fishery, the Stephens seized on the idea and developed it with characteristic enthusiasm. Remarkable success attended the departure, and for many years the building of steam-whalers for Greenock, Newfoundland and Dundee owners was a leading feature of the business.

Profiting by the experience of seamen frequenting the Arctic Seas, and the advance of engineering knowledge, William Stephen was ever ready to investigate and adopt anything that might improve the whaling trade. Eventually he became interested in the industry as an owner, and for many years met with excellent results. He usually constructed and sent out two new vessels every February, and of these the *Eagle*, completed in 1871, and the *Neptune*, 1872, are still at work after sixty years' service. When the Greenland seal fishing threatened to become unremunerative, he sent his ships to the Newfoundland coast with such success that other owners soon followed his example.

Himself a man of keen judgment, William Stephen was quick to recognize similar qualities in others, with the result that his whaling-vessels were officered by some of the ablest men who sailed the northern seas. Captain William Adams, probably the most experienced whaler

captain of his day, was long in William Stephen's service, and successfully commanded some of his most powerful Arctic vessels. Even in adverse seasons, when other shipmasters returned from the Greenland and Davis Straits but poorly fished, Captain Adams always managed to obtain a good catch. Several years, however, before his death, his connexion with the Firm was severed when he left the Stephens' employment and became a shareholder in a vessel which he commanded with considerable success.

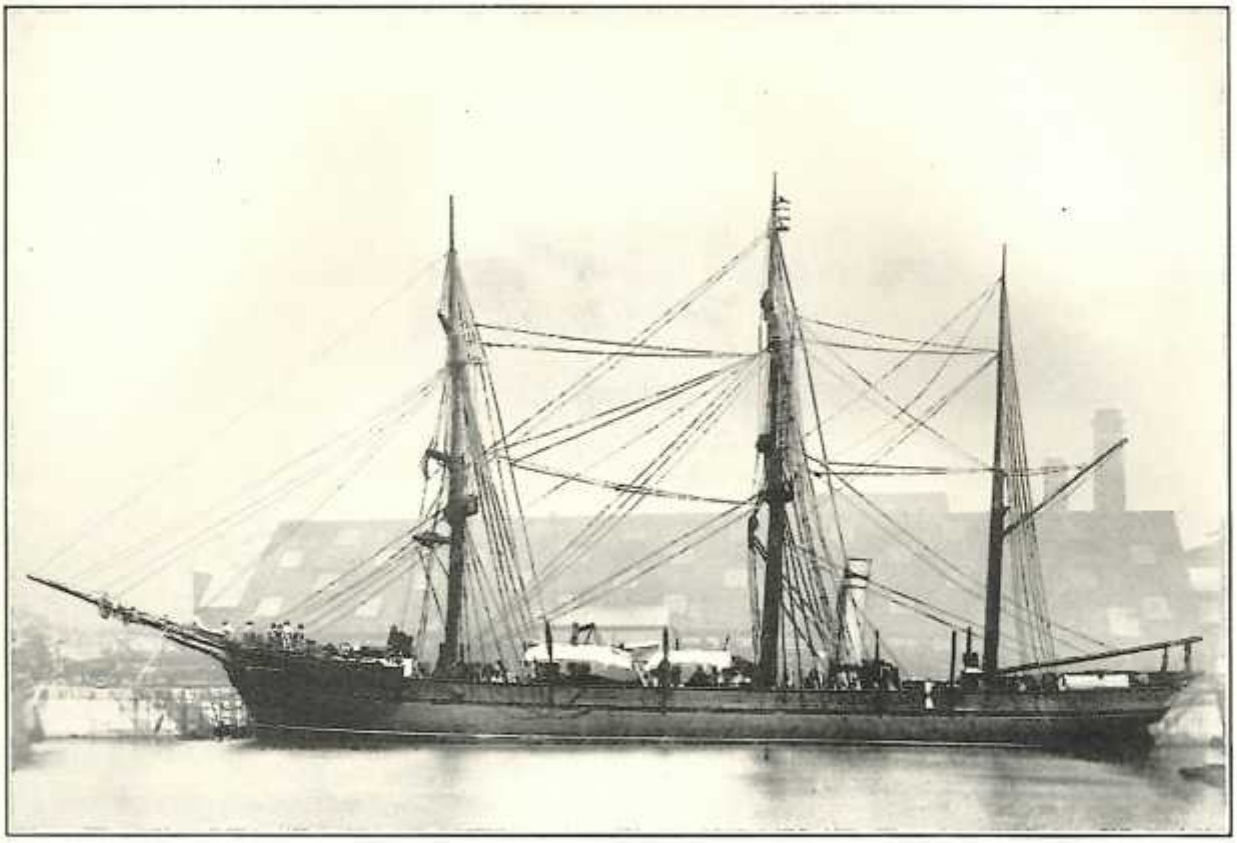
In the extension of this side of the business, William Stephen erected in 1881 the Arctic tannery, at Marine Parade, Dundee, where he made arrangements for storing, tanning and curing sealskins. This was a separate business from the whale yard, wherein were situated the tanks for the storage and treatment of the oil and where the salted skins and whalebone were stowed. Like his other ventures, this tannery prospered remarkably, and, during the 'seventies, its stock of sealskins, oil and whalebone was one of the largest in the kingdom. The tannery was still in existence at the time this history was in course of compilation.

During the 'seventies the Firm also leased a piece of ground on the south of St. John's harbour, Newfoundland, building thereon a fine yard for the rendering of their produce. Large storage and sunning tanks, blubber-crushing machines, skinning-room, boiling coppers, cooperage, coal depot and other equipment were erected. This yard gave the vessels quick handling, enabling them to get away direct to the Davis Strait as soon as the Newfoundland seal-fishing was over. For the sealing the Dundee crews were supplemented by several hundred Newfoundlanders, and while some Dundee captains for the time being gave place to Newfoundland commanders, the Stephens did not often follow this practice. The ships literally swarmed with men at these times, as all the seals had to be killed and put aboard by hand.

Some idea of the scope of this side of the business may be gathered from the fact that in one year the *Arctic* brought home twenty-eight whales, of which a number were probably small. A sizable fish would yield about twenty tons of oil and a ton of whalebone, the latter fetching, in the ordinary way, about £370 per ton in the 'fifties. During the American Civil War, when, by curious coincidence, the Yankee whaling fleet was badly mauled by the Kelvinhaugh-built *Shenandoah*, the price of whalebone soared to an unprecedented level, considerably enriching the Dundee whalers.

SOME FAMOUS POLAR VESSELS

Being specially constructed for arduous service in the ice of the Northern seas, the whalers built in the Stephens' yard were much sought after



Whaler "Bloodhound II"
re-named "Discovery"
1872.

for Polar expeditions. In the list of Dundee-built vessels at the end of this volume will be found many names now famous in the annals of Arctic and Antarctic exploration, including the *Nimrod*, completed in 1866; the *Bloodhound II* (renamed the *Discovery*), 1872; the *Aurora*, 1876; *Bear*, 1874; *Thetis*, 1881; and the *Terra Nova*, 1884.

The *Bloodhound II*, which was renamed the *Discovery* by the British Government, who acquired her for their expedition to investigate the North-West Passage, should not be confused with the later vessel of that name, built by the Dundee Shipbuilders in the old Stephen yard in 1899–1901. The *Alert*, constructed by the Firm at Kelvinhaugh, in 1869, was also chosen by Sir George Nares for his venture of 1875.

The vessels *Nimrod* and *Aurora* played leading parts in the Antarctic voyages of Sir Ernest Shackleton. The first-named had the honour of carrying that famous explorer south on his first expedition of 1908, which has been well described as "one of the most brilliant exploits of Antarctic exploration." The *Nimrod* entered the Ross Sea in the January of that year, when she attempted to land a party on King Edward VII Land, but was foiled by heavy ice and forced to return to Ross Island, where Scott had set up his base in 1902. Here Shackleton landed and unloaded his stores and equipment with all speed, in order that the ship might return to New Zealand before the sea froze over. From Ross Island he set out for the Pole in November, 1908, and succeeded in reaching a point within 133 miles of his goal before bad weather and lack of food forced him to abandon the attempt.

Returning to pick up Shackleton and his party in the following February, the *Nimrod's* crew was dismayed to find that the expedition had not yet returned to its base. Though the risk of being frozen in increased almost hourly, the vessel lingered in McMurdo Sound several days after her official departure date, and thus sighted the distress signal kindled by Shackleton and Wild. Thanks to this deliberate delay the whole party was rescued, and the *Nimrod* turned north again just in time to escape the icy grasp of the swiftly-freezing sea.

The *Aurora* was one of the ships selected for Shackleton's 1914 expedition. This venture involved two parties; that of the *Endurance*, which carried Shackleton and his companions into the terrible Weddell Sea, and a secondary expedition, in the *Aurora*, which was to set up a base on Ross Island and lay down a trail of provision depots along Shackleton's route, to assist him on the later stages of his march across the Pole.

Though public interest centred chiefly on the dramatic fate of the *Endurance*, crushed by ice in the Weddell Sea, the *Aurora* expedition had also its share of triumph and disaster. It is recorded that

" considerable difficulty was experienced afterwards in relieving the men who had landed on Ross Island. The *Aurora*, in which they had sailed south, was imprisoned in heavy pack ice for many months, and her rudder was broken and her coal exhausted before she was set free. Further delay was caused by the necessity for repairs, and the seven survivors of the ten men of the shore party had already been in the Antarctic for nearly two years before the *Aurora* returned to bring them away." It is interesting to note that the *Aurora* went south with Dr. Mawson *prior* to her service with Shackleton.

In 1884 the *Thetis* (which must not be confused with the steel barque of that name, built by the Firm in 1885), together with the sealer, *Bear*, was sold to the United States' Government for relief work, in connexion with the ill-fated Greely expedition. The price of the *Thetis* was £28,000, which included an allowance for the estimated " success " of the sealing and whaling voyage upon which she was just setting out when she changed hands. She was on the point of departure for St. John's and the Davis Strait, and had aboard all her stores and tanks, which had to be removed before she was handed over.

The *Thetis* and *Bear*, together with the collier *Lough Garry*, and the *Alert*, given by the British Government, formed the expedition to relieve Greely's party, which, having been sent out in 1881 by the United States' Government, to make astronomical observations in the Arctic, had spent three years without fresh supplies, owing to the failure of previous relief vessels. The *Thetis* and *Bear*, after making a remarkably early passage through the Davis Strait, succeeded in rescuing the seven survivors of the twenty-five original members of the expedition at Cape Sabine.

An interesting reference to the sealer, *Bear*, appeared in the " Shipbuilding and Shipping Record " for March 31st, 1932, in which it was stated that after the Greely relief expedition the vessel served as a patrol-boat in the sealing grounds of the North Pacific until 1899, when the duty being transferred to the revenue service, she continued to patrol Arctic waters, under the U.S. Coastguard flag, from San Diego. It also appears that she served the U.S. Navy as a patrol-boat during the War, and was the vessel which brought Amundsen home after the failure of his Polar flight in 1923. Replaced by the Washington Government in 1924, she was laid up in San Francisco for some time; the above reference suggests that Admiral Byrd is at present negotiating for her acquisition for use in connexion with his next Polar venture.

The Greely relief party was accompanied by several of the Stephens' Dundee-built whalers, whose owners had been attracted by the handsome reward offered for the discovery of the lost explorers. Among these

were the *Arctic*, *Aurora*, *Esquimaux*, *Narwhal*, *Polynia* and the *Wolf*, several of which had been previously sold by the Stephens. The surgeon of the *Aurora*, Dr. Lindsay, has since published a most interesting account of that season's whaling.

One of the most famous vessels ever built by the Dundee yard was undoubtedly the *Terra Nova*, immortalized by her association with the Scott expeditions of 1901 and 1910. She was a three-masted wooden sealer, built by the Firm in 1884, to their own account. Of 744 tons and 187 ft. in length, barque-rigged and fitted with auxiliary steam power, she had already seen considerable service in Arctic waters when the British Government acquired her for work in the far south.

In 1903, when fears arose as to the safety of the *Discovery*, then ice-bound in McMurdo Sound, the societies responsible for the Scott Expedition approached the Government regarding the dispatch of a relief vessel. As the Admiralty could not afford to risk failure, it was decided that two ships should be sent, the *Morning* and the *Terra Nova*, the latter being specially purchased and adapted for the purpose. To avoid delay the *Terra Nova* was taken in tow by a succession of cruisers, until by the end of November, 1903, she reached the Tasmanian coast. In December she sailed south with the *Morning*, bearing the order that " if the *Discovery* could not be freed in time to accompany the relief ships home, she must be abandoned in the ice." Happily, however, this was not necessary, as the ice broke up sufficiently to enable her to return to New Zealand with the *Terra Nova* in the spring of 1904.

Five years later, in September, 1909, the *Terra Nova* was chosen to carry Scott's second expedition into the Antarctic. She was purchased for the purpose by Messrs. David Bruce & Co., for the sum of £12,500, her owners at the time being C. T. Bowring & Company, who contributed £500 towards the expedition, and greatly assisted Scott to raise funds in Liverpool. It is interesting to recall that Messrs. Bruce & Co. also subscribed their commission on the deal towards the venture.

The *Terra Nova* was handed over to Scott in the West India Dock, London, in November, 1909. She was docked by the Glengall Iron-works Company, who altered her to meet the needs of her new service. She was rigged as a barque, her original rig, and a large, well-insulated ice-house, holding 150 carcasses of frozen meat, was erected on her upper deck. Other alterations and additions included the rebuilding of her galley, and the installation of a new stove ; the fitting of the wardroom with mess tables and lockers ; the construction of a lamp-room, with tanks to hold 200 gallons of paraffin, and the addition of new storerooms, an instrument-room and a chronometer-room. Her saloon was altered

to accommodate 24 officers, while a smaller mess was built for her warrant-officers. Two large, zinc-lined magazines and a clothing-store were constructed between-decks, while a new mizzen-mast was fitted and all her blubber-tanks withdrawn.

On 1st June, 1910, she left London Docks for the Solent, Captain Scott accompanying her as far as Greenhithe. A fine picture of her departure will be found in Ponting's *Great White South*, wherein the author describes how " amidst the cheers of thousands on both sides of the river," the *Terra Nova* " steamed slowly down the Thames to the screaming of steamers' whistles and the wailing of ocean liners' sirens. Nearly every craft on the river was 'dressed' for the occasion, and each steamer dipped her flag and gave loud blasts on her whistle in salute as we glided by. The progress of the rugged whaler down the Thames was like a triumphal procession."

On reaching the Solent the *Terra Nova* was registered as a yacht; she was thus entitled to fly the burgee of the Royal Yacht Squadron, and had also the honour of sailing under the White Ensign. Leaving the Solent, she visited Cardiff, to take in a gift of several hundred tons of coal before leaving for the Cape. She left South Africa in September and a stone model of a Viking ship has been erected at Cape Town to commemorate her departure.

Reaching Lyttelton harbour, New Zealand, she was unloaded, thoroughly overhauled and completely re-stored, many final additions being made to her stores and equipment. As in the case of her predecessor, the *Discovery*, she was heavily overloaded, her cargo including a number of Siberian dogs and ponies. It is said that she left Port Chalmers on 29th November with her Plimsoll line almost a foot under water!

After leaving New Zealand the *Terra Nova* ran into a terrific gale, during which her pumps became choked with coal-dust, causing her to settle deeply in the water and be in danger of foundering. However, continuous hard work by every member of the expedition brought her safely through.

Arriving in Antarctic waters, the *Terra Nova* commenced her struggle through the ice in search of winter headquarters for the expedition. That Scott became greatly attached to her is obvious from the following notes, written during this period. He says, " The ship behaved splendidly —no other ship, not even the *Discovery*, would have come through so well. Certainly the *Nimrod* would never have reached the south water had she been caught in such a pack. As a result I have grown strangely attached to the *Terra Nova*. As she bumped the floes with mighty shocks, crushing and grinding a way through some, twisting and turning to avoid others, she seemed like a living thing fighting a great fight.

Captain Scott's Expedition ship, the "Terra Nova," icebound.
Built at Dundee in 1884.
(Reproduced by permission from "The Great White South" by Herbert G. Ponting (Duckworth & Co.).

As the *Discovery's* old quarters in McMurdo Sound were frozen over, the *Terra Nova* dropped anchor off Cape Evans, Ross Island, one of the mountains on which now bears her name. From here she proceeded to transfer the western party to the ice near the Ferrar Glacier. She then attempted to land the eastern party on King Edward VII Land, but found the way blocked by icebergs. In attempting to negotiate Shackleton's Bay of Whales, she discovered Amundsen's *Fram* already established therein. After visiting the rival expedition, her crew decided to report the presence of the Norwegian party to headquarters, and then proceed with the eastern party to Victoria Land. Having carried out this programme the *Terra Nova* " dipped her ensign and, with three blasts of her whistle in salute, stood away to the northward " for New Zealand.

She returned from New Zealand the following year to collect members of the expedition who were unable to stay a second year in the Antarctic. Later she made her third and last voyage south to bring home the survivors of the party, whose leader sleeps forever amid the eternal snows.

* * * * *

Although Scott's earlier vessel, the *Discovery*, was not actually constructed by the Stephens, the Firm is closely linked with this famous vessel, as she was built in their old Dundee yard by the Dundee Shipbuilders' Company, which included several of the Firm's old foremen and staff among its shareholders.

Launched in May, 1901, the *Discovery* was the first ship specially built for Antarctic exploration, her designer being W. E. Smith, C.B., Advising Naval Architect to the Expedition, which was organized by that veteran explorer, Sir Clements Markham, K.C.B. At a preliminary meeting between these gentlemen and Sir Francis Leopold M'Clintock, hero of the Franklin search-party, and Admiral-Superintendent of H.M. Dockyard, Portsmouth, during the fitting out of the old *Discovery* and *Alert* for the Nares' expedition of '75, it was decided that a special vessel must be built for the new venture. All earlier Polar voyages had been made in ships adapted for the purpose by structural alterations, but in view of the distant regions into which it was hoped the expedition would penetrate, and the important magnetic work to be undertaken, it was felt that only a specially-planned boat would be worthy of the occasion.

The dimensions of the *Discovery* were as follows:

Length on the water line	172 ft.
Breadth, extreme	34 ft.
Depth amidships	18 ft.
Mean draught to water line	16 ft.
Displacement to this water line ..	1,620 tons

Among the many special features embodied in the vessel the following are worthy of mention.

MAGNETIC OBSERVATORY. In order that the magnetic work of the Expedition should be of the utmost value, it was decided that the *Discovery* must be as free as possible from magnetic influence. This was ensured by the exclusion of all iron and steel from a globular space of a radius of 30 ft., whose centre was that of the Magnetic Observatory. Even the iron buttons of the upholstery within the radius were replaced by leaden ones, while the main shrouds had to be hemp cordage and the shrouds were set up by hemp lanyards rove through old-fashioned wooden dead-eyes.

STERN. Though previous Polar vessels and whalers had all shown the old wooden frigate form of square counter stern, Mr. Smith pressed for the adoption of the pronounced overhanging rounded form of stern, which had met with success in the smaller classes of gunboats, claiming that this form would afford better protection to the rudder, rudder-posts and screw in ice-work. After close consideration the committee approved this suggestion, though the innovation met with a great deal of criticism in Dundee, where the experienced whaler-captains were all used to the older form of stern. That the decision was sound, however, is amply proved by the following letter to Mr. Smith, in which Scott says, " The shape of the stern is excellent. In the heaviest following seas it rises quickly and naturally and without risk of ' pooping ' as long as the ship has way on. This is naturally the greatest relief to me ; there is no more demoralizing circumstance for a helmsman in bad weather than the chance of being ' pooped.' "

RUDDER. Special consideration was given to convenience and certainty in shipping and unshipping the rudder, as delay had been experienced in previous expeditions when the rudder had been put on deck while negotiating heavy ice. PROPELLER : A two-bladed lifting screw was fitted and special means adopted to facilitate its ready shipping and unshipping. LABORATORY : A large laboratory-room was constructed and fitted on the lines of that in the famous *Challenger*. BILGE KEELS : These were omitted as they would have enhanced the risk of the vessel becoming ice-locked.

Various alterations were naturally made before the plans of the *Discovery* were finally passed to the builders, the most important being an increase of 10 ft. in length over that of the old *Discovery*. This increase (only approved after deep discussion, as smaller vessels stand a far better chance in ice-work), rendered many improvements practicable, chief of which was an increase of the I.H.P. from 400 to 450.

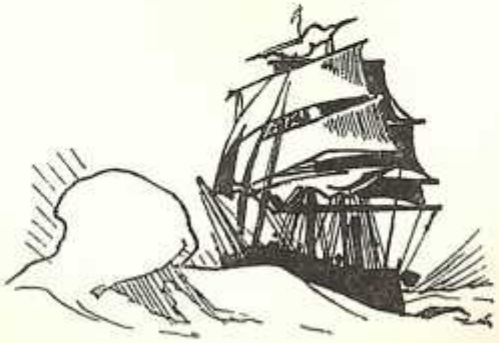
ENGINES. Her main engines and boilers were constructed by

Messrs. Gourlay Brothers of Dundee, under the direction of Engineer-Commander P. Marrack, R.N. Steam was supplied by two cylindrical boilers, 10 ft. 3 ins. in diameter each, with two furnaces; the combined total grate surface was 67 square feet. Maximum working pressure 150 lbs. per square inch. Her engines were of the triple-expansion type, designed to develop 450 H.P. when working at about 90 revolutions per minute.

It is interesting to recall that the Dundee Shipbuilders' Company was the only firm in the kingdom that displayed a real desire to secure the *Discovery* contract. In his paper on the vessel, read at the spring meeting of the forty-fifth session of the Institution of Naval Architects, 1905, Mr. Smith paid special tribute to the builders, saying that " they went with great spirit into the question of the alterations of the specifications.

Though Scott was not chosen to command the *Discovery* until she was well under construction, his notes, written after his appointment, show how closely he followed her progress. He writes : " The art of building wooden ships is now almost lost to the United Kingdom; probably in twenty or thirty years' time a new *Discovery* will give more trouble and cost more money than a moderate-sized warship. This is natural enough; it is the day of steel, of the puncher and the riveter; the adze and the woodplate are passing away."

The *Discovery* was later taken over by the Hudson Bay Company, from whom she was purchased in 1923 by the Discovery committee, who refitted her for exploration work connected with the whaling industry. In the course of the work it was found that many timbers had deteriorated and the refit almost amounted to reconstruction. An account of the work done on the ship and the alterations made in her will be found in *Discovery* Reports, Vol. I, pp. 151–174 (1929). She was engaged in research work in the Atlantic sector of the Antarctic under the scientific leadership of Dr. S. Kemp from 1925 to 1927, and was later chartered to the Commonwealth Government of Australia for the B.A.N.Z. Expedition, under Sir Douglas Mawson. At the present time (1932) she is lying idle, but completely sea-worthy, in the East India Dock, London.



CHAPTER SIX

Linthouse, 1900—1932

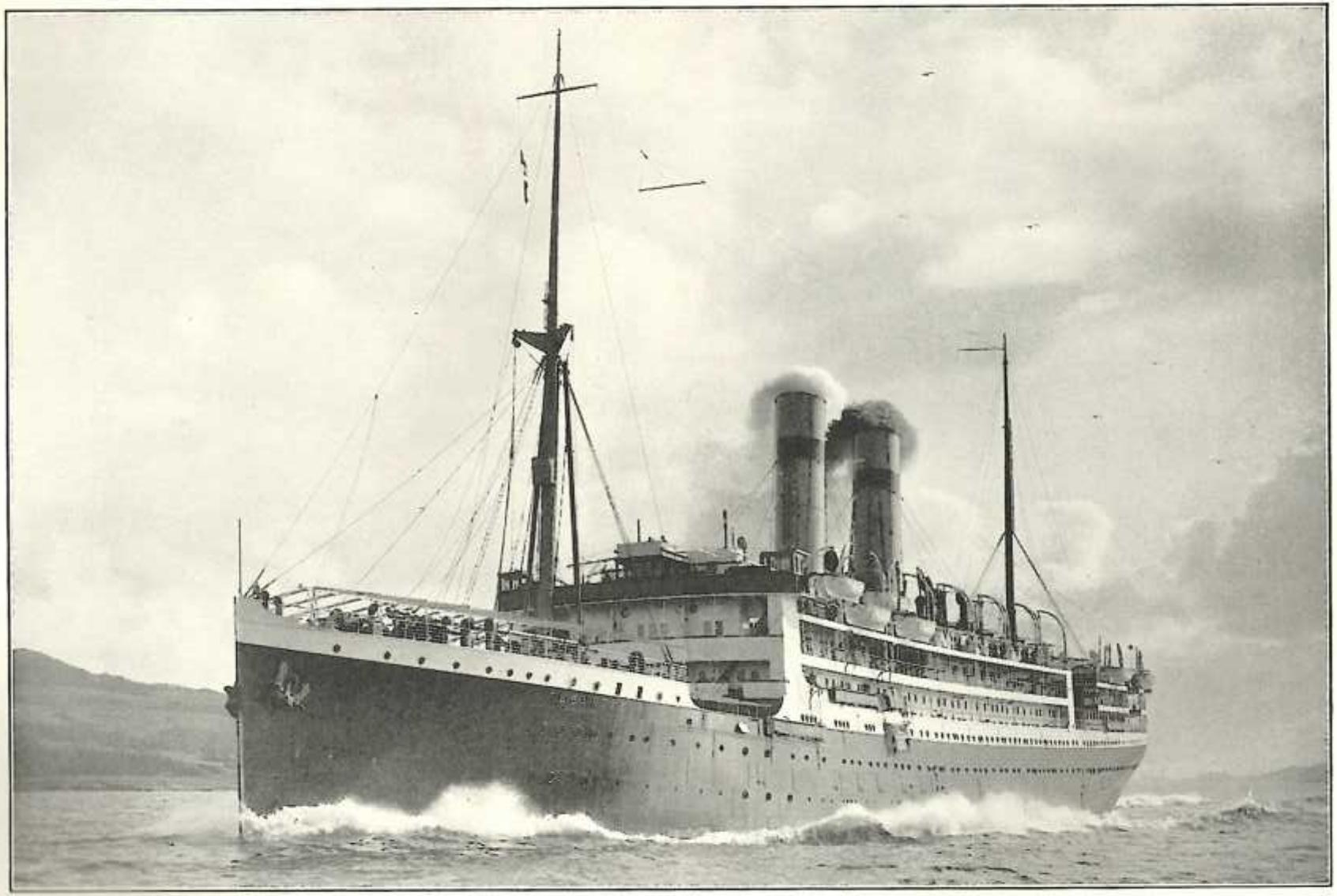
PRE-WAR PERIOD, 1900—1914

NO records of the comparative outputs of the various Clyde shipbuilders are available until 1876, but after that date Alexander Stephen & Sons topped the tonnage output for any yard on the Clyde in the years 1876, 1881, 1883, 1923, 1925 and 1931, and were close to the first in 1877, 1879, 1880, 1882, 1887, 1893, 1894, 1896, 1900 and 1913. The fact that they have been able to top the tonnages three times in the last ten years is remarkable, as the vessels built at Linthouse are not of a type conducive to mass production and large tonnages.

Touching this latter point, it should be recalled that in 1900, when the business was first made a limited company, the two younger managing directors, A. E. and F. J. Stephen, came to a decision on policy which affected the whole future of the company. They felt that it was not good strategy to attempt to compete with the pure cargo-builders, and that the personnel and layout of the yard were more suited to higher-class vessels. From that date a change can be seen in the average type of ships built at Linthouse.

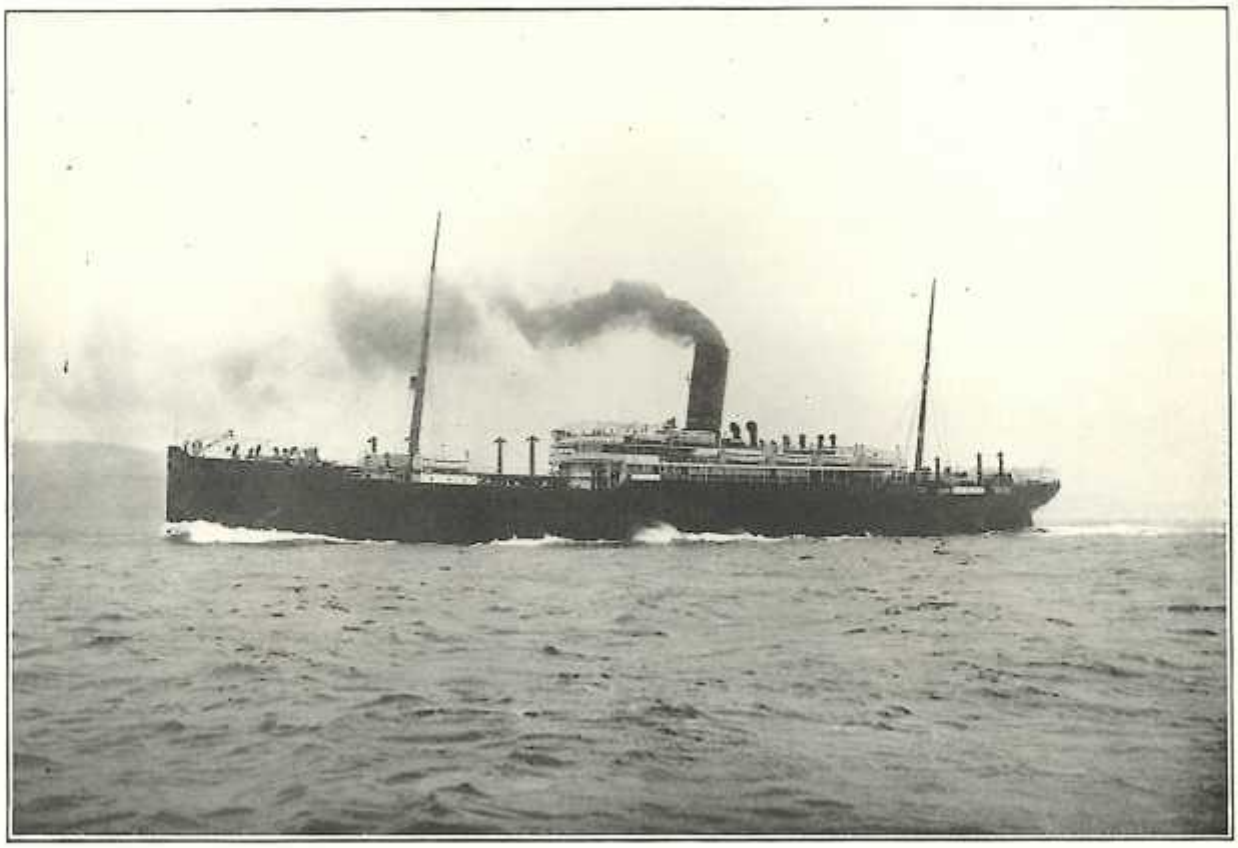
During the period between 1900 and 1931, though the yard's output of mercantile tonnage was increased by over 50 per cent. above the output of the previous thirty years, and reached a total of 770,000 gross tons in 145 ships, including some 19,000 tons in eighteen torpedo-boat destroyers, there is ample evidence in the Firm's records of the disturbing influence of the Great War upon world trade and, consequently, on shipbuilding in general.

In the ten years prior to 1914, Linthouse had settled down to a steady average of 30,000 tons per annum, but this, of course, was interrupted by the War. Since then the output has been very erratic, averaging only about 21,500 tons per annum, though this latter figure includes many important large ships, among them the *Viceroy of India*, of 19,648 gross tons, the largest vessel yet built at Linthouse. This average also includes the largest output of any one year, viz., 58,784 tons of ships completed in 1931, with a total value of about two and a half million pounds.

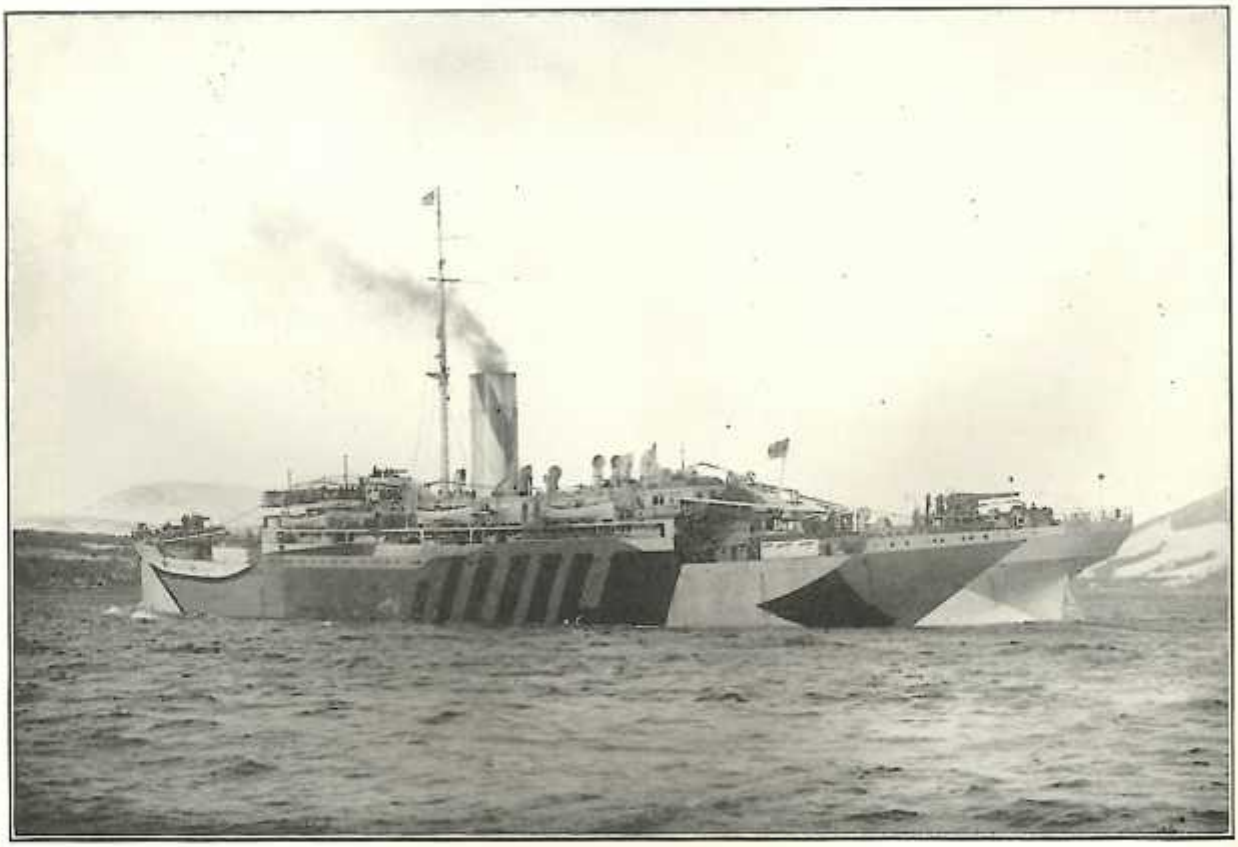


"Tubantia."

A luxurious passenger liner for Dutch owners. Sunk by a German submarine during the war. 1914.



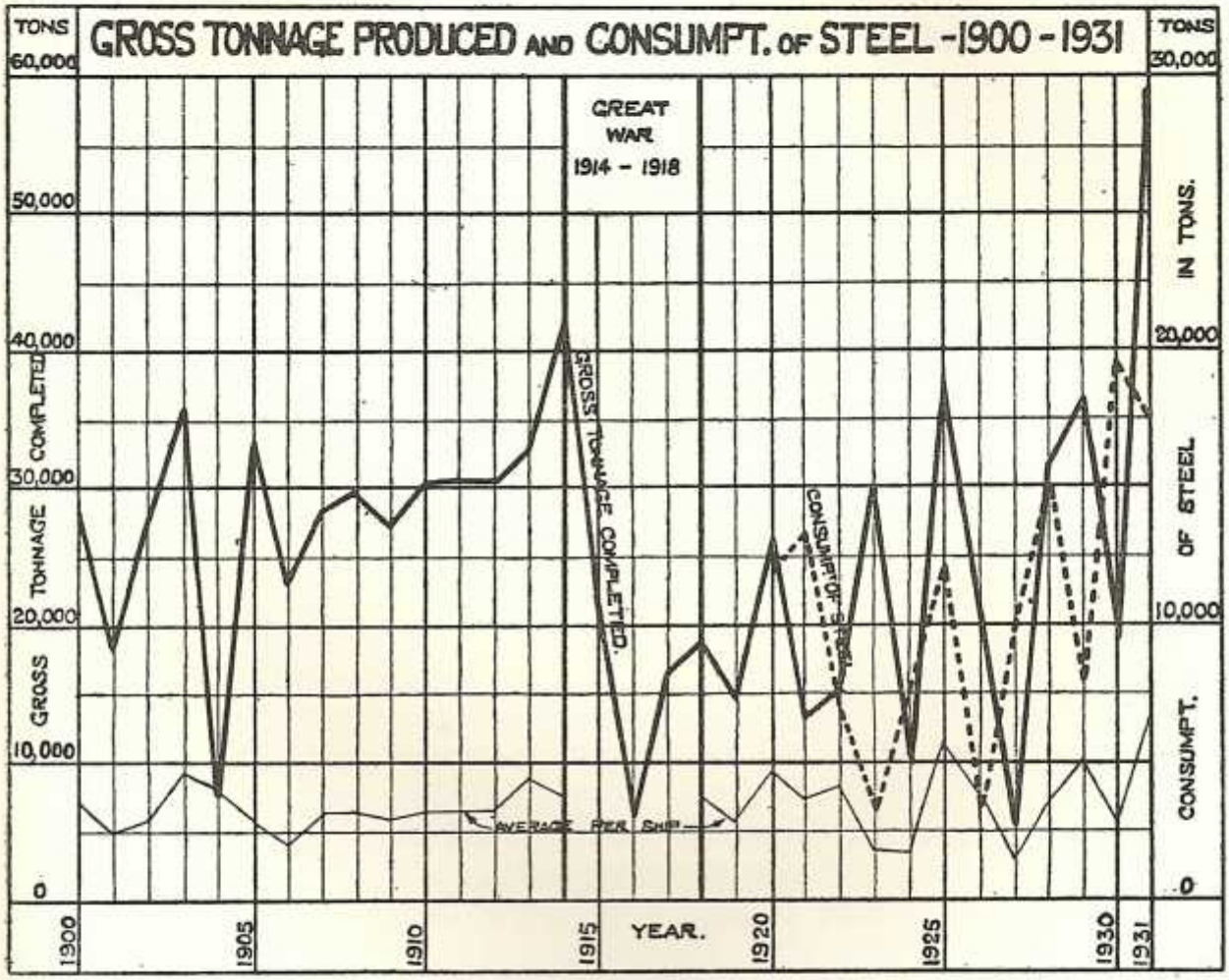
"United States."
Mr. Ford's "Peace Ark." 1903.



"Bayano I" in war-time camouflage.

Tonnage Records, 1900–1931

The following diagram, showing the amount of tonnage produced from 1900 to 1931, as well as the amount of steel worked, gives a graphic indication of the variation in yearly output, both before and after the War.



The Firm's books, besides recording the ever-increasing size and complexity of ships and their machinery, show other world tendencies—one of the most apparent being the sudden increase, and gradual decrease, in ships built for foreign owners.

Thus, before 1900 there were many vessels built for European nationals —French, German, Italian and others, as well as for owners in the Americas and further afield. At the same time there were foreigners serving apprenticeships in the yard, and learning naval architecture at the universities. As time went on, however, more shipyards opened abroad, and to-day a vessel built on the Clyde for a foreign owner may be regarded as the exception rather than the rule.

Foreign Orders

After 1900, although there was a distinct falling-off in foreign orders, a number of important ships still continued to be built at Linthouse for Continental owners. In 1902 and 1903, for example, the three ships, *Oscar II*, *Hellig Olav*, and *United States*, each of 10,000 tons gross, were built for the Atlantic passenger and emigrant service of Det Forenede Dampskibs-Selskab, of Copenhagen.

In 1905, an order was also secured for a passenger ship from the Koninklijke Hollandsche Lloyd, of Amsterdam, after keen competition with other builders; it may be mentioned that a slight slip in adding up the cost of this vessel was probably the deciding factor that secured the contract. This error, however, was not allowed to detract from the quality of the construction, and the connexion thus formed resulted in four ships being built between 1905 and 1913—the *Hollandia*, *Zeelandia*, and finally, the two luxury liners, *Gelria* and *Tubantia*, of 14,000 tons each. These ships traded between Amsterdam, the Continent, and Buenos Ayres. The last-named vessel, delivered shortly before the War, had but a short career, as, although neutral, she was sunk by a German torpedo, off the Belgian coast.

During 1907, when the Austrian owners, Fratelli Cosulich, of Trieste, decided to embark upon the passenger trade, carrying Italian labourers to Buenos Ayres, their first ship for the service was the Linthouse-built *Oceania*.

A number of vessels were also built during the same period for the Compagnie Belge Maritime du Congo, for their cargo and passenger-trade between Antwerp and the Congo. This was a profitable and increasing service, although hampered by the limited draft at the bar of the Congo River; the successive ships built at Linthouse for this company were of increasing size, culminating in the *Anversville*, of 7,645 tons. This ship, which was built in 1912, returned to the yard, eighteen years later, in 1930, to be reconditioned and thoroughly modernized, with new boilers fitted with superheaters; she now appears good for another eighteen years, and her owners report that she is highly satisfactory, with most economical fuel consumption.

An account of work done for foreign owners would be incomplete without some reference to the curious structure built by the Firm, in 1902, for a Spanish client, Señor Felix de Chavarri. Designed to represent the navigation bridge and forward deck-house of a mammoth ocean-liner, it consisted of two stories, the lower one of steel, about 50 ft. square, the upper of teak, representing a wheel and chart house. The upper house was the billiard room, while the lower contained other public rooms and bedrooms. All the apartments were very handsomely panelled in polished hard-woods, as was the practice in shipwork at that

time, and the whole structure rested on a very solid stone and cement foundation, about 10 or 12 ft. high, containing the kitchens and offices. The house was built on the summit of a hill, overlooking Bilbao, and Mr. Hunter took a great interest in the scheme, personally designing many of its naval features. Much of the work was done in the shipyard, the whole structure taking many months to complete, and a number of men being sent out to Bilbao to assist in its erection. It was currently reported, at the time, that the building was in some way to play an important part in Spanish political events, but the Linthouse "Ship House" does not appear to have figured in the revolution of 1931!

Since the completion of the aforementioned foreign vessels, and after the War period, the drastic change in conditions is clearly reflected at Linthouse by the entire absence of Continental orders; it is not until 1931, the year of fiscal change and the fall in value of the pound sterling, that an order from the Continent appears, in the shape of a 7,400-ton cargo-ship for the Compagnie de Navigation d'Orbigny, of Paris.

With the gradual decline of Continental orders, contracts were secured for Linthouse from another quarter overseas, a large proportion of the vessels required for the reconstruction of the merchant fleets of Australia and New Zealand being built by the Stephens between 1902 and 1913. These Australasian vessels, which totalled some 42,000 tons, included ships for the Australasian United Steam Navigation Company, the Howard Smith Company, the Adelaide S.S. Company, and the Union S.S. Company of New Zealand.

Three ships were built for the Australasian United Steam Navigation Company, and each presented special problems to their builders. As it was supposed in Australia at the time that 340 ft. was the maximum length for some Australian ports, the first ship, the *Wyandra*, of 4,058 tons, was limited to this length, while her speed, deadweight and cargo-capacity were all specified under penalty at the maximum. The contract was difficult, but all conditions were fulfilled with the barest possible margin, and the *Wyandra* proved a highly successful ship.

The second of this series, the *Wyreema*, of 6,338 tons, was also a difficult contract, so much so, in fact, that an eminent Clyde shipbuilder declared the conditions to be impossible, especially in respect to stability. Here again, however, the conditions were fulfilled with the dimensions 400 ft. by 54 ft. by 33 ft. 3 ins. The third ship, the *Levuka*, was similar to the *Wyreema*, but the design was complicated by the fact that half her cargo space was required for the carriage of bananas from Fiji to Australia, necessitating refrigerating machinery and insulated holds. A few years ago the *Wyreema* and *Levuka* were sold to the Lloyd Brasileiro

Cia. de Nav., of Brazil, and sail to-day under the flag of that company, bearing the names *Pedro I* and *II*.

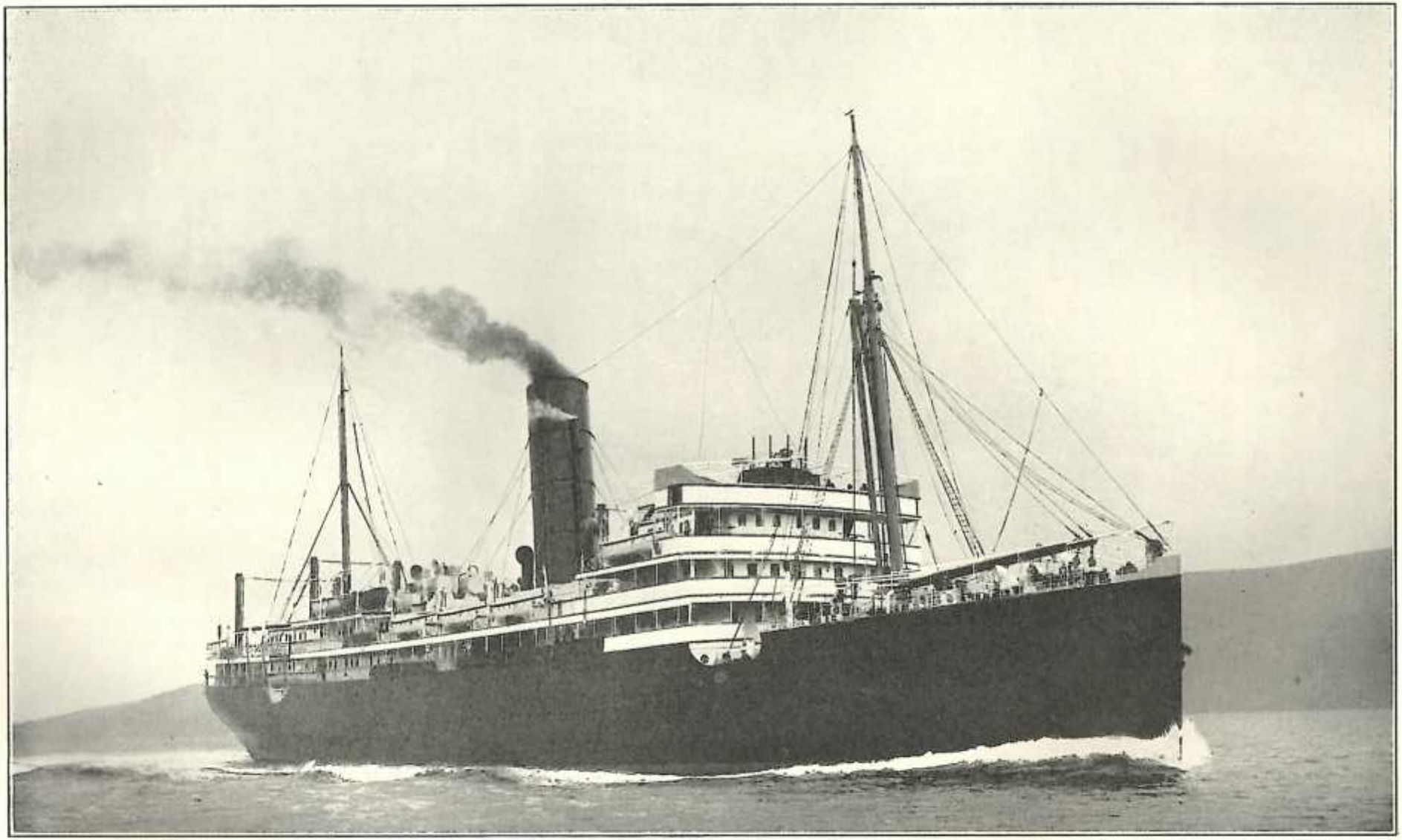
The specifications of the Howard Smith Company and the Adelaide S.S. Company were equally difficult, and, as all these ships were most elaborately equipped, it became proverbial at the time among shipbuilders, that an Australian vessel spelt a loss. Throughout the eleven or twelve years during which the boom lasted, however, Linthouse managed to satisfy the owners and take repeat orders whenever they were offered.

Three passenger ships were built for the Howard Smith Company—the *Cooma*, of 3,839 tons; the *Canberra*, of 7,707 tons; and the *Mourilyan*, of 1,349 tons; the last-named being a small cross-Channel steamer, which attained a speed of 15 knots on trial.

The *Koombana*, of 4,399 tons, built for the Adelaide S.S. Company, in 1908, was one of the earliest merchant-ships to be fitted with watertube boilers of the Babcock type. Unfortunately, however, she became a total loss, being wrecked on the Australian coast within a few months of her arrival in that latitude. The *Makura*, of 8,075 tons, built for the Union S.S. Company of New Zealand, was a passenger liner running across the Pacific between America and Australia; she is still on this route, after having been altered to burn oil fuel. The *Makura* formed the last link in the chain of passenger and mail transport round the globe by all-British steamers and railways. She was hailed in Australasia as the first ship of the " All-Red " route. F. J. Stephen and A. S. MacLellan went out to Australia with her on her maiden trip. Curiously enough, another Linthouse vessel, the *Port Kingston*, of 7,585 tons, built in 1904, was also taken over by the same company, who re-named her the *Tahiti* and fitted her to burn oil fuel; after running in conjunction with the *Makura* for many years she was eventually lost in 1931.

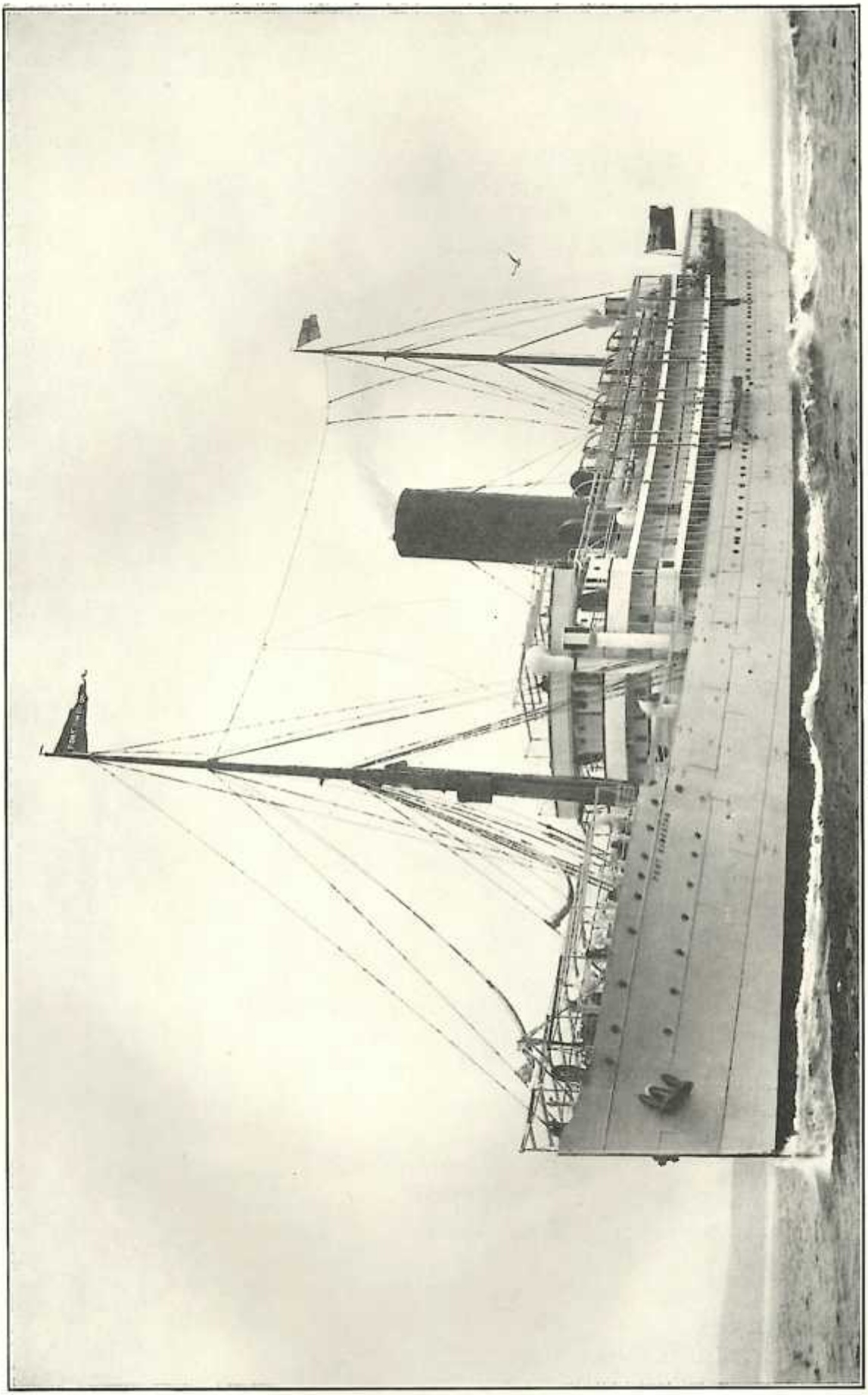
The eight ships detailed above were all built before the War, since when this opening for shipbuilding appears to be closed, owing to the financial position of Australia. Only two tugs have been built at Linthouse for Australia since the War, the *Forceful* and *Carlock*, both powerful, sea-going vessels constructed for the Australasian United Steam Navigation Company in 1925 and 1929.

While the Australians were building, another Colonial connexion commenced with the completion, in February, 1901, of an interesting little steamer, the *Port Morant*. She and her sister ships (one from Ramage & Ferguson, Leith and a second from Messrs. Stephen & Sons), were ordered by a Captain Lamont and Mr. Cousins, who started a company in Glasgow, with the object of importing bananas from the West Indies. This project had never been attempted before, as the



"Makura."

Still—in 1932—a well-known passenger liner in the Pacific. 1908.



"Port Kingston."

First large passenger and banana ship. 1904.

voyage was too long to carry the fruit in a fresh condition; indeed, to do so, even with refrigeration, was considered almost impossible.

The original company, being unable to carry out its contract owing to lack of capital, suspended payment when the first ship was in frame and much material for the second already in the yard. Shortly afterwards, however, Sir Alfred Jones, chairman of Elder Dempster & Company, deciding to take up the venture, approached the builders with a view to purchasing the first ship. His wish was for a larger vessel (she was only 290 ft. long), and he desired her lengthened by 30 ft., in order to fit a large amount of passenger-accommodation and (ample) refrigerating plant. All these requirements were eventually arranged.

As the ship was in frame, she had to be cut in two, after being partially plated, her after end launched down thirty feet, and the gap built in amidships, as described in full elsewhere. She was launched in 1901, and sailed on her first voyage from Avonmouth, under the colours of the Imperial Direct West India Mail Service, for Port Kingston, Jamaica; here she loaded the first cargo of bananas that ever left the West Indies for Europe. Her voyage was naturally watched with great interest by her owners, who were delighted when the cargo arrived in fairly good condition, giving great hopes for the future, which have since been amply fulfilled.

As soon as the *Port Morant* had proved the practicability of this venture, two other ships were built for the same trade, by Messrs. Raylton, Dixon & Company, and eventually Sir Alfred Jones ordered a larger vessel, the T.S.S. *Port Kingston*, of 7,585 tons, launched in 1904. The latter, one of the handsomest steamers ever built at Linthouse, enjoyed an honourable career, first on the Atlantic and later on the Pacific Ocean.

The business of the Imperial Direct West India Service was then absorbed by Elders & Fyffes Ltd., a company which has been so progressively developed that in 1930 its fleet included thirty-eight vessels of a total of 202,000 tons, all engaged in the transport of bananas to Europe. The foundation of this immense business was due to the energy, enterprise and foresight of the late Sir Alfred Jones, and the ability and resource of Mr. A. H. Stockley, the late Mr. Ackerley and Captain H. F. Bartlett, the directors who have so ably piloted the organization down to present times.

Great difficulties had to be surmounted and much experience acquired in the early days, before the business became so successful. It was necessary, for example, to ascertain at what stage of ripeness the bananas should be cut, and at what temperature the steamers' holds should be maintained to ensure the fruit being landed in a proper condition for distribution. Again, the railway companies had to be induced to furnish

specially insulated vans for the transport of the fruit throughout the country in winter, when a touch of frost might destroy an entire cargo. However, all these problems have now been overcome, both in Great Britain and on the Continent. It is a matter of great regret, however, that Sir Alfred Jones, who was always most enthusiastic regarding the prospects of the business, did not live to see his ambition that bananas should be sold in this country at ½d. each, so nearly realized as it has been during recent years.

Sir Alfred, a man of wide views and great enterprise, was undoubtedly a firm friend to Alexander Stephen & Sons, who built for him at the rate of one ship per year for ten years, until his death in 1907. The first vessel constructed at Linthouse for Elders & Fyffes Ltd., in 1905, was the *Nicoya*, of 3,617 tons, which was followed in due course by the ships listed below:

Nicoya (I)	T.S.S. *Camito*	*Chagres* (II)
Barranca	T.S.S. *Bayano* (II)	*Telde*
Tortuguero (I)	*Tortuguero* (II)	*Orotava*
Manzanares	T.S.S. *Cavina*	*Nicoya* (II)
T.S.S. *Chagres* (I)	T.S.S. *Ariguani*	*Corrales*
T.S.S. *Bayano* (I)	*Tucurinca*	

The majority of these vessels transport bananas only, but the twin-screw ships, running on Elders & Fyffes' passenger service to the West Indies, carry a hundred passengers each, in addition to their fruit cargoes. The small ships, *Telde* and *Orotava*, were built for the fruit and vegetable trade between Liverpool and the Canaries.

Considering the present enormous world consumption of bananas, it is interesting to recall that the fruit was once an expensive curiosity, exhibited at the Colonial Exhibition of 1887. Its current popularity and efficient distribution are largely due to the close and friendly co-operation between the owners, shipbuilders, and refrigerators—Messrs. J. &. E. Hall Ltd., of Dartford.

Though the main principles of the original systems of construction, insulation and refrigeration devised for the first *Nicoya* have not been greatly altered, the second *Nicoya*, of 1929, is different in almost every detail, showing many gradual improvements of methods, simplifications of fittings and new constructional materials. The process of improvement is still by no means completed, however, and the co-operative method is still carried on, after twenty-five years, with as much enthusiasm as at the commencement of the enterprise. The growth of Messrs. Elders & Fyffes Ltd., from a one-room office in Covent Garden to an organization covering all Britain and many parts of the Continent, is a striking example

of what can be achieved, and may still be done in the future by the application of science to the creation of new trades.

Besides the West Indian ships, Sir Alfred Jones built at Linthouse, during the same period, a large number of vessels for the West African trade of Elder Dempster & Company; these ships, which were all specially designed to suit west coast conditions, included the *Burutu*, *Tarquah*, *Karina*, *Mendi* and *Falaba*, all of about 4,000 tons. This branch of the business was run in conjunction with the Belgian firm, Cie. Belge Maritime du Congo, which continued building at Linthouse as already detailed elsewhere.

During the pre-War years of the present century many other well-known shipowners were constant customers of Linthouse. Four vessels were built for the Anchor Line—one Indian trader, the *Massilia*, 5,353 tons; the two cargo-ships, *Anchoria* and *Media*, and one Atlantic liner, the *Tuscania I.*, of 14,348 tons. Four large passenger-ships were also constructed for the Allan Line—the *Tunisian*, *Virginian*, *Grampian* and *Hesperian*; the *Virginian*, 10,754 tons, is notable as being one of the first two Atlantic liners to be propelled by steam turbines, in 1905, while the *Tunisian* was the first ship built at Linthouse to British Corporation rules.

The Clan Line also constructed the three cargo-ships, *Clan MacLachlan*, *Clan MacNaughton* and *Clan MacQuarrie*, of about 5,000 tons each, while the Aberdeen Line (George Thompson & Company), built the sister ships, *Miltiades* and *Marathon*, in 1903.

When the British India Steam Navigation Company decided to reconstruct its fleet in 1910, the Stephens received a large proportion of the orders, and, between that date and 1914, 52,500 tons were built for this company alone. Ten ships were constructed, varying from plain cargo-ships to passenger vessels and high-speed mail-carriers; all, however, possessed the common characteristic of being suitable for Indian waters and conditions.

Alongside the above vessels a continuous succession of cargo-ships was laid down to augment the growing fleet of Maclay & McIntyre, for whom several vessels were built about this period, ranging from the *Uganda*, in 1905, to the *Mascara*, in 1912—a total tonnage of 32,668 tons.

Prominent in the yard's records is the *El Uruguayo*, 8,361 tons, built in 1912 for Furness Withy & Company, and the first Linthouse ship to be completely insulated and refrigerated for the transport of frozen meat.

Meanwhile, in addition to the ordinary output of approximately 30,000 tons of cargo and passenger ships per annum, various smaller craft were constructed, including the steam yachts, *Emerald* and *Medea*, and

the tugs *Cruiser*, *Victor* and *Campaigner*, for Messrs. Steel & Bennie's Clyde River service.

* * * * *

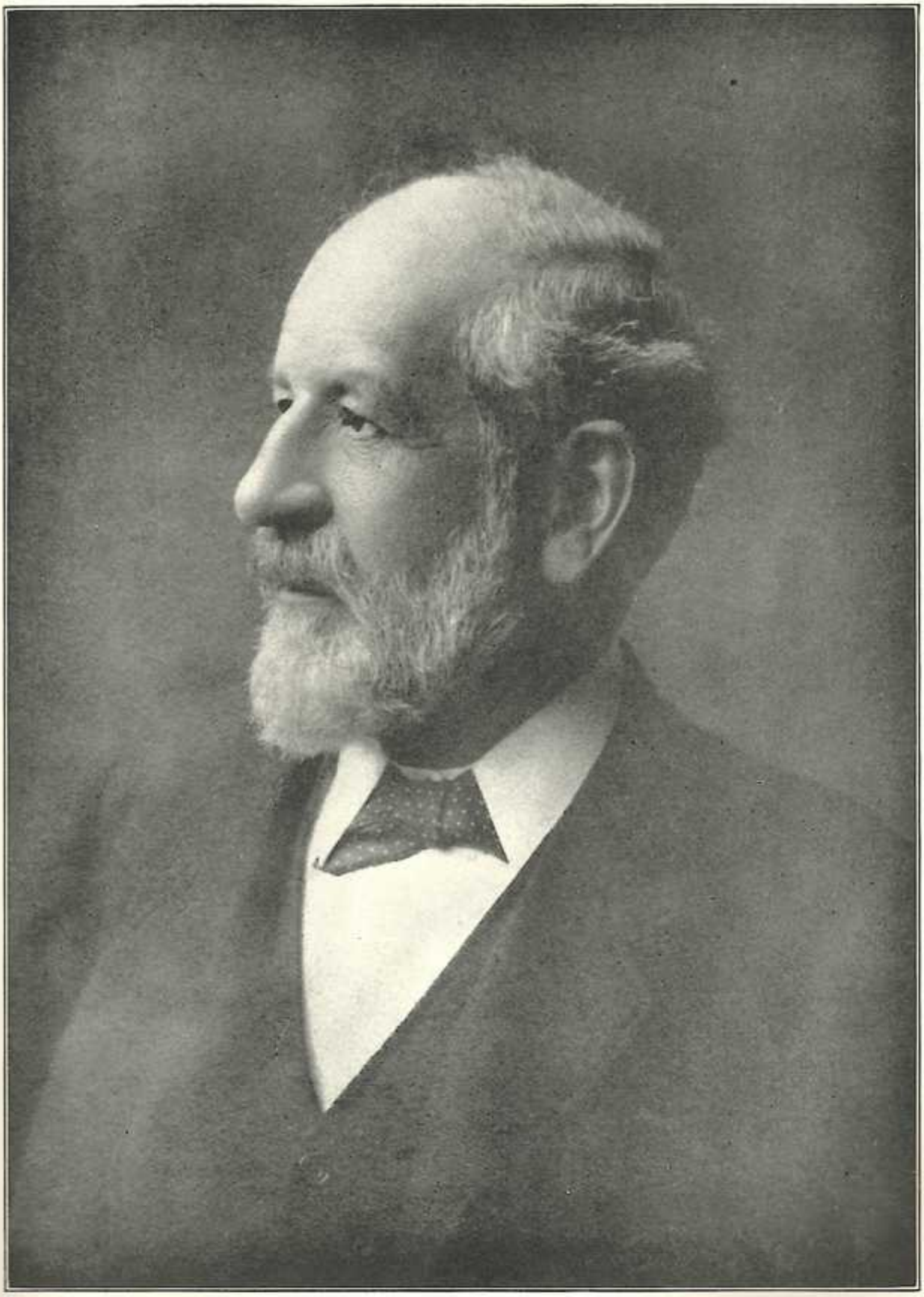
During the pre-War period, outlined in the previous pages, various changes naturally occurred in the Firm's personnel, owing to the inevitable and regrettable operations of "Anno Domini." It has already been shown how, after the death of Alexander Stephen, in 1899, the Firm was converted into a limited liability company, of which his brother, John Stephen, became chairman. About 1902 the latter being well advanced in years, the active direction of affairs passed into the hands of A. E. and F. J. Stephen, sons of the late Alexander, both of whom had been partners in the business since 1887. But John Stephen continued as chairman until his death in March, 1917, at the age of eighty-one. Though trained as an engineer, he had throughout his business life been in charge of the construction work in the shipyard, and was exceedingly popular with the men, who latterly referred to him as "Old Jock." He was greatly interested in Central Africa, being one of the founders of the Livingstonia Mission, and also of the African Lakes Corporation, which was so largely instrumental in opening up the Zambesi Valley as a trading route. An exceedingly generous man, he more or less financed the building of at least two Govan churches, in addition to the Govan Y.M.C.A., and contributed largely to many African missions and Glasgow charities.

The yard manager, Robert MacMaster, who had been with the Stephens since 1864, became a partner before his death in 1902, while Robert Kelly, another forceful character, who had grown up with the Firm, held the post of engine-works manager. Matthew Hunter, a man of unusual personality and ability, who had joined in 1899 to assist F. J. Stephen, succeeded Robert MacMaster as yard manager, in 1902, and became a director in 1908; he retained charge of the yard throughout the exceptionally difficult War period.

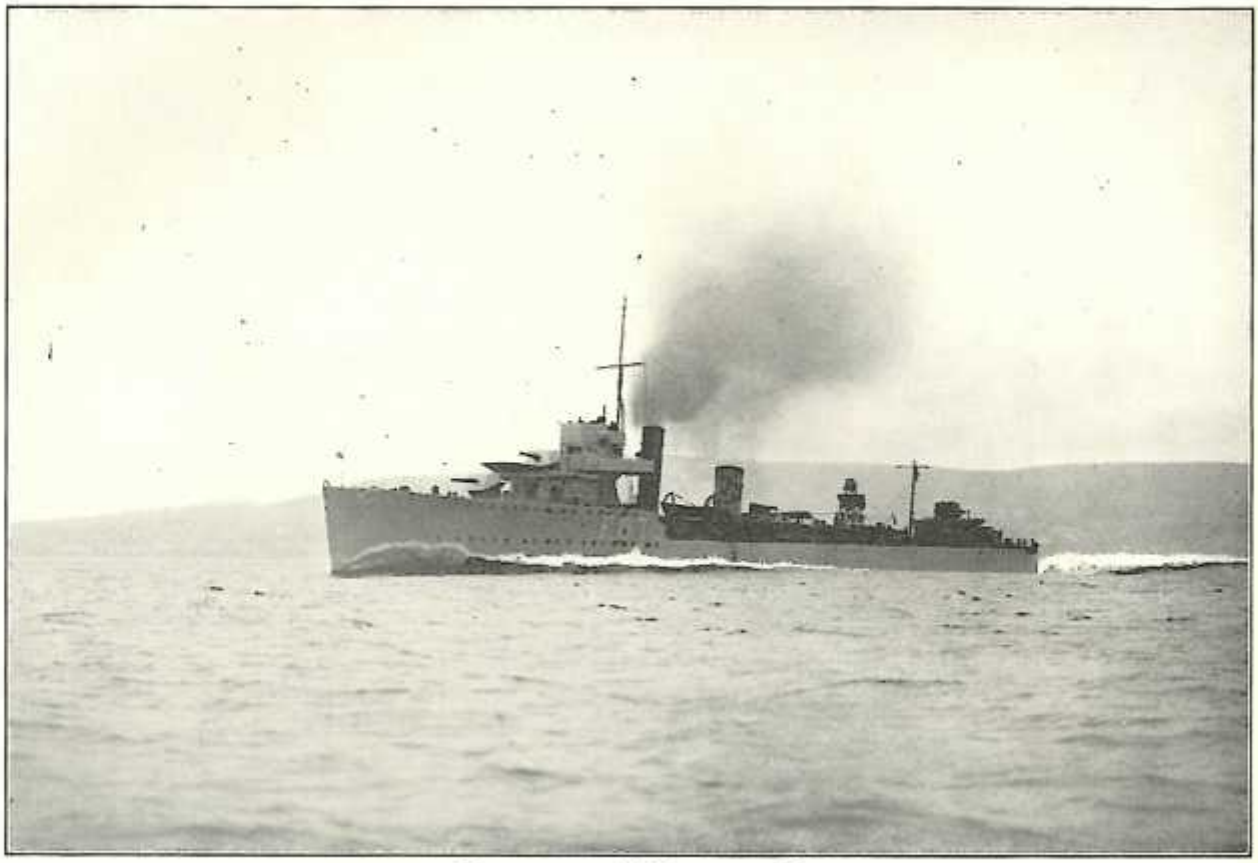
The secretary, Alexander Scott, a well-known figure at Linthouse for many years, was also made a director in 1908, shortly before his death in 1910, when he was succeeded by the then assistant secretary, Thomas W. McIlmoil.

A nephew of the Stephens, Alexander Stephen MacLellan, became a director in 1913, after having been some years in charge of the engine works, to assist his uncle, A. E. Stephen. The shipyard drawing-office was under the direction of Shirley B. Ralston, who was made a director, with T. W. McIlmoil, in 1921.

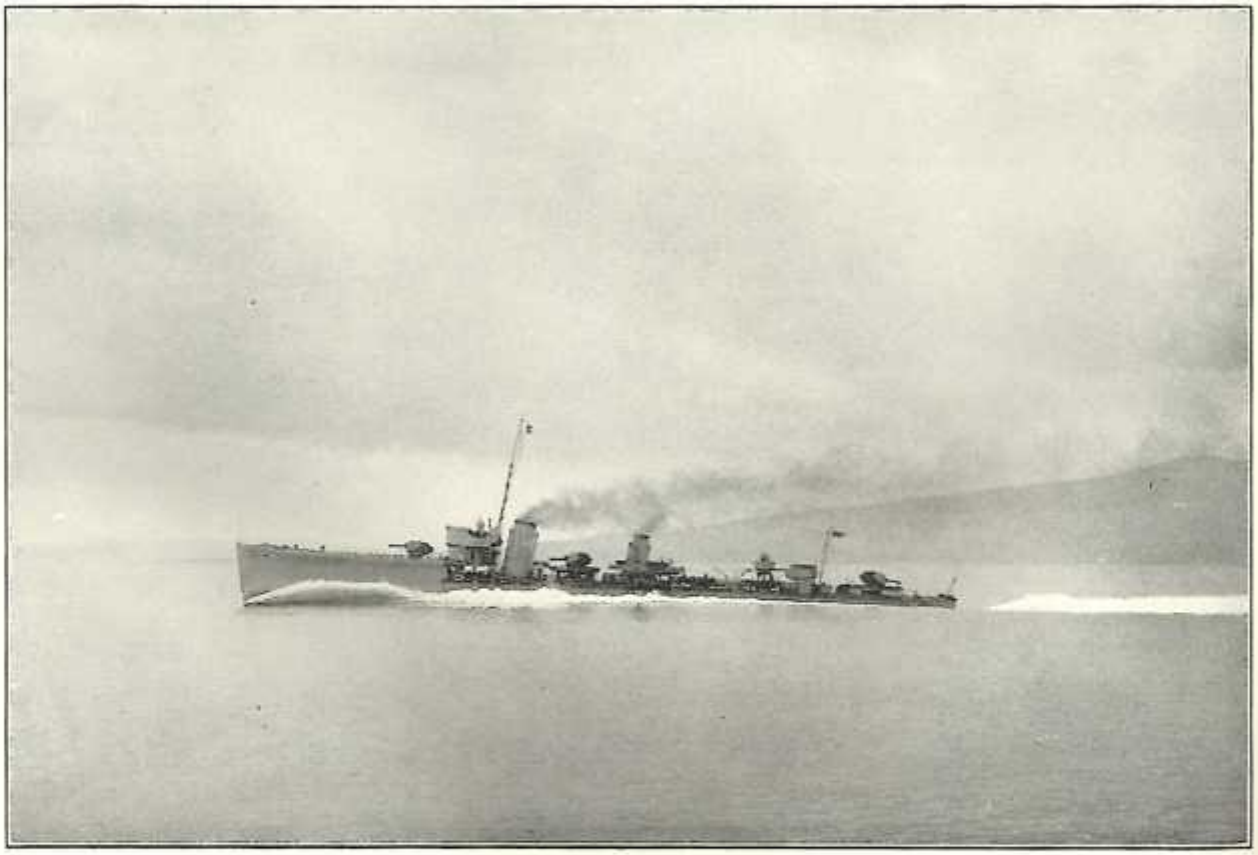
In 1904, the Firm opened a department to deal exclusively with repair-work, in addition to its shipbuilding and engineering activities. For



John Stephen, 1835-1917.
Dundee—Kelvinhaugh—Linthouse.



Destroyer "Voyager."



Destroyer "Saladin."

this purpose a piece of ground belonging to the old Napier Yard, close to Govan dry docks, was purchased, fitted with shops and machinery, and placed under the management of Mr. Thomas Ballantine, well known in ship-repairing circles. Among the much important work handled by this new department was the lengthening of the two Aberdeen liners, in 1912, and the conversion of several ships from cargo-carriers to oil tankers, during the War.

War Period

1914–1918

The War years of 1914 to 1918 are reflected in the shipyard records by a sudden drop in the annual output of tonnage from 41,000, in 1914, to no merchant ships at all, in 1916, and an average of 11,000 tons of merchant work for the following five years. First came a gradual paralysis, caused by the enlistment of workers, then an increased activity, due to the building of torpedo-boat destroyers, aeroplanes and other War work.

For a short time after the outbreak of hostilities the Firm, having a full order book, carried on its usual programme, but it soon became apparent that all the resources of the country would be needed to supplement the activities of the regular warship builders and naval dockyards.

In November, 1914, Messrs. Stephen & Sons were visited by a representative of the Admiralty, in the person of Admiral Sir Reginald Hall, R.N., who suggested that the most suitable vessels for the Firm to construct were light cruisers, torpedo-boat destroyers and submarines. It was evident that at first it was not the intention of the Admiralty that the ordinary work of the Firm should cease. Indeed, this was scarcely practicable, as some of the berths were still occupied by merchant ships in various stages of construction, and there were signs of a growing demand for such vessels as transports, hospital ships and armed merchant-cruisers.

In view of the type and capacity of the yard, it was decided that a beginning should be made with torpedo-boat destroyers, and in December, 1914, an order was placed with the Firm for two vessels of the Admiralty-designed "M" class, to be named the *Noble* and the *Nizam*, their yard numbers being 470 and 471. The first of these vessels was delivered in February, 1916, but before their delivery took place orders were received for two more of the same class. These were followed, at intervals, as shown in the table of vessels completed during

the War, by fourteen others, making a total of eighteen, practically a whole flotilla, as enumerated below:

Noble	*Prince*	*Tormentor*	*Sabre*
Nizam	*Pylades*	*Tornado*	*Saladin*
Nomad	*Sturgeon*	*Vesper*	*Sardonyx*
Non Pareil	*Sceptre*	*Vidette*	*Saturn*
		Voyager	*Sycamore*

All the propelling machinery for the above vessels was constructed in the Linthouse engine and boiler shops, save that supplied to the *Noble*, *Nizam* and *Nomad*, which were fitted with machinery built elsewhere on the Clyde.

The first four sets of machinery were triple-screw direct-driven Brown-Curtis turbines; subsequent ships had also Brown-Curtis turbines, but with single-reduction gearing driving twin screws. The aggregate S.H.P. per ship was about 30,000. The boilers, of which there were three per vessel, were of the usual water-tube type, the first four sets being constructed by Babcock, while the remainder were made at Linthouse to Yarrow's design.

A maximum speed of almost 37 knots was attained on trials, which took place on the measured mile at Wemyss Bay, as in peace time; in this instance, however, the destroyers' guns were ready for action against submarines as soon as they were outside the defence-boom across the Firth, between Dunoon and the Cloch.

Throughout this period, when many firms were engaged upon war-work, there was a very welcome co-operation between the various organizations. The spirit of co-operation thus inaugurated has continued, and, as time passes, it becomes increasingly apparent that closer contact between the units of the engineering and shipbuilding industries is a vital factor in establishing the success of Great Britain in competition with foreign countries.

One of the most unusual events of that time was the midnight launch of H.M.S. *Non Pareil*—the first, and probably the last, in the experience of the Firm. Although there was a great demand for more destroyers during 1916, it was not for this reason that the witching hour was chosen. Owing to exceptionally cold weather, or inferior grease, the vessel failed to move more than a few feet when the triggers were released at 11 a.m., on May 15th, 1916. The " ways " were immediately removed, re-greased and replaced, and thirty-six hours later, at almost midnight on the 16th, the launch took place by the light of a brilliant full moon—a most creditable performance on the part of the shipwrights.

Several of the Linthouse-built destroyers did not remain long unscathed. H.M.S. *Nomad* was sunk at Jutland, after being in commission

only a few weeks, while H.M.S. *Sturgeon* tried conclusions with a mine shortly after leaving her builders. Apropos the latter accident, in which the after part of the vessel, up to the bulkhead forward of the wardroom, was completely removed, a friend from Chatham sent word to Linthouse that "The fish had lost her tail!"

An early War incident, in December, 1914, at the time of the Scarborough raid, was the despatch of twenty-four Linthouse carpenters, in charge of their foreman, Charles Brown, to Scapa Flow, for work on the Grand Fleet. Their work, which consisted largely in repairing storm-damaged ships on the spot, included far more than timber repairs; they undertook all kinds of woodwork, steelwork, hole-boring; in fact, whatever was required, as the Navymen appeared to imagine that no job was too big for them. The constant movement of the Fleet, however, prevented their being constantly employed, and they returned home, after considerable delay, in February, 1915.

Working conditions were extremely difficult, especially during the earlier years of the War. Prices and wages rose to unprecedented heights, while skill fell in equal proportion, and materials were controlled so that no yard could be sure of obtaining even its nominally-allotted quota. Gradually, however, the various problems were surmounted, large numbers of women being employed and found eminently suited to different kinds of work. The manufacture, or mass-fabrication, of standardized aeroplanes, also undertaken by the Firm, was equally hampered by lack of both materials and labour.

AEROPLANES

In the Spring of 1915, Messrs. Stephen & Sons, together with several other shipbuilding firms, were consulted by the War Office, regarding the construction of aeroplanes. It was found that establishments with large woodworking departments could, with certain modifications, undertake the supply of the fuselages of aeroplanes. In the case of Linthouse, the only difficulty lay in the erection of the machines, which was overcome by installing and equipping for this purpose a new building, 400 ft. long by 70 ft. wide, along the east side of the yard.

In this building there was ample room for the frame-erecting department, wing and tail section, completed nacelles, doping room, enamelling room, large store, and A.I.D. office; there was also space for erecting completed machines, and for the large cases wherein they were packed, which passed out through large doors, on horse lorries, for despatch by rail. An annex along one side was added later, for the accommodation of mechanics, metal-workers and the necessary machinery.

The aeroplanes were built on a mass-production system, in conjunction

with Messrs. G. & J. Weir Ltd., of Cathcart; owing, however, to early difficulties in arranging the fabrication system of the different parts, the first machine was not completed until 20th August, 1915. After that date, the rate of production improved rapidly, and latterly as many as four or five 'planes per week were despatched.

At the termination of the War, there had been completed and despatched to the Continent, Russia, and home aerodromes, fifty B.E. 2C scouting machines, and 430 F.E. 2B fighters, the last hundred of which were fitted with special electric outfits for night-flying, in addition to Holt flares and bomb-carriers.

The engines for all the machines were supplied by the Royal Aircraft Factory, and several of the 'planes were flown direct from Renfrew Aerodrome to the Western front. The major portion of the woodwork for all the machines was made in the joiners' shop, at Linthouse, which also handled large quantities for Messrs. G. &. J. Weir's aeroplane factory, at Cathcart.

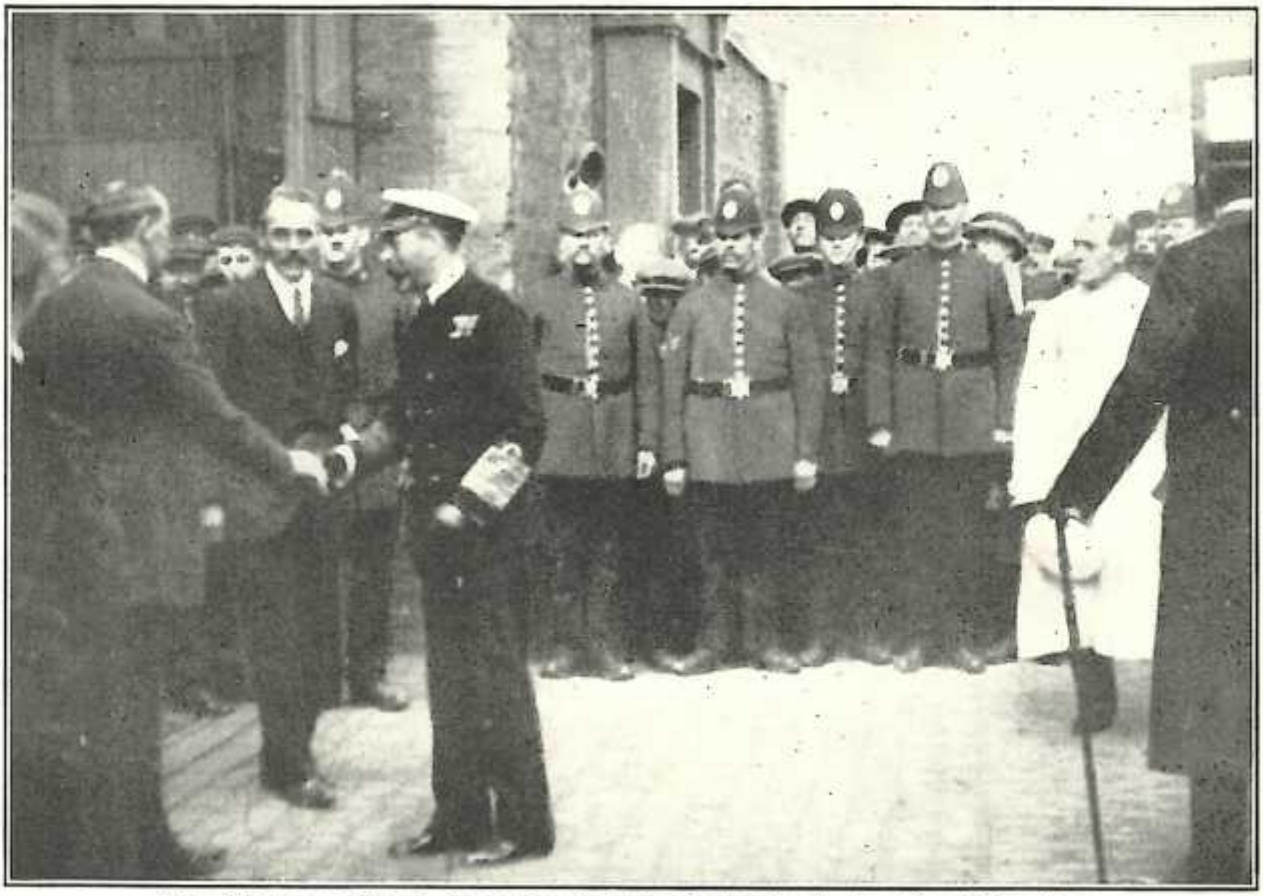
One hundred sets of B.E. 2E wings and tail-planes were also made in the joiners' shop, and 25 used sets were stripped, reinforced and repaired. A vast quantity of spare-parts were also made, including 60 tubular nosings, 30 complete sets of wings, tail-planes, fins and rudders, fitted complete with mountings; the packing of one set of wings alone, in large cases 20 ft. long, 6 ft. wide and 4½ ft. deep, took four men a full day to complete.

At the same time continuous demands for replacements of various components were promptly attended to and despatched to the required destination. Another side of the work was the dismantling and rebuilding of crashed machines, sixty-four of which—some bearing ominous evidence of contact with the enemy—were taken down, twelve of these being entirely rebuilt. One of these rebuilt 'planes, No. B.410, brought down a Zeppelin during a London air-raid.

In addition to these contracts, material for 150 night flyers was received, tabulated and despatched to Messrs. Barclay Curle & Company Ltd., for erection; rough material was also distributed to sub-contractors for manufacture.

The erection contract terminated on 31st December, 1918, by the application of the break clause. The enumeration, packing and despatch of surplus material—comprising 9 complete and 20 incomplete machines, 31 sets of wings, 103 cases of instruments, 337 cases of various fittings and material, containing a total of 224,250 items; also 3,846 gross of bolts, pins, washers, ferrules, etc., in many different sizes, with an advice note of contents, and seven copies of A.S.1 forms placed in each of the 440 cases—took six months to complete.

The first of fifty B.E.2C Scouting Biplanes erected at Linthouse, August, 1915.



His Majesty King George V being received by the Directors of Alexander Stephen & Sons at Linthouse on 18th May, 1915.

H.R.H. The Prince of Wales being escorted through Linthouse Works by A. E. and F. J. Stephen in 1918.

From start to finish of the contract, not a single machine was turned down, or a serious complaint received from pilots, headquarters, or A.I.D. In June, 1918, a warm letter of appreciation was received by the Firm from the Department of Aeronautical Supplies.

Although work was constantly hampered by delays in the supply of components, a considerable number of hands—averaging 6 staff, 130 men and 60 women—were fairly consistently employed. During the progress of the work, the Government arranged several lectures and cinema demonstrations to show the workers some of the results of their labours.

Several Linthouse-built machines are mentioned in the following official accounts :

"The night fliers have been very active of late and have been doing some very efficient work both in bombing and in night reconnaissance, flying over roads and railways, dropping flares at intervals and reporting when and where troops and transport were observed.

"It is risky work, because the machines have to come low and are under heavy fire, but the risks have been well justified, and most valuable information obtained.

"Three night fliers, Linthouse-built machines—Nos. A5711, A5749 and D9099—set out on one of these trips in very bad weather, to get some urgently required information. They started about 11 p.m. and were greatly hindered by severe rain-storms and low clouds. They persisted, however, flying as low as a few hundred feet, dropping lights and noting where lights were seen in woods, and troops and transport observed on the roads. On several occasions the troops showed up so plainly in the light of the flares, that our men were able to turn their machines' guns on them, doing a great deal of damage and scattering the troops. The wind and rainstorms grew worse, and all three machines had the greatest difficulty in struggling back with a 30-mile-per-hour wind against them. They succeeded in crossing the line 300–400 ft. up, and of course were subjected to a very heavy fire.

"The whole trip was carried out most daringly and successfully, and the skill and daring of the pilots and observers was recognized by awarding them all the Distinguished Flying Cross !"

In another raid, a Linthouse machine, No. A5713, "saw lights on a Hun aerodrome. On making for it the light was extinguished, but the pilot flew round and fired a coloured light, whereupon another aerodrome was lit up and two Huns were seen taking off and one landing. Our pilot came down and dropped eight light bombs round the 'drome : the lights were promptly extinguished and one of the Hun machines was seen, in the light of a flare, to have crashed in the darkness."

On another occasion, " the above machine with two others, in a night reconnaissance, encountered bad weather and heavy rainstorms, but managed to find a field packed with transport. Flares revealed transport, troops, and apparently an artillery brigade bivouacked, and these were bombed and machine-gunned, and the troops dispersed in all directions."

* * * * *

During the latter part of the War, when the sinking of merchant-ships became increasingly serious, some standard cargo-vessels were built at Linthouse, to the order of the Controller of merchant shipping. Three of these vessels, which were altered and re-altered on the stocks, to meet the constantly-varying need to replace ships sunk during the intensive submarine campaign, were the *War Hunter*, *War Gascon* and *War Hussar*; all three were single-screw vessels of about 5,200 tons gross, of the type known at that time as " A " Class.

The fourth, taken over during construction, in 1920, by the New Zealand Shipping Company, and named the *Piako*, was a single-screw refrigerated cargo vessel, of 8,283 tons register with double-reduction geared Linthouse-built turbines. Contrary to the general experience with double-reduction gears, the machinery of the *Piako* was an outstanding success, and is still running at the present time, 1932. The only renewal has been one pinion—a good record for even a single-reduction gear for a ten-year period! It is interesting to recall that the first *Piako* was built at Linthouse for the same owners in 1876.

Work on the *Vasna*, which was building for the British India Steam Navigation Company in 1914, was stopped when the War broke out; after a year on the stocks she was converted into a hospital ship for the Persian Gulf, under the direction of Colonel Carter, celebrated for his reorganization of the Medical Service of the Mesopotamia Campaign.

The *Bayano*, built at Linthouse in 1913 for Elders & Fyffes Ltd., and converted into an auxiliary cruiser, was unhappily torpedoed off Port Patrick as she was proceeding south from the Clyde; her commander, Captain Parsons, an old friend of Linthouse, and most of his company, were lost.

Towards the end of the War, plans were considered for fabricated ships with straight frames, parts of which were to be constructed all over the country by bridge-builders and others, and finally assembled in the shipyards. Fortunately, however, the Armistice was declared before these examples of " Frightfulness " took shape at Linthouse.

In addition to supplying armaments, Linthouse also undertook the manufacture of artificial feet and ankles, under the direction of Yarrow's. These limbs, which were made in the modelmakers' shop, from rough beechwood blocks to several sizes, proved highly satisfactory when

completed with fittings and polished. As the shop was of but moderate size, the workers were limited to one foreman and nine joiners; despite its small staff this department completed and delivered 2,175 feet and ankles between April, 1917, and June, 1920.

Another war-time activity at Linthouse was the spare-time cultivation of allotments on the twelve acres of ground specially set aside for that purpose by the Firm. These allotments, which were situated in front of the main office, provided excellent growing-ground; fine crops were raised and there were keen contests for the prizes offered by the directors for the best produce.

Linthouse received Royal recognition of its War-work upon two occasions, as both H.M. The King and H.R.H. The Prince of Wales inspected the yard during their visits to the Clyde.

During the King's visit, on 18th May, 1915, a number of employees with long-service records were presented to His Majesty. The Prince of Wales, who inspected Linthouse in April, 1918, displayed keen interest in all departments, and insisted, with his usual enterprise, upon personally manipulating certain machinery, including a pneumatic riveter.

Both visits undoubtedly encouraged the people to renewed efforts during the critical days preceding the Armistice of November, 1918.

Post-War Period

1918–1932

At the end of the War a period of intense activity began. Owners filled the books of the shipyards with orders for new tonnage to replace ships lost in the War, in many instances absorbing individual yards to ensure the delivery of new vessels. The shipbuilders were equally harassed to ensure supplies of steel from the steelmakers, and many thousands of tons of steel were imported in stock sizes and taken up by the builders, at exorbitant prices, sometimes as high as £27 per ton, to keep the works going.

Many of the leading steelmaking firms were bought up by the larger shipbuilders, so that it became almost impossible for other builders to obtain steel to complete their vessels on the stocks. Prompted by these conditions Alexander Stephen & Sons, together with a number of other firms, including the Clan Line (which by this time possessed its own shipyard), combined to purchase the Steel Company of Scotland, of Blochairn & Hallside; this company had large rolling mills for plates and angles of all qualities, including the special Admiralty high-tensile steel, and a foundry which was one of the best-equipped for the largest type of steel castings, such as ships' sternposts.

Since then Linthouse has obtained all its steel from The Steel Company of Scotland, of which Fred J. Stephen is chairman, a position which he has held since the company was purchased by the Linthouse Firm and its associates in April, 1920.

The feverish period immediately following the War, when money appeared well-nigh inexhaustible, provided a new impetus to the already apparent tendency towards combines and amalgamations; firms of long standing and ancient name were absorbed and disappeared, or were controlled by others, and the terms "vertical" amalgamations and "horizontal" combines came into common use.

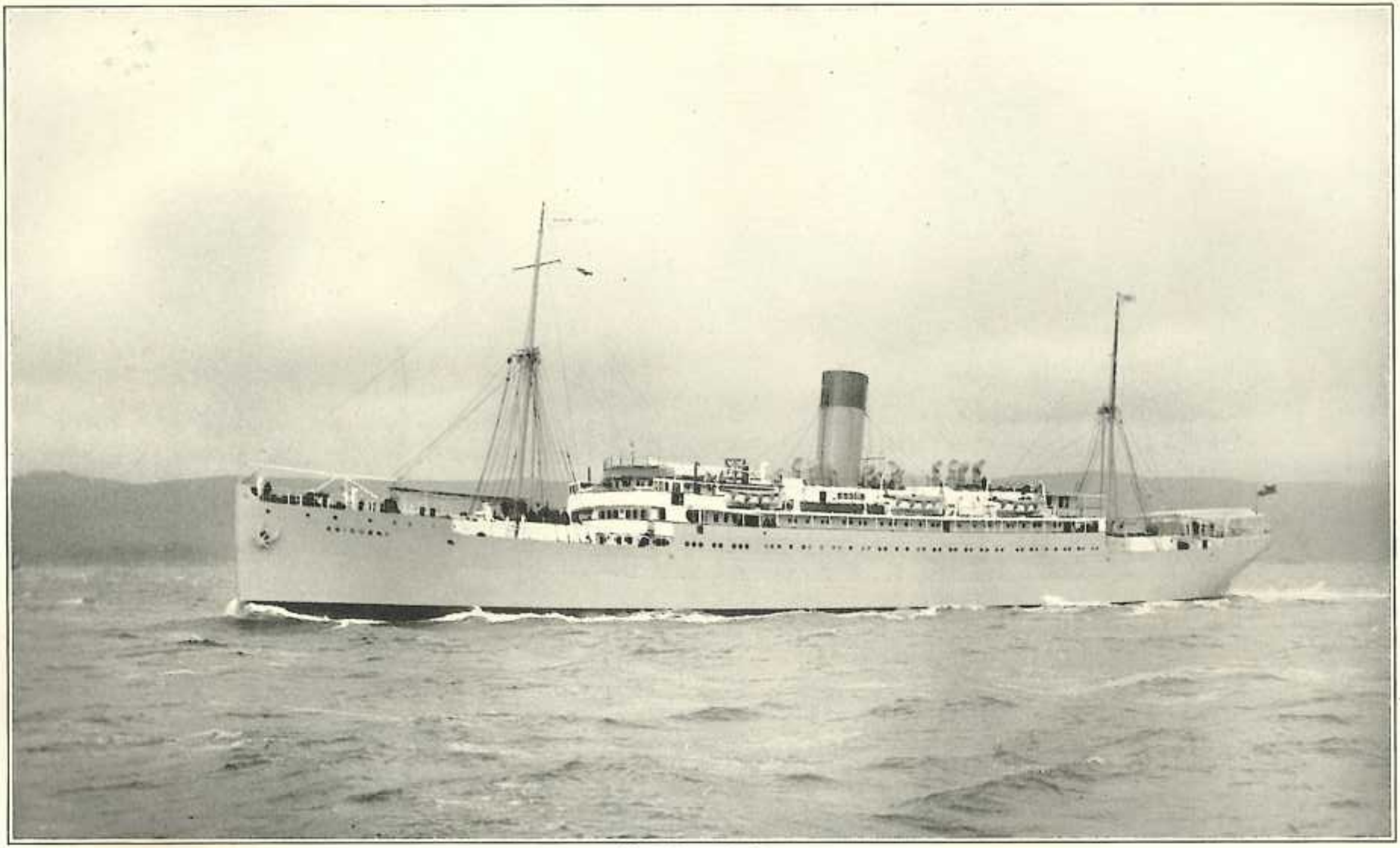
In addition to, or because of, the difficulty in obtaining material, labour was still a problem. The Government's War policy of "Peace at home at any price" had its effect in the post-War reconstruction; again, departmental delay and red tape kept many workers idle with their regiments merely for lack of the machinery necessary for their release. By degrees, however, work in the shipyards approached normal, and ships were produced in greatly increased numbers, though at greatly increased cost.

An unlooked-for effect of this large and expensive output was that many shipowners were unable to take up all the vessels ordered, and many were cancelled, with or without penalty. The Stephens did not escape this shrinkage of orders, but agreed to accept the cancellation of a number of contracts by old clients without insisting on penalties.

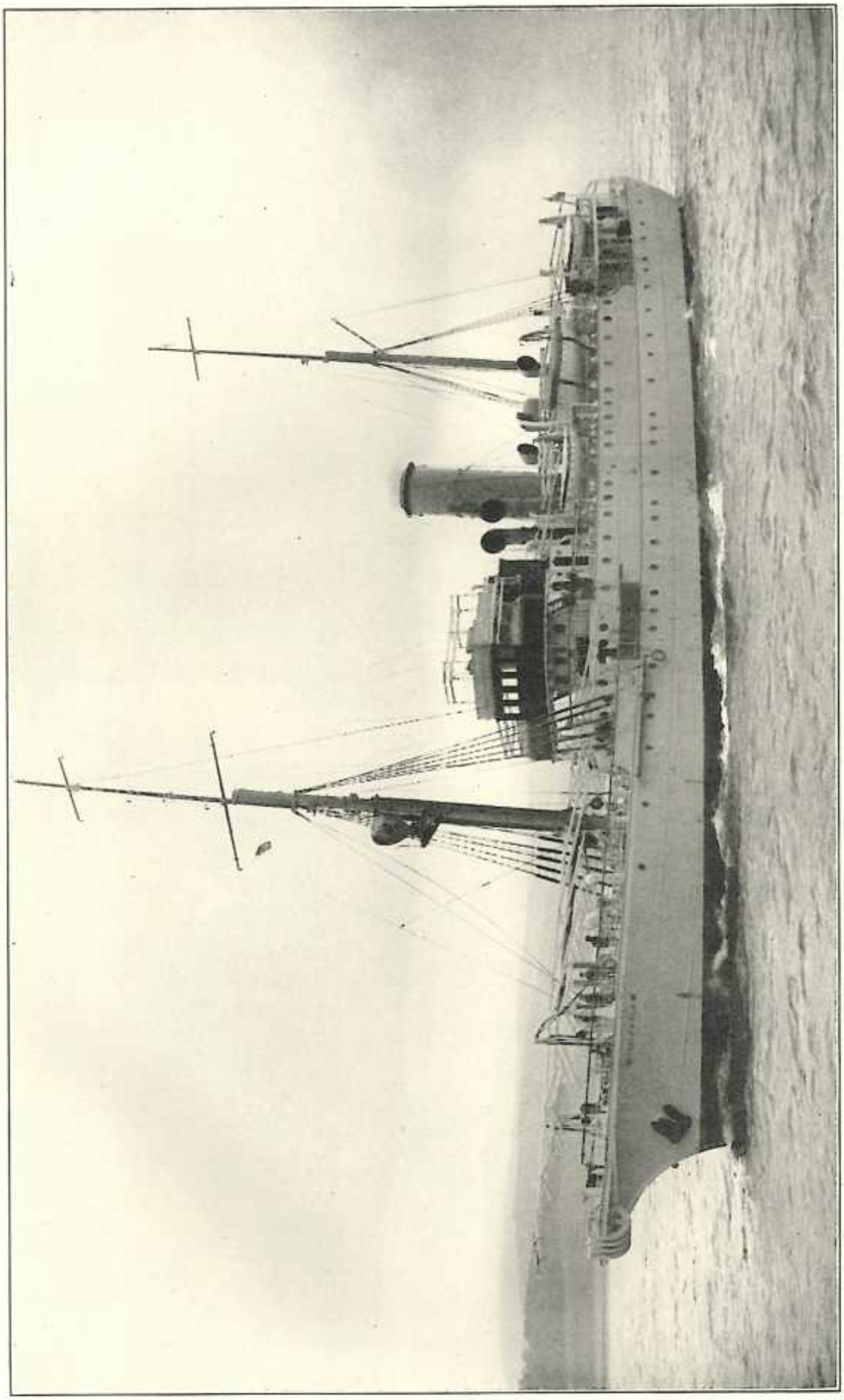
The first post-War ships to be completed at Linthouse were of the type urgently needed after the loss of so many provision-ships. Five insulated and refrigerated meat-carrying vessels were finished—the *Princesa*, in 1918, for Furness Withy & Company; the *Nariva* and *Natia*, in 1920, for the R.M.S.P. Meat Transports Ltd.; the *Piako*, in 1920, for the New Zealand Shipping Company; and the *Matakana*, in 1921, for the Shaw Savill & Albion Company.

A new series of banana ships was also commenced in 1921 with the *Tortuguero*, which has been followed by four others of a similar type, the *Tucurinca*, *Chagres*, *Corrales* and *Nicoya*, also the *Cavina* and *Ariguani*, two larger ships carrying passengers as well as fruit, and two smaller ships for the Canary trade.

Two large, luxurious liners for the Anchor Line were also commenced when the War ended, and finished in 1923 and 1925. These vessels were the *California* and *Caledonia*, of 17,000 tons each, which, with three similar ships, built at Fairfield and Dalmuir, formed a new fleet of the finest ships that had ever traded between the Clyde and New York. The *California* and *Caledonia*, easily the most important ships launched from Linthouse up to that date, were equipped with magnificent passenger



"Ariguani."
A passenger and banana ship. 1926.



"The Cable."
A cable repair-ship. 1924.

accommodation, and geared turbine machinery, with oil-fired boilers. The construction of both these ships was suspended by the owners during the 1921–2 slump, that of the first vessel for seven months and that of the second for fully two years. Though well advanced, neither ship suffered in the slightest through this delay. In 1926 a third ship, the *Britannia*, of 8,464 tons, was completed for the Indian passenger-trade of the Anchor Line.

Another series, built between 1921 and 1931 for old clients, was one of eleven ships for the British India Steam Navigation Company and its associates—the Khedivial Mail Steamship and Graving Dock Company Ltd., The Nourse Line, and the Australasian United Steamship Company.

The *Mulbera*, of 9,200 tons, and the sister ships, *Kenya* and *Karanja*, of 9,890 tons, were built for the East African branch of the B.I.S.N. Company, the former trading out of London and the two latter out of Bombay. All three are passenger-ships, the *Kenya* and *Karanja* being built to carry 1,700 natives, as well as 246 Europeans; all three are engined with twin-screw geared turbines with oil-fired boilers, the *Mulbera* having double-reduction gear, and the other two ships single-reduction gear.

The *Dalgoma*, 430 ft. long and 5,953 gross tons, launched in 1923, is an entirely different type—a cargo deadweight carrier (designed to carry on occasion a large number of Indian emigrants in her 'tween decks), on the lines of the company's pre-War ships, *Umta*, and others. Her propelling machinery is of a different type, and marks a milestone in the progress of the Linthouse engine-works, as the twin engines are two-cycle Diesels, of 3,200 S.H.P., of the Stephen-Sulzer type.

These engines were at that time the largest two-stroke engines built in this country, and the first of a standard size of cylinder, which has since been used in many ships. They were the first of the Diesel type to be constructed by the Firm, and were built under licence from Sulzer Brothers, of Winterthur, Switzerland. They have proved a great success, with a most economical consumption of fuel oil; the *Dalgoma*, which is giving excellent service, has, until recently, only once returned to this country since she was handed over.

The two ships, *Famaka* and *Fezara*, of 5,800 tons, were built in 1922 for the Khedivial Company's trade from Egypt to the Red and Ægean Seas. When these were sold to the Australasian United Steam Navigation Company, two smaller vessels, of 1,590 tons, the *Taif* and *Talodi*, were built, in 1928, to meet the altered conditions of the eastern trade. All are up-to-date vessels, as the company has progressed far since those dim days when the Arab captain set his course to Malta by means of

a red mark on his compass and returned home reporting that the island had vanished! As mentioned in the chapter on "Notable Associations," the seagoing tugs, *Forceful* and *Carlock*, were also built at Linthouse, in 1925 and 1929, for the same company.

The *Jumna*, carrying 9,300 tons deadweight, was launched in 1929 for the Nourse Line's trade between India and the West Indies. She is notable as being fitted with a Bauer-Wach exhaust turbine, to augment the power of her triple-expansion engines; her boilers burn oil-fuel.

A noticeable feature of the Firm's post-War work has been the scarcity of the purely cargo type of vessel, very few of this class having been built since 1918. Two interesting exceptions are the *Induna* and *Masunda*, both good examples of deadweight carriers, built in 1925 and 1929, to carry 9,000 tons deadweight, for the Firm's old friends, Maclay & MacIntyre.

On the other hand, more specialized vessels appear in the yard records, including a cable-laying ship, the *Cable*, of 1,534 tons, built in 1924 for the Eastern Extension Australasian & China Telegraph Company Ltd.; a home trade ship, the *Toward*, of 1,571 tons, constructed in 1923 for the Clyde Shipping Company; a cross-Channel steamer, the *St. Patrick*, of 1,922 tons and 20 knots speed, built in 1930 for the Great Western Railway's passenger-service between Weymouth and the Channel Islands, as well as several yachts (sail, steam and Diesel), which are dealt with elsewhere.

Two large oil tankers, the *Victolite* and *Vancolite*, of 11,400 tons gross, to carry 16,000 tons deadweight on a length of 510 feet, were built in 1928, on the Isherwood bracketless system, under the supervision of Sir J. Isherwood, for the Imperial Oil Company of Canada. These vessels have twin-screw Diesel Machinery of 3,300 B.H.P., fitted aft, as is usual in tankers. The engines of the *Vancolite* are of the Stephen-Sulzer 2-cycle type, built at Linthouse, while the other set is by Krupp's.

In 1931, two other twin-screw Diesel-engined vessels, the *Orari* and *Opawa*, were built for the New Zealand Shipping Company. Both ships are about 10,100 tons gross and completely insulated and refrigerated for the New Zealand meat and butter trade, via the Panama Canal. Their engines are of the Sulzer type of 10,000 B.H.P., giving a speed of 17½ knots on trial.

* * * * *

In 1924 the Peninsular & Oriental Company recommenced its connexion with Linthouse with a modest contract of 1,048 tons—the *Bulan*, 220 ft. long, designed for Singapore and eastern waters.

This ship was followed, in 1925, by the *Chitral*, a twin-screw vessel of 15,248 tons, for the company's London-Australia service. The latter

vessel was really the beginning of the series of well-designed, finely-equipped ships with which the P. & O. Company has modernized its fleet. She carries 306 passengers, and a large proportion of her cargo-space is refrigerated for the Australian trade. Her twin engines are of the quadruple-expansion type, developing 10,400 I.H.P., with boilers burning fuel oil. One of a class of three ships ordered about the same time, she is probably the last of the fleet to be engined by reciprocating machinery, as later P. & O. vessels have all had their power produced by steam turbines, either with gears or electric drive.

The *Chitral* was followed by the *Viceroy of India*, ordered by Lord Inchcape, Chairman of the P. & O. Company, in 1927, and completed early in 1929, for their London-Bombay service. This ship, which is the largest and finest vessel yet launched at Linthouse, possesses special features of hull and machinery which made her until recently the crack ship of the P. & O. Line and, in many ways, the most advanced vessel in Great Britain.

Her gross tonnage is 19,648, and her dimensions 612 ft. overall by 76 ft. beam and 45 ft. depth. She carries 683 passengers, or 1,100 persons including her crew.

Her saloon accommodation, which includes some 32 de luxe and special cabins, is distinguished by the fact that each of the 415 first-saloon passengers has a separate bedroom. The height of the passenger decks is particularly noteworthy, especially in the case of the fine promenade deck, which is 11 ft. high. The public rooms on this deck are all handsome apartments, luxuriously decorated by Waring & Gillow, of London. The dining saloons are naturally placed near the galleys and pantries, while the spacious Pompeian swimming bath below is reached by an electric lift.

Her propelling machinery is probably the most outstanding feature of the *Viceroy of India*, as she was the first passenger liner to be fitted with turbo-electric machinery by British builders for British owners. Despite the large power of 17,000 S.H.P. in two shafts, the machinery, turbines, electro-generators and electro-motors have all given perfect service throughout. It may be interesting to record the history of their inception.

The original specification called for 17,000 S.H.P. to be developed by high-pressure geared turbines and Yarrow water-tube boilers, but the Firm, being aware of the special conditions attached to the London-Bombay mail service, suggested that the turbo-electric drive was worthy of consideration. With customary foresight Lord Inchcape and his technical advisors decided to adopt the suggestion, and when the order was finally placed with the Firm, the gearing had given way to electric motors.

There are six Yarrow boilers, working at 375 lbs. pressure and 700° superheat. The two turbines of Curtis type revolve at 3,000 revolutions per minute and drive the two turbo-alternators, which deliver electric power to the two large motors driving the propellers at 109 revolutions per minute. A speed of 19.7 knots with two alternators, and 17 knots with one alternator, was obtained on trial. The oil-fuel tanks carry 2,300 tons.

There are also many other interesting engineering features in this vessel. Two ordinary Scotch boilers of 230 lbs. pressure are provided for auxiliary and domestic service, and the twenty-two electric cargo winches, the four capstans and the windlass are all of special type on the constant current variable voltage system. The very extensive passenger accommodation is mechanically ventilated by Thermotanks, and heated by electric Morganite panels.

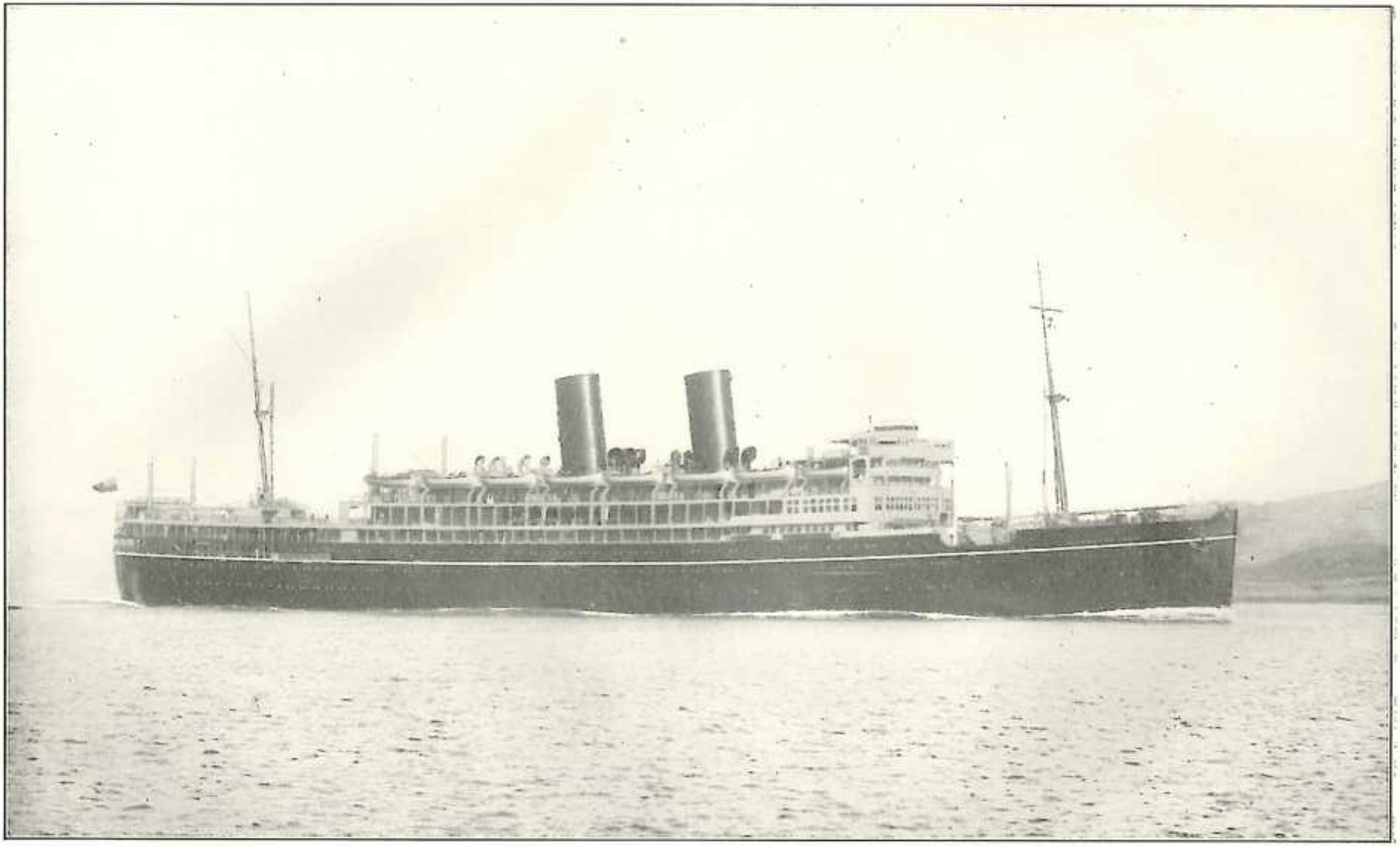
* * * * *

Following the satisfactory completion and performance of the *Viceroy of India*, two similar but slightly smaller ships, the *Corfu* and *Carthage*, were laid down and completed, before the close of 1931, for the P. & O. Company's service between London and the Far East, including Singapore, China and Japan.

These ships, of 14,300 tons gross each, are most efficiently and scientifically equipped for carrying passengers and cargo through climatic extremes, from the heat of the Red Sea to the bitter cold of Northern China. Their passenger accommodation, for 180 1st and 200 2nd Saloon, is fitted with all possible regard for health and comfort, while the furnishings of their public rooms show a pleasant departure from the over-elaboration of decoration which has arisen in recent years. To meet the modern demand for sea and sun bathing an open-air swimming bath is incorporated in their design. In a word, their accommodation is designed to please the passenger rather than the architect.

These two ships, being smaller and of slightly less speed than the *Viceroy of India*, have twin-screw single-geared turbine engines, with superheated Yarrow water-tube boilers at 400 lbs. pressure, burning oil fuel, and two Scotch boilers for auxiliary purposes. Their I.H.P. is about 16,000, and they attained a speed of over 19½ knots on trial, although intended for a service speed of 17 knots. Their machinery rooms are equally well furnished with every modern device for economy and efficiency, and they are worthy examples of the progressive policy of both their owners, the P. & O. Company, and their builders, Messrs. Alexander Stephen & Sons Limited.

Three times in the last ten years Linthouse has headed the Clyde firms' list of tonnage launched, but by the end of 1931, the third year



"Viceroy of India."
The first turbo-electric liner built in Europe. 1929.

A. E. Stephen. 1932.

on which this happened, all these ships were finished and for some months all the berths in the yard were empty for the first time in the history of the Firm. At the end of 1931, the *Gazcon* was laid down, but she will soon be launched, and the prospects of further work are far from bright. The 1931–2 depression has been by far the worst period that the British shipbuilding industry has ever faced—and it comes on top of ten lean years! So much we know, but what of the future?

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Several changes in the directorate and staff should be noted, to bring the personal record of the Firm up to date to the present year of 1932. During the War, on the death of John Stephen, A. E. Stephen, his nephew, became chairman of the Firm, a position which he held until 1929, when he retired and his brother, F. J. Stephen, took the office. Of these two sons of the late Alexander Stephen, A. E. and F. J., the former was always intended for the engineering side of the business; he served his time under Mr. Kemp, at Linthouse, and finally succeeded him as engineering partner. A Scottish Rugby internationalist and fine athlete, he infused his department with new energy, and was responsible for many improvements, as well as taking part in the general direction of the business. Unfortunately, however, although he still remains a director, some years before the War indifferent health caused him to give up active control of his department, which was thereafter directed by his nephew, Alexander Stephen MacLellan, who had understudied him for some years, and had become a director of the Firm in 1913.

The present chairman, F. J. Stephen, was always destined to be a shipbuilder and, after taking his M.A., joined the first naval architecture class to be formed at Glasgow University, where he carried off the prize for the first two years of its existence. Following in his father's footsteps he made all the models with his own hands for many years until changed drawing-office methods put an end to this. Even so, he frequently put the finishing touches to a model. During the 'nineties, he took over from his father the main responsibility of the shipyard side of the business and negotiations with owners, in which he has been active ever since.

The latter was also President of the Clyde Shipbuilders' Association, and has been for some years a member of Council of the Institute of Naval Architects. After the *Titanic* disaster, he was called upon to serve on the "Boats and Davits" committee to advise the Board of Trade on life-saving appliances, and became one of its most active members.

Later, in 1921 and 1924 respectively, Alexander Murray and John Graeme Stephen, the sons of F. J. Stephen, became directors; T. W. McIlmoil and Shirley B. Ralston also became directors, in 1921, as already recorded in the post-War section of this chapter. The latter has now

been naval architect to the Firm for close on thirty years, and during that time has been faced with designs of growing complexity and very varied type.

Matthew Hunter, who had been in charge of the shipyard since 1902, and had become a director in 1908, continued with unabated vigour and resource in this important position. He took a leading part in the affairs of the Clyde Shipbuilders' Association, and in many other ways was of service to the industry. During the very difficult War period, with its variety of problems, A. W. Sampson was brought in to assist Mr. Hunter with the destroyer work. The former is now yard manager, with J. G. Stephen as general manager of the shipyard.

Both Matthew Hunter and T. W. McIlmoil, the secretary, died within a short time of each other, in 1923 and 1925. During the latter year, John Haydock, C.A., who had been acting as accountant for the Firm owing to the increasing complication of business during and after the War, succeeded Mr. McIlmoil, and H. McQuarrie became assistant secretary.

On the engineering side of the business, which in shipbuilding, as in all other activities of to-day, has become increasingly important, the management was extended by the inclusion of George R. Grange, D.S.O., M.C., who was made a director in 1926.

It may also be mentioned that A. M. Stephen, J. G. Stephen and G. R. Grange, who had all done some work in the Firm prior to 1914, joined the army on the outbreak of War, seeing much active service in the years that elapsed before they were able to resume their careers. All three won the Military Cross, and the latter the D.S.O. in addition. A third young Stephen, James Howie Frederic, twin brother of John G., was killed in the advance on Baghdad, in January, 1917.

In the repair department, Thomas Ballantine carried on throughout the War, but retired early in 1928, when the department was reorganized and transferred to the main office at Linthouse, under the direction of Mr. W. B. Johnstone.

Apart from those who have been mentioned, the Firm have naturally been much indebted to many old and loyal servants—some of whom have been with them as many as fifty and sixty years. It is impossible of course to mention all of them. Some are still alive as pensioners, though probably none remain from the wooden and composite shipbuilding days.

There is one name which should be noted—William Leitch—to whom we are indebted for a considerable amount of information forming some chapters of this book. Stone deaf from boyhood, he served the Firm for close on sixty-five years until his death in 1929, for most of

this time making all the ship estimates and doing most of the buying—a very responsible position.

Another is that of William Edwards, head clerk at Dundee and Kelvinhaugh, whose grandson, John McLachlan, is in a leading position in the office to-day, and whose son-in-law, William McLachlan, was with the Firm for sixty-five years—a total service of 120 years.

CHAPTER SEVEN

Notable Associations

THE history of such an old-established firm as the Stephens' is naturally linked with the progress of other companies in similar, or parallel, lines of business. As time passes firms arise, some to drop out entirely after brief periods of success, others to win through from modest beginnings to world-wide importance. At the same time, new inventions and designs appear, are generally condemned, then ultimately become the accepted procedure, until they, in turn, are supplanted by fresh methods.

This change of men and methods is continually apparent in the records of a shipbuilding and engineering works. At no time was the disappearance of one firm and the expansion of another, coupled with the introduction, acceptance and supersession of constructional methods, more marked than during the last decade. "Progress or go under" is the inexorable law of existence, and the firms that have progressed are naturally those which have made history.

During a little over a century, in the course of which Alexander Stephen & Sons advanced from a shipyard employing about thirty hands in 1813, to a yard and engine-works covering thirty acres in 1932, the Firm has come in contact with many of the leading shipowners; thus, while building for a number of once well-known firms whose very names are forgotten, it has also formed close connexions with various companies now world-famous.

Although it is impossible to deal with all the Firm's clients, many of whom are already mentioned in other chapters, a brief review of some of its more notable and long-standing connexions should certainly prove worthy of inclusion in this volume.

THE BRITISH INDIA STEAM NAVIGATION COMPANY

One of the first that comes to mind is naturally the British India Steam Navigation Company, both before and after its association with the Peninsular & Oriental Company. The "B.I.", as it is familiarly known to those who go down to the sea in ships, dates from 1859, about the time the first Anchor Line ship, *Cora Linn*, was being built at Kelvinhaugh. Originating as the Calcutta & Burma Steamship Company, it adopted its present title in 1862.

Fred. J. Stephen.
Chairman. 1932.

Directors of

Alexander Stephen & Sons, Ltd.

1. Mr. A. M. Stephen. 2. Mr. J. G. Stephen. 3. Mr. A. S. MacLellan.
4. Mr. S. B. Ralston. 5. Mr. G. R. Grange.

This fine old company, with its amazing ramifications throughout India, Burma, the Persian Gulf and the Far East, is an outstanding example of Scottish enterprise. Under the able direction of its founder, Sir William Mackinnon, its merchant fleet has become one of the largest in the world. As Sir William, who resided in Kintyre, remained deeply attached to his homeland, much of the company's personnel was drawn from that district. His ships were officered almost entirely by Scots, and it became a well-known tradition in the trade that a call of "Mac!" down the engine-room of a B.I. vessel seldom lacked response.

The B.I. did not become aware of the excellence of the Stephen ships until 1887, when the company purchased the steamers *Wardha* and *Warora* on the stocks. These vessels had been built, during 1883 and '84, to the order of Hume, Smith & Company, of Liverpool, who went into liquidation before they were completed. Intended, originally, for the New Orleans cotton trade, they were built with a much larger beam in proportion to length than was usual at that time, their dimensions being 350 ft. by 47 ft. beam, to ensure sufficient stability with a cargo of cotton. To provide large capacity for a very light cargo, they had also only a double bottom under the engines and boilers, instead of a double bottom all fore and aft, as was the usual practice at that time. On account of this extra beam there was considerable doubt regarding their speed, but their breadth being counteracted by fairly fine lines fore and aft, they proved most successful in every way, including speed and fuel consumption. After the vessels were taken over by the British India Steam Navigation Company they were provided with passenger accommodation, teak decks, etc., to make them suitable for the intermediate passenger trade to India.

The Firm's next transaction with this company was in 1893, when the latter purchased, again on the stocks, the *Bezwada*, a large cargo ship with a carrying capacity of 7,000 tons, then being built for the late Lord Furness.

In 1896, as a result of the successful running of these three vessels purchased "out of stock," the company contracted for two cargo-steamers, the *Uganda* and *Umta*, both large carriers, having a deadweight capacity of 8,250 tons, and a co-efficient displacement of .826. Despite the fullness in their lines they were easily driven, and maintained a consistently good speed on the India coastal trade for many years. These, the first contracts placed with the Firm by Sir James Mackay, now the Earl of Inchcape, were followed at intervals by fourteen others of all classes, as already described. It is noteworthy that hardly any of these ships were finished without being personally inspected by his Lordship, with characteristic thoroughness. In later years his Lordship's son and

daughters have also shown a keen personal and practical interest in the completion of the Company's vessels.

This long connexion with the B.I.S.N. Company led to contact with its subsidiary companies, resulting, as shown elsewhere, in the construction of further ships at Linthouse, though not without severe competition before the orders were secured. Although no B.I. contract was ever placed at Linthouse except under the strictest business conditions, this frequent association in building has engendered the friendliest relations between the Stephens and Lord Inchcape, for whom, in 1930, the Firm had the pleasure of constructing the steam yacht, *Rover*, described in detail in chapter ten.

THE PENINSULAR & ORIENTAL STEAM NAVIGATION COMPANY

Although several of the most modern ships owned by this famous company, to-day associated in all minds with Lord Inchcape, have been built at Linthouse under the direction of his Lordship and his family, the Firm's earliest connexion with the P. & O. Company originated in the same manner as its association with the B.I.S.N. Company—by the sale of a steamer off the stocks.

In 1874 four ships had been laid down in Linthouse new yard for the North Atlantic trade of a German company. However, difficulties arose regarding payment, and in the end three ships were taken over by the Hamburg Amerika Company, while the fourth was left on the builders' hands. This vessel remained in the yard until 1876, when the P. & O. Company, requiring a passenger and cargo ship for immediate service in their Eastern trade, purchased the vessel on the stocks, naming her the *Nepaul;* under this name she gave long and efficient service, until eventually wrecked in south of England waters.

In passing it may be recalled that Reischek, the naturalist, who did so much to extend our knowledge of New Zealand, starting on his voyage in the *Nepaul*, in 1877, wrote: "The boat was overcrowded, and the heat was unbearable,"—a curious contrast to the luxury and comfort experienced on the present-day vessels of the P. & O. Company.

In 1894 the P. & O. Company again purchased a vessel on the stocks, in this instance a large cargo-steamer, built by the Firm on speculation, in conjunction with the late Lord (then Sir Christopher) Furness. The company spent a considerable sum in adapting this ship to suit their eastern trade, and named her the *Mazagon*.

Her success led to the Firm securing a contract for the *Sumatra*, which was built to the company's own specifications. This ship, a single-screw

passenger steamer, 400 ft. long, for the China trade, was delivered to the P. & O. Company in 1895.

During 1901 the company laid down a class of twin-screw cargo and passenger steamers, 450 feet long, of which one, the *Syria*, was built at Linthouse. This vessel remained in service until the end of the War, when she was sold to the ship-breakers.

Until this period all business negotiations had been carried on with Sir Thomas Sutherland, then chairman of the P. & O. Company. Later, however, all vessels for the company were contracted for by Lord Inchcape, in pursuance of his progressive policy which has done so much to maintain the P. & O. in the forefront of post-War shipping.

After the War, the P. & O. Company resumed its connexion with the Firm, commencing with a small vessel, the *Bulan*, and continuing to the present day with the highest-class passenger ships, such as the *Viceroy of India*, and the sister ships, *Corfu* and *Carthage*, as already stated.

THE ANCHOR LINE

Returning to the earlier days at Kelvinhaugh, the beginnings of the now-famous Anchor Line may be traced to the Stephen yard, in 1859. This Line, then known as Messrs. Handyside & Henderson, placed the contract for its first steamers, the *Cora Linn* and *Ailsa Craig*, with the Firm. Though these vessels, to present ideas, were too small for ocean-going work, they were apparently successful, and were followed by a number of ships built at Kelvinhaugh in the 'sixties.

Shortly after the Firm was moved to Linthouse, a much larger steamer was built for Messrs. Handyside & Henderson, as the company was still known. This vessel, the *California*, 360 ft. long, was delivered in 1872. She was followed in '73 by the *Ethiopia*, one of the largest vessels of her time, and certainly the largest built by the Stephens up to that date. Her dimensions were 400 ft. by 40 ft. beam and 33 ft. depth; her beam, of one-tenth of her length, is an interesting example of the approved fashion of those times, described by contemporary writers as "long, lean and fast." Twenty-one years elapsed before a ship of equal length was built at Linthouse, and by that time the beam had grown considerably, the B.I.S.N. Company's *Bezwada* being 400 ft. by 48 ft.

Shortly after the *Ethiopia* was built, a branch of the Henderson family began shipbuilding at Meadowside, Partick, and naturally took over the construction of succeeding vessels for the Anchor Line. In 1911, however, Linthouse secured orders for the Line's cargo ships, *Anchoria* and *Media*, and, later, other vessels, of gradually-increasing size, were constructed, culminating in two ships of the Line's post-War programme, the *California* and *Caledonia*, of 17,000 tons each—in all, some twenty

vessels of 91,000 tons. The last of the series was approximately four times the length and seventy times the size (as regards tonnage), of the first ship built for this line in the 'fifties.

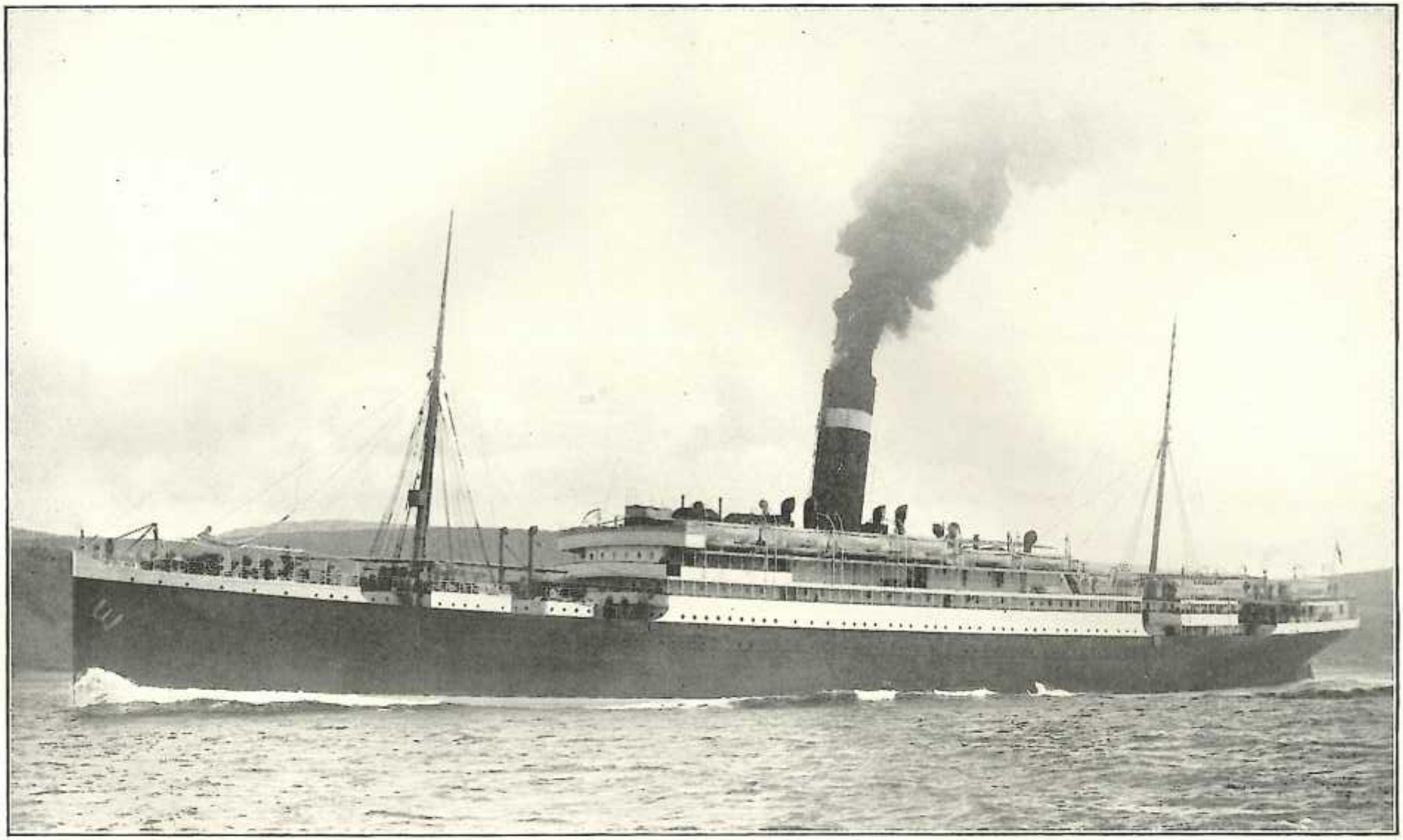
THE ALLAN LINE

Shortly after the Anchor Line commenced business, another Glasgow family placed an order with the Firm at Kelvinhaugh, which proved the beginning of the well-known Allan Line. The vessels in question were the iron paddle steamers *Lake Ontario* and *Bay of Kandy*, 180 ft. long and 640 tons gross tonnage, delivered to Messrs. J. & A. Allan in 1864. Later, in 1866 and '67, an iron paddle tug, the *Topsy*, and the iron sailing-ship, *Abeona*, of 980 tons, were built for the Allans. The *Abeona*, a vessel of 200 ft. long, was a famous clipper in the days when the passage of a ship from the Clyde to Montreal was a matter of public interest. As related elsewhere, she continued in service for over thirty years.

It was not until 1900 that the Allan Line again placed an order with the Stephens, now at Linthouse, and by this time the Line and its ships had " suffered a sea change," both having grown out of all resemblance to their forerunners. The *Tunisian*, 500 ft. long and 10,756 gross tons, was built in 1900 to carry passengers and cargo on the original Glasgow-Montreal route blazed by the *Abeona* and her sisters. She had twin-screw triple-expansion engines of 7,900 I.H.P., and was the first ship built at Linthouse under the rules of the British Corporation.

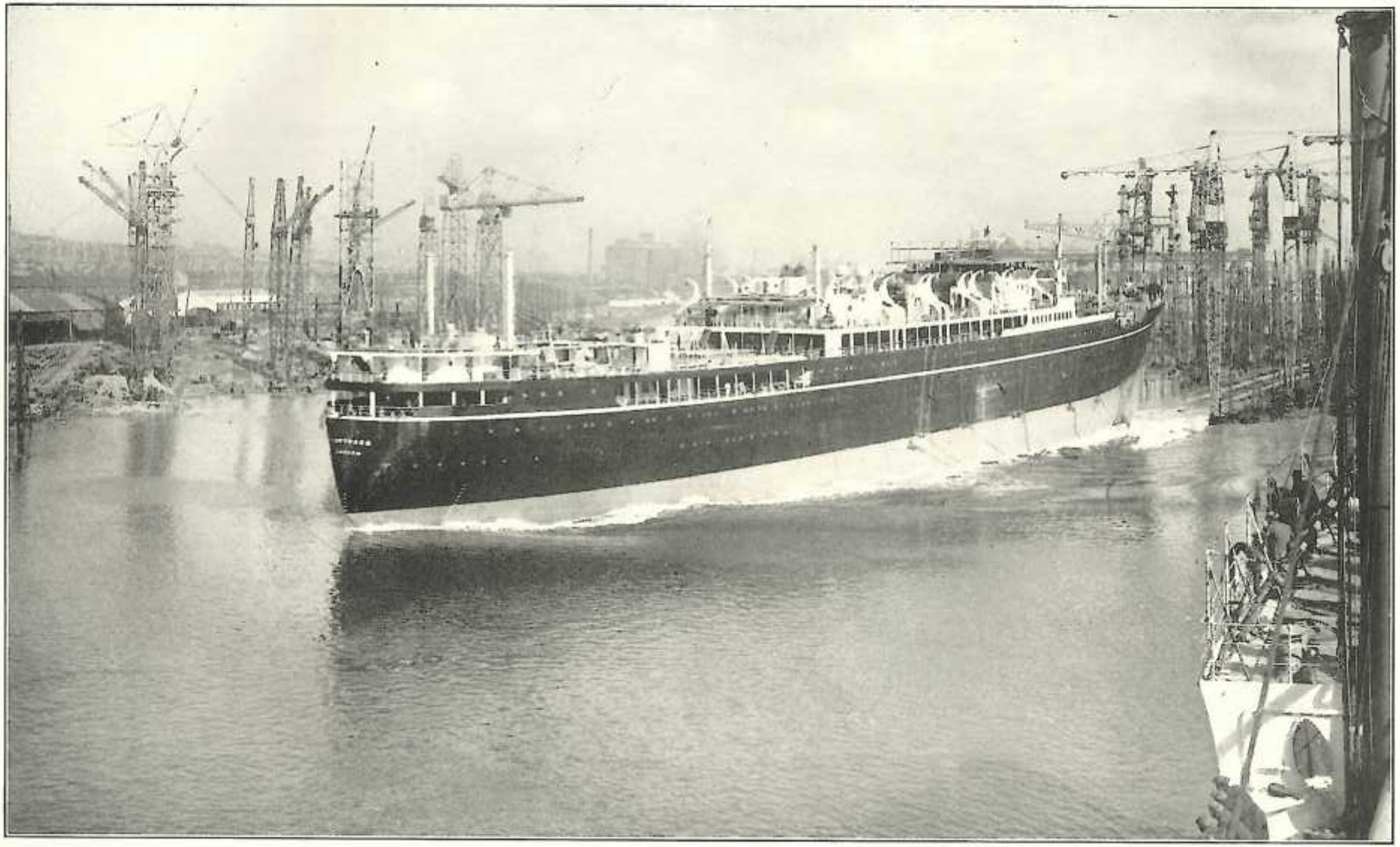
The progressive policy of the Allans is demonstrated by the building, in 1905, of the *Virginian*, of 10,754 tons, fitted with turbine machinery. Parsons steam turbines were by this time well advanced beyond the experimental stage. The Stephens had already fitted turbines in the yacht *Emerald*, in 1903, but the Allans' *Virginian*, and her sister ship, the *Victorian* (built by Workman & Clark), were the first large liners to be fitted with the type of machinery which is in common use to-day. The turbines were three in number, driving three small screws of 9 ft. 6 ins. diameter at the high speed of 280 revolutions per minute, a speed of over 19 knots being obtained on trial.

At that time, as the gearing of turbines, to enable them to run economically at high speed with propellers running at their economical low speed, had not been invented, the coal consumption of the *Virginian* was excessive; it is not surprising to find, therefore, that the next two ships built at Linthouse for the Allan Line, in 1907, reverted to twin-screw reciprocating engines. These two ships, the *Grampian* and *Hesperian*, were intermediate passenger and cargo vessels of 9,600 tons, engaged in the emigrant traffic from this country to Canada,



"Virginian."

One of the first two turbine Atlantic liners. 1905.



Launch of the P. and O. T.S.S. "Carthage." 1931.

then at its height. They were the last ships built by the Firm for the Allans as, since the latter sold their business to the Canadian Pacific Railway (now the Canadian Pacific Ocean Steamships Line), before the War, the orders for this Line have been placed elsewhere.

T. H. ISMAY & COMPANY

The years following the Great Exhibition of 1851 witnessed great progress in shipbuilding, which received special encouragement in 1859, when several well-known shipowners commenced business.

Both the British India and the Anchor Line made their first ventures during the latter year, while the records show that in 1859 Kelvinhaugh also built the first ship for the small firm of Nelson, Ismay & Company, who later appeared as T. H. Ismay & Company, changing again to Ismay Imrie & Company, founders of the famous White Star Line. Their first vessel was the *Angelita*, a small brigantine of 129 tons, No. 21 on the Firm's books; her dimensions were 100 ft. by 16 ft. 6 ins. by 11 ft. 6 ins. It is difficult now to believe that such a small vessel could cross the Atlantic and lay the foundations of the White Star Line. Apparently the new firm of shipowners found the little vessel profitable, however, as a similar sized ship, the schooner, *Mexico*, was ordered in 1860, and followed by the *Ismay*, an iron-built barque of 423 tons, and 140 ft. in length. These were succeeded in 1862 by the composite-built brigantine, *Arriero*, a smaller vessel of 167 tons, the company apparently feeling that it had been too progressive in building the 400-ton *Ismay*.

By 1868, however, Messrs. Ismay had definitely embarked upon a policy of larger ships. With the financial assistance of the builders, who took a share in the vessel, they built the *Comadre*, an iron sailing-ship of 805 tons and 185 feet in length, which was followed, in 1869, by the composite-built barque *Singapore*. These vessels were among the last sailing-ships constructed by the company, which shortly afterwards went into steam.

MESSRS. SLOMAN & COMPANY, HAMBURG

While both Scots and Englishmen were opening up new avenues of trade, the Germans were equally alive to the possibilities of current conditions, and in 1864 Kelvinhaugh witnessed the launch of the *Copernicus*, an iron sailing-ship of 699 tons, for R. M. Sloman & Company, of Hamburg. This German connexion continued for many years, the last ship built for the firm being the S.S. *Pisa* of 4,473 tons, launched at the close of 1896. Mr. R. M. Sloman, founder of the company, was a man of unusual personality, a German of the old school, who never

failed to express his appreciation of good work. During their long business association Mr. Sloman and Alexander Stephen became close friends, until the former died, at the age of eighty, some time before the *Pisa* was built. Besides being the last of the Sloman Line, the latter vessel was also the last ship built by the Stephens for German owners.

A list of vessels built for the Sloman Line during a period of thirty-two years is of interest, as showing the gradual increase in size of cargo-carrying ships, and the comparatively recent date of the change from sail to steam.

Year	*Name*	*Tonnage*
1864	*Copernicus*	699
1864	*Newton*	699
1867	*Humboldt*	742
1867	*Reichstag*	742
1869	*Friedeburg*	818
1869	*Lammershagen*	913

Year	*Name*	*Tonnage*
1870	*Alert*	799
1872	*Neapel*	867
1879	*Malaga*	1,344
1879	*Barcelona*	1,347
1881	*Catania*	2,199
1881	*Sorrento*	2,371
1882	*Marsala*	2,367
1883	*Procida*	3,545
1884	*Taormina*	2,423
1889	*Capua*	2,012
1889	*Salerno*	2,026
1896	*Pisa*	4,473

6 sailing vessels 4,613 tons — 12 steamers 25,773 tons

TOTAL—18 ships .. 30,386 tons

THE NEW ZEALAND SHIPPING COMPANY

Among shipping firms of a somewhat later origin than the almost prehistoric lines of the 'fifties and 'sixties, comes the New Zealand Shipping Company, a brief reference to which should be of interest.

During the 'seventies, when fighting still continued with the Maoris, the cattle and sheep introduced in New Zealand having multiplied beyond all expectations, the farmers became dissatisfied with the existing shipping facilities. Although the frozen-meat trade had not yet come into existence, the annually increasing output of wool prompted the formation of the New Zealand Shipping Company, in Christchurch, N.Z.

Three of this company's earliest ships, built at Linthouse in 1876, were the *Opawa*, *Piako* and *Wanganui*, each of 1,070 tons and 215 ft. in length. It is not until forty-five years later, however, that the name of the company reappears on the Linthouse records, in 1921, when another *Piako*, of 8,283 tons, was built to carry, not the wool, but the sheep themselves, frozen and stowed in refrigerated holds.

Later still, a second *Opawa*, a refrigerated meat ship of 10,000 tons, fitted with twin-screw Diesel engines, was built, together with her sister ship, the *Orari*, for the large and flourishing New Zealand Shipping Company of to-day.

In 1874, as mentioned elsewhere, in connexion with the *Cyphrenes*, the Stephens constructed the *Bruce* and *Euro*, pioneer ships for the Union Steamship Company of New Zealand.

THE CLAN LINE

Many other important Glasgow shipowners, although not of such antiquity as the British India or Anchor Lines, also laid the foundations of their present fleets with Linthouse-built vessels.

In 1878, for example, Mr. C. W. Cayzer founded Cayzer Irvine & Company, known generally as the Clan Line, with the S.S. *Clan Alpine* and S.S. *Clan Fraser*, of 2,080 tons each. Mr. John Muir, of James Finlay & Company, later Sir John Muir, Lord Provost of Glasgow, was associated with this venture. The Stephens also took a financial interest in the Company, agreeing to an extension of the terms of payment for their vessels, to facilitate the foundation of the new Line. In a few years Mr. Cayzer was able to dispense with outside assistance and take full control of the business.

The association thus formed continued for many years, new ships being built in batches of two or three about every third year, until 1900, when there was a break in the series owing to the Clan Line's adoption of the Doxford turret type of vessel, which was reputed to save much in Suez Canal dues through small tonnage measurement. This turret form came to be regarded as the mark of a Clan Line ship until about 1911 to 1913, when two shelter-deck ships, the *Clan MacNaughton* and *Clan MacQuarrie*, of 5,000 tons each, were built at Linthouse, completing a total of nineteen ships and 54,000 gross tons for this Line.

Latterly, however, under the direction of Sir August B. C. Cayzer, the Clan Line took over a Clyde shipyard, which now supplies all its requirements.

MACLAY & McINTYRE

Shortly after the Clan Line commenced business, the shipping firm of Maclay & McIntyre was established, in 1885, by Mr. Joseph Maclay and Mr. Thomas McIntyre, who together built up a most flourishing organization. Mr. Maclay, who ultimately became Lord Maclay, was made Shipping Controller during the War.

The firm's first vessel, the S.S. *General Gordon*, of 1,294 tons, and 240 ft length, was launched at Linthouse in 1885, and a firm business and personal friendship sprang up between the families of Maclay and Stephen. The

second ship, the *Victoria*, built in the Jubilee year, 1887, was followed by a new vessel almost every year, all of the cargo deadweight carrying type, until the latest ship, *Masunda*, a single-deck cargo vessel of 9,000 tons deadweight, built in 1929.

The Maclay & McIntyre series of ships has now reached a total of twenty-three vessels and 82,000 tons. The Line has generally adopted an African nomenclature for its ships, owing to Lord Maclay's active interest in African missions, an interest which he shared with John Stephen, of Linthouse.

It may be recalled, in passing, that the A, B and C classes of War standard ships were designed on the lines of the vessels of the Maclay & McIntyre fleet.

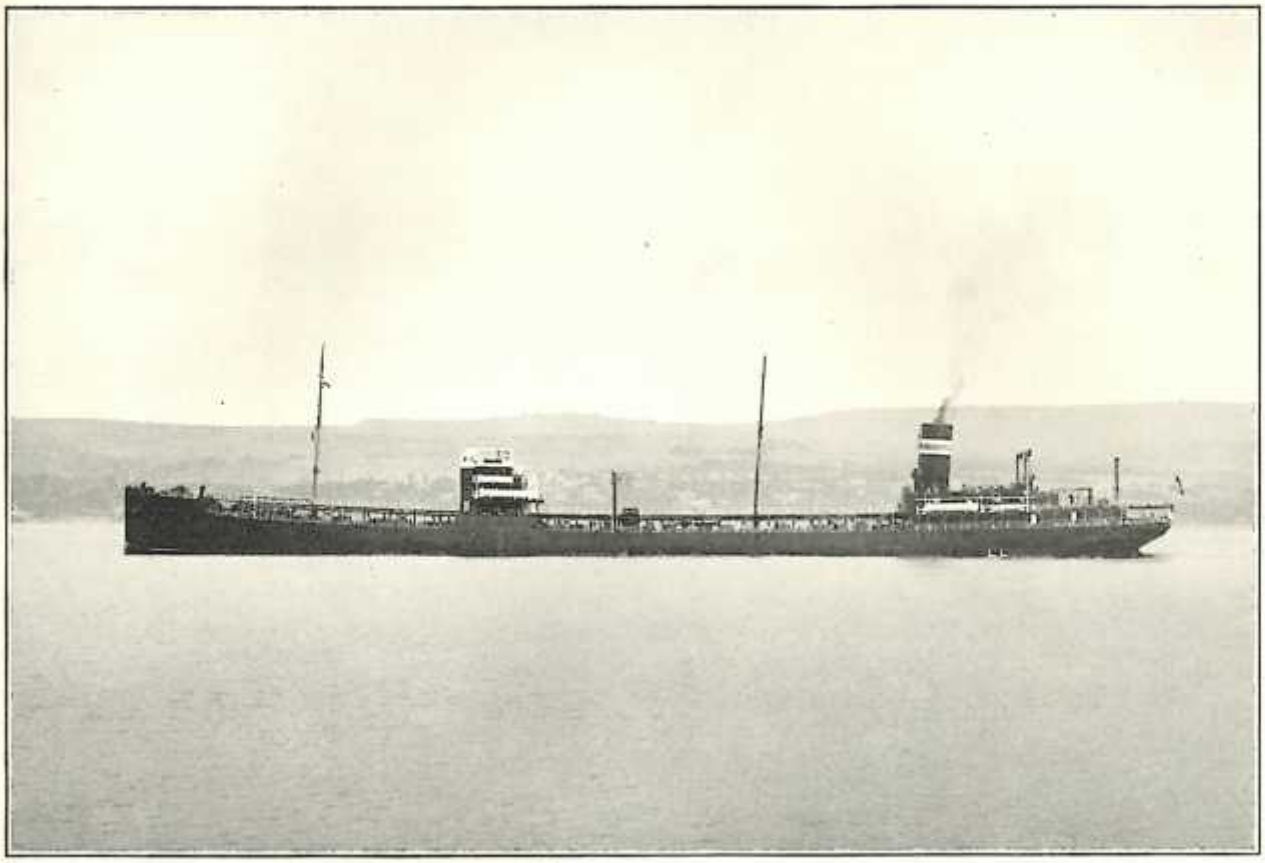
FURNESS, WITHY & COMPANY

At the time that the first ship was building for Maclay & McIntyre, in 1885, the Firm had left on its hands two small steamers built specially to the order of the Halifax S. N. Company for the Canadian trade. Mr. Christopher Furness, of Hartlepool, being already interested in this trade, entered into an agreement with the Firm to run the steamers on their joint account. The venture proving financially successful the vessels, *Damara* and *Ulanda*, were taken over by Mr. Furness, who in 1888 ordered a third ship, the *Baltimore City*, of 3,234 tons, for the same trade.

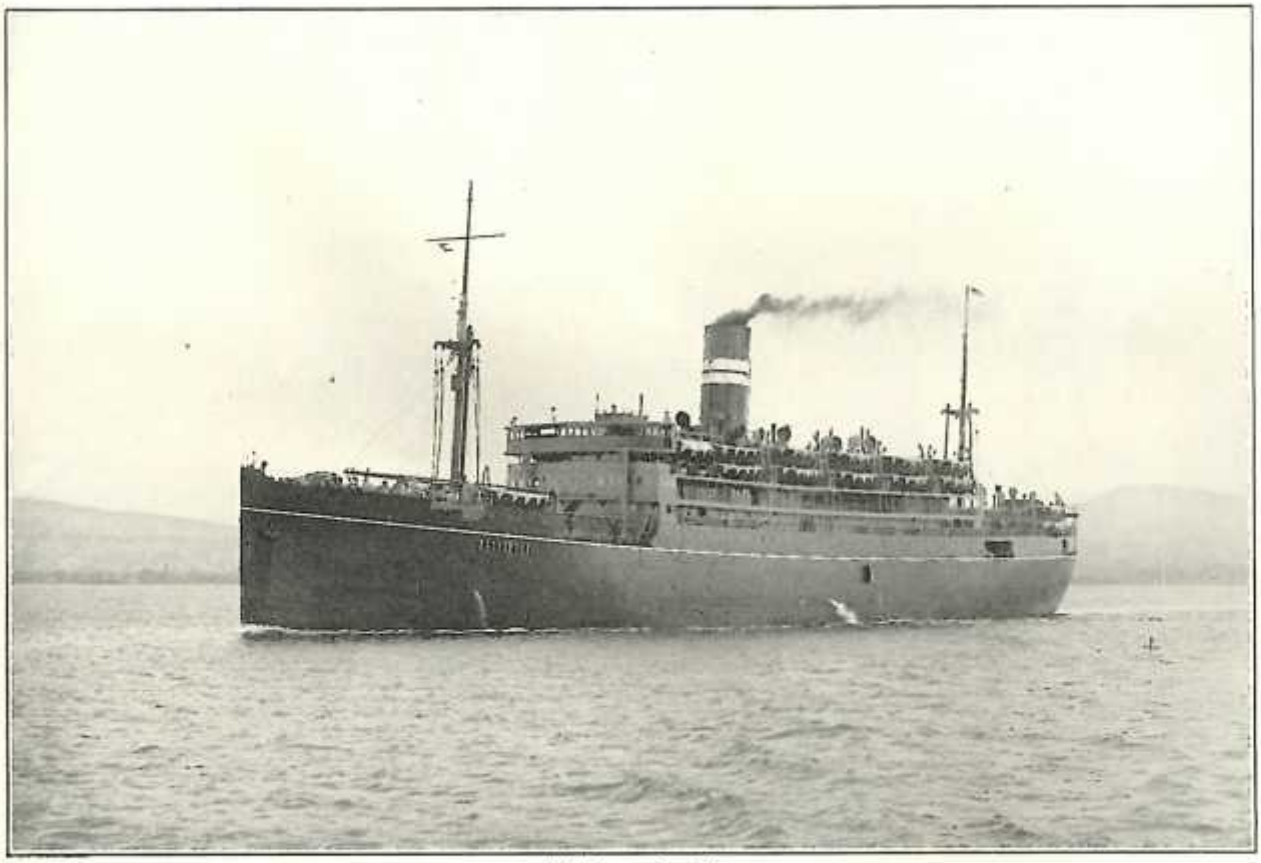
This satisfactory disposal of the stranded steamers was the beginning of a long and intimate association between Christopher Furness, later Lord Furness, and members of the Linthouse firm, and the formation of Furness, Withy & Company, in 1891, was followed in a few days by an order for a new ship from Linthouse. The firm retained shares in many of the ships built for the new company, and combined with Lord Furness in constructing several vessels on speculation, some of which were sold to the B.I.S.N. and P. & O. Companies, as already related.

In all, some nineteen ships, totalling 92,000 tons, were built for the Furness-Withy interest between 1885 and 1918, during which period they gradually increased in size from the original 2,300 tons to 8,700 tons. The earlier vessels were specially fitted to carry live cattle on the hoof from Canada, but, as engineering knowledge advanced, the later ships were completely refrigerated for the Argentine trade, first for frozen, and later for chilled beef, this final development bringing with it many difficult problems.

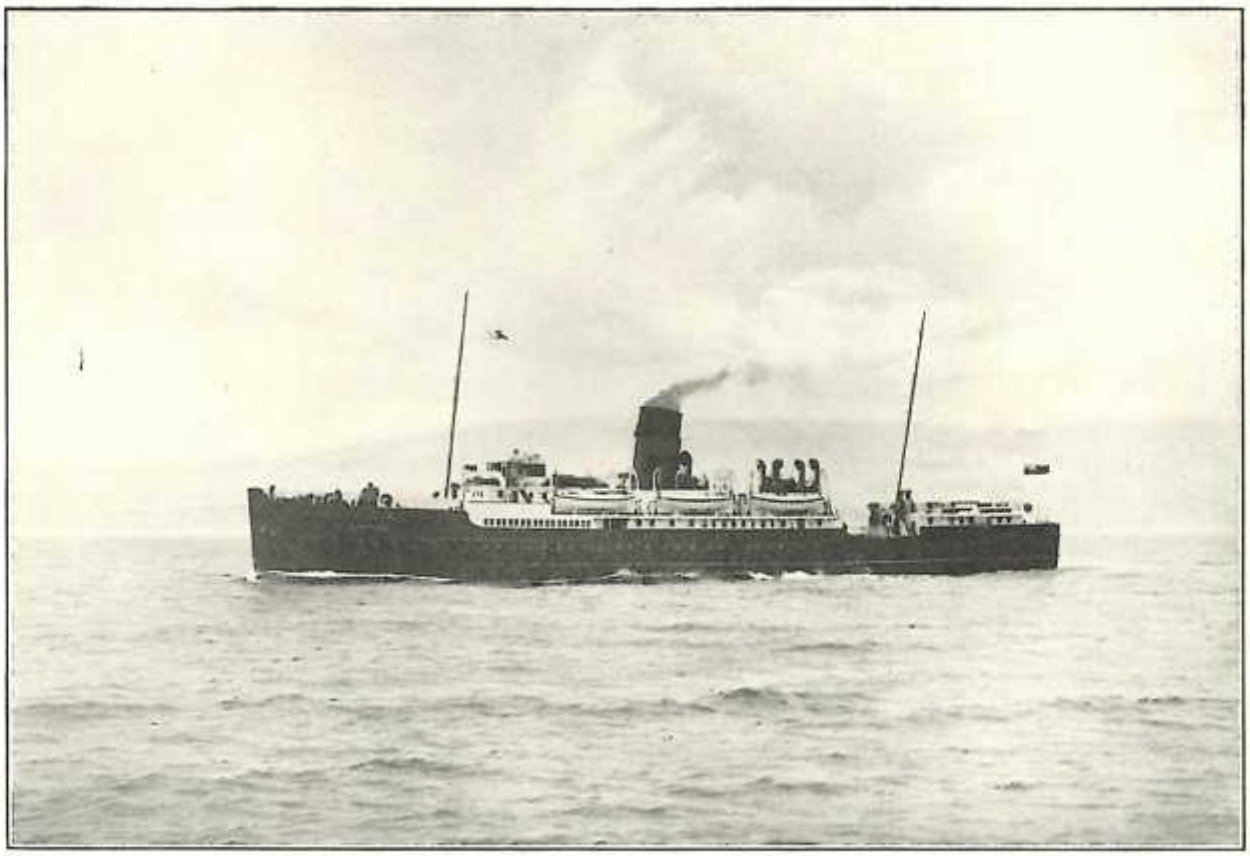
In 1903 the turbine yacht, *Emerald*, was built for Lord Furness at Linthouse.



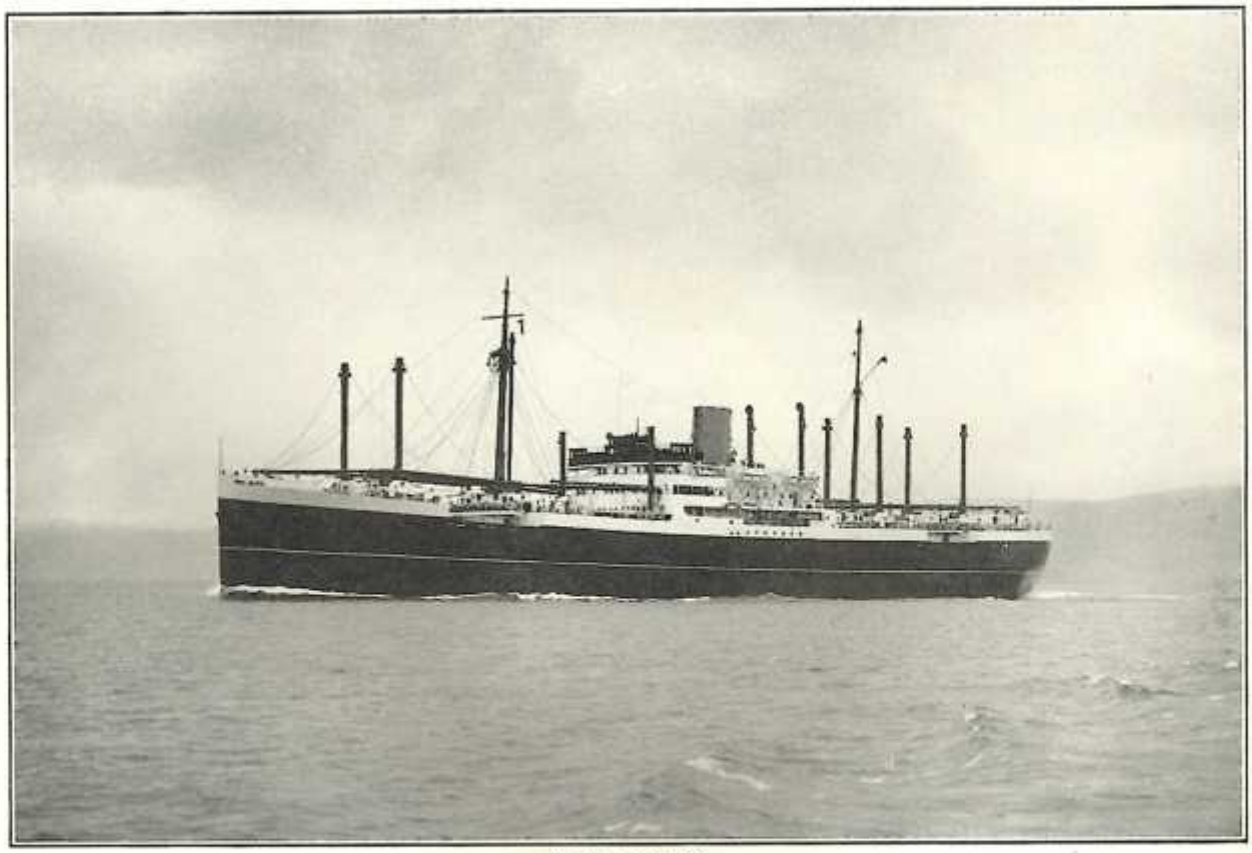
"Vancolite."
A 16,000-ton D.W. Oil Tanker. 1928.



"Karanja."
Turbine Passenger Steamer. 1931.



"St. Patrick."
Cross Channel Turbine Steamer. 1930.



"Opawa."
Twin screw insulated Motor Ship. 1931.

ELDER DEMPSTER & COMPANY

This friendly association with Lord Furness and his wide interests brought the Firm into touch with Sir Alfred Jones, the able chairman of Elder Dempster & Company, and founder of the Imperial Direct West India Line.

A man of tremendous energy and advanced views, Sir Alfred had also the courage to put his theories into practice. An early believer in the application of science to Empire development, he assisted Sir Ronald Ross in his great fight against tropical disease—a faith that was fully justified, though not in his lifetime, as Sir Ronald's efforts have entirely transformed living conditions on the West African coast and in the West Indies.

The Stephens constructed many ships for the Elder Dempster Company, the confidence on both sides being so great that many of the vessels were built without the formality of a signed contract. The Firm's connexion with the Imperial Direct West India Line, and its successor, Elders & Fyffes Ltd., has already been fully detailed in another part of this volume.

Upon the death of Sir Alfred, at a comparatively early age, his interest in Elder Dempster was taken over by other shipping concerns, and later vessels for the Line were built at shipyards allied to these firms. However, Linthouse continued to receive orders from the Belgian firm, Cie. Belge Maritime du Congo, which had been associated with Sir Alfred in the West African trade, and from Elders & Fyffes Ltd.

THE BRITISH CORPORATION

Reference has already been made to the Allan liner, *Tunisian*, as being the first ship built at Linthouse under the rules and inspection of the British Corporation for the Survey and Registry of Shipping. This Registry Society was founded in 1890, by two or three Glasgow shipowners, in association with several shipbuilders. Its object was to provide an alternative classification to those already existing, but based on modern and scientific lines. Many new methods of construction were introduced, most of which have been generally adopted. The late Professor Jenkins was engaged to make out the rules; associated with him were Mr. (now Sir Archibald) Denny, Mr. Courtier Dutton and Mr. Foster King, who later became the well known chief surveyor.

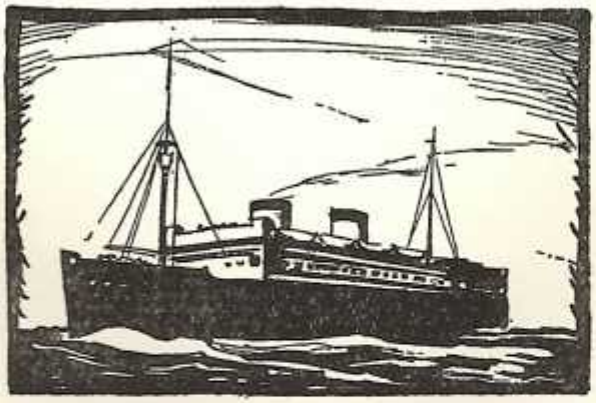
While it is certain that the older societies would have ultimately moved with the times, and developed their rules on a more scientific basis, there seems no doubt that the advent of the new society provided a useful stimulus. The steel ship of to-day is the result of the work of members of all the registry societies and others, and while

investigation still progresses, the present structure of a ship is designed on a firm, scientific basis.

It is interesting to compare a single-decker cargo ship, built in 1897, with a similar type of ship built in 1929. Although the comparison can only be accepted with reservations, it is instructive to note that the earlier ship, the *Vizcaina*, of 2,191 tons gross, carried only 3 tons of cargo for each ton of steel structure, while the present-day *Masunda*, of 5,364 tons, carried 4 tons per ton of steel, a gain of 33 per cent.

To return to the British Corporation, and its connexion with Stephen-built ships. The first ships to be classed at Linthouse were Allan and Anchor liners, and in the course of time many owners in this country, and in Belgium, Australia, New Zealand, etc., came to class their ships with the symbol B. S. ★, signifying "Under the rules and inspection of the British Corporation." Up to the present time over 300,000 tons of shipping have been built at Linthouse under this classification.

The Firm itself, in addition to many of its clients, has taken a practical interest in the society from an early date. On the retirement of Sir Archibald Denny, the first chairman of the technical committee, Fred J. Stephen was temporarily appointed. The appointment later became permanent, being retained by Mr. Stephen for eighteen years. Upon retiring from the chairmanship of this committee he remained a member of the general committee, a position he still retains in 1932.



CHAPTER EIGHT

Linthouse—1932

THE present-day works of Messrs. Alexander Stephen & Sons Limited form a complete and compact combination of the various yards and shops required for the entire construction and repair of ships of all types and sizes. The shipbuilding yard, engineering and boiler shops, and such auxiliary departments as the joiners', plumbers' and sheet-iron shops, are all situated on the Linthouse estate, on the south bank of the Clyde, near the western boundary of the city of Glasgow.

The land now held by the Firm, including the original Linthouse estate, purchased in 1870, and various areas more recently acquired, totals 46 acres—34 acres in the main yard and works and 12 acres to the east of Holmfauld Road. The whole estate is practically level, and consists of a sandy subsoil with a foundation of boulder-clay, affording a clean, dry surface for shipbuilding purposes. The majority of the building berths are laid with concrete foundations for the construction of the large vessels of to-day.

The river-frontage of the main shipyard is 1,140 feet, while the eastern portion possesses a frontage of 375 feet. The use of these frontages is unrestricted as, the ancient towing-path along the river bank having disappeared, the rights of way have also been extinguished.

The Clyde Trust Wharf of Shieldhall, used for the fitting-out and completion of Linthouse-built ships, extends westward from the end of the shipyard, while the dry-docks and 130-ton crane of the Princes Dock are within convenient distance eastward of the works. The dwelling-houses and recreation ground for the Firm's employees are within a few minutes of the shipyard and works, while the main road from Glasgow to Renfrew and Greenock, passing behind the yard, affords ample facilities for entrances and exits at all convenient points. Cross-river communication between Linthouse and Whiteinch is provided by a vehicular ferry, plying from Holmfauld Road, a main thoroughfare between the works and the land which is held for future development.

General Offices

The head offices of the Firm, situated in a modern building fronting on to the Holmfauld Road, are convenient to both the shipyard and

engineering works. This building, erected in 1914–15, when the original mansion of Linthouse was vacated, is designed to ensure ample light for all administrative and executive departments. Three storeys high, and of ferro-concrete construction, it provides facilities for the addition of a fourth storey, should such an extension be required.

On the ground floor are situated the commercial departments, including the counting-house, secretarial offices, and directors' rooms. The first floor contains the shipyard drawing office, designing office, decorators' and repair departments, while the engine drawing office, tracers' office, print and plan rooms occupy the second floor. All departments are thus in close contact—a vital necessity in a firm handling the construction of first-class vessels, wherein shipbuilding and engineering are so closely combined.

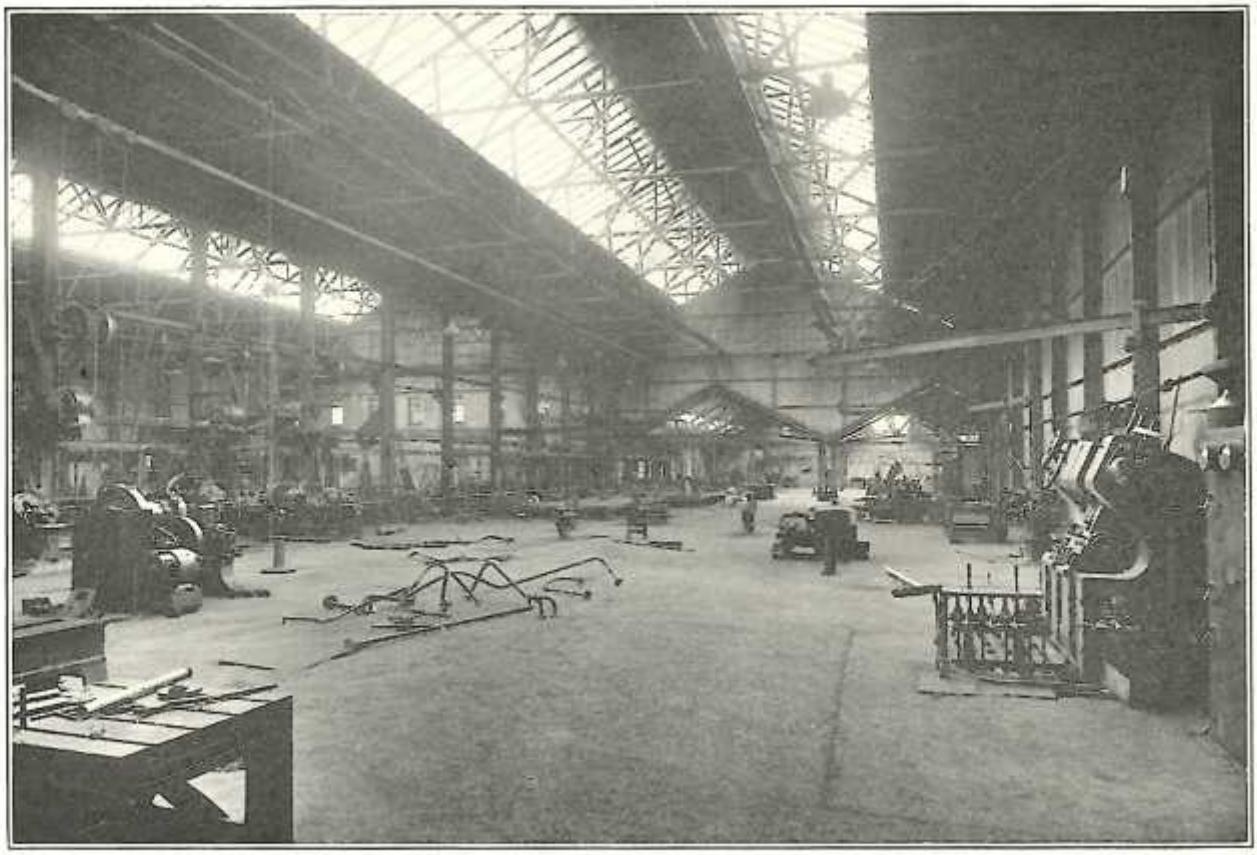
Adjacent to the head office is the main entrance to the yard, complete with time office, workers' entrances, welfare supervisor's office, canteen and dining-rooms for officials and men, and a fully-equipped ambulance room.

The plumbers', sheet-iron, tinsmiths' and paint shops, situated at the eastern side of the yard, are all new buildings, erected in 1930 and containing a number of modern machines, installed to cope with the increased work and more massive construction of to-day, including a large-size "Bonn" bending machine, which bends pipes of all sizes cold; a latest type A1 automatic electric machine for flash-welding flanges on pipes, and a large "Marden" machine for screwing flanges. The shops are also equipped with electric arc welding sets, high speed saws, oil fuel fires, etc.

Adjacent to these buildings is the smithy, which occupies only a part of the original brick structure erected in 1870, as complicated smithwork for sailing-ships is a thing of the past, much hand-wrought smithwork being now replaced by drop forgings and castings. The surplus area of the smithy has been utilized for the finishing shop, which is completely equipped with all machinery necessary for the speedy and economical finishing of smithy products, and the machining of the numerous castings, etc., required for ship construction. Within the same shop is situated an up-to-date store, with supply-windows (from which the riveters, drillers, caulkers, etc., receive their various tools), facing the building berths.

The above building forms the eastern end of the steelworkers' shed, which runs parallel to the river, at the head of the building berths. Half of this shed was re-erected and modernized in 1923, and the whole shed occupies the original site, chosen in 1870, which is still found to be in the most convenient position for the steel work of the ships, despite

The Main Offices. 1915.



New Plumbers' Shop.

Joiners' Shop.

the increase in the size of vessels from about 300 ft. to 600 ft. or more in length. This shed has been recently rearranged, so that each squad has its special area and necessary machinery; amongst the modern tools installed may be mentioned the following:

Set of heavy rolls, capable of rolling plates up to 35 ft. in length.
An electrically-driven planing machine.
A flanging machine, capable of flanging cold plates 33 ft. in length by $1\frac{1}{8}$ ins. in thickness.
Four Endert-Curchin, or "one man," punches.

All the machines are equipped with powerful hydraulic and electric cranes, capable of handling the heaviest plates.

At the western end of the steelworkers' shed is situated a brick building containing the joiners' shops on the ground floor and first floors, with the moulding loft on the second floor. This is also an early building, serving the purpose it was originally designed for, save that the joinery department, having increased during the years, has taken over the spar shed, which has become unnecessary in these days of steel masts and spars. The joiners' shop, when fully employed, accommodates about 200 workers, and the machine shop, situated on the ground floor, has been recently rearranged and fitted with the latest machinery, among which the following are worthy of special mention:

Double spindle vertical moulding machine.
Continuous-feed glue jointing machine.
Scraping or planing machine.
Sandpapering machine.
Tenon and scribing machine; also
The only automatic vertical chain mortiser fitted in any Scottish shipbuilding establishment.

Behind, and connected with the joiners' shop, is the polishing department, capable of producing highly-finished panelling and furniture of all types; included among its equipment is a spraying-plant for finishing articles with cellulose. Beneath the polishing shop is the boat-building shed, alongside which, on the western boundary of the yard, lies a large area containing sheds, stores, and racks for the storage of timber.

Beyond the joiners' shops are situated the power houses, containing the hydraulic pumps, air compressors and electrical convertors. Slightly beyond these is a Babcock boiler, fired by refuse conveyed by a special suction-plant from the joiners' shop and saw mill.

Adjoining these buildings is the saw mill, convenient for supplying decks to the ships and timber of all description to the joiners' shop, shipwrights' department, etc. The machinery of the mill is

capable of converting all materials from the "log" as required by the various departments.

The foregoing buildings form the frontage of the shipbuilding works, the space between them and the river being occupied by the building berths. Since the war these berths have been reduced in number from eight to six, and rearranged to take advantage of a long bend in the Clyde, giving ample room for launching the largest ships down-river. This latest arrangement of the berths was completed in 1927, when the ground under many was concreted and a complete new series of electric cranes erected. The latter, are 120 ft. from ground to underside of jib, with outreach of 70 ft. and a working load of 6 tons.

Behind the steelworkers' shed is a large area, equipped with hydraulic and travelling steam-cranes, for the stowage of the steel-plates and sections, brought directly into this part from the L.M.S. Railway at Shieldhall, *via* the tram lines on the Renfrew road. A traffic office, with weigh-bridge, has been placed at the south-west corner of the yard to deal with all heavy railborne traffic.

The above description deals with about two-thirds of the Linthouse yard, the remaining one-third being devoted to the engine and boiler shops, which are fed with raw materials, castings, etc., by the same rail system. The latter buildings are divided into two main structures—the engine and boiler shops, both in direct contact with the shipyard.

A comparatively new building, close to the engine shop, is the aircraft shed, erected during the War for the construction of aeroplanes; this is now used partly for the electrical department's shops and offices, and partly as a general store for all perishable materials. In this south-eastern corner of the yard are also the Linthouse Buildings, a block of dwellings erected by the Firm for the housing of its workmen.

With these improvements the shipyard has completed in one year a total of about 60,000 gross tons. The berths are now angled so that the longest one can take a vessel of 700 feet or more in length.

Welfare and Educational Schemes

Messrs. Alexander Stephen & Sons Limited have ever shown a deep interest in the welfare of their employees—an interest which in recent years has taken practical form in the provision of a canteen, ambulance room, club rooms and recreation grounds. The Firm has also initiated educational, thrift, safety and suggestion schemes, as outlined below.

Coila Park. As the welfare department developed, it was felt that a playing field and recreation ground would be greatly appreciated by the Linthouse employees and their families. In 1920, therefore, the Firm purchased, for £12,000 a ten-acre area adjacent to the works. These

grounds, which formed part of the park surrounding the old Mansion House, Shieldhall, have a very attractive setting with some fine old trees. A pavilion and house for the head greenkeeper were erected, while the grounds were laid out in four tennis courts, two bowling greens, football and hockey pitches, putting and croquet greens, a children's corner, etc.

The scheme has met with great success, a large number of the employees taking advantage of these facilities for healthy recreation amid ideal surroundings. The sports club is managed by its own committee, so that its success, after the initial arrangements by the Firm, is entirely in the hands of the members.

RECREATION : In addition to the provision of facilities for social events in the canteen, the Firm in 1917 purchased " Cressy Hall," since named the " *Stephen Apprentices' and Boys' Club.*"

This club, at 6 Cressy Street, Govan, is open for membership to apprentices and boys employed by the Firm and it has proved a convenient meeting place and recreation centre for all the young employees. A large gymnasium has been equipped with the usual apparatus, and boxing and other physical training is carried on by special instructors. Baths (hot and cold) are available, also a photographic dark room and a large games room, fitted with billiard and bagatelle tables, card tables, and most indoor games. A reading room, supplied with a good library and weekly and monthly magazines, is provided, and dances, whist drives and social evenings are periodically arranged.

The club is managed by a committee widely representative of the employees and staff. In addition there is an "Apprentices' Representative Committee," elected from and by the members, who meet regularly to make suggestions to the senior committee upon which they are represented by their chairman, vice-chairman and secretary.

In connexion with this club, arrangements are made each year for a HOLIDAY CAMP which is held during the customary ten days of the Fair holidays. This has proved a great success, enabling the young employees to visit various Scottish and English summer resorts which would have been otherwise beyond their means.

THE WELFARE DEPARTMENT, inaugurated during the War, under a supervisor, and originally intended to cater for employees during working hours only, has gradually expanded until it now includes facilities for sport and recreation.

The movement commenced with the provision of dining facilities in a canteen installed in the old mansion of Linthouse, already mentioned elsewhere. When the house was demolished, in 1919, large canteen premises, fully equipped with the latest cooking appliances, were erected near the main entrance ; these new premises soon became the centre not

only for refreshment during working hours, but for evening recreations and social events connected with the works.

SAFETY FIRST AND AMBULANCE: The firm attaches the utmost importance to accident prevention. Posters and notices warning employees to exercise the greatest care are displayed in the various departments and other prominent places throughout the works. Committees meet regularly, to devise ways and means of reducing the number of accidents by a stricter observance of "safety first" principles, and the training of employees in ambulance work is encouraged.

In addition to the ambulance boxes required by statute, a well-equipped ambulance room is always maintained. A fully-trained man is on duty all day, and every facility is given the employees for the daily dressing of such wounds as do not prevent them from following their occupations, thereby considerably reducing the incidence of sepsis for minor wounds.

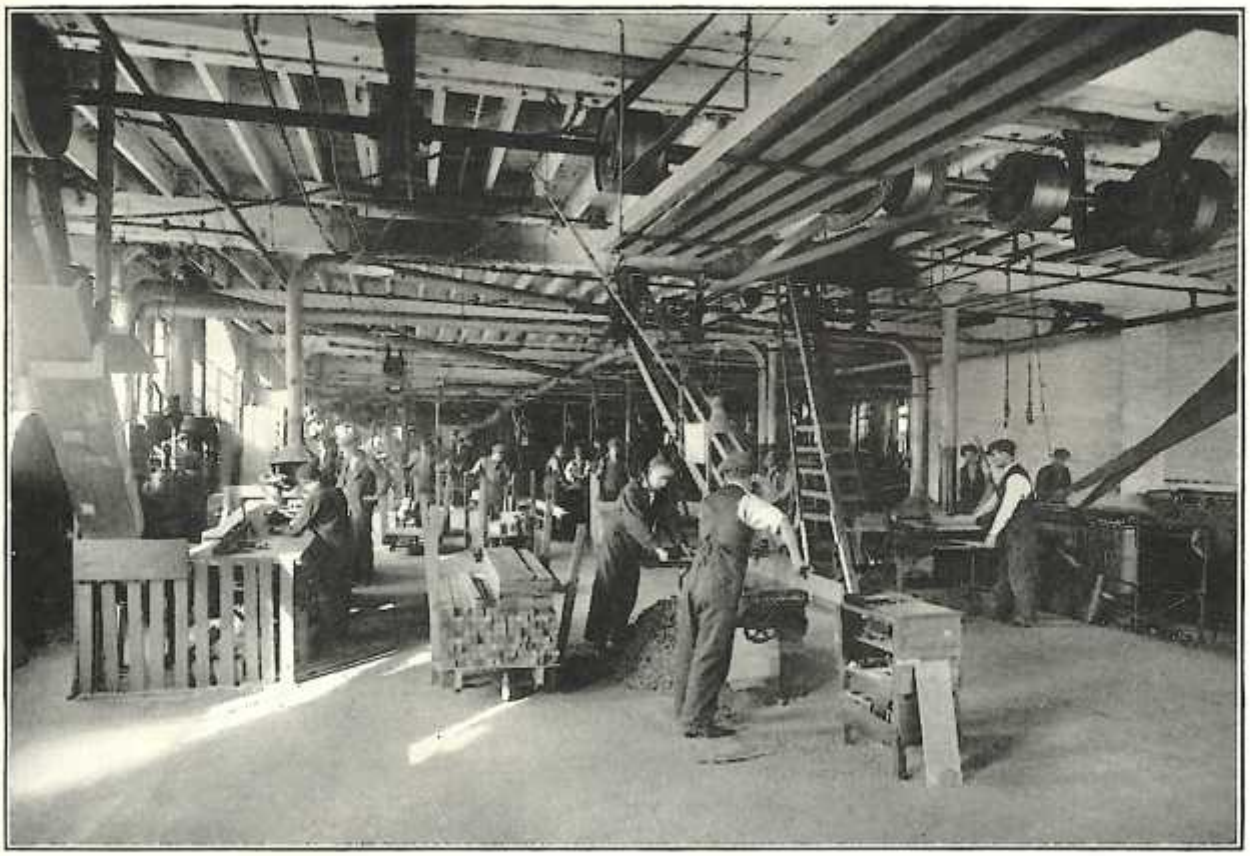
A SUGGESTION SCHEME is in operation by which suitable rewards are given to employees for suggestions both for reducing accidents and increasing the efficiency of the works.

EDUCATIONAL SCHEMES: While employees, irrespective of age or sex are encouraged to attend classes organized by the local authorities, special encouragement is offered the apprentices by the payment of weekly bonuses on their achievements of the previous winter. The welfare department has been instrumental in establishing local classes, to suit the particular requirements of the various departments, and these have been greatly appreciated.

APPRENTICE TRADE EXAMINATIONS are held each year, and although these are voluntary, upwards of two hundred apprentices present themselves for examination. Each trade is divided into four groups, viz., (1st year), (2nd), (3rd), (4th and 5th), and the heads of departments prepare examination papers covering the work performed by each group. The examination (which is of course a written one), is held in the works canteen towards the end of April of each year. The papers are corrected by the management and returned through the foremen to the apprentices, when faults and mistakes are indicated. Cash awards to the value of approximately twenty-five pounds are made annually.

The advantages of these examinations are twofold. They enable the apprentices to realize how far they have advanced in their training, and how much they have still to learn, while keeping the head foreman and management in touch with the training of the apprentices.

In addition to these examinations, the welfare department is responsible for the selection and engagement of all apprentices and young workers. Careful records of the apprentices' time-keeping, conduct and general efficiency are kept, and when trade conditions permit, bonuses



Woodworking Machine Shop.

Polishing Shop.

Recreation Grounds and Pavilion.

are awarded to those with sufficient marks. Apprentices are also advised as to the classes and schools most suited to their trade requirements and bonuses awarded on the results of the session's work.

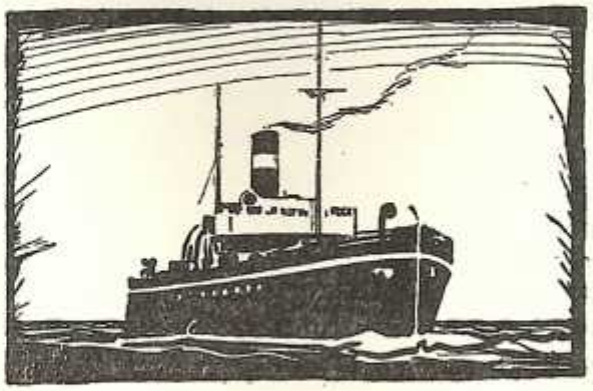
On the general question of training, while each department is expected to carry this through in a systematic manner, it has been found advisable in certain departments to appoint special instructors, whose main duty is the supervision of apprentice training.

THRIFT: One large savings scheme, in which sums are accepted on deposit at 5 per cent. interest, is available to all departments, and it is gratifying to know that even in these hard times hundreds of the workers and the staff take advantage of this scheme. Accounts may be withdrawn in whole or in part at holiday times, and as much as £9,000 has been paid out to subscribers, although the amount disbursed each year varies with trade conditions.

In the works savings bank, which also pays 5 per cent. interest per annum, the total amount at the credit of depositors is £1,800.

There is also a staff pension scheme in addition to the above saving facilities.

WORKS MAGAZINE. This publication was inaugurated in 1919, in order that the Firm's employees might keep in touch with all the welfare and recreational activities organized upon their behalf. Although the magazine originally appeared as a quarterly, exigencies of trade reduced its issues to two per year in 1928, and one issue in 1931. The magazine, however, has always been well received and supported by the employees, who contribute matter for publication as and when required.



CHAPTER NINE

Linthouse Engine and Boiler Works

IT was not until the Firm arrived at Linthouse from Kelvinhaugh, in 1870, that it possessed an engine works of its own. The buildings which were then erected for the construction of engines and boilers are still in existence although now more than doubled in size, and equipped with the most up-to-date machinery and handling-plant.

It is a far cry in the evolution of the engineering industry from 1870 to 1932, although as time goes, it is a comparatively brief period. The original portions of the buildings erected sixty years ago, at that time the last word in industrial architecture, appear ponderous and unsightly to the modern eye, accustomed to light steel and glass. The roofs, though liberally provided with glass, were otherwise entirely of wood, while the supporting-columns were of cast iron. These cast-iron columns served various purposes besides the usual ones of carrying the roof and providing support for the travelling-crane girders. One column in each bay acted as the bed of a vertical single-cylinder steam-engine, some 8 or 10 ft. above the floor, which supplied power for driving machine-tools through a shaft running the length of the shop. Other columns formed the base of the heaviest machine-tools, viz., the vertical and horizontal planing-machines, or "wall creepers," to give them their familiar name.

Until shortly after the year 1900, the power of the machine and boiler-shops was derived from the aforementioned steam-engines. As soon as electrical power production became a practical proposition, the Firm installed a large plant to produce its own electricity, and gradually changed over from a complete steam-driven plant to a completely electric one. When the distribution of electrical power from the city power stations became available, a proportion was taken from this outside station, which ultimately became the sole source of power for the works. This in its turn, is now being gradually changed over to the National grid system, which, incidentally, means the alteration of many motors in the works, to suit the common frequency.

During the period of change from steam to electric power, the engine and boiler works were both doubled in size, and a corresponding increase in equipment added for greater output.

Until 1912, the products of Linthouse engine and boiler works

consisted of steam reciprocating engines and Scotch marine-type boilers, commencing in the 'seventies with compound condensing engines for paddle and propeller drive. A gradual increase in speeds and powers brought with it the triple-expansion, and finally the quadruple-expansion engine, balanced on the Yarrow-Schlick-Tweedy system. Although the Firm had become licensees of Messrs. Parsons for the building of turbines, in the year 1905, and two ships—the yacht *Emerald* in 1903, and the Allan Liner *Virginian* in 1905—had been built at Linthouse and fitted with turbine machinery made at Parsons' works, it was not until 1912 that the first turbines were built at Linthouse. In that year an order was received from the Anchor Line for a twin-screw single reduction geared turbine passenger liner for their Glasgow–New York service. This vessel, the *Tuscania*, had a power of 10,000 S.H.P., and a sea speed of 17 knots. The *Tuscania*, which went on service in February, 1915, and is not to be confused with the post-war *Tuscania*, was torpedoed during the War. There followed during the War, and after, a long series of turbine-driven ships both of the Parsons' reaction and Brown-Curtis impulse type. During the War the boiler shop had also its experience of turning out water-tube boilers of Yarrow & Company's design.

From 1912 onwards, an almost complete metamorphosis has taken place in the machine shops and boiler works, due to the belief of the management that only the best and most up-to-date plant is suitable for turning out the class of work for which Linthouse is celebrated. To-day, it would be difficult to find half a dozen pre-war machine tools in the works, and continual additions and renewals are made from time to time.

The advent of the Diesel engine caused another revolution in machine-shop methods and standards of accuracy. In 1920, the Firm, after carefully weighing the advantages and disadvantages of the various types of engine then on the market, took out a licence from Sulzer Brothers, of Winterthur, Switzerland, for the manufacture of their famous two-stroke engine. The first order obtained for Stephen-Sulzer machinery was in 1922. This installation was for the M.V. *Dalgoma*, a twin-screw cargo vessel for the British India Steam Navigation Company Ltd. The power developed by the two 4-cylinder engines was 3,200 B.H.P., and the principal dimensions were—stroke 1,100 mm. and cylinder bore 680 mm., the revolutions being 86. This ship continues to give good service at the present day.

ENGINE SHOP

The engine shop consists of four bays, each over 400 feet long, two of which are served by overhead cranes. At the end of one of these

bays there is a special test-bed suitable for testing Diesel engines up to 6,000 H.P. with a water brake.

The most interesting machine tool in the engine shop is probably the recently installed high-speed planing-machine. This machine has a capacity of 5 ft. x 5ft., with a table stroke of 16 ft. The table is divided so that one half can be working while the second half is being loaded.

A Lancashire drive with a 30 H.P. motor is fitted, giving cutting speeds up to 250 ft. per minute and return speeds up to 300 ft. per minute, while a special tool lifting device, operated by compressed air, is fitted to all tool boxes. This tool lifting device, which has been developed at Linthouse, is almost essential when using the new Tungsten carbide tools, in order to prevent chipping of the cutting edge on the return stroke.

Another new machine, which is rapidly revolutionizing numerous operations, is the oxygen-cutting machine. This machine, which has been developed from the oxy-acetylene blow pipe, is capable of cutting to templet from mild-steel billets up to 16 inches in thickness. The surface of the cut as it leaves the machine is so good that in a large number of cases no machining of the surface is required. Such parts as crank webs, eccentric straps, large spanners, valve bodies, mast bands, and many other items previously forged in the Smithy, are now cut direct from steel billets. Recently, a large mast band for use in connexion with a 40-ton derrick, was cut from a billet ten inches thick, in a little over an hour, with an expenditure for oxygen of just over twenty shillings. It was calculated that it would have taken two smiths about a fortnight to forge a similar article.

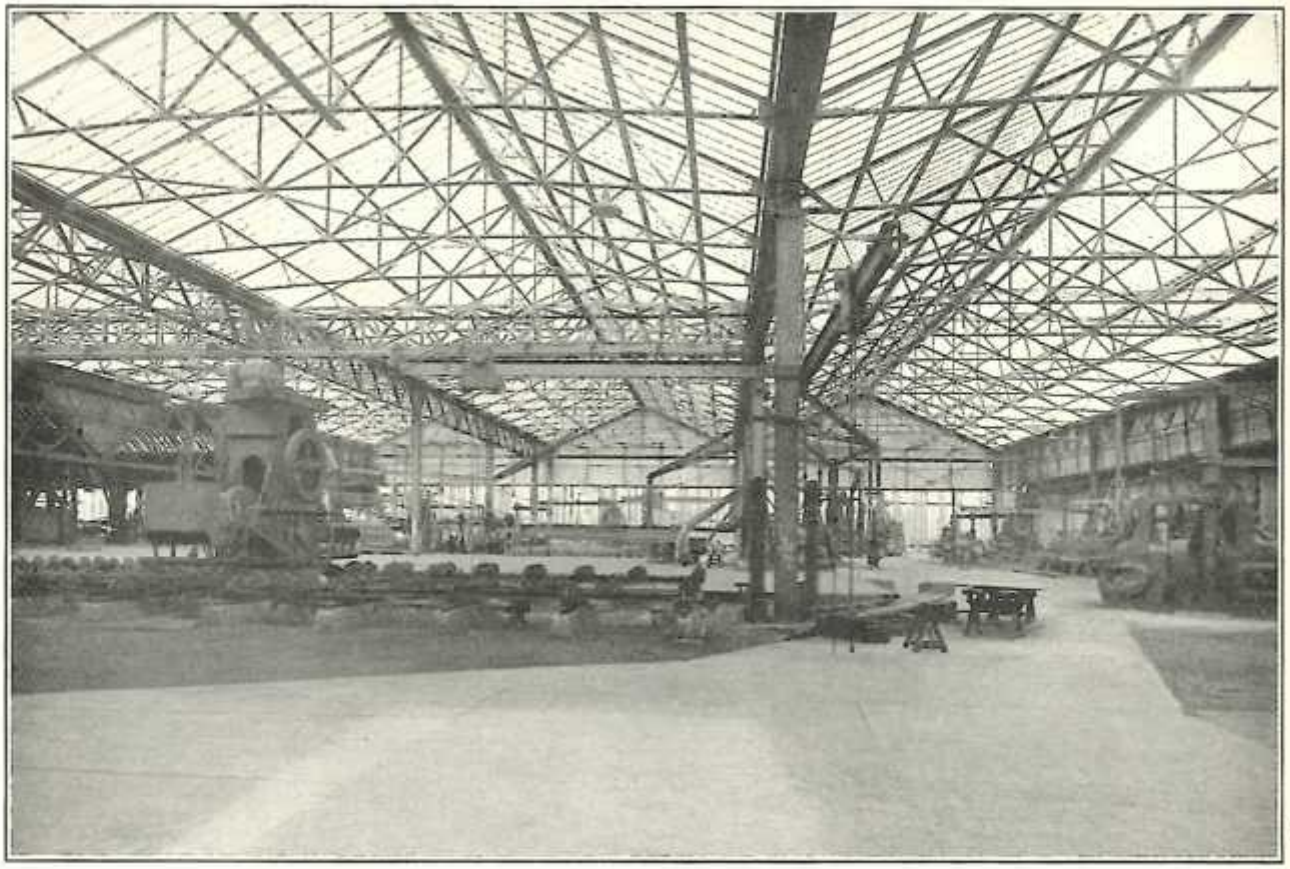
Several interesting machines have recently been installed in the tool room, among which may be mentioned an electric-furnace for tool tempering and hardening; a dynamic balancing machine for balancing the fan impellers used in connexion with oil fuel plants, and a rotary converter which is capable of supplying alternating electric current at any voltage, frequency, and phase, for testing motor-driven oil fuel plants.

Electric welding is another process which is rapidly expanding in marine engineering, and a number of single operator machines, using alternating current, have recently been installed, as well as two spot-welding machines.

In 1930, the plumbers' shop was rebuilt, and among the new tools installed at that time the outstanding one is a large flash-welding plant of 120 kw. capacity, capable of welding steel flanges on to pipes up to seven inches in diameter. The operation is carried out as follows :

The flange, which has a spigot of the same diameter as the pipe, is held against a copper head by two triggers operated hydraulically ; the pipe

View of Heavy Machine Shop.



View of Steelworkers' Shed.

New Sheet Ironworkers' Shop.

is also held in hydraulic grips, and is brought into a concentric position with the spigot on the flange, and into touch with it. A low voltage current is then passed through the flange and pipe and an arc forms at the point of contact; at the same time an hydraulic feed moves the pipe a certain predetermined distance towards the flange, the hydraulic pressure depending on the diameter and thickness of the pipe. The current is cut off a few seconds before the hydraulic pressure is released, with the consequence that a forging action takes place on completion of the weld. The resulting weld is practically equivalent in strength and resistance to fatigue to the original material, and microphotographs show a structure completely free from oxydized material. The Board of Trade and Lloyds have now approved this type of flange for high pressure water- and air-pipe lines. The highest output of the engine shop in a year was 135,000 indicated horse power.

BOILER SHOP

The boiler shop is of ample size to produce all the boilers required for Linthouse-built ships. There is, in fact, a considerable margin, and many boilers have been constructed to replace old ones, or for firms whose establishments do not include boiler shops.

The maximum turnover of the shop is, approximately, one single-ended Scotch boiler of, say, 15 ft. diameter per week, or fifty boilers per year.

The plant in the shop, which consists of two large and two smaller bays, is modern, and adequate for all the demands so far made upon it for Scotch or water tube types of boilers. The usual heavy hydraulic flanging press and riveting machines are in evidence, the latter for riveting both front and back circumferential seams of the boiler shells. The main plate-heating furnace is oil fired on the "Clyde" system, manufactured in the Firm's works.

All the most up-to-date facilities for electric welding, pneumatic riveting, etc., have been added in recent years.

The boiler works, although threatened with extinction by the Diesel engine, may yet have a long and useful life ahead.

It would occupy too much space to give descriptions of the many outstanding sets of machinery produced by the Linthouse shops, or installed in Linthouse-built ships, in recent years, but the following brief account of a few should prove of interest.

TWIN-SCREW PASSENGER VESSEL *VICEROY OF INDIA*

Although the main propelling machinery of this now famous ship was not constructed in the Firm's works, the whole installation marks a new step in the sphere of marine engineering in Britain, and Europe.

The turbo-electric machinery, supplied by the British Thomson-Houston Company Ltd., of Rugby, consisted of the following: Two slow-speed synchronous motors, each coupled direct to a propeller shaft and capable of developing together 17,000 S.H.P. at 109 r.p.m. The motors receive their power from two high-pressure steam turbine-driven alternators having a maximum speed of 3,110 r.p.m. Steam is supplied by six Yarrow boilers and two Scotch boilers, working at pressures of 375 and 230 lbs per sq. inch respectively. The high-pressure steam is superheated to 700° F., for which the turbines are specially designed. The working of the ship, including cooking, deck machinery, and steering-gear, is almost exclusively electrical, the latter being of the well known electric hydraulic type manufactured by Brown Brothers, of Edinburgh.

This vessel realized all her owners' and builders' highest expectations, both as to performance and popularity, as a passenger-carrier on the Bombay mail run.

TWIN-SCREW STEAM YACHT *ROVER*

Though vastly different in size and power from the last-mentioned vessel, the machinery installation of the S.Y. *Rover* has also its points of interest. The majority of large yachts built in recent years have been fitted with Diesel machinery, but unless a yacht is to be used for extended ocean cruising, where a large radius of action without re-fuelling is of primary importance, the Diesel engine can hardly justify its high initial cost. While fuel economy at sea is of importance in a yacht, as in any other vessel, fuel economy while at anchor also plays a large part in overall running costs, while low maintenance charges for repairs are essential. Silence and absence of vibration at all times are imperative, and these can most readily be obtained with steam machinery and boilers.

The main propelling machinery of the *Rover* consists of two four-crank triple-expansion balanced engines, capable of developing 3,000 I.H.P. at 160 r.p.m. In addition to being fully balanced on the Yarrow-Schlick-Tweedy system, each engine has in the centre of its crankshaft a heavy cast-iron flywheel. The balancing was so successful, and the turning moment so even, that it is impossible to tell at any speed that the vessel is not driven by turbines or other rotary engine.

Another feature of the engine room is the attention paid to reduction of staff, by making so far as possible, all lubrication automatic.

Steam is supplied by three large Scotch boilers using oil fuel, and fitted with superheaters.

All electric power on the ship is supplied by three 60 kw. turbo generators. A large secondary battery is installed, of sufficient capacity

to supply lighting throughout the ship at night, thus allowing all machinery to be shut down.

PASSENGER STEAMERS *CORFU* AND *CARTHAGE*

As an example of the most modern installations of high-pressure water tube boilers and single-reduction geared turbine, no better choice could be made than the above two ships, completed at the end of 1931.

The main propelling machinery, all built at Linthouse, consists of two sets of Parsons' single-reduction geared turbines, six turbines in all, developing 15,000 S.H.P., at 120 r.p.m. propeller speed. The turbines, of the all-reaction type, are designed for a stop-valve pressure of 400 lbs. per sq. inch and an initial steam temperature of 725° F. The steam consumption of 7.5 lbs. of steam per S.H.P. at full power is equal to the very best modern practice. The fuel consumption, also, at .68 lbs. of oil per S.H.P., is a most satisfactory achievement. Steam is supplied by four Yarrow water-tube boilers.

REFRIGERATED MOTOR CARGO VESSEL *OPAWA*

There is no better example of the Firm's latest Diesel engine output than the above twin-screw motor ship *Opawa*, engined by twin 9-cylinder Stephen-Sulzer engines constructed in the Firm's works in 1930-31. The power developed is 9,400 B.H.P. at 120 r.p.m. giving a sea speed of 15¼ knots. The principal dimensions of the engines are—cylinder bore 680 mm., piston stroke 1,200 mm.

As this vessel is designed for refrigerated cargo, the list of auxiliaries is particularly large. There are three Diesel-driven electric generators, each of 300 kw., and, in addition, a 100 kw. turbo generator, taking steam from waste heat boilers at sea, and from an oil-fired boiler in port.

From the foregoing instances of the variety of engineering work produced, it will be evident that the Linthouse engine and boiler works of 1932 must be equipped with every variety of up-to-date machinery and tools to deal with the construction of machinery of all powers, with marine engines of every type, steam reciprocating, steam turbines, gearing, and internal combustion Diesels, and with boilers of all makes, water tube, Scotch, and vertical. This very variety of marine propulsive machinery is indeed one of the difficulties of the engineering trade at the present day, as a shop equipped yesterday for the efficient output of, say, turbines, may to-day require expensive extension and re-organization for Diesels, and to-morrow may find it necessary to again extend for electric propulsive machinery, or whatever other type may evolve in the future. The works are, however, fully equipped to deal with this

variety of types, and the foregoing description is merely a general outline, with some notes on the more important tools and plant.

WORK CARRIED OUT FOR OTHER FIRMS

(1) Gear Cutting

In the year 1917, when it appeared that the geared turbine had been proved a success and was beyond the experimental stage, it was decided that the cutting of gears should be undertaken at Linthouse.

A Muir-Melloy machine was installed, and up to the present time twenty-five sets of gearing have been cut for the machinery of vessels built at Linthouse. These include, with one exception, all the torpedo-boat destroyers built by the Firm, the remainder being for merchant ships.

In addition to those required for Linthouse-built ships, contracts have been carried out for nine other well known marine engineering firms. To the firm of Barclay, Curle & Co. Ltd. alone, ten sets of gearing have been supplied. In 1928, Messrs. Scott's S. & E. Co. Ltd. placed an order for the gears for one of the latest British torpedo-boat destroyers, H.M.S. *Ardent*. Another important contract, carried out in 1931, to the order of Messrs. Yarrow & Company Ltd., was a twin set of gears for a 40,000 S.H.P. flotilla leader, the *Dubrovnik*, for the Yugo-Slav navy.

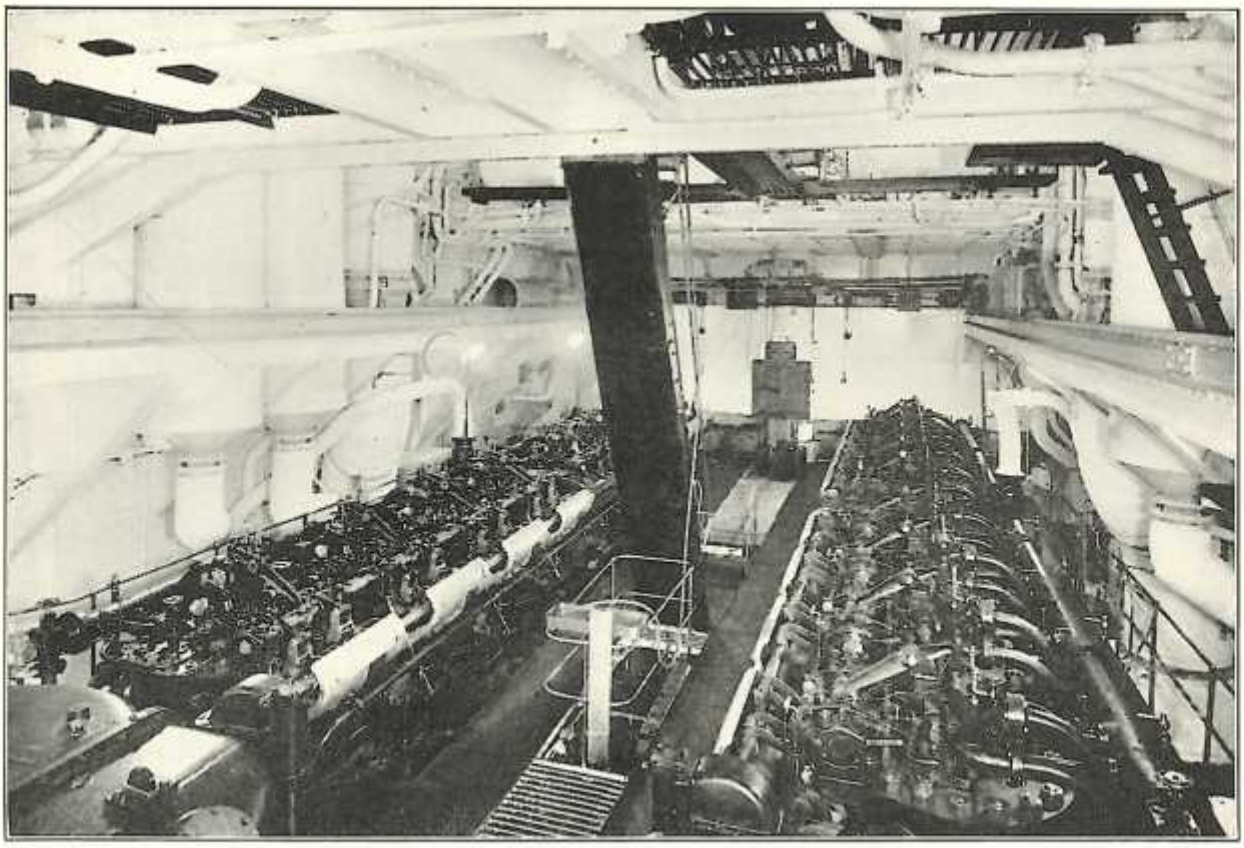
Modern marine gear-cutting is an extremely precise form of work, and all hobs used are tested for accuracy at the National Physical Laboratory, while the machine itself is frequently dismantled and the slightest error corrected. To this care and attention bestowed on the machine, the Firm attribute their conspicuous success in gear cutting.

(2) Condensers for Electric Power Stations

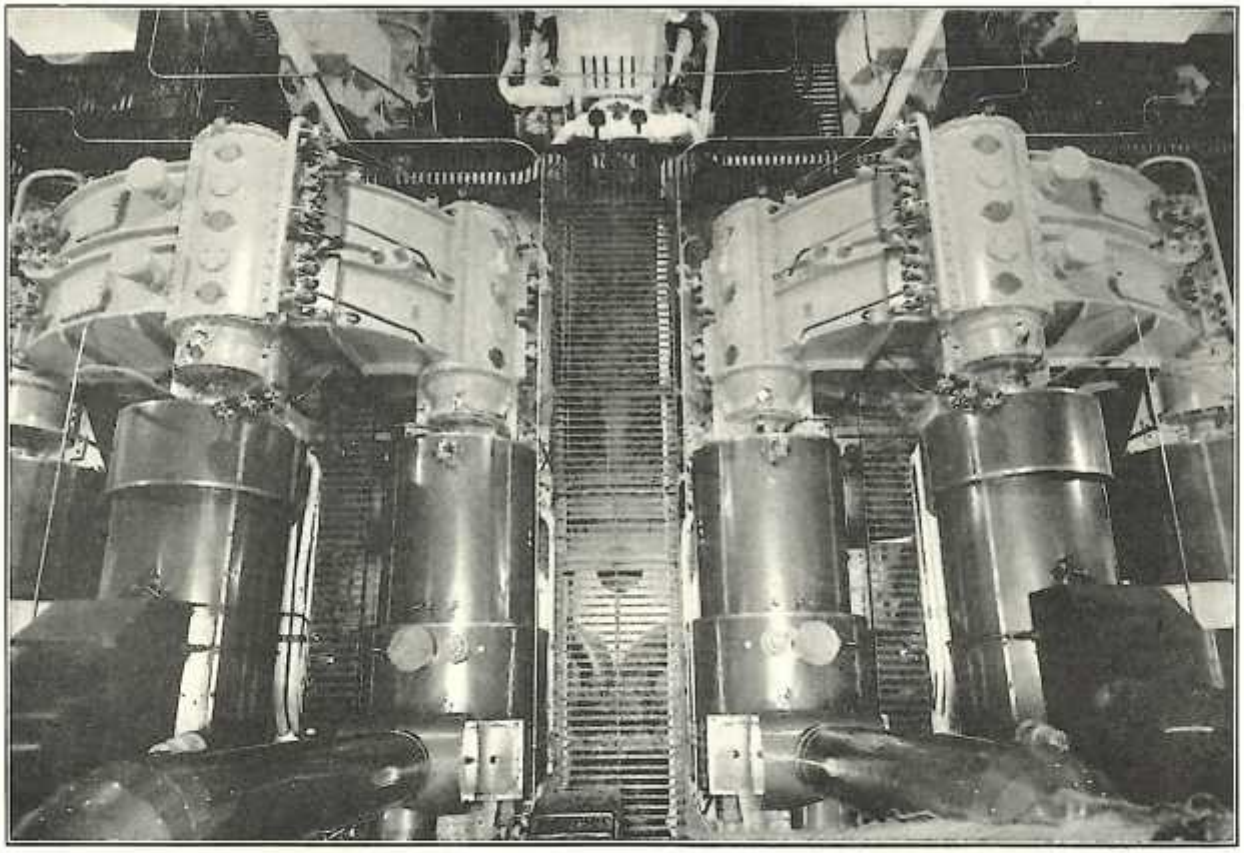
Large condensers have been built in the Linthouse boiler shops for Worcester and other land power stations. This, and other work in the form of steel shells for evaporators and feed heaters, has been carried out to the order of Messrs. G. & J. Weir Ltd., of Glasgow.

(3) Oily Water Separators ("Comyn" Patent)

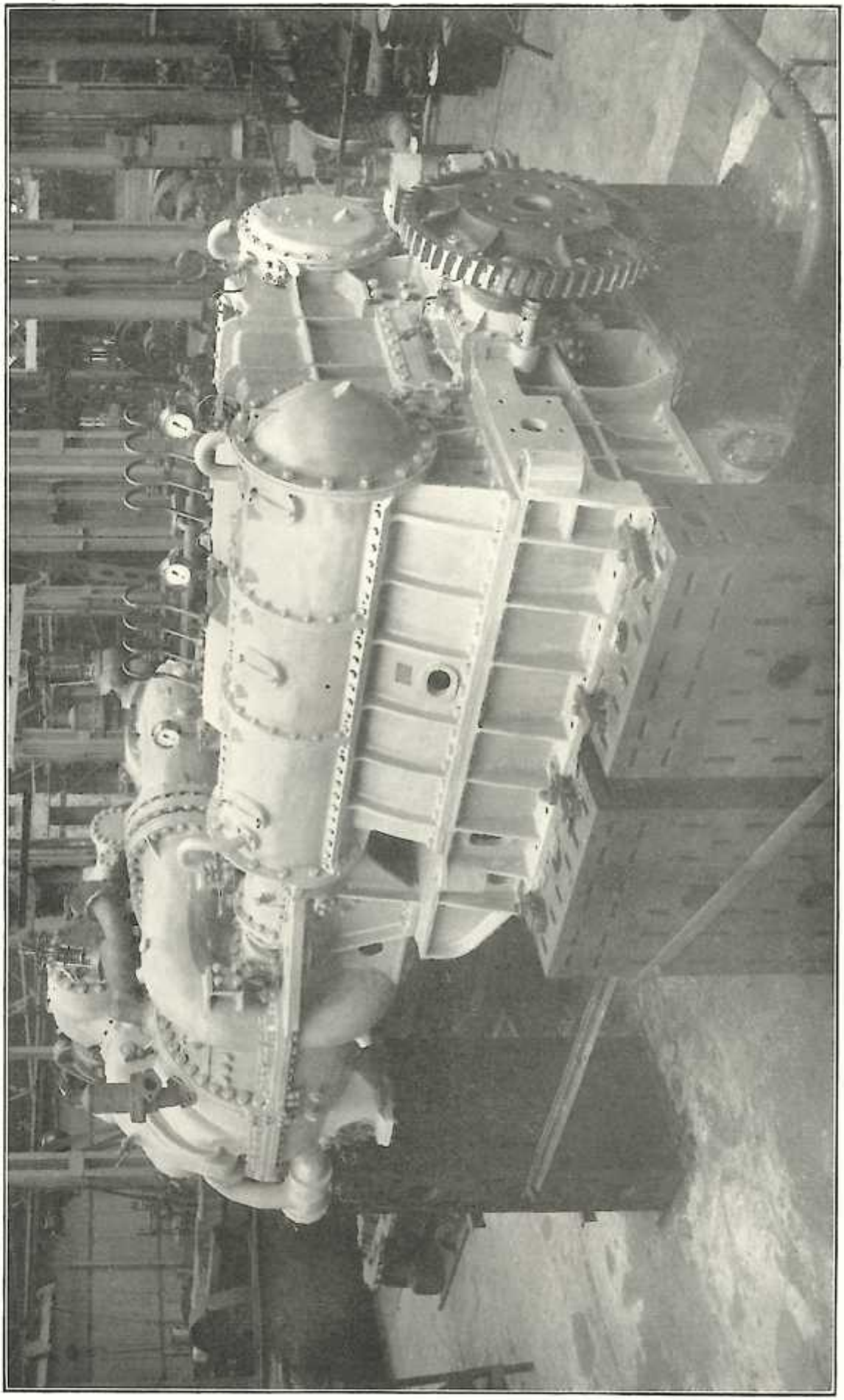
With the increasing use of oil as fuel on board ship, and the resulting waste and nuisance caused by discharging overboard oily water from bilges or tanks, the necessity for some form of separator is obvious. With this in view, the Firm took up the manufacture of the "Comyn" separator for Messrs. Separators Limited. The work is of a nature suitable for the boiler shop, and the demand for the article is increasing as its advantages become known.



M.V. "Opawa." View of cylinder platform; two 9 cyl. Stephen-Sulzer engines.



T.S.S. "Carthage." View of main turbines and gear cases from upper platform.



Half Set of Geared Turbine Machinery for a British Torpedo Boat Destroyer, 1917.

(4) Oil Burning Plant: Clyde Oil Fuel System Limited.

The manufacture of oil fuel burning plant has occupied a prominent place in the engine works of the Firm since 1921.

By agreement with the Clyde Oil Fuel System Limited, formed in 1920, Alexander Stephen & Sons Limited became sole manufacturers for all their products. Practically the whole field of oil burning is covered by the large variety of apparatus turned out of the shops at Linthouse. A list of these includes the largest installations on marine and land boilers of all types, boiler plate heating furnaces, rivet heating furnaces, lime kilns, cooking ranges, central heating installations and many others.

Marine installations of note are to be found in vessels belonging to the Royal Mail Steam Packet Company, Peninsular and Oriental Steam Navigation Company, British India Steam Navigation Company Ltd., and most of the other large British shipowning companies.

Central heating installations range from those required by the largest buildings, hotels, offices, factories, etc., to the smallest domestic automatic sets for private houses. The latter have recently become very popular and are selling in large numbers in this country.

Some of the buildings so fitted are the new Bank of England building, London; the North of Ireland Houses of Parliament, Belfast; the Royal Mail Company's new offices, Leadenhall Street, London; the Royal Mint (for gold refining); J. & P. Coats' factories, etc.

In addition to supplying the home market, a large export trade is carried on with India, South America, and Continental countries.

VACUUM CLEANING

Another side-line in engineering, which has proved most successful, is the manufacture of the "Clyde" turbo exhauster for vacuum cleaning purposes.

As in the case of the oil-burning plant, Alexander Stephen & Sons Limited are sole manufacturers for the firm of Barr & Company, Glasgow, who sell the machine for the purposes of factory dust collection, railway carriage cleaning, passenger ship cleaning, power station duty, public buildings, restaurants, warehouses, theatres, cinemas, hotels, etc.

The apparatus consists of a multi-stage electro-turbo blower or exhauster, designed to blow or draw through a very efficient filter.

The whole plant, which is extremely compact and simple in its construction, is placed in any convenient or central position. In buildings it is generally in the basement or on the ground floor, and a system of piping is led to the points at which the dust extraction or cleaning takes

place. This up-to-date labour-saving device has achieved great popularity in many large buildings throughout the country, and may be seen in operation at the Gleneagles Hotel, Perthshire, and a large number of similar establishments.

Unusual Alterations

The records of a firm engaged in shipbuilding, from the dawn of the industrial age until to-day, must naturally include a number of highly interesting and specialized undertakings outside the ordinary requirements of the trade.

Earlier examples of unusual structural alterations, such as the lengthening of the *Oscar*, in 1813, have already been mentioned, but the present century has also its share of "major operations" which merit special attention. Since 1901 three existing ships have been lengthened at Linthouse, the length added in the first case being thirty feet, and fifty feet in the other two.

In the first instance, in 1901, the ship, *Port Morant*, was still on the stocks, while the other vessels, the *Miltiades* and *Marathon*, returned to their birthplace in 1912, after nine years' service, to be lengthened in dry dock, their finished weight being increased by about 1,000 tons.

In every case the vessels were cut through at near amidships, but forward of the engine and boiler space, so as to necessitate no alterations to the machinery. One half of the ship was then moved by tackles along greased ways, similar to launching ways, for the required distance; the extra structure was then built in and made one with the separated portions. Though simple enough to describe, the operation demanded great care and forethought to ensure the separated portions remaining in line during their journey apart; in order to provide the extra strength necessary for a longer vessel it also entailed the addition and riveting on of considerably more steel than that merely required for the new midships.

These operations were undertaken at a time when the facilities for such work were still very limited; in 1912, for example, the method of cutting steel plates by burning was not in existence. In the case of the *Miltiades* and *Marathon*, the weight of the one end was about 2,500 tons—no small weight to be moved and placed in a new position without deviating a hair's breadth!

Further important structural alterations to existing vessels were also undertaken in 1925. In this case the problem was to cut away the under-water portion of the forward end of two large liners, of 17,000 tons, and fit structures of new form without disturbing the upper

portions of the ships, or rendering the alterations so extensive as to be economically impracticable.

The vessels so altered were the *California* and *Caledonia*, two of the class of five liners built by the Anchor Line when reconstructing its fleet after the War. The lines for all five ships had been designed by the owners' naval architects and tested by model experiments at the Teddington tank, to ensure the most economical power and fuel consumption. Although the unusually full underwater lines of the bows gave excellent results in the still waters of the experimental tank, when the first ships of the class went into service (before the Linthouse vessels were completed), their commanders reported severe slamming in heavy weather in mid-Atlantic; in fact, the bottoms of their foreholds were found to have rivets started and plates stove in.

The owners called a general meeting of captains, naval architects and builders, and, after considerable discussion, the Stephens' representative proposed a bow form of " V "-shaped section, which could be built without undue alteration and at reasonable cost. This new bow form, after being tested under wave conditions in the Teddington tank, was approved, and it was decided to perform the operation on the *California*, which was nearly ready for launching. Her bows were, therefore, cut away, leaving the heavy weight of the top decks to be supported on shores, while the new form was built in underneath. The alteration was entirely successful, not only in curing the slamming and resultant structural damage, but in improving the fuel consumption in Atlantic weather. Following its success, the other ships of the fleet, including the *Caledonia*, were dry-docked and altered to the same model.

* * * * *

Apropos the Teddington tank referred to above, it may be noted that Froude's method of ascertaining the resistance of a ship, by means of scale models towed in a tank, has always been of great interest to the Firm. Indeed, many years before the ship-model testing tank was installed at the National Physical Laboratory, Teddington, an apparatus was erected over the condenser-tank at Linthouse.

In this latter tank, which was about 45 ft. long and formed the roof of the power-house, many models were towed, their speeds and resistances being measured by an apparatus devised by Fred J. Stephen. The most obvious part of this apparatus is a pendulum, adjusted to record half-second beats on a rotating drum, and the machine, though crude, and exposed to all the winds that blow, gave remarkably accurate results.

The tank was used on many occasions when the Firm estimated for vessels of unusual form or speed, such as the small channel steamer, *Mourilyan*. An outstanding instance of its accuracy was that of the

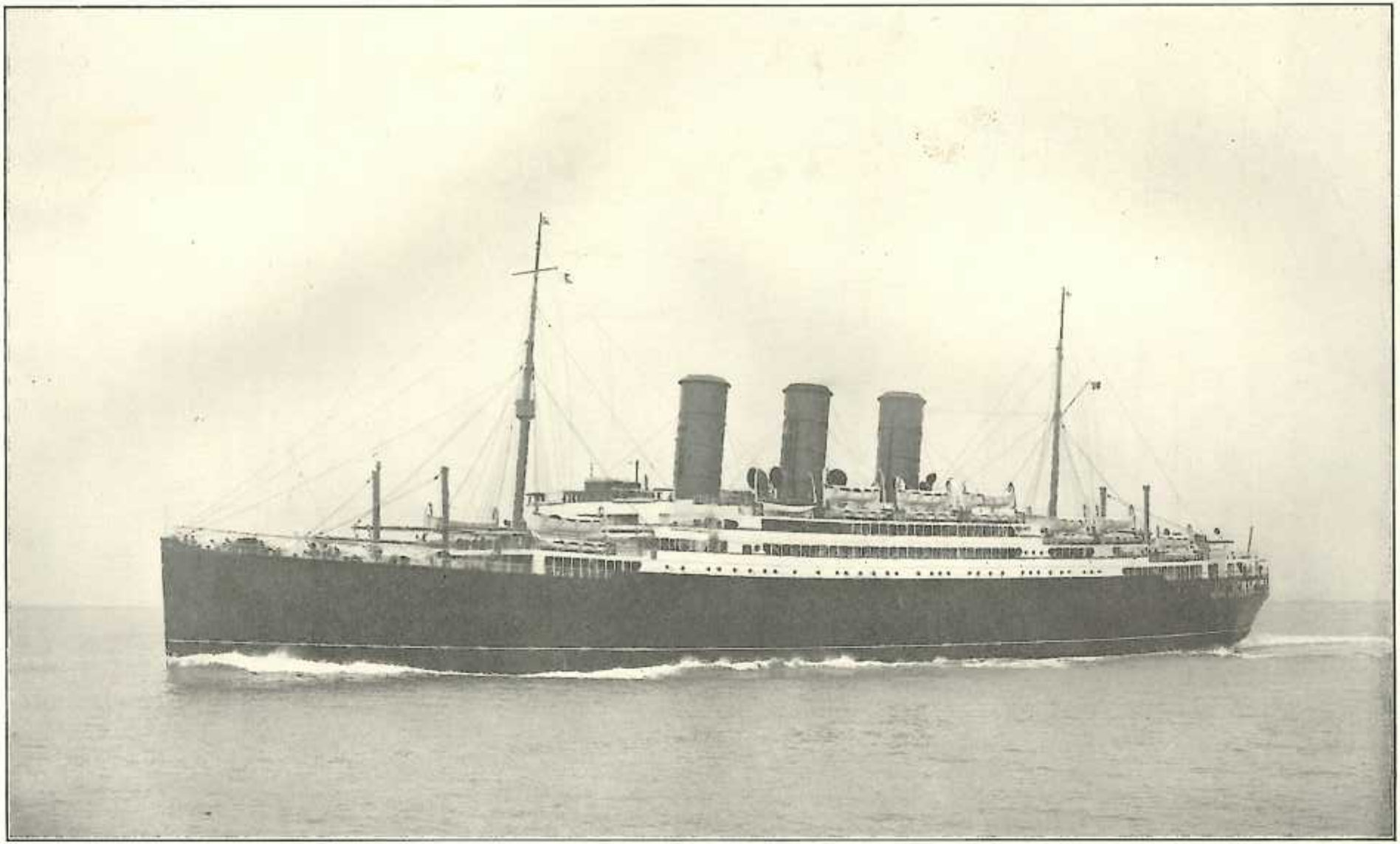
Wyandra, built in 1902; on the measured mile this vessel exceeded her contract speed of 14 knots by .002 knots, thus evading a heavy penalty, largely by the help of the model experiments carried out in the Linthouse condenser tank. Such accuracy could hardly be exceeded to-day with even the most approved appliances.

In later years a more modern tank was built, and a special shed erected for the old apparatus which, equipped with certain improvements, continued to do valuable work until the tank authorities at Teddington introduced the system of testing models equipped with working propellers—a most important improvement, which put an end to the testing of models alone.

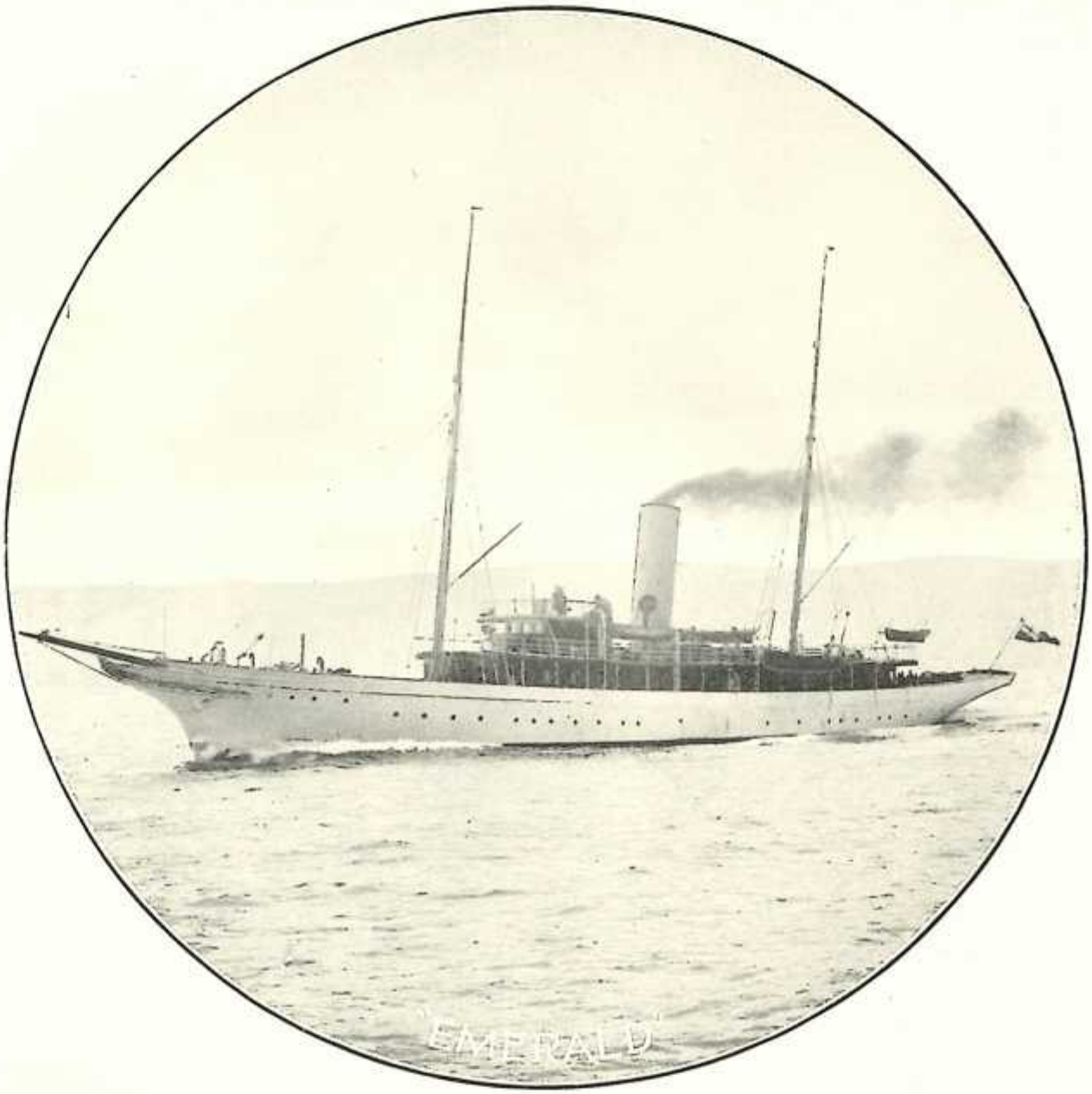
* * * * *

The aforementioned testing apparatus is but one of the many inventions which have originated at Linthouse. Indeed, it is safe to affirm that few ships of to-day have been built or equipped without the aid of some Linthouse-devised gadget, and certainly every Stephen-built vessel has many distinctive fittings designed to enhance her efficiency.

Until welding takes the place of riveting, for instance, a steel ship can hardly be constructed without the use of the countersinking machine described elsewhere, while as long as wooden decks continue to be laid, use will be found for the Linthouse electric deck-caulker. Again, all ships with pretensions to efficient equipment will be fitted with the hydraulic skylight-lifter, and the Ralston stability indicator in the chart-room, besides other Linthouse devices of more recent date.



"Caledonia."
Twin screw turbine passenger ship. 1925.



"Emerald."
Turbine Steam Yacht.
The first turbine vessel to cross the Atlantic. 1903.

CHAPTER TEN

Steam, Motor, Auxiliary and Racing Yachts

. . . those proud ones swaying home,
With mainyards backed and bows a cream of foam,
Those bows so lovely-curving, cut so fine
Those coulters of the many-bubbled brine.

MASEFIELD.

THOUGH the late Alexander Stephen was a Glasgow man, and resided for many years in that city, he invariably spent the summer months at his residence, "Fearan Coille," at the Bullwood, about two miles from Dunoon. From there he travelled daily to the yard for about twenty-four years, until 1890, when he moved to Wemyss Bay, where he had built a new house on the estate of Kelly. Living on the Firth of Clyde throughout the summer, it was natural that he and his family should take up yachting with an enthusiasm characteristic of their line.

STEAM YACHTS

The first yacht owned by Alexander Stephen was the *Coolan*, an old iron cutter of 37 tons, yacht measurement, purchased in 1878, in which he made several cruises up the west coast of Scotland. This vessel was retained by her owner for about four years until, being badly becalmed on several occasions, and becoming impatient of the uncertainty of reaching his destination on time, Mr. Stephen sold her and chartered the steam yacht *Ada*, of 110 tons, for the season of 1881.

The following year he had built at Linthouse the *Sylvia*, of 136 tons, which gave himself and family so much enjoyment that he decided to construct a larger vessel. He therefore sold the *Sylvia*, in 1884, and constructed, in 1885, the *Nerissa*, a very able and successful vessel of 264 tons, yacht measurement, which proved a great advance on her predecessor.

Some years later, in 1898, just prior to his death, Alexander Stephen built the *Calanthe*, of 429 tons, which was afterwards sold to Mr. Hinckley of New York. The success of these steam yachts, all of which were very efficient and typical vessels of their time, doubtless led to many future orders for the Firm. Alexander Stephen made various extended

cruises in them up the west coast of Scotland, as far as Orkney and Shetland, down the east coast to the Tay, and across to Norway and the Baltic.

In 1903 the Firm designed and built, for the late Lord Furness, the *Emerald*, a yacht of 797 tons. At that time steam turbines, invented by the late Sir Charles Parsons, were in their infancy, and Lord Furness, who had great faith in both the invention and the inventor, wished to assist in their development. He therefore decided, in co-operation with the builders, to fit turbines into his new yacht, the *Emerald*.

At that period it was Messrs. Parsons' practice to fit three turbines driving three shafts, with one propeller in the centre shaft and two on each of the side shafts. The five propellers were of small diameter, and fast running, which evidently did not suit the *Emerald*, a vessel of fairly deep draft and rather large displacement. The results were somewhat disappointing, both as regards speed and the fact that there was a disagreeable noise in the after end of the vessel. The Stephens then suggested that a single propeller on each side shaft might be an improvement, as they considered that the forward propeller on the side shaft was not conducive to efficiency in the after propeller on that shaft. This suggestion was ultimately adopted, with a considerable gain in speed and the disappearance of the noise in the after cabins. Following the success of this experiment, single screws were always fitted on the side shafts in turbine vessels with three shafts. For example, the very successful and popular Clyde river steamer, *King Edward*, the pioneer commercial turbine-engined vessel, which had originally five propellers, was altered to three with excellent results.

It is interesting to recall that the *Emerald*, which later became the property of Lord Inverclyde, was the first turbine-engined ship to cross the Atlantic. She was also chartered by the late Mr. Jay Gould, who used her for following the races for the America Cup. After she had changed hands, however, and while lying up in the Gareloch, she was fired by the suffragettes, in their campaign of propaganda, and became a total loss. At the same time a similar fate befell Kelly House, the ruins of which are still one of the landmarks of the Firth of Clyde, above Wemyss Bay.

In 1904, Captain W. MacAllister Hall, of Torrisdale, sent out an enquiry for the construction of a steam yacht of 137 tons, to be delivered within three months, in time for the shooting season. This contract was secured by the Stephens, as they were the only builders who would undertake to construct the yacht in so short a period. As there was not a great deal of work on hand at Linthouse when the contract was obtained, the Firm was able to push the order through so well that only

fifty-one working days elapsed between the laying of the keel and the completion of the vessel. She was launched with her engines and boilers on board, steam up, and complete in every detail. Two days later she was handed over to her owner, who expressed his complete satisfaction—especially in receiving the yacht in time for his requirements. This feat the Firm regards as one of its records in shipbuilding.

The yacht in question, which was named the *Medea*, has had a very varied career, having passed through many hands since she first took the water. In 1912 she was purchased by the late John Stephen, after whose death she was sold by the trustees to Mr. Graham-White, who lent her to the French Red Cross during the War, when she appears to have been employed in carrying wounded on the Seine. Later, in 1928, when Fred Stephen was prevented by illness from continuing yacht-racing, he re-purchased the *Medea*, which is still in his possession. As he is Commodore of the Royal Northern Yacht Club she is often to be seen as the Commodore vessel at the Club's Regattas.

In 1926 Mr. Kenneth Clark placed an order with the Firm for a 230 ton motor yacht, the *Mingary*, to the design of Messrs. Cox & King. This vessel, which was of the modern type, with straight stem and cruiser stern, was luxuriously fitted in every way, having hot and cold forced ventilation and central heating throughout. Her machinery consisted of two Sulzer Diesel engines, capable of obtaining a speed of about 12½ knots.

The finest yacht ever built by the Firm is undoubtedly the steam yacht, *Rover*, constructed in 1930 for the Right Hon. The Earl of Inchcape, G.C.S.I., G.C.M.G., K.C.I.E., Chairman of the Peninsular & Oriental and British India Companies. She is a vessel of 2,115 tons, Thames measurement, and the largest and most luxurious yacht yet built in this country, save the Royal yacht *Victoria and Albert*. Schooner-rigged, with cut-water stem and long counter giving her an extremely handsome appearance, the *Rover* is driven by triple-expansion four-crank engines, operating two screws which enable her to obtain a speed of nearly 16 knots. Her public rooms are exceedingly spacious, and most handsomely decorated. She has forced mechanical ventilation throughout, marbled bathrooms attached to every state-room, and special store-rooms and oil-fuel tanks are provided to enable her to remain at sea for long voyages and world cruises. Large open deck spaces for dancing and games are also a feature of this vessel. She was visited during Cowes Regatta in August, 1930, by Their Majesties The King and Queen.

AUXILIARY YACHTS

The Stephens have also constructed several very fine examples of

the best type of cruising yacht, including the auxiliary yawl, *Vadura*, built in 1926 for Mr. J. H. M. Clark, to the design of Messrs. Alfred Mylne & Company. She was a vessel of 111 tons, 65 ft. on the water-line, and 19ft. 4ins. beam, having over 30 tons of lead in her keel, which was cast on the berth, in the yard. She had steel frames and teak planking throughout.

In 1931 the Firm built a somewhat similar yacht, the *Golden Hind*, also designed by Alfred Mylne & Company, for Commander J. H. Kitson, of Arnisdale, Loch Hourn. She is a schooner of 144 tons, and her auxiliary engine gave her a speed of 8.4 knots on trial.

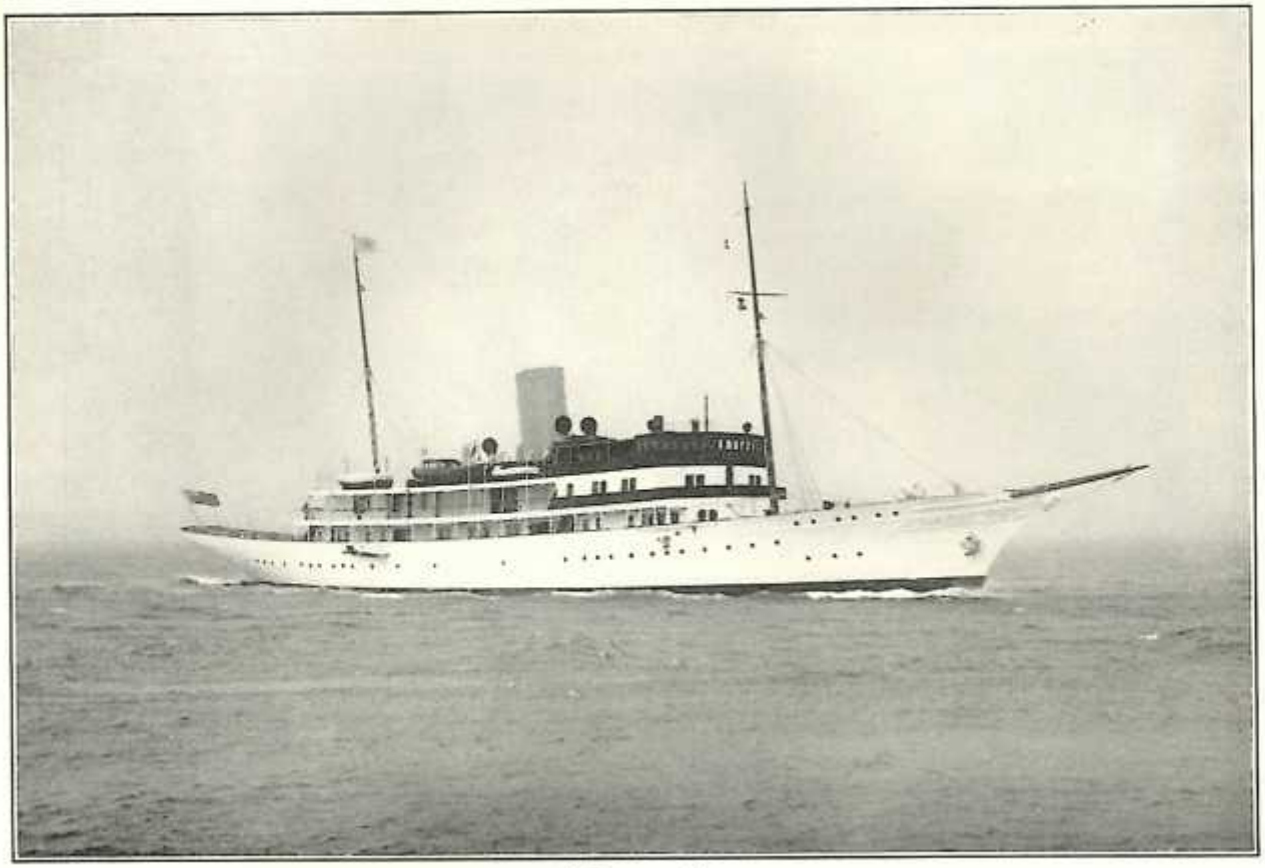
RACING YACHTS

Since the Stephens took up residence on the Firth of Clyde, at least two generations of the family have figured prominently in British yacht-racing circles. In addition to a keen personal enthusiasm for the sport itself, they have naturally a sound practical knowledge of the technicalities of yacht construction which has doubtless contributed largely to the success of their Linthouse-built boats both at home and abroad.

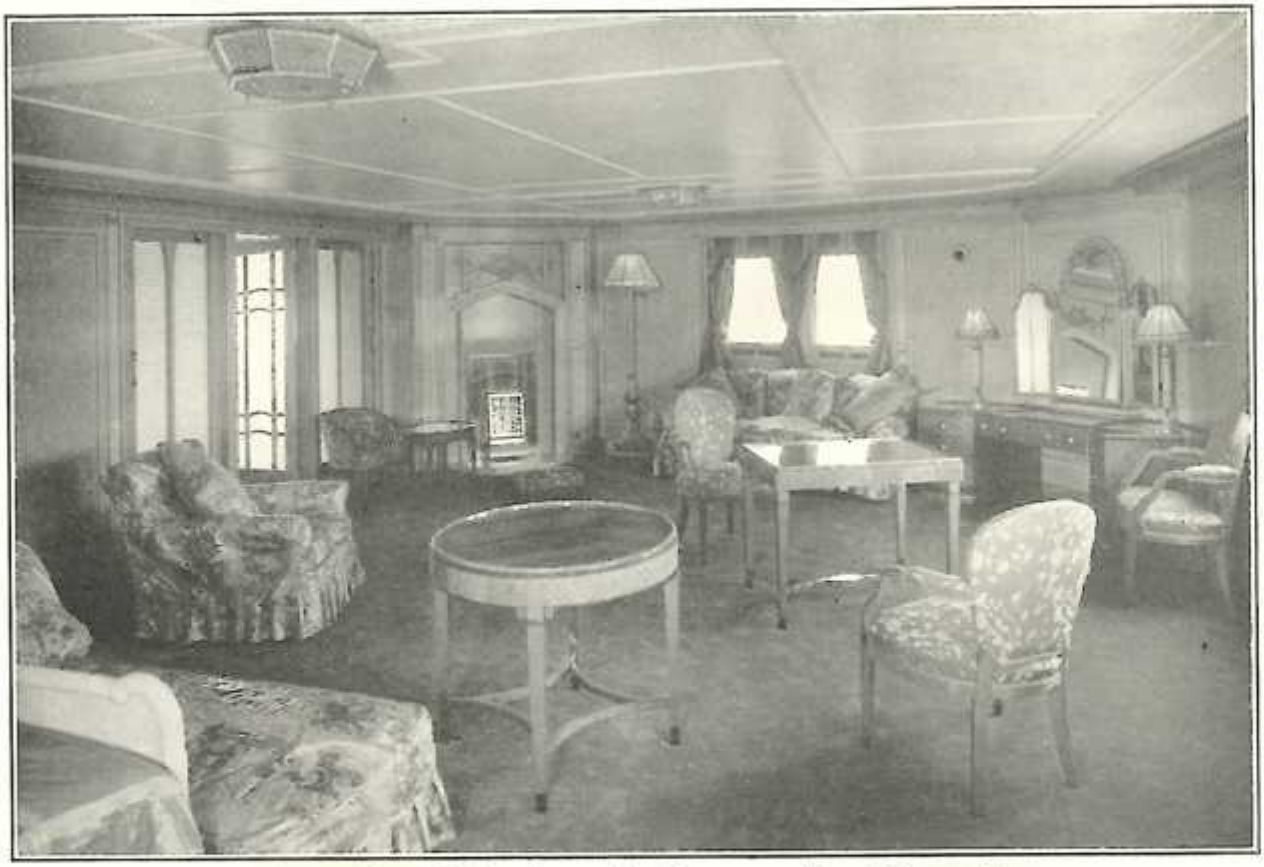
The Firm has built five racing yachts in all, to the designs of Fred J. Stephen.

The first of the series was the *Coila*, constructed at Linthouse in 1886, for A. E. and F. J. Stephen. She was one of five vessels built that year to the old length and breadth yacht racing rule—two being designed by the late Mr. G. L. Watson, one by Mr. Fife of Fairlie, and one by the late Mr. Paton. As this rule caused a severe tax on beam, it produced a long narrow type of yacht with a deep body and heavy lead keel. These five 3-tonners, which were the most extreme ever built under that rule, were such extraordinary boats that they practically brought the rule to an end. They were generally 29 ft. on the water-line, about 40 ft. overall, with a beam of 4 ft. 8 ins., and 6 ft. draught, with approximately 5 tons of lead on the keel. The *Cora*, designed by Mr. Paton, had 6 tons, and so full was her body that there was no hollow in her midship section. So long and narrow were these boats that they became known as the "ham knives." However, they provided excellent sport, and were good boats to windward, though very wet.

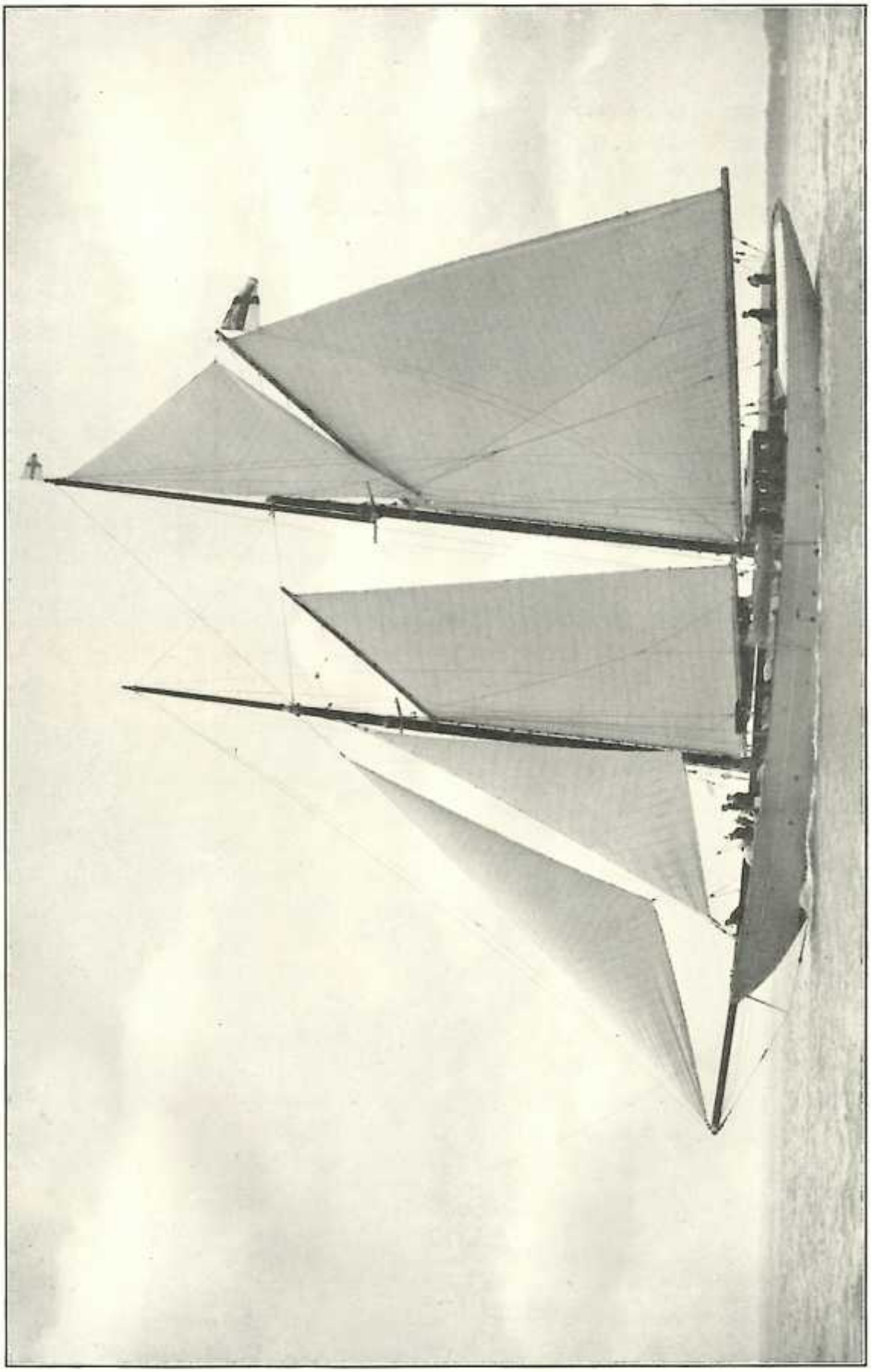
The *Coila* was moderately successful in her first two years. In 1888, Fred Stephen, taking advantage of the alteration to the rule of measurement when the length and sail area came into force, made certain changes to the boat—slightly increasing her beam and deepening her keel. That year she was most successful, and gained 23 prizes out of 25 starts.



"Rover."
2,115 *Ton Steam Yacht.* 1930.



A portion of the Owner's Room on the "Rover."



"Golden Hind."
Composite Schooner Yacht. 1931.

In 1891 A. E. and F. J. Stephen built a 10 rater (length and sail area rule), the *Maida*. This measurement rule, which came into force in 1886, produced a much better type of boat—the *Maida* and two or three others, built about that time, being approximately 35 ft. on the water-line, and 8 to 9 ft. beam. The *Maida* was fairly successful, coming out top of her class in one of the three years during which she was sailed by Fred Stephen.

COILA II. During 1908 a new International rule of measurement was adopted, to supersede the previous length and sail area rule, which had eventually produced an unsatisfactory type of boat, with a shallow body and light displacement. As a new class of 6-metre boats to this rule was being formed on the Clyde, Fred Stephen was invited to join: upon deciding to do so, he built at Linthouse the little yacht, *Coila II.*

The second *Coila*, which was destined to be very successful, was more powerful and had rather deeper draft than the majority of 6-metre boats built at that time. In her first year there were only two in her class on the Clyde, and she beat her opponent on practically every occasion.

At the end of the season, however, the *Dormy*, having won the race for 6-metre boats in the Olympic Games—the yacht races of which were held in the Solent—challenged *Coila II* in order that she might call herself the best 6-metre yacht in the world.

The late Mr. George Moir, a most enthusiastic yachtsman, offered a prize of £30, and a match was fixed for the best out of five races. Mr. Moir's own 6-metre boat, *Era*, also competed, and after a most exciting struggle, in which the *Dormy* and *Coila II* both won two races, *Coila II* secured the fifth race, and so carried off the prize. She continued successful until 1910, when the newer boats were proving somewhat faster. In 1911, after being extensively altered and improved, and her rig changed from the gunter lug to the Bermudian rig, then coming rapidly into favour, she regained the head of her class, and remained near that position for the rest of her racing career.

In 1914 a points cup was presented for competition in the 6-metre class, and *Coila II* had just carried it off when all racing was stopped by the outbreak of the War.

COILA III. In 1922 *Coila II* was broken up, and a new 6-metre, *Coila III*, constructed to the revised International rule that had come into force the previous year.

Coila III differed somewhat from the boats already built to the new rule. Her longitudinal under-water profile was practically a complete triangle, which had not yet been adopted in this type of yacht. She had also a little more beam that the other boats, and slightly hollower

section. Her length was 21 ft. 6 ins. on the water-line, 35 ft. overall, her beam being 7 ft. and draught of water 5 ft. 3 ins.; she was rigged as a Bermudian sloop, a rig which had by this time entirely superseded the old style.

Her owner, Fred Stephen, was unfortunately unable to sail *Coila III* during her first year, owing to serious injuries sustained in an accident that occurred just before her launch. Mr. Stephen missed his footing on the staging round her gunwale, and fell to the ground, breaking four ribs and puncturing his lungs. He was seriously ill for several months, during which, though debarred from racing, he found an excellent deputy in his son, John Stephen, who took his place at the tiller of *Coila III* and sailed her with great skill.

Coila III proved a successful boat from the very outset of her career. During her first year she was included in the four-yacht team selected to represent Great Britain in the British America Cup races at Oyster Bay, Long Island Sound. Though the British team lost, *Coila III* scored as great a number of points as any yacht on either side.

THE SEAWANHAKA CUP

At the close of these races, the Seawanhaka Club invited one of the British team to challenge for the Seawanhaka Cup, then held by the Manchester Yacht Club, Marble Head, Massachusetts. This trophy, an International challenge cup put up by the club in 1895, for races between small yachts of not more than 25 ft. sailing length, with amateur crews, is one of the oldest International challenge cups in existence, and ranks in importance, for small yachts, with the America Cup, for large yachts.

At the period in question the cup had already been raced for many times, but had never crossed the Atlantic. A south of England yachtsman had challenged for it, with a boat built specially for the purpose, but without success. Mr. Duggan, the noted Canadian yachtsman, who designed and sailed his own boats with much success, had been more fortunate, having won and held the trophy for eight or nine years. Eventually the cup had been re-captured for America by the Manchester Yacht Club, mentioned above. As the Seawanhaka Club did not wish to challenge another American club, the cup had not been raced for for a considerable number of years, until one of the British team was invited to challenge.

Coila III was selected by the British team, although when she left Britain, John Stephen, who sailed her, had no intention of challenging for the trophy. But, upon being forced into the challenge, "under penalty of being held down in his bath," he complied with the wishes of

his assailants and challenged on behalf of the Royal Northern Yacht Club, the senior club of Scotland. *Coila III* was then towed up to Marble Head, where she defeated the *Saki*, winning three races in succession, and carrying the cup across the Atlantic for the first time.

The following year, 1923, *Coila III* was again selected as one of the four 6-metre boats to represent Great Britain in the race against America, held on this occasion in the Solent. In this series, with John Stephen at her tiller, she gained considerably more points than any British or American boat.

The same year *Coila III* was also chosen by the Royal Northern Yacht Club to defend the Seawanhaka Cup on the Clyde, against the American challenger, *Lea*, sent over by the Seawanhaka Club. Once again she was successful in carrying off the trophy.

In 1924 the Royal Norwegian Yacht Club challenged the Royal Northern for the Seawanhaka Cup, and again *Coila III* defended, defeating the Norwegian challenger, *Uni*, designed and sailed by the famous Norwegian naval architect, Mr. Anker.

During the year that followed the Americans once more challenged, building two special boats for the purpose. *Coila III* was selected to defend, but she was now getting old and was defeated by the *Lanai* (designed by Mr. Clinton Crane), which thus regained the cup for America. In these races for the Seawanhaka Cup on the Clyde, *Coila III* was sailed by her owner, Fred J. Stephen, whose sons, A. M. Stephen and J. G. Stephen, formed two of her amateur crew. The cup was recaptured, in 1928, for the Royal Northern Yacht Club of Scotland, by Mr. W. F. Robertson's 8-metre boat, *Caryl*, after it had been won and lost by Norway.

The Seawanhaka Club again challenged in 1931, sending over the 8-metre boat, *Priscilla*, which was defeated by the Scottish boat *Saskia*, in four consecutive races. On both occasions J. G. Stephen formed one of the Scottish crew.

The cup is to be raced for again during the present year (1932), as America has challenged with a 6-metre boat.

COILA IV. In 1927 Fred J. Stephen built an 8-metre boat, to his own design, and raced her with considerable success for three years. This vessel, which bore the name *Coila IV*, came top of her class in both 1928 and 1929. During the latter year, when Fred J. Stephen, who had been seriously ill during 1928, was advised to abandon yacht-racing, *Coila IV* was sailed by his son, John G. Stephen.

It is interesting to note that Fred J. Stephen must have sailed about 670 races with his four *Coilas*, winning approximately 440 prizes, about 256 of which were firsts ; in the great majority of these contests he sailed

the boats himself. Although debarred from racing, he is at present Commodore of the Royal Northern Yacht Club, Vice-Admiral of the Mudhook Yacht Club (that unique club which is limited to a membership of forty), and a member of the council of the Yacht Racing Association.

In conclusion it may be mentioned that John G. Stephen is at present (1932) building a new 6-metre boat to his own design, for himself and two friends. She is to be called the *Maida*, and will race in 1932.

"Coila III."
1922.

The 1st Class Lounge in the "Viceroy of India."

The 1st Class Lounge of the "California," with decorations designed by the Architectural Staff of Alexander Stephen & Sons.

Ships built by Alexander Stephen & Sons, at Aberdeen

NOTE.

Though no records of ships built at Aberdeen are available prior to 1825, it is safe to assume that the majority of vessels constructed before that date were chiefly brigs, sloops and schooners ordered by local Owners for fishing or trading purposes.

Yard No.	Type of Ship	Name of Ship	Dimensions	Builders' Old Tonnage	Built for	Owners' Port	Completed
—	Brig	" Erol Fife " ..	— — —	113	A. Mortomer (*Manager*) ..	— ..	1825
—	,,	" Bolivar " ..	84′10″×24′ 6″×16′ 6″	224	Alex. Stephen & Sons	Aberdeen ..	,,
—	,,	" James Hadden "	74′ 3″×21′10½″×13′ 3″	156	A. Mortomer (*Manager*) ..	— ..	1826
—	,,	" Matchless " ..	79′ 7″×23′2½″×15′ 5½″	188	A. Mortomer (*Manager*) ..	— ..	,,
—	Schooner	" Aid "	67′ 2″×20′ 4″×12′ 7″	121	Mr. Chapel	Arbroath ..	,,
—	Sloop	" Young George " ..	50′ 1″×17′ 6″×9′ 4″	64	Captain Ritchie	Rosehearty ..	1827
—	Schooner	" Henry Michie " ..	57′ 8″×18′ 3″×10′ 9″	83	R. Leitch	— ..	,,
—	Brig	" Rosilinda " ..	68′ 3″×20′ 9″×12′ 6″	129	Mr. Clarkson	— ..	1828
—	Sloop	" Sarah "	43′ 7″×14′10½″×8′ 1½″	40	Mr. James Dick	— ..	,,
—	Brig	" Abbotsford " ..	65′ 4″×20′ 9″×12′ 5″	121	Robt. Spring (*Manager Owner*)	— ..	1829

Ships built by Alexander Stephen & Sons, at Arbroath

Yard No.	Type of Ship	Name of Ship	Dimensions	Builders' Old Tonnage	Built for	Owners' Port	Completed
	Sloop	"Ann"	46′ 8″ × 17′ 0″ × 9′ 0″	56	James Cay	— ..	1830
1	Schooner	"Helen"	71′ 4″ × 20′ 11½″ × 12′ 9″	137	John Peatt & Son	— ..	,,
2	,,	"Margaret" ..	68′ 7″ × 19′ 9½″ × 12′ 1″	118	Mr. Renny	— ..	1831
3	,,	"Euphemia" ..	71′ 1″ × 20′ 8½″ × 12′ 9″	134	Mr. Mills	Arbroath ..	,,
4	—	"Royal William" ..	70′ 4″ × 19′ 8″ × 12′ 0″	120	Mr. Livies	— ..	,,
5	—	"Broathwick" ..	75′ 10″ × 21′ 0″ × 13′ 2″	148	Mr. Chapel	Arbroath ..	1832
6	Schooner	"Hope"	75′ 6″ × 21′ 1½″ × 13′ 3″	149	Mr. D. Muir	Montrose ..	,,
7	,,	"Majestic"	78′ 3″ × 21′ 1¾″ × 13′ 9″	156	Mr. Mills	Arbroath ..	,,
8	Brigantine	"Oporto"	73′ 10″ × 19′ 10½″ × 12′ 5½″	130	Mr. John Mitchell	Glasgow ..	1833
9	—	"Ann" (II) ..	67′ 2¼″ × 19′ 2″ × 11′ 8″	109	John Cargill	Arbroath ..	,,
10	Sloop	"Reaper"	50′ 10″ × 16′ 6″ × 8′ 6″	59	Capt. D. Peter	Montrose ..	,,
11	Brig	"Themis"	67′ 4″ × 20′ 3¼″ × 12′ 5½″	121	Mr. Chapel	Arbroath ..	1834
12	Schooner	"Juno"	72′ 3″ × 21′ 6″ × 13′ 1″	146	David Paterson	— ..	,,
13	,,	"Mentor"	72′ 7″ × 21′ 3½″ × 13′ 5″	144	Andson, Allan & Chapel ..	Arbroath ..	1835
14	Snow	"Romulus" ..	78′ 11″ × 21′ 7″ × 13′ 3″	164	Capt. D. L. Cargill	,, ..	1836
15	—	"Lady Jane" ..	70′ 0″ × 21′ 0″ × 12′ 8″	138	Capt. W. Logan	,, ..	,,
16	Snow	"David Grant" ..	83′ 11″ × 22′ 10″ × 14′ 0″	195	Mr. Lawrence	,, ..	1837
17	Schooner	"Hamille Mitchell"	75′ 6″ × 22′ 2″ × 13′ 10″	166	Mr. John Mitchell	Glasgow ..	,,
18	Barque	"Anne"	88′ 0″ × 22′ 10½″ × 14′ 6″	207	Charles Kidd & Co.	Arbroath ..	1838
19	Brig	"Mary's Brig" ..	82′ 2″ × 22′ 9″ × 13′ 8½″	189	Capt. Thos. Leslie	Aberdeen ..	,,
20	,,	"Ariel"	82′ 11″ × 22′ 8″ × 14′ 3″	189	T. Couper & Sons	Dundee ..	1839
21	Schooner	"John Mitchell" ..	121′ 2″ × 26′ 7½″ × 18′ 6″	402	Mr. John Mitchell	Glasgow ..	,,
22	Brig	"Jessie Greig" ..	91′ 0″ × 22′ 10″ × 14′ 10″	220	Andrew Greig	Dundee ..	1840
23	Snow	"Adino"	92′ 0″ × 22′ 11″ × 15′ 0″	219	Leslie & Co.	,, ..	,,
24	Barque	"Royal Archer" ..	101′ 4″ × 24′ 7″ × 16′ 10″	278	W. & I. Fleming	Glasgow ..	1841
25	,,	"Peruvian" ..	102′ 8″ × 24′ 7½″ × 16′ 10″	283	Alex. Pitcaithly	Newburgh ..	,,
26	Brig	"Eden Bank" ..	83′ 4″ × 22′ 11″ × 14′ 9″	194	T. Couper & Sons	Dundee ..	,,
27	Barque	"Britannia" ..	105′ 9″ × 25′ 3″ × 18′ 0″	308	Alex. Stephen & Sons ..	Arbroath ..	1842
28	Schooner	"Isabella"	64′ 0″ × 19′ 0″ × 10′ 6″	102	Allen & Co.	,, ..	1841
29	Brig	"Prince Albert" ..	94′ 6″ × 23′ 10″ × 16′ 0″	256	D. Peat	,, ..	1842
30	,,	"Jessie"	64′ 3″ × 17′ 7″ × 9′ 6″	88	Mr. Just	Dundee ..	,,
31	,,	"Laurel"	63′ 10″ × 17′ 6″ × 9′ 6″	87	T. Couper & Sons	,, ..	,,
32	,,	"Eliza"	86′ 3″ × 22′ 3″ × 14′ 4″	191	Mr. Jack	,, ..	1843

Ships built by Alexander Stephen & Sons, at Dundee

Yard No.	Type of Ship	Name of Ship	Dimensions	Builders' Old Tonnage (Gross*)	Built for	Owners' Port	Completed
1	Brig	"Diana"	86.2′×22.3′×14.3′	191	A. Blives	Dundee ..	1844
2	Schooner	"Jules"	70.3′×19.9′×11.7′	123	Baxter Bros.	,, ..	,,
3	Barque	"Brechin Castle" ..	115.3′×25.8′×17.5′	371	,, ...	,, ..	,,
4	,,	"Richard Cobden"	116.6′×25.11′×17.8′	361	Wm. Small	,, ..	1845
5	Snow	"Cathereen" ..	86.6′×22.2′×14.6′	192	Mr. Fenwick	,, ..	,,
6	Barque	"Queen"	115.3′×25.8′×17.5′	370	D. Martin & Co.	,, ..	1846
7	Snow	"William"	87.2′×22.5′×14.7′	197	Scott & Murdo	,, ..	,,
8	Brig	"Neva"	88.8′×23.5′×14.5′	218	Andrew Low	,, ..	1847
9	Snow	"Netta"	85.8′×21.0′×12.6′	172	D. Martin & Co.	,, ..	,,
10	Barque	"Jean Andson" ..	106.5′×23.6′×15.6′	274	Andson & Duncan ..	Arbroath ..	,,
11	,,	"Asia"	139.0′×25.5′×19.8′	548	Alex. Stephen & Sons ..	Dundee ..	1848
12	,,	"Europe" (Troop Ship "Dudbrook")	143.6′×28.6′×20.4′	551	Mr. Mann	London ..	,,
13	Brig	"Duna"	93.2′×23.3′×14.6′	228	A. Low, Junr.	Dundee ..	1849
14	Ship	"Amazon"	144.0′×31.6′×21.6′	791	J. & F. Somes	London ..	1850
15	,,	"Cossipore" ..	148.7′×28.8′×21.0′	838	W. S. Lindsay	,, ..	1851
16	Brig	"Elizabeth Duncan"	94.5′×23.2′×14.5′	228	Mr. Westland	Aberdeen ..	,,
17	Ship, Wood	"Harkaway" ..	167.8′×32.4′×21.0′	830	J. & F. Somes	London ..	1852
18	,,	"Polmaise" ..	178.9′×32.2′×21.2′	878	Mr. Campbell	Glasgow ..	1853
19	,,	"Whirlwind" ..	187.0′×33.6′×21.1′	1003	J. & F. Somes	London ..	1854
20	,,	"Bumah"	188.0′×33.6′×21.2′	1020	A. Willis & Co.	Liverpool ..	1855
21	,,	"Eastern Monarch"	239.0′×40.3′×24.9′	1849	J. & F. Somes	London ..	1856
22	Barque (Wood)	"Dartmouth" ..	185.4′×34.3′×21.6′	*978	,, ...	,, ..	1859
23	,,	"Ianthe"	135.6′×26.0′×16.6′	380	L. Tulloch & Co. ..	Sunderland ..	1858
24	Sealer & Whaler	"Narwhal" ..	151.4′×30.1′×18.5′	*533	Dundee S. & W. Fishing Co.	Dundee ..	1859
25	Barque (Wood)	"Star of India" ..	190.4′×34.2′×22.1′	*1092	J. & F. Somes	London ..	1861
26	Sealer & Whaler	"Camperdown" ..	154.5′×30.0′×18.6′	*541	Dundee S. & W. Fishing Co.	Dundee ..	1860
27	,,	"Polynia"	146.2′×29.0′×18.1′	*472	,,	,, ..	1861
28	Barque (Wood)	"Earl Dalhousie" (I)	191.5′×34.8′×22.2′	1047	Alex. Stephen & Sons ..	,, ..	1862
29	,,	"The Sir Jamsetjee Family"	192.8′×34.8′×21.9′	1049	Cursetjee Jamsetjee (*Per* Forbes & Co.) ..	Bombay ..	1863
30	Sealer & Whaler	"Wolf" (I) ..	131.5′×25.4′×13.3′	400	Walter Grieve	Greenock ..	,,
31	,,	"Alexander" ..	149.0′×29.2′×18.6′	590	Gilroy Bros.	Dundee ..	1864
32	,,	"Erik"	157.8′×29.5′×18.5′	*533	G. Gibbs	London ..	1865
33	,,	"Esquimaux" ..	157.3′×29.5′×19.3′	*593	Dundee S. & W. Fishing Co.	Dundee ..	,,
34	,,	"Retriever" ..	138.0′×26.5′×15.5′	462	Ridley, Son & Co. ..	Liverpool ..	,,
35	Barque (Composite)	"Corona"	209.6′×35.0′×22.0′	*1202	Alex. Stephen & Sons ..	Dundee ..	1866
36	Sealer & Whaler	"Nimrod"	136.0′×26.9′×16.0′	*334	Job Bros.	Liverpool ..	,,

NOTE.—All Sealing and Whaling Vessels are Wood and Auxiliary Steam.

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, AT DUNDEE—*continued.*

Yard No.	Type of Ship	Name of Ship	Dimensions	Builders' Old Tonnage (Gross*)	Built for	Owners' Port	Completed
37	Ship (Composite)	"Sree Singapura" ..	164.8′×27.7′×17.5′	585	McTaggart & Co . ..	London ..	1866
38	Sealer & Whaler	"Mastiff"	137.4′×26.9′×16.1′	*360	John Munn	Harbour Grace Newfoundland	1867
39	,,	"Arctic" (I) ..	158.0′×29.3′×19.5′	*567	Alex. Stephen & Sons ..	Dundee ..	,,
40	—	*Unnamed*	*Destroyed in Fire*	—	— — ..	— ..	—
.....	.....	YARD TOTALLY	DESTROYED BY	FIRE	.....	.....	1868
41	Barque (Composite)	"Tonbridge" ..	181.0′×32.0′×19.4′	856	J. H. Luscombe	London ..	1869
42	,,	"Laju"	162.0′×28.0′×17.6′	556	Dundee Shipowning Co. (W. O. Taylor, *Manager*)	Dundee ..	,,
43	Steamer (Iron)	"Cheops"	255.0′×33.2′×24.5′	*1505	Alex. Stephen & Sons .. (Sold to Shaw Maxton and Co., 1885)	,, ..	1870
44	Barque (Composite)	"Woodlark" ..	182.4′×32.1′×19.3′	*890	Alex. Stephen & Sons ..	,, ..	,,
45	Sealer & Whaler	"Commodore" ..	151.0′×27.1′×16.5′	*427	John Munn	Harbour Grace Newfoundland	1871
46	Sealer	"Hector"	151.1′×27.1′×16.6′	*473	Job Bros.	Liverpool ..	1870
47	Sealer & Whaler	"Eagle"	156.4′×28.7′×18.1′	*506	N. F. Sealing & Wh. Co. (C. T. Bowring Bros.)	St. Johns .. Newfoundland	1871
48	Steamer (Iron)	"Cyphrenes" ..	300.0′×34.1′×25.5′	*1994	Alex. Stephen & Sons ..	Dundee ..	1872
49	,,	"American" ..	320.0′×34.2′×19.7′	*2126	Union S.S. Co.	Southampton	1873
50	Sealer & Whaler	"Ranger"	161.1′×28.7′×18.0′	*520	Robert Alexander ..	St. Johns, N.F.	1871
51	,,	"Wolf" (II) ..	165.9′×28.8′×18.0′	*520	Walter Grieve	Greenock ..	,,
52	,,	"Iceland"	150.5′×27.3′×16.4′	*423	D. Murray & Son ..	Glasgow ..	1872
53	Sealer	"Discovery" .. ("Bloodhound")	160.0′×32.2′×18.3′	396	British War Vessel ..	London ..	,,
54	,,	"Proteus"	190.4′×29.9′×18.6′	*687	J. W. Stewart	Greenock ..	1873
55	,,	"Neptune" ..	190.5′×29.8′×18.4′	*684	Job Bros.	Liverpool ..	1872
56	,,	"Bear"	190.4′×29.9′×18.6′	*689	W. Grieve	Greenock ..	1874
57	Sailing Ship (Iron)	"Lochee"	264.2′×39.0′×23.4′	*1812	Dundee Clipper Line ..	Dundee ..	,,
58	Sealer	"Arctic" (II) ..	200.6′×31.6′×19.9′	*828	Alex. Stephen & Sons ..	,, ..	1875
59	Barque (Iron)	"Edith Lorn" ..	200.1′×32.3′×10.9′	*847	Dundee Shipowning Co. (W. O. Taylor, *Manager*)	,, ..	1876
60	Sailing Ship (Iron)	"Duntrune" ..	245.2′×38.3′×23.0′	*1565	Dundee Clipper Line ..	,, ..	1875
61	,,	"Maulesden" ..	245.2′×38.3′×23.1′	*1554	,, ..	,, ..	,,
62	Sealer	"Aurora"	165.2′×30.6′×18.9′	*580	Alex. Stephen & Sons ..	,, ..	1876
63	Barque (Iron)	"Aithernie Castle" ..	233.5′×36.2′×21.3′	*1260	Geo. Duncan	Liverpool ..	,,
64	Sailing Ship (Iron)	"Glamis"	225.3′×34.8′×21.9′	*1205	Dundee Clipper Line ..	Dundee ..	,,
65	,,	"Southesk" ..	225.2′×35.0′×21.8′	*1210	,, ,, ,, ..	,, ..	1877
66	Barque (Iron)	"Glengarry" ..	199.8′×32.2′×19.1′	*844	Dundee Shipowning Co. (W. O. Taylor, *Manager*)	,, ..	,,

NOTE.—All Sealing and Whaling Vessels are Wood and Auxiliary Steam.

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, AT DUNDEE—*continued.*

Yard No.	Type of Ship	Name of Ship	Dimensions	Builders' Old Tonnage (Gross*)	Built for	Owners' Port	Completed
67	Barque (Iron)	"Stuart"	202.5′×34.2′×19.1′	*912	J. Hay & Co.	Liverpool	1877
68	,,	"Overdale"	203.3′×34.2′×19.2′	,,	,,	,,	,,
69	,,	"Edgbaston"	203.2′×34.2′×19.2′	,,	T. Frost, Junr.	,,	1878
70	,,	"Easterhill"	202.5′×32.1′×18.8′	*915	R. Gilchrist & Co.	Glasgow	,,
71	,,	"Helenslea" (I)	228.0′×35.2′×21.8′	*1248	Alex. Stephen & Sons	Dundee	1879
72	,,	"Victorine"	233.5′×36.2′×21.3′	*1253	Ant. Dom. Bordes	Paris	,,
73	Sealer & Whaler	"Resolute"	175.5′×30.7′×18.6′	*624	Dundee S.&W. Fishing Co.	Dundee	1880
74	,,	"Thetis" (I)	181.1′×30.9′×19.1′	*723	Alex. Stephen & Sons (American War Vessel)	,,	1881
75	Steamer (Iron)	"North Sea"	230.0′×30.9′×15.9′	*1117	Dundee, Perth & London Shipping Co.	,,	,,
76	,,	"White Sea"	230.3′×30.7′×15.9′	*1119	,,	,,	,,
77	Barque (Iron)	"Glenfarg"	203.8′×34.1′×19.1′	*898	Dundee Shipowning Co. (W. O. Taylor, *Manager*)	,,	,,
78	,,	"Glenshee"	203.8′×34.1′×19.1′	*895	,,	,,	1882
79	Barque (Steel)	"Helenslea" (II)	249.8′×35.4′×21.6′	*1374	Alex. Stephen & Sons	,,	,,
80	,,	"Glenfyne"	213.8′×34.2′×19.1′	*957	Dundee Shipowning Co. (W. O. Taylor, *Manager*)	,,	,,
81	,,	"Glenogle"	213.8′×34.2′×19.1′	*958	,,	,,	1883
82	,,	"Earl of Dalhousie" (II)	264.0′×38.7′×23.4′	*1765	Alex. Stephen & Sons	,,	1884
83	Steamer (Steel)	"Thane"	245.0′×33.2′×20.6′	*1351	R. A. Mudie & Son	,,	1883
84	Sealer	"Terra Nova"	187.0′×31.0′×19.0′	*744	Alex. Stephen & Sons	,,	1884
85	Barque (Steel)	"Thetis" (II)	248.5′×35.4′×21.6′	*1352	,,	,,	1885
86	Barque (Steel and Iron)	"Doris"	248.6′×35.3′×21.6′	*1353	,,	,,	1887
87	Barque (Steel)	"Eudora"	287.5′×40.5′×23.7′	*1992	,,	,,	1888
88	—	North Carr Lightship	— — —	—	Northern Lights Commissioners	Edinburgh	1889
89	Barque (Steel and Iron)	"Newfield" (I)	248.6′×35.3′×21.6′	1306	Brownelles & Co.	Liverpool	,,
90	Barque (Wood)	"Diana"	151.1′×24.1′×16.6′	*473	Job Bros.	,,	1891
91	Barque (Steel and Iron)	"Galena"	292.0′×42.0′×24.0′	*2294	Alex. Stephen & Sons	Dundee	1890
92	,,	"Mayhill"	292.0′×41.0′×23.7′	*2121	W. & J. Myres Sons & Co.	Liverpool	,,
93	,,	"Annie Speer"	243.0′×37.1′×21.6′	*1540	Brownelles & Co.	,,	1891
94	,,	"Kirkhill"	243.0′×37.1′×21.6′	*1540	John Steel & Son	,,	,,
95	,,	"Melita"	310.0′×45.2′×25.2′	*2946	Alex. Stephen & Sons	Dundee	1892
96	Barque (Steel)	"Pitlochry"	319.5′×45.2′×26.5′	*3088	Alex. Stephen & Sons (Afterwards sold to Laisz, Hamburg)	,,	1894
97	,,	"Newfield" (II)	249.2′×37.2′×21.5′	*1512	Brownelles & Co.	,,	1893

NOTE.—All Sealing and Whaling Vessels are Wood and Auxiliary Steam.

Ships built by Alexander Stephen & Sons, at Kelvinhaugh

Yard No.	Type of Ship	Name of Ship	Dimensions	Builders' Old Tonnage (Gross*)	Built for	Owners' Port	Completed
1	Wood Sailer	"Cyclone"	151′ 8″ × 26′ 4″ × 19′ 2″	594	Catto & Son	Aberdeen	1853
2	Iron ,,	"Typhoon"	190′ 0″ × 32′ 6″ × 22′ 6″	780	Cannon & Sons	Liverpool	1852
3	,, ,,	"Hurricane"	214′ 9″ × 30′ 7″ × 20′ 0″	980	Martin & Co.	Gt. St. Helens, London	1853
4	,, P.S.	"Myrtle"	172′ 0″ × 23′ 6″ × 14′ 0″	590	*Unknown*	—	,,
5	,, ,,	"Wm. McCormick"	205′ 0″ × 28′ 0″ × 16′ 6″	840	Derry Company	Derry	1854
6	,, Sailer	"John Bell"	220′ 0″ × 33′ 0″ × 22′ 0″	*997	Bell Brothers	Glasgow	,,
7	,, ,,	"Storm Cloud"	195′ 3″ × 30′ 0″ × 20′ 4″	789	Alex. Stephen & Sons	,,	,,
8	,, ,,	"White Eagle"	195′ 4″ × 32′ 9″ × 22′ 3″	1072	,, ,,	,,	1855
9	,, S.S.	"Euphrates"	228′ 0″ × 35′ 0″ × 22′ 0″	1348	,, ,,	,,	,,
10	,, ,,	"Semaphore"	200′ 0″ × 24′ 0″ × 16′ 6″	715	*Unknown*	,,	,,
11	,, P.S.	"Blazer"	150′ 0″ × 23′ 0″ × 13′ 0″	383	Liverpool Tug Co.	Liverpool	1856
12	Wood Sailer	"Tyburnia"	185′ 0″ × 34′ 0″ × 22′ 0″	1012	J. & F. Somes	London	1857
13	Iron S.S.	"Bee"	96′ 0″ × 16′ 0″ × 9′ 0″	118	*Unknown*	—	1856
14	,, Sailer	"Charlemagne"	195′ 0″ × 33′ 0″ × 21′ 0″	1014	Catto & Son	Aberdeen	1857
15	,, P.S.	"Prince Albert"	192′ 0″ × 24′ 0″ × 14′ 6″	*524	Aberdeen, Leith & Clyde S.N. Co.	,,	,,
16	,, S.S.	"Dahome"	165′ 0″ × 24′ 6″ × 15′ 6″	479	Regis Ainée	Marseilles	,,
17	,, Sailer	"Sea Queen"	180′ 0″ × 30′ 0″ × 21′ 0″	775	J. H. Watt	Glasgow	1858
18	,, Barque	"Edith Preston"	154′ 0″ × 25′ 0″ × 17′ 6″	490	E. Preston	London	,,
19	,, Sailer	"C. of Lucknow"	192′ 0″ × 30′ 0″ × 21′ 0″	859	George Smith & Sons	Glasgow	1859
20	,, Barque	"Carnatic"	162′ 0″ × 27′ 0″ × 18′ 9″	566	G. L. Munro	London	,,
21	,, Brig'tine	"Angelita"	100′ 0″ × 16′ 6″ × 11′ 6″	134	Nelson, Ismay & Co.	Liverpool	,,
22	,, Sailer	"Clyde"	200′ 0″ × 33′ 0″ × 22′ 10″	1044	J. & F. Somes	London	1860
23	,, ,,	"C. of Madras"	200′ 0″ × 31′ 8″ × 21′ 10″	967	George Smith & Sons	Glasgow	1859
24	,, S.S.	"Cora Linn"	140′ 0″ × 18′ 6″ × 11′ 0″	234	Handyside & Henderson (Anchor Line)	,,	,,
25	,, ,,	"Ailsa Craig"	140′ 0″ × 18′ 6″ × 11′ 0″	234	,, ,,	,,	1860
26	,, Dredger	No.	80′ 0″ × 23′ 0″ × 8′ 10½″	240	Clyde Trust	,,	,,
27	,, Sailer	"C. of Calcutta"	200′ 0″ × 31′ 8″ × 21′ 10″	967	George Smith & Sons	,,	,,
28	,, S.S.	"Coringa"	190′ 0″ × 27′ 6″ × 15 8½″	765	Burmah S.N. Co. (P. Henderson)	,,	1861
29	,, Schooner	"Mexico"	100′ 0″ × 20′ 0″ × 11′ 9″	187	Nelson, Ismay & Co.	Liverpool	,,
30	,, Barque	"Ismay"	140′ 0″ × 26′ 0″ × 17′ 0″	447	,, ,,	,,	,,
31	,, ,,	"Dunnikier"	147′ 0″ × 25′ 4″ × 17′ 0″	450	Thomas Skinner	Glasgow	,,
32	,, Sailer	"Wave Queen"	180′ 0″ × 30′ 0″ × 21′ 2½″	775	J. H. Watt	,,	,,
33	,, ,,	"City of Bombay"	200′ 0″ × 31′ 8″ × 21′ 10″	967	George Smith & Sons	,,	1862
34	W. & I. Sailer	"John Lidgett"	178′ 7″ × 30′ 0″ × 20′ 6″	770	J. Lidgett & Sons	London	,,
35	,, ,,	"Arima"	170′ 0″ × 29′ 6″ × 20′ 0″	704	G. Turnbull & Co.	—	,,
36	Iron ,,	"C. of Cashmere"	200′ 0″ × 31′ 8″ × 21′ 10″	967	George Smith & Sons	Glasgow	1863
37	,, Brig	"Belle of the Mersey"	106′ 0″ × 21′ 6″ × 11′ 9″	229	George Eastee	Liverpool	1862

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, AT KELVINHAUGH—*continued.*

Yard No.	Type of Ship.	Name of Ship	Dimensions	Builders' Old Tonnage (Gross*)	Built for	Owners' Port	Completed
38	Iron Barque	"Black Watch" ..	153′ 0″ × 26′ 10″ × 17′ 8″	524	Lennox, Nephew & Co. ..	New Broad St., London	1862
39	„ „	"Glencoyn"	140′ 0″ × 26′ 2″ × 16′ 10″	452	H. W. Hewitt	Whitehaven ..	1863
40	W. & I. Brigantine	"Arriero"	105′ 0″ × 21′ 0″ × 11′ 9″	216	T. H. Ismay & Co. ..	Liverpool ..	1862
41	Iron Sailer	"Severn"	180′ 0″ × 30′ 0″ × 21′ 2½″	775	J. H. Watt	Glasgow ..	1863
42	W. & I. S.S.	"Sea King"	222′ 7″ × 32′ 8″ × 20′ 6″	1152	Robertson & Co.	„ ..	„
43	Iron Sailer	"Bothwell Castle" ..	170′ 0″ × 28′ 0″ × 18′ 5″	638	Thomas Skinner	„ ..	„
44	W. & I. „	"Eliza Shaw" ..	180′ 0″ × 30′ 6″ × 18′ 6″	800	Killick & Martin	— ..	„
45	Iron Barque	"Pembroke Castle" ..	140′ 0″ × 26′ 2″ × 16′ 4″	452	J. H. Simpson	Swansea ..	„
46	„ Brig'tine	"Zircon"	105′ 0″ × 21′ 0″ × 12′ 6″	216	R. Tedcastle & Co. ..	Dublin ..	„
47	„ Sailer	"Woosung"	170′ 7″ × 31′ 2″ × 19′ 3″	784	W. B. Boodle	Birkenhead ..	„
48	„ P.S.	"Fergus"	210′ 0″ × 23′ 0″ × 9′ 6″	552	N. Mathieson	Glasgow ..	„
49	„ Sailer	"C. of Lahore" ..	202′ 0″ × 31′ 8″ × 21′ 10″	976	George Smith & Sons ..	„ ..	1864
50	W. & I. „	"Hoang Ho" ..	170′ 0″ × 28′ 6″ × 17′ 6″	668	Smith, Preston & Co. ..	Liverpool ..	„
51	„ „	"Janet Ferguson" ..	157′ 0″ × 28′ 6″ × 18′ 0″	604	Bain Brothers	Dumbarton ..	„
52	Iron P.S.	"The Dare" ..	210′ 0″ × 23′ 0″ × 9′ 6″	552	E. Miller	London ..	1863
53	W. & I. Sailer	"Gossamer"	180′ 0″ × 30′ 6″ × 18′ 8¼″	800	Potter Brothers	Liverpool ..	1864
54	„ „	"Mofussilite" ..	200′ 0″ × 33′ 0″ × 21′ 0″	1043	Finlay, Campbell & Co. ..	London ..	„
55	„ P.S.	"Luzon"	180′ 0″ × 26′ 0″ × 14′ 0″	591	Ker, Bolton & Co.	Glasgow ..	„
56	Iron Sailer	"Lucerne"	162′ 0″ × 28′ 2¼″ × 18′ 9″	613	G. L. Munro	London ..	„
57	„ P.S.	"Lake Ontario" ..	180′ 3″ × 27′ 2″ × 10′ 0″	643	J. & A. Allan	Glasgow ..	„
58	„ „	"Bay of Kandy" ..	176′ 0″ × 26′ 11″ × 8′ 6″	615	„	„ ..	„
59	„ Sailer	"Copernicus" ..	155′ 6″ × 30′ 0″ × 18′ 8½″	658	R. M. Sloman & Co. ..	Hamburg ..	„
60	„ S.S.	"Spartan"	170′ 0″ × 22′ 6″ × 13′ 6″	421	R. Little	Greenock ..	„
61	„ „	"Clara"	160′ 0″ × 21′ 0″ × 12′ 1⅛″	346	Ben Simons	Glasgow ..	„
62	„ Sailer	— ..	*Not built*	—	J. H. Watt	„ ..	—
63	„ „	"Newton"	155′ 6″ × 30′ 0″ × 18′ 8½″	658	R. M. Sloman & Co. ..	Hamburg ..	1864
64	„ S.S.	"Roma"	200′ 0″ × 25′ 0″ × 16′ 6″	615	Handyside & Henderson ..	Glasgow ..	„
65	W. & I. Sailer	"Leon Crespo" ..	170′ 0″ × 29′ 6″ × 18′ 3″	705	Bain Brothers	Dumbarton ..	1865
66	Iron Barque	"Tocopilla"	149′ 0″ × 26′ 9″ × 17′ 6″	506	Leon Jose & Co.	Bolivia ..	„
67	W. & I. „	"Carmelita"	160′ 0″ × 28′ 6″ × 18′ 0″	626	„	„ ..	„
68	Iron S.S.	"Hibernia"	270′ 0″ × 33′ 6″ × 22′ 2″	1492	Handyside & Henderson ..	Glasgow ..	„
69	„ Barge	No. 1	85′ 0″ × 20′ 1¼″ × 6′ 3″	154	Finlay, Campbell & Co. ..	London ..	„
70	„ „	„ 2	„	„	„ ..	„ ..	„
71	„ „	„ 3	„	„	„ ..	„ ..	„
72	„ „	„ 4	„	„	„ ..	„ ..	„
73	„ „	„ 5	„	„	„ ..	„ ..	„
74	„ „	„ 6	„	„	„ ..	„ ..	„
75	„ „	„ 7	„	„	„ ..	„ ..	„
76	„ „	„ 8	„	„	„ ..	„ ..	„

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, AT KELVINHAUGH—*continued.*

Yard No.	Type of Ship.	Name of Ship	Dimensions	Builders' Old Tonnage (Gross*)	Built for	Owners' Port	Completed
77	Iron Barge	No. 9	85′ 0″ × 20′ 1½″ × 6′ 3″	154	Finlay, Campbell & Co. ..	London ..	1865
78	,, ,,	,, 10	,,	,,	,, ..	,, ..	,,
79	,, ,,	,, 11	,,	,,	,, ..	,, ..	,,
80	,, ,,	,, 12	,,	,,	,, ..	,, ..	,,
81	,, S.S.	"Zeta"	185′ 0″ × 28′ 0″ × 18′ 0″	*734	H. Bath & Sons	Swansea ..	,,
82	,, Barque	"Belle of the Clyde"	110′ 0″ × 22′ 0″ × 11′ 9″	249	George Eastee	Liverpool ..	,,
83	W. & I. ,,	"Fusi Yama" ..	165′ 0″ × 28′ 0″ × 17′ 0″	618	Killick, Martin & Co. ..	London ..	,,
84	,, ,,	"Kappa"	155′ 0″ × 27′ 0″ × 17′ 6″	538	H. Bath & Sons	Swansea ..	,,
85	,, Sailer	"Rohilla"	200′ 0″ × 33′ 0″ × 21′ 0″	1044	Finlay, Campbell & Co. ..	London ..	,,
86	Iron S.S.	"Valetta"	200′ 0″ × 25′ 0″ × 16′ 6″	615	Handyside & Henderson ..	Glasgow ..	,,
87	,, ,,	"Sarah Garcia" ..	170′ 0″ × 22′ 6″ × 13′ 8″	421	Ben Simons	,, ..	,,
88	,, ,,	"Venezia"	200′ 0″ × 25′ 0″ × 16′ 6″	615	Handyside & Henderson ..	,, ..	,,
89	Iron Barque	"Mineiro"	150′ 0″ × 27′ 6″ × 17′ 0″	537	J. Hainsworth	Liverpool ..	1866
90	W. & I. Sailer	"William Davie" ..	185′ 0″ × 31′ 6″ × 19′ 6″	877	Albion Shipping Co. ..	Glasgow ..	,,
91	Iron S.S.	"Columbia"	280′ 0″ × 33′ 6″ × 22′ 2″	1390	Handyside & Henderson ..	,, ..	,,
92	,, ,,	"Osaca"	175′ 0″ × 27′ 6″ × 15′ 2½″	700	J. Howden & Co.	,, ..	,,
93	W. & I. ,,	"Thomas Roys" ..	126′ 0″ × 22′ 0″ × 13′ 2″	290	Hannen & Melchior ..	Copenhagen ..	,,
94	Iron P.S.	"Topsy"	130′ 0″ × 24′ 0″ × 11′ 0″	440	J. & A. Allan	Glasgow ..	,,
95	,, Sailer	"Abeona"	200′ 0″ × 33′ 0″ × 21′ 2½″	1044	,, ...	,, ..	1867
96	,, S.S.	"Arcadia"	210′ 0″ × 26′ 0″ × 17′ 6″	807	Handyside & Henderson ..	,, ..	1866
97	W. & I. Schooner	"Metero"	120′ 0″ × 26′ 0″ × 9′ 0″	375	J. Hainsworth	Liverpool ..	,,
98	Iron Barge	No. —	40′ 0″ × 13′ 0″ × 5′ 0″	—	,, ...	,, ..	,,
99	,, Brig	"Annie Story" ..	165′ 0″ × 28′ 0″ × 18′ 6″	*591	R. G. Sharp	Maryport ..	1867
100	,, Barque	"Pacific"	140′ 0″ × 26′ 0″ × 16′ 6″	447	W. R. Tremellen	Swansea ..	,,
101	,, Sailer	"Humboldt" ..	165′ 0″ × 30′ 0″ × 18′ 8½″	*741	R. M. Sloman & Co. ..	Hamburg ..	,,
102	,, ,,	"Reichstag"	165′ 0″ × 30′ 0″ × 18′ 8½″	*737	,, ...	,, ..	,,
103	,, S.S.	"Europa"	280′ 0″ × 33′ 6″ × 22′ 2″	1390	Handyside & Henderson ..	Glasgow ..	,,
104	,, ,,	"Hannah Simons" ..	200′ 0″ × 27′ 0″ × 16′ 0″	713	Ben Simons	,, ..	,,
105	,, Sailer	"Grace Gibson" ..	162′ 0″ × 27′ 3″ × 17′ 10″	*548	H. W. Hewitt	Whitehaven ..	,,
106	W. & I. ,,	"Omba"	185′ 0″ × 37′ 9″ × 19′ 0″	890	J. H. Watt	Glasgow ..	1868
107	Iron Barque	"Annie Richmond" ..	170′ 0″ × 29′ 3″ × 19′ 3″	*713	R. G. Sharp	Maryport ..	,,
108	W. & I. Barque	"Mary Moore" ..	160′ 0″ × 28′ 0″ × 18′ 0″	*585	J. Norman, Junr.	,, ..	,,
109	Iron ,,	"Annie Main" ..	148′ 0″ × 27′ 9″ × 17′ 2½″	545	T. Skinner	Glasgow ..	1867
110	W. & I. Sailer	"Forward Ho" ..	190′ 0″ × 33′ 6″ × 20′ 8½″	943	Joseph Hossack	Liverpool ..	,,
111	Iron Barque	"Limari"	167′ 0″ × 27′ 8″ × 18′ 6″	600	Thomas Connell	Whitehaven ..	,,
112	W. & I. Sailer	"Rona"	155′ 0″ × 29′ 6″ × 18′ 9″	638	Sandbach Tinne & Co. ..	Liverpool ..	,,
113	,, Barque	"Lizzie Iredale" ..	170′ 0″ × 31′ 0″ × 18′ 5½″	693	Peter Iredale	Maryport ..	1868
114	Iron Schooner	"Janette"	82′ 0″ × 19′ 0″ × 9′ 2″	*91	Wm. Couper & Co. ..	Glasgow ..	1867
115	,, Sailer	"Centurion"	220′ 0″ × 35′ 0″ × 22′ 6″	1297	Captain James McKellar ..	,, ..	1868

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, AT KELVINHAUGH—*continued.*

Yard No.	Type of Ship.	Name of Ship	Dimensions	Builders' Old Tonnage (Gross*)	Built for	Owners' Port	Completed
116	Iron Sailer	"Comadre"	185′ 0″ × 31′ 0″ × 19′ 6″	851	T. H. Ismay & Co. ..	Liverpool ..	1868
117	W. & I. ,,	"Malacca"	165′ 0″ × 29′ 0″ × 17′ 8½″	594	James Graham & Co. ..	,, ..	,,
118	,, ,,	"Singapore"	170′ 0″ × 29′ 9″ × 17′ 11½″	656	T. H. Ismay & Co. ..	,, ..	1869
119	Iron Barque	"Clydevale"	150′ 0″ × 27′ 6″ × 17′ 0″	*537	William Wylie	Glasgow ..	1868
120	W. & I. Sailer	"St. Kilda"	187′ 0″ × 32′ 6″ × 19′ 3″	947	Sandbach Tinne & Co. ..	Liverpool ..	,,
121	Iron Barque	"Belle of Lagos" ..	125′ 0″ × 24′ 0″ × 11′ 9″	*251	George Eastee	,, ..	,,
122	,, ,,	"Atlantic"	150′ 0″ × 27′ 6″ × 17′ 0″	537	W. R. Tremellen	Swansea ..	1869
123	,, ,,	"Caroline"	174′ 0″ × 29′ 0″ × 18′ 8″	687	Le Quellec & Bordes ..	Bordeaux ..	,,
124	,, ,,	"Antonia"	174′ 0″ × 29′ 0″ × 18′ 8″	689	,, ..	,, ..	,,
125	W. & I. Sailer	"City of Hankow" ..	220′ 0″ × 36′ 0½″ × 22′ 6″	1368	George Smith & Sons ..	Glasgow ..	,,
126	Iron ,,	"Kildonan"	170′ 0″ × 30′ 0″ × 18′ 3″	728	Wm. Ross & Co.	,, ..	,,
127	,, ,,	"City of Sparta" ..	223′ 0″ × 35′ 0″ × 22′ 6″	*1256	George Smith & Sons ..	,, ..	1870
128	W. & I. ,,	"Norham Castle" ..	175′ 0″ × 32′ 0″ × 18′ 2½″	698	T. Skinner & Black ..	,, ..	1869
129	,, ,,	"Brechin Castle" ..	200′ 0″ × 35′ 0″ × 20′ 3″	1166	,, ...	,, ..	,,
130	Iron ,,	"Friedeburg" ..	175′ 0″ × 32′ 0″ × 19′ 8½″	849	R. M. Sloman & Co. ..	Hamburg ..	,,
131	,, ,,	"Lammershagen" ..	175′ 0″ × 32′ 0″ × 19′ 8½″	849	,, ...	,, ..	,,
132	,, Barque	"Armin"	175′ 0″ × 32′ 0″ × 19′ 8½″	849	D. H. Watjen & Co. ..	Bremen ..	,,
133	,, ,,	"Henry Sempe" ..	148′ 0″ × 27′ 9″ × 17′ 2½″	*492	P. Dumont & Co.	Bordeaux ..	,,
134	W. & I. S.S.	"Diana"	115′ 0″ × 21′ 6″ × 12′ 7″	*189	J. Lamont	Toward ..	,,
135	Iron ,,	"Anglia"	315′ 0″ × 35′ 0″ × 22′ 8½″	*2143	Handyside & Henderson ..	Glasgow ..	,,
136	,, Barque	"Otago"	140′ 0″ × 26′ 0″ × 14′ 0″	*349	Angus Cameron	,, ..	,,
137	,, Sailer	"Sydenham"	200′ 0″ × 34′ 0″ × 21′ 3″	*1120	J. H. Luscombe	London ..	1870
138	,, Schooner	"Aurora del Titcaca"	48′ 0″ × 10′ 6″ × 5′ 0″	70	A. Gibbs & Sons	,, ..	1869
139	W. & I. S.S.	"Stork"	160′ 0″ × 23′ 0″ × 11′ 2½″	*460	E. M. De Busshe	,, ..	,,
140	Iron Sailer	"Maggie Trimble" ..	185′ 0″ × 31′ 0″ × 19′ 3″	*820	R. G. Sharp	Maryport ..	1870
141	,, P.S.	"Countess of Kelly"	81′ 0″ × 19′ 0″ × 6′ 6″	210	Caledonian Railway Co. ..	Glasgow ..	1869
142	,, Barque	"Valentine & Helene"	170′ 0″ × 29′ 3″ × 17′ 11½″	694	A. C. Le Quellec	Bordeaux ..	1870
143	,, ,,	"Virginia"	177′ 0″ × 32′ 0″ × 19′ 8½″	*804	D. H. Watjen & Co. ..	Bremen ..	,,
144	W. & I. ,,	"Lima"	178′ 0″ × 31′ 10″ × 19′ 8½″	805	,, ...	,, ..	,,
145	Iron S.S.	"Atholl"	245′ 0″ × 32′ 3″ × 24′ 2½″	1395	J. Warrack & Co.	Leith	,,
146	,, ,,	"Shiraz"	230′ 0″ × 29′ 6″ × 23′ 9″	983	Gray, Dawes & Co. ..	London ..	,,
147	,, ,,	"Alert"	205′ 0″ × 28′ 6″ × 16′ 6″	*776	R. M. Sloman & Co. ..	Hamburg ..	,,

Ships built by Alexander Stephen & Sons, at Linthouse

Yard No.	Type of Ship	Name	Dimensions	Gross Tonnage	Built for	Owners' Port	Completed
148	S.S.	"Glendarroch" ..	265′ 0″ × 33′ 0″ × 24′ 6″	1509	Wm. Ross & Company ..	Glasgow ..	1870
149	Barque	"Canopus"	182′ 0″ × 32′ 6″ × 21′ 9″	902	E. M. De Busshe	London ..	,,
150	S.S.	"Sunfoo"	255′ 0″ × 33′ 0″ × 24′ 3″	1449	,, ...	,, ..	,,
151	,,	"Glen Sannox" ..	265′ 0″ × 33′ 0″ × 24′ 6″	1500	Wm. Ross & Company ..	Glasgow ..	,,
152	,,	"California"	360′ 0″ × 40′ 0″ × 31′ 10″	3434	Handyside & Henderson ..	,, ..	1872
153	P.S.	"Para"	240′ 0″ × 38′ 0″ × 19′ 9½″	1543	Wm. R. Garrison	New York ..	1871
154	,,	"Ceara"	,, ,, ,,	1546	,, ...	,, ..	,,
155	,,	"Bahia"	,, ,, ,,	1539	,, ...	,, ..	,,
156	S.S.	"Daqupon"	130′ 0″ × 22′ 0″ × 7′ 4″	169	Killick Martin & Co.	London ..	,,
157	Barque	"Anna"	175′ 0″ × 32′ 0″ × 21′ 6″	877	D. H. Watjen & Co.	Bremen ..	,,
158	S.S.	"Selicia"	230′ 0″ × 31′ 0″ × 17′ 7″	908	F. J. G. Servais	Antwerp ..	1872
159	Barque	"Josefa"	175′ 0″ × 32′ 0″ × 21′ 6″	875	D. H. Watjen & Co.	Bremen ..	,,
160	S.S.	"Nelusko"	320′ 0″ × 36′ 0″ × 27′ 0″	2279	F. J. G. Servais	Antwerp ..	,,
161	,,	"Muriel"	250′ 0″ × 30′ 0″ × 20′ 0″	1161	Blythe Brothers	Liverpool ..	,,
162	Barque	"Belle of the Niger" ..	141′ 0″ × 25′ 0″ × 11′ 8″	246	George Eastee	London ..	,,
163	S.S.	"Neapel"	205′ 0″ × 28′ 6″ × 16′ 8″	866	R. M. Sloman & Co.	Hamburg ..	,,
164	,,	"Tromp"	320′ 0″ × 36′ 0″ × 27′ 0″	2279	T. C. Engels & Co.	Antwerp ..	1873
165	,,	"Pow An"	220′ 0″ × 34′ 0″ × 12′ 10½″	2379	Fearon & Co.	London ..	,,
166	,,	"Ethiopia"	400′ 0″ × 40′ 0″ × 33′ 1″	4004	Handyside & Henderson ..	Glasgow ..	,,
167	,,	"Cassandra"	250′ 0″ × 32′ 0″ × 23′ 9½″	1434	John White, London ..	London ..	,,
168	,,	"Cybele"	320′ 0″ × 34′ 6″ × 25′ 3″	1980	Donaldson Brothers	Glasgow ..	1874
169	,,	"Herder"	375′ 0″ × 40′ 0″ × 32′ 2½″	3494	Deutsche Transatlantische Dampfschiffshalt Gesellshaft	Hamburg ..	1873
170	,,	"Lessing"	375′ 0″ × 40′ 0″ × 32′ 2½″	3496	,,	,, ..	1874
171	,,	"Wieland"	375′ 0″ × 40′ 0″ × 32′ 2½″	3507	,,	,, ..	,,
172	,,	"Tambaroora" ..	160′ 0″ × 24′ 0″ × 14′ 0″	400	Leon Fernadas	Costa Rica ..	1875
173	,,	"Gellert"	375′ 0″ × 40′ 3″ × 32′ 0″	3536	D. T. D. G.	Hamburg ..	,,
174	,,	"Nepaul"	375′ 0″ × 40′ 3″ × 32′ 2½″	3536	P. & O. S. N. Co.	London ..	1876
175	,,	"Bruce"	170′ 0″ × 22′ 0″ × 10′ 3″	335	John Darling	Dunedin ..	1874
176	Barque	"Germania"	180′ 0″ × 31′ 8″ × 19′ 8″	861	D. H. Watjen & Co.	Bremen ..	,,
177	,,	"G. Broughton" ..	190′ 0″ × 31′ 9″ × 18′ 10″	828	Peter Iredale	Carlisle ..	,,
178	,,	"Britannia"	175′ 0″ × 32′ 0″ × 21′ 6″	881	D. H. Watjen & Co.	Bremen ..	,,
179	S.S.	"Euro"	165′ 0″ × 23′ 0″ × 10′ 6″	335	Capt. Wm. Osborne	Adelaide ..	,,
180	Sail Ship	"Airlie"	235′ 0″ × 38′ 2″ × 24′ 5″	1577	David Bruce & Co.	Dundee ..	1875
181	,,	"Camperdown" ..	,, ,, ,,	1575	,, ...	,, ..	,,
182	,,	"Panmure"	235′ 0″ × 38′ 2″ × 24′ 5″	1523	,, ...	,, ..	,,
183	Schooner	"Osburgha"	140′ 0″ × 26′ 0″ × 13′ 8″	357	William Cook	London ..	,,
184	Barque	"Picton Castle" ..	165′ 0″ × 28′ 0″ × 17′ 10½″	596	Simpson Brothers	Swansea ..	,,
185	,,	"Lord Clyde" ..	165′ 0″ × 28′ 0″ × 18′ 7″	591	Gilbert Tulloch	,, ..	,,
186	,,	"Llewellyn"	155′ 0″ × 27′ 6″ × 17′ 3″	529	Captain John Rosser	,, ..	,,
187	Sail Ship	"Amana"	230′ 0″ × 36′ 0″ × 21′ 11″	1375	Captain John Smith	Glasgow ..	,,

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, AT LINTHOUSE—*continued.*

Yard No.	Type of Ship	Name	Dimensions	Gross Tonnage	Built for	Owners' Port	Completed
188	Composite P.S.	"Mauricio"	108′ 0″ × 19′ 0″ × 9′ 11″	165	James Graham & Co.	London ..	1875
189	Barque	"Lady Penrhyn" ..	198′ 0″ × 31′ 9″ × 20′ 6″	839	J. Richards, M.D.	Bangor ..	,,
190	,,	"Martha Fisher" ..	198′ 0″ × 31′ 9″ × 20′ 0″	839	Peter Iredale	Carlisle ..	,,
191	,,	"Primera"	174′ 0″ × 28′ 6″ × 18′ 7″	597	William Sherwen	Liverpool ..	,,
192	,,	"Nokomis"	190′ 0″ × 31′ 6″ × 18′ 11″	881	W. McCorkell & Co.	Londonderry ..	1876
193	,,	"Werra"	187′ 0″ × 32′ 0″ × 19′ 8½″	932	D. H. Watjen & Co.	Bremen ..	,,
194	,,	"Fulda"	187′ 0″ × 32′ 0″ × 19′ 8½″	884	,, ...	,, ..	,,
195	Composite Barque	"India"	187′ 9″ × 34′ 0″ × 19′ 8½″	974	,, ...	,, ..	,,
196	P.S.	"City of Grafton" ..	207′ 0″ × 27′ 0″ × 19′ 6″	825	J. B. Watt & Co.	London ..	,,
197	Sail Ship	"Shenir"	215′ 0″ × 34′ 9″ × 23′ 3″	1229	Captain John Smith	Glasgow ..	,,
198	,,	"Pleione"	210′ 0″ × 34′ 6″ × 21′ 9″	1092	Shaw, Savill & Albion Co. ..	London ..	,,
199	,,	"Cockermouth" ..	239′ 0″ × 36′ 9″ × 22′ 9″	1297	Peter Iredale	Carlisle ..	,,
200	,,	"Ardenclutha" ..	220′ 0″ × 35′ 6″ × 21′ 6″	1293	J. L. Mitchell .. .. .. (Edmiston & Mitchell)	Glasgow ..	,,
201	Barque	"Kinclune"	185′ 0″ × 30′ 0″ × 19′ 8″	718	Dundee, Perth & London S.Co.	Dundee ..	,,
202	,,	"Lochinvar"	185′ 0″ × 30′ 0″ × 19′ 8″	685	J. Boumphrey & Co.	Liverpool ..	,,
203	Sail Ship	"Opawa"	215′ 0″ × 34′ 0″ × 21′ 11″	1076	New Zealand Shipping Co. ..	London ..	,,
204	,,	"Piako"	215′ 0″ × 34′ 0″ × 21′ 10″	1075	,, ,, ..	,, ..	,,
205	,,	"Wanganui"	215′ 0″ × 34′ 0″ × 21′ 10″	1077	,, ,, ..	,, ..	1877
206	S.S.	"Leon"	197′ 0″ × 26′ 6″ × 14′ 0½″	621	Chevillotte Bros.	Brest	1876
207	Barque	"Lurline"	189′ 0″ × 32′ 0″ × 19′ 3″	761	Paton & Grant	Glasgow ..	1877
208	,,	"Psyche"	205′ 0″ × 34′ 0″ × 20′ 3″	1031	A. C. Le Quellec	Bordeaux ..	,,
209	S.S.	"Brutus"	190′ 0″ × 27′ 0″ × 15′ 9½″	628	Gebrüder Andersen	Kiel	,,
210	,,	"Pinzan"	201′ 6″ × 28′ 2″ × 18′ 2″	832	Robert McAndrew & Co. ..	London ..	,,
211	,,	"Solis"	201′ 6″ × 28′ 2″ × 18′ 2″	835	,, ...	,, ..	,,
212	Barque	"River Leven" ..	178′ 0″ × 32′ 2″ × 18′ 8½″	806	Alex. Denny	Dumbarton ..	,,
213	Ferry P.S.	Australian Ferry Steamer ..	116′ 0″ × 15′ 6″ × 7′ 5″	100	John Hay & Wm. Buchanan	Ayr	,,
214	Barque	"Palala"	215′ 0″ × 34′ 0″ × 19′ 11″	1030	Bullard King & Co. ..	London ..	1878
215	,,	"Mabel Young" ..	203′ 0″ × 33′ 6″ × 20′ 8½″	1046	Killick Martin & Co. ..	,, ..	,,
216	,,	"Visurgis"	207′ 6″ × 34′ 6″ × 20′ 3″	1141	D. H. Watjen & Co.	Bremen ..	1877
217	,,	"Lesmona"	,, ,, ,,	1144	,, ...	,, ..	,,
218	S.S.	"Mercator"	280′ 0″ × 35′ 0″ × 26′ 0″	1958	T. C. Engels & Co.	Antwerp ..	,,
219	Barque	"George Knox"	138′ 0″ × 27′ 0″ × 13′ 8½″	349	George Knox	Natal	,,
220	S.S.	"Titus"	190′ 0″ × 28′ 0″ × 15′ 9½″	760	Gebrüder Andersen	Keil	1878
221	,,	"Augustus"	236′ 0″ × 31′ 0″ × 19′ 0½″	1126	,, ..	,, ..	,,
222	T.S.S.	"Houssa"	192′ 0″ × 26′ 0″ × 13′ 1″	544	Alex. Miller Bros. & Co. ..	Glasgow ..	,,
223	Barque	"Hannah Landles" ..	230′ 0″ × 36′ 0″ × 22′ 6½″	1332	David Law	,, ..	,,
224	,,	"Alice Platt" ..	208′ 0″ × 34′ 0″ × 21′ 11″	1139	J. Lloyd, Junr.	Bangor ..	,,

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, AT LINTHOUSE—*continued.*

Yard No.	Type of Ship	Name	Dimensions	Gross Tonnage	Built for	Owners' Port	Completed
225	Barque	"Goethe"	217′ 6″ × 34′ 6″ × 21′ 7½″	1209	D. H. Watjen & Co.	Bremen	1878
226	S.S.	"Clan Alpine"	305′ 0″ × 34′ 9″ × 25′ 6½″	2080	Cayzer, Irvine & Co.	Liverpool	,,
227	,,	"Clan Fraser"	305′ 0″ × 34′ 9″ × 25′ 6½″	2083	,,	,,	,,
228	,,	"Escurial"	230′ 0″ × 30′ 0″ × 23′ 4″	1185	Raeburn & Verel	Glasgow	1879
229	,,	"Claverhouse"	230′ 0″ × 30′ 0″ × 23′ 4″	1188	John Dunn & Co.	,,	,,
230	,,	"Eileen Dubh"	100′ 0″ × 18′ 0″ × 8′ 7½″	111	Moray Firth Shipping Co.	Inverness	,,
231	,,	"Felicia"	236′ 0″ × 31′ 0″ × 19′ 0½″	1125	A. C. de Freitas & Co.	Hamburg	1878
232	,,	"Clan Gordon"	305′ 0″ × 34′ 9″ × 25′ 6½″	2091	Cayzer, Irvine & Co.	Liverpool	1879
233	,,	"Clan Lamont"	305′ 0″ × 34′ 9″ × 25′ 6½″	2091	,,	,,	,,
234	Schooner	"Tabasco"	131′ 0″ × 23′ 0″ × 10′ 4″	215	Jenequel Frères	Bordeaux	,,
235	T.S.S.	"Fantee"	120′ 0″ × 18′ 0″ × 19′ 0″	166	Alex. Miller Bros. & Co.	Glasgow	,,
236	S.S.	"Claudius"	254′ 0″ × 33′ 0″ × 21′ 5½″	1454	C. Andersen	Hamburg	,,
237	,,	"Plantyn"	320′ 0″ × 36′ 0″ × 27′ 6½″	2328	T. C. Engels & Co.	Antwerp	,,
238	,,	"Malaga"	265′ 0″ × 33′ 0″ × 21′ 5″	1344	R. M. Sloman & Co.	Hamburg	,,
239	,,	"Barcelona"	265′ 0″ × 33′ 0″ × 21′ 5″	1346	,,	,,	,,
240	,,	"Mobile"	250′ 0″ × 32′ 6″ × 23′ 7″	1409	Capt. H. N. Herriman	U.S.A.	,,
241	,,	"Africa"	260′ 0″ × 33′ 6″ × 23′ 4″	1495	Edward Carr	Hamburg	,,
242	,,	"Vincenzo Florio"	340′ 0″ × 38′ 0″ × 30′ 4½″	2817	Nav. Gen. Italiana	Palermo	1880
243	,,	"Washington"	340′ 0″ × 38′ 0″ × 30′ 4½″	2814	,,	,,	,,
244	,,	"Lennox"	310′ 0″ × 35′ 0″ × 26′ 8″	2054	John Warrack & Co.	Leith	,,
245	,,	"Carlo"	240′ 0″ × 34′ 0″ × 18′ 6″	1271	Tellefsen Wills & Co.	Cardiff	,,
246	,,	"Earl of Rosebery"	240′ 0″ × 33′ 2½″ × 17′ 2″	1163	Martin & Marquand	,,	,,
247	,,	"Benalder"	310′ 0″ × 35′ 0″ × 26′ 8″	2054	Wm. Thomson & Co.	Leith	,,
248	,,	"Katie"	320′ 0″ × 40′ 6″ × 26′ 0″	2450	C. H. S. Schultz	Hamburg	,,
249	,,	"Mount Hermon"	320′ 0″ × 38′ 0″ × 27′ 6″	2410	Captain John Smith	Glasgow	,,
250	,,	"Alverton"	240′ 0″ × 34′ 0″ × 18′ 6″	1321	Osborn & Wallis	Cardiff	,,
251	,,	"Mount Lebanon"	320′ 0″ × 38′ 0″ × 27′ 6″	2410	Captain John Smith	Glasgow	1881
252	,,	"Pieter de Connick"	340′ 0″ × 40′ 9″ × 34′ 3″	3310	T. C. Engels & Co.	Antwerp	,,
253	,,	"Catania"	315′ 0″ × 35′ 6″ × 25′ 10″	2198	R. M. Sloman & Co.	Hamburg	,,
254	,,	"Fidra"	237′ 8″ × 33′ 0″ × 19′ 1″	1139	Francis F. Reid	Leith	,,
255	,,	"Iniziativa"	300′ 0″ × 37′ 3″ × 26′ 3″	2032	Carlo Raggio	Genoa	,,
256	,,	"Pallas"	192′ 0″ × 26′ 0″ × 14′ 9½″	595	Wm. Jex & Co.	London	,,
257	,,	"Cameo"	300′ 0″ × 39′ 0″ × 26′ 7½″	2280	Tellefsen, Wills & Co.	Cardiff	,,
258	,,	"Archimede"	340′ 0″ × 40′ 0″ × 28′ 10″	2837	Nav. Gen. Italiana	Rome	,,
259	,,	"Benlarig"	310′ 0″ × 38′ 0″ × 26′ 6″	2265	W. Thomson & Co.	Leith	,,
260	,,	"Sorrento"	320′ 0″ × 36′ 0″ × 25′ 10″	2370	R. M. Sloman & Co.	Hamburg	,,
261	,,	"Clan Cameron"	324′ 0″ × 38′ 0″ × 26′ 9½″	2432	Cayzer, Irvine & Co.	Liverpool	1882
262	,,	"Clan Campbell"	324′ 0″ × 38′ 0″ × 26′ 9½″	2433	,,	,,	,,
263	,,	"Clan Forbes"	324′ 0″ × 38′ 0″ × 26′ 9½″	2441	,,	,,	,,
264	,,	"Clan Ogilvie"	324′ 0″ × 38′ 0″ × 26′ 9½″	2425	,,	,,	,,
265	,,	"Marsala"	320′ 0″ × 36′ 0″ × 25′ 10″	2370	R. M. Sloman & Co.	Hamburg	,,

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, AT LINTHOUSE—*continued.*

Yard No.	Type of Ship	Name	Dimensions	Gross Tonnage	Built for	Owners' Port	Completed
266	S.S.	"Mudela"	260′ 0″ × 38′ 0″ × 20′ 1″	1711	J. Martinez de la Rivas ..	Bilbao	1882
267	,,	"Albany"	310′ 0″ × 38′ 0″ × 26′ 8″	2276	John Warrack & Co. ..	Leith	,,
268	,,	"Independente" ..	340′ 0″ × 40′ 0″ × 28′ 10″	2836	Nav. Gen. Italiana	Palermo ..	1883
269	,,	"Gottardo"	340′ 0″ × 40′ 0″ × 28′ 10″	2836	,, ...	,, ..	,,
270	Barque	"Aberdeenshire" ..	230′ 0″ × 36′ 0″ × 22′ 6½″	1340	Thomas Law & Co. ..	Glasgow ..	1882
271	S.S.	"Rosslyn"	270′ 0″ × 34′ 3″ × 23′ 1″	1615	John Warrack & Co. ..	Leith	,,
272	,,	"Clan Grant" ..	350′ 0″ × 41′ 0″ × 27′ 9″	3545	Cayzer, Irvine & Co.	Liverpool ..	1883
273	Barque	"Teviotdale"	255′ 0″ × 38′ 6″ × 24′ 3½″	1695	J. & A. Roxburgh	Glasgow ..	1882
274	S.S.	"Benvenue"	310′ 0″ × 38′ 0″ × 26′ 6″	2286	Wm. Thomson & Co. ..	Leith	1883
275	S.Y.	"Sylvia"	125′ 0″ × 18′ 0″ × 10′ 10½″	136	Dean of Guild Stephen ..	Glasgow ..	1882
276	S.S.	"Marques de Mudela"	280′ 0″ × 38′ 0″ × 24′ 9½″	1913	J. Martinez de la Rivas ..	Bilbao	1883
277	,,	"Cymro"	300′ 0″ × 39′ 0″ × 26′ 7½″	2280	Tellefsen, Wills & Co. ..	Cardiff	,,
278	,,	"Graville"	300′ 0″ × 39′ 0″ × 26′ 7½″	2397	Cicero Brown	Le Havre ..	Oct. 1883
279	,,	"Rose" (Daphne) ..	176′ 3″ × 25′ 2″ × 21′ 2½″	449	Glasgow & Londonderry S.P. Co. (Laird Line)	Glasgow ..	Sept. ,,
280	,,	"Euterpe"	260′ 0″ × 36′ 0″ × 19′ 1½″	1522	Osborn & Wallis	Cardiff ..	Oct. ,,
281	,,	"Clan Davidson" ..	240′ 0″ × 34′ 0″ × 18′ 6″	1326	Thos. Dunlop & Sons ..	Glasgow ..	Dec. ,,
282	,,	"Ella"	220′ 0″ × 31′ 0″ × 17′ 5″	1058	Theodore Rodenacker ..	Dantzig ..	Dec. ,,
283	,,	"Taormina"	320′ 0″ × 38′ 6″ × 26′ 8″	2422	R. M. Sloman & Co.	Hamburg ..	Mar. 1884
284	,,	"Dunedin"	240′ 0″ × 34′ 0″ × 18′ 6″	1326	Henderson & McIntosh ..	Leith	Mar. ,,
285	Barque	"Galathee"	220′ 0″ × 36′ 0″ × 21′ 11½″	1253	A. C. Le Quellec	Bordeaux ..	May ,,
286	S.S.	"Rivas"	300′ 0″ × 42′ 0″ × 28′ 2½″	2700	J. Martinez de la Rivas ..	Bilbao, Spain ..	Sept. ,,
287	Schooner	"Tampico"	131′ 0″ × 24′ 0″ × 11′ 10½″	309	Jenequel Frères	Bordeaux ..	July ,,
288	Barque	"Edinburghshire" ..	230′ 0″ × 36′ 0″ × 22′ 6½″	1343	Thomas Law & Co.	Glasgow ..	Oct. ,,
289	Sail Ship	"Ardencaple" ..	255′ 0″ × 39′ 6″ × 25′ 0″	1782	Robert Lockhart	,, ..	Jan. 1885
290	S.S.	"Damara"	275′ 0″ × 35′ 0″ × 23′ 11″	1779	Halifax S. Nav. Co. Ltd. ..	Nova Scotia ..	Mar. ,,
291	,,	"Ulanda"	275′ 0″ × 35′ 0″ × 23′ 11″	1789	,, ..	,, ..	May ,,
292	Barque	"Abercorn"	230′ 0″ × 36′ 0″ × 22′ 6½″	1341	P. H. Dixon & Co.	Glasgow ..	April ,,
293	Sail Ship	"Brynhilda"	232′ 0″ × 38′ 0″ × 23′ 3¾″	1502	J. W. Carmichael & Co. ..	New Glasgow, Nova Scotia	May, ,,
294	S.Y.	"Nerissa"	147′ 0″ × 22′ 0″ × 13′ 6″	264	Alexander Stephen	Glasgow ..	June ,,
295	S.S.	"Wardha"	350′ 0″ × 47′ 0″ × 29′ 5″	3917	British India S. N. Co. Ltd. ..	London ..	July 1887
296	,,	"Warora"	350′ 0″ × 47′ 0″ × 29′ 5″	3920	,, ...	,, ..	Sept. ,,
297	,,	"General Gordon" ..	240′ 0″ × 34′ 0″ × 18′ 6″	1294	Maclay & McIntyre	Glasgow ..	Sept. 1885
298	Sail Ship	"Circe"	240′ 0″ × 39′ 6″ × 23′ 11½″	1650	A. C. Le Quellec	Bordeaux ..	Nov. ,,
299	S.S.	"Queen Victoria" ..	290′ 0″ × 39′ 0″ × 25′ 3½″	2311	Thos. Dunlop & Sons ..	Glasgow ..	Jan. 1887
300	,,	"Bléville"	300′ 0″ × 40′ 0″ × 25′ 9″	2518	C. Brown	Havre	Sept. 1886
301	Barque	"Kilfauns"	197′ 0″ × 34′ 6″ × 20′ 8½″	1007	C. Couper	Dundee ..	Oct. ,,
302	Sail Ship	"Armadale"	275′ 0″ × 40′ 6″ × 25′ 3½″	2015	J. & A. Roxburgh	Glasgow ..	April 1887
303	,,	"Bracadale"	275′ 0″ × 40′ 6″ × 25′ 3½″	2015	,, ...	,, ..	May ,,
304	S.S.	"Gairloch"	282′ 0″ × 37′ 0″ × 21′ 9″	2173	James Gardiner & Co. ..	,, ..	Sept. ,,
305	,,	"Vascongada" ..	250′ 0″ × 35′ 0″ × 19′ 4½″	1483	Ferguson & Reid	,, ..	Oct. ,,

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, AT LINTHOUSE—*continued.*

Yard No.	Type of Ship	Name	I.H.P.	Dimensions	Gross Tonnage	Built for	Owners' Port	Completed
306	S.S.	"Elettrico" ..	—	250′ 0″ × 33′ 0″ × 23′ 10½″	1246	Nav. Gen. Italiana	Rome	Aug. 1887
307	,,	"Victoria" ..	—	260′ 0″ × 36′ 9″ × 19′ 2″	1620	Maclay & McIntyre	Glasgow ..	Oct. ,,
308	,,	"Strathearn" ..	—	310′ 0″ × 41′ 2¼″ × 27′ 9″	2814	Burrell & Son	,, ..	Feb. 1888
309	,,	"Caloric" ..	—	260′ 0″ × 36′ 9″ × 19′ 2″	1747	Ebenezer Kemp	,, ..	Jan. ,,
310	,,	"Domira" ..	—	260′ 0″ × 36′ 9″ × 19′ 2″	1791	Maclay & McIntyre	,, ..	April ,,
311	,,	"Baltimore City" ..	—	290′ 0″ × 39′ 0″ × 25′ 3½″	2334	C. Furness	W. Hartlepool	May ,,
312	,,	"Kentigern" ..	—	300′ 0″ × 40′ 0″ × 25′ 9″	2463	R. McMillan	Dumbarton ..	July ,,
313	,,	"Amaranth" ..	—	310′ 0″ × 40′ 0″ × 27′ 3½″	2677	J. B. Murray & Co.	Glasgow ..	Sept. ,,
314	,,	"Queen Elizabeth" ..	—	300′ 0″ × 40′ 0″ × 25′ 9″	2507	Thos. Dunlop & Sons ..	,, ..	Nov. ,,
315	,,	"Strathclyde" ..	—	340′ 0″ × 45′ 5¼″ × 26′ 9½″	3265	Burrell & Son	,, ..	Mar. 1889
316	Sail Ship	"Carr Rock" ..	—	240′ 0″ × 39′ 0″ × 23′ 9″	1657	Jas. Cornfoot & Co. ..	,, ..	Jan. ,,
317	S.S.	"Capua"	1150	285′ 0″ × 37′ 0″ × 23′ 8½″	2012	R. M. Sloman & Co. ..	Hamburg ..	May ,,
318	,,	"Salerno" ..	1061	285′ 0″ × 37′ 0″ × 23′ 8½″	,,	,, ..	,, ..	Sept. ,,
319	,,	"Nyassa"	980	280′ 0″ × 37′ 3″ × 21′ 9″	2202	Maclay & McIntyre ..	Glasgow ..	June ,,
320	,,	"Mangara" ..	817	260′ 0″ × 36′ 9″ × 19′ 2″	1784	,, ...	,, ..	,, ,,
321	Sail Ship	"Carradale" ..	—	275′ 0″ × 41′ 0″ × 25′ 3½″	2085	J. & A. Roxburgh	,, ..	Nov. ,,
322	S.S.	"Chemnitz" ..	1563	320′ 0″ × 39′ 0″ × 25′ 6″	2700	German Australian Co. Ltd.	Hamburg ..	Dec. ,,
323	Sail Ship	"Fascadale" ..	—	275′ 0″ × 41′ 0″ × 25′ 3½″	2085	J. & A. Roxburgh	Glasgow ..	Feb. 1890
324	S.S.	"Highland Chief" ..	1510	310′ 0″ × 41′ 0″ × 26′ 3″	2648	Maclay & McIntyre ..	,, ..	May ,,
325	,,	"Asphodel" ..	1340	310′ 0″ × 41′ 0″ × 26′ 3″	2674	J. B. Murray & Co.	,, ..	,, ,,
326	,,	"Queen Margaret"	1475	310′ 0″ × 41′ 0″ × 26′ 3″	2678	Thos. Dunlop & Sons ..	,, ..	,, ,,
327	,,	"Ben Lomond" ..	1596	310′ 0″ × 40′ 0″ × 26′ 9″	2670	Wm. Thomson & Co. ..	Leith ..	July ,,
328	,,	"Boston"	4763	245′ 0″ × 36′ 1½″ × 21′ 0″	1694	Yarmouth S.S. Co., Ltd. ..	Nova Scotia	Oct. ,,
329	,,	"State of California"	4315	385′ 0″ × 46′ 0″ × 32′ 8″	4244	State of California Co. Ltd.	Glasgow ..	Aug. 1891
330	,,	"Ottawa"	1530	275′ 0″ × 35′ 0″ × 23′ 11	1719	C. Furness	W. Hartlepool	Feb. ,,
331	,,	"Acanthus" ..	1562	310′ 0″ × 42′ 0″ × 25′ 6″	2877	J. B. Murray & Co.	Glasgow ..	Mar. ,,
332	,,	"Clan Mackinnon"	2036	295′ 0″ × 39′ 0″ × 24′ 9″	2268	Cayzer, Irvine & Co. ..	,, ..	May ,,
333	,,	"Clan Macnab" ..	1955	295′ 0″ × 39′ 0″ × 24′ 9″	,,	,, ...	,, ..	June ,,
334	,,	"Clan Macallister"	1917	295′ 0″ × 39′ 0″ × 24′ 9″	,,	,, ...	,, ..	Aug. ,,
335	Barque	"Urania"	,,	245′ 0″ × 39′ 0″ × 23′ 8″	1688	Telef Lassen	Arendal, Norway	Oct. ,,
336	,,	"Afon Alaw" ..	,,	275′ 0″ × 41′ 0″ × 25′ 3½″	2052	Hughes & Co.	Menai Bridge, N. Wales	Dec. ,,
337	S.S.	"Camelot"	1840	300′ 0″ × 42′ 0″ × 28′ 6″	2881	Francis F. Reid	Leith	April 1892
338	,,	"Uganda"	1323	310′ 0″ × 41′ 0″ × 24′ 6″	2444	Maclay & McIntyre ..	Glasgow ..	May ,,
339	Barque	"Afon Cefni" ..	,,	275′ 0″ × 41′ 0″ × 25′ 3½	2066	Hughes & Co.	Menai Bridge, N. Wales	April ,,
340	S.S.	"Bezwada" ..	1956	400′ 0″ × 48′ 0″ × 31′ 6″	5000	British India S. N. Co. Ltd. ..	London ..	May 1893
341	,,	"Agapanthus" ..	1760	380′ 0″ × 46′ 0″ × 30′ 3″	4409	J. B. Murray & Co.	Glasgow ..	Jan. ,,
342	,,	"Durward" (No. 1)	2370	260′ 0″ × 32′ 6″ × 17′ 5½″	1274	G. Gibson & Co. ..	Leith ..	July 1892
343	,,	"Arabistan" ..	1904	325′ 0″ × 42′ 0″ × 29′ 6″	3193	F. C. Strick & Co. Ltd. ..	London ..	April 1893

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, AT LINTHOUSE—*continued.*

Yard No.	Type of Ship	Name	I.H.P.	Dimensions	Gross Tonnage	Built for	Owners' Port	Completed
344	S.S.	"Rappahannock" ..	3110	370′ 0″ × 44′ 0″ × 31′ 6″	3884	Chesapeake & Ohio S.S. Co.	London ..	Aug. 1893
345	,,	"Shenandoah" ..	3122	370′ 0″ × 44′ 0″ × 31′ 6″	3886	,, [Ltd.	,, ..	Oct. ,,
346	,,	"Kanawha" ..	1660	370′ 0″ × 44′ 0″ × 31′ 6″	,,	,, ..	,, ..	Dec. ,,
347	,,	"Benmohr" ..	1850	330′ 0″ × 41′ 9″ × 27′ 0″	3000	Wm. Thomson & Co. ..	Leith ..	Nov. ,,
348	,,	"Halifax City" ..	1650	300′ 0″ × 37′ 0″ × 25′ 9″	2141	Furness Withy & Co. Ltd. ..	W. Hartlepool	Feb. 1894
349	,,	"Mazagon" ..	1138	400′ 0″ × 48′ 0″ × 31′ 6″	4997	P. & O. S.N. Co.	London ..	July ,,
350	,,	"Janeta"	1766	330′ 0″ × 43′ 0″ × 29′ 0″	3302	Maclay & McIntyre ..	Glasgow ..	April ,,
351	,,	"Jeanara"	1894	330′ 0″ × 43′ 0″ × 29′ 0″	,,	,, ..	,, ..	June ,,
352	,,	"Turkistan" ..	1750	345′ 0″ × 47′ 0″ × 29′ 6″	4060	F. C. Strick & Co. Ltd. ..	London ..	Aug. ,,
353	,,	"Dionée"	1348	300′ 0″ × 40′ 0″ × 26′ 6″	2471	A. C. Le Quellec	Bordeaux ..	Dec. ,,
354	,,	"Julia Park" ..	1585	330′ 0″ × 43′ 4″ × 25′ 11″	3085	J. Smith Park	Glasgow ..	Oct. ,,
355	,,	"Marthara" ..	1398	300′ 0″ × 42′ 0″ × 23′ 0″	2397	Maclay & McIntyre ..	,, ..	Dec. ,,
356	,,	"St. John City" ..	2016	300′ 0″ × 37′ 0″ × 25′ 9″	2153	C. Furness	W. Hartlepool	Jan. 1895
357	,,	"Durward" (No. 2)	2349	260′ 0″ × 32′ 6″ × 17′ 5½″	1304	G. Gibson & Co.	Leith ..	Feb. ,,
358	,,	"Benalder" ..	1925	330′ 0″ × 41′ 9″ × 27′ 0″	3044	Wm. Thomson & Co. ..	,, ..	April ,,
359	,,	"Sumatra"	3436	400′ 0″ × 46′ 8½″ × 31′ 0″	4607	P. & O. S.N. Co.	London ..	Aug. ,,
360	,,	"Oceana"	1444	330′ 0″ × 45′ 0″ × 28′ 9″	3530	Maclay & McIntyre ..	Glasgow ..	Sept. ,,
361	,,	"Magdala" ..	1494	330′ 0″ × 45′ 0″ × 28′ 9″	3512	,, ..	,, ..	Nov. ,,
362	,,	"Idaho" (London City)	4808	450′ 0″ × 49′ 0″ × 34′ 3″	5531	T. Wilson, Sons & Co. Ltd.	Hull ..	April 1896
363	,,	"Grenada" ..	2012	281′ 0″ × 39′ 0″ × 25′ 6″	2158	Geo. Christall	New York ..	Jan. ,,
364	,,	"Megantic" ..	5010	450′ 0″ × 49′ 0″ × 34′ 3″	5531	Wilson & Furness—Leyland Line Ltd.	London ..	May ,,
365	,,	"Benvorlich" ..	1940	345′ 0″ × 43′ 3″ × 27′ 6″	3381	Wm. Thomson & Co. ..	Leith ..	June ,,
366	,,	"Clan Chisholm" ..	2093	312′ 0″ × 40′ 2½″ × 26′ 2″	2647	Cayzer, Irvine & Co. ..	Glasgow ..	July ,,
367	,,	"Clan Ogilvy" ..	2104	312′ 0″ × 40′ 2½″ × 26′ 2″	,,	,, ...	,, ..	Sept. 1897
368	,,	"Lakmé"	1893	330′ 0″ × 43′ 2½″ × 27′ 2″	3110	A. C. Le Quellec	Bordeaux ..	Oct. 1896
369	,,	"Pisa"	2528	390′ 0″ × 46′ 0″ × 30′ 6″	4473	R. M. Sloman & Co. ..	Hamburg ..	Dec. ,,
370	,,	"Nyanza"	1713	370′ 0″ × 48′ 0″ × 27′ 6″	4053	Maclay & McIntyre ..	Glasgow ..	Jan. 1897
371	,,	"Sahara"	1667	370′ 0″ × 48′ 0″ × 27′ 6″	4089	,, ..	,, ..	April ,,
372	,,	"Alexandria" ..	4989	475′ 0″ × 52′ 3″ × 34′ 6″	6919	Wilson & Furness—Leyland	London ..	Oct. ,,
373	,,	"Boadicea" ..	4960	486′ 0″ × 52′ 3″ × 34′ 6″	7057	,, [Line Ltd.	,, ..	Jan. 1898
374	,,	"Viscaina"	1180	290′ 0″ × 42′ 9″ × 21′ 10″	2191	Ferguson & Reid	Glasgow ..	July 1897
375	,,	"Uganda"	2274	410′ 0″ × 50′ 9″ × 31′ 9″	5366	British India S.N. Co. Ltd...	London ..	May 1898
376	,,	"Umta"	2280	410′ 0″ × 50′ 9″ × 31′ 9″	,,	,, ...	,, ..	June ,,
377	,,	"Bengalia"	4093	485′ 0″ × 57′ 0″ × 36′ 0″	7690	Sir C. Furness (Sold to Hamburg-Amerika Linie)	W. Hartlepool	Oct. ,,
378	,,	"Induna"	1564	380′ 0″ × 49′ 11⅜″ × 28′ 2¾″	4426	Maclay & McIntyre ..	Glasgow ..	Nov. ,,
379	S.Y.	"Calanthe" ..	841	157′ 0″ × 24′ 0″ × 14′ 3″	351	Alex. Stephen ..	,, ..	June ,,
380	S.S.	"Bethania" ..	5018	485′ 0″ × 57′ 0″ × 36′ 0″	7519	Sir C. Furness (Sold to Hamburg-Amerika Linie)	W. Hartlepool	Mar. 1899
381	,,	"Clan Macaulay" ..	1588	326′ 0″ × 40′ 2½″ × 26′ 2½″	2834	Cayzer, Irvine & Co. ..	Glasgow ..	April ,,
382	,,	"Clan Maclaren" ..	1593	326′ 0″ × 40′ 2½″ × 26′ 2½″	,,	Cayzer, Irvine & Co. ..	,, ..	June ,,

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, LTD., AT LINTHOUSE—*continued.*

Yard No.	Type of Ship	Name	I.H.P.	Dimensions	Gross Tonnage	Built for	Owners' Port	Completed
383	T.S.S.	"Montezuma" ..	4384	485′ 0″ × 59′ 0″ × 33′ 6″	7345	Elder Dempster & Co. ..	Liverpool ..	Sept. 1899
384	,,	"Tunisian" ..	7906	500′ 0″ × 59′ 3″ × 43′ 0″	10756	Allan Line S.S. Co. Ltd. ..	Glasgow ..	Mar. 1900
385	S.S.	"Clan Maclachlan"	2551	395′ 0″ × 48′ 0″ × 30′ 0″	4729	Cayzer, Irvine & Co. ..	,, ..	April ,,
386	,,	"Bohemian" ..	4789	511′ 0″ × 58′ 3″ × 45′ 0″	8548	F. Leyland & Co. Ltd. ..	Liverpool ..	Aug. ,,
387	,,	"Port Morant" ..	5872	320′ 0″ × 40′ 0″ × 27′ 11½″	2831	Elder Dempster & Co. ..	,, ..	Feb. 1901
388	—	Spanish Ship House	—	— — —	—	Senor Felix de Chavarri ..	Spain ..	,, 1902
389	S.S.	"Evangeline" ..	3460	360′ 0″ × 45′ 2½″ × 30′ 6″	3900	Furness, Withy & Co. Ltd..	London ..	Oct. 1900
390	,,	"Loyalist" ..	3502	360′ 0″ × 45′ 2½″ × 30′ 6″	3904	,, ..	,, ..	Jan. 1901
391	T.S.S.	"Syria"	4738	450′ 0″ × 52′ 2¾″ × 33′ 6″	6660	P. & O. S.N. Co.	,, ..	June ,,
392	S.S.	"Inkum"	2431	392′ 0″ × 50′ 0″ × 38′ 10″	4747	J. H. Welsford & Co. Ltd. ..	,, ..	Aug. ,,
393	T.S.S.	"Oscar II" ..	9463	500′ 0″ × 58′ 3″ × 40′ 9″	9956	Det Forenede Dampskib-Selskab	Copenhagen ..	Feb. 1902
394	S.S.	"Burutu"	3137	360′ 0″ × 44′ 2½″ × 26′ 0″	3863	Elder Dempster & Co. ..	Liverpool ..	May ,,
395	,,	"Tarquah" ..	3095	360′ 0″ × 44′ 2½″ × 26′ 0″	3859	,, ...	,, ..	June ,,
396	,,	"Wyandra" ..	3809	340′ 0″ × 46′ 0″ × 28′ 0″	4058	Australasian U.S.N. Co. Ltd.	Sydney ..	Sept. ,,
397	Triple Turbine Yacht	"Emerald"	1640	203′ 0″ × 28′ 8″ × 18′ 6″	694	Sir Christopher Furness ..	London ..	April 1903
398	S.S.	"Massilia"	2796	400′ 0″ × 49′ 2½″ × 30′ 9″	5353	Anchor Line	Glasgow ..	Sept. 1902
399	T.S.S.	"Hellig Olav" ..	9610	500′ 0″ × 58′ 3″ × 40′ 9″	10072	Det Forenede Dampskib-Selskab	Copenhagen ..	Mar. 1903
400	,,	"United States" ..	9600	500′ 0″ × 58′ 3″ × 40′ 9″	10082	,, ,,	,, ..	May ,,
401	,,	"Miltiades" ..	8156	442′ 0″ × 55′ 0″ × 33′ 1″	6765	Aberdeen Line	London and Aberdeen	Oct. ,,
				Lengthened 50′ 0″	7827	(G. Thompson & Co. Ltd.)		Mar. 1912
402	,,	"Marathon" ..	8182	442′ 0″ × 55′ 0″ × 33′ 1″	6765	,, ,, ..	,, ..	Dec. 1903
				Lengthened 50′ 0″	7827			Oct. 1912
403	,,	"Port Kingston" ..	10284	460′ 0″ × 55′ 6″ × 36′ 0″	7585	Elder Dempster & Co. ..	Liverpool ..	July 1904
404	S. Tug	"Cruiser"	660	105′ 0″ × 21′ 1″ × 11′ 9″	167	Steel & Bennie Ltd. ..	Glasgow ..	April ,,
405	Trip. Turb.	"Virginian" ..	13200	520′ 0″ × 60′ 3″ × 41′ 2″	10754	Allan Line S.S. Co. Ltd. ..	,, ..	Mar. 1905
406	S.S.	"Karina"	4070	370′ 0″ × 46′ 2½″ × 26′ 0″	4230	Elder Dempster & Co. ..	Liverpool ..	June ,,
407	,,	"Mendi"	4085	370′ 0″ × 46′ 2½″ × 26′ 0″	4222	,, ..	,, ..	July ,,
408	S.Y.	"Medea"	254	105′ 0″ × 16′ 7¼″ × 10′ 0″	112	Capt. W. Macallister Hall ..	Torrisdale Castle ..	Aug. 1904
409	S.S.	"Nicoya"	3617	365′ 0″ × 46′ 2½″ × 32′ 6″	3911	Elders & Fyffes, Ltd. ..	London ..	April 1905
410	,,	"Eildon"	2128	260′ 0″ × 34′ 2″ × 18′ 7½″	608	G. Gibson & Co.	Leith ..	Oct. ,,
411	,,	"Uganda"	2647	385′ 0″ × 50′ 0″ × 28′ 8″	4257	Maclay & McIntyre ..	Glasgow ..	Sept. ,,
412	,,	"Livingstonia" ..	2695	385′ 0″ × 50′ 0″ × 28′ 8″	4294	,, ..	,, ..	Dec. ,,
413	,,	"Albertville" ..	4219	380′ 0″ × 47′ 6¼″ × 33′ 9″	4793	C. Belge Maritime du Congo	Antwerp ..	July 1906
414	,,	"Falaba"	4270	380′ 0″ × 47′ 6¼″ × 33′ 9″	4806	Elder Dempster & Co. ..	Liverpool ..	Oct. ,,
415	,,	"Barranca" ..	3644	372′ 0″ × 47′ 8½″ × 32′ 6″	4124	Elders & Fyffes, Ltd. ..	London ..	April ,,
416	,,	"Crown of Galicia"	2920	400′ 0″ × 52′ 0″ × 29′ 9″	4821	Prentice, Service and Henderson ..	Glasgow ..	Oct. ,,

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, LTD., AT LINTHOUSE—*continued.*

Yard No.	Type of Ship	Name	I.H.P.	Dimensions	Gross Tonnage	Built for	Owners' Port	Completed
417	S.S.	"Ormiston" ..	2947	400′ 0″ × 52′ 0″ × 29′ 9″	4843	R. & C. Allan	Glasgow ..	April 1907
418	S. Tug	"Victor"	797	106′ 0″ × 22′ 1″ × 11′ 0″	175	Steel & Bennie Ltd. ..	,, ..	May 1906
419	S.S.	"Cooma"	3832	330′ 0″ × 46′ 0″ × 32′ 3″	3839	Howard Smith Co. Ltd. ..	Sydney ..	Mar. 1907
420	,,	"Janeta"	2715	385′ 0″ × 50′ 0″ × 28′ 8″	4271	Maclay & McIntyre ..	Glasgow ..	Nov. 1906
421	,,	"Kazembe" ..	2914	400′ 0″ × 50′ 0″ × 29′ 10″	4658	Bucknall S.S. Line, Ltd ..	London ..	April 1907
422	T.S.S.	"Grampian" ..	7930	485′ 0″ × 60′ 3″ × 41′ 3½″	9598	Allan Line S.S. Co. Ltd. ..	Glasgow ..	Sept. ,,
423	,,	"Oceania"	3797	390′ 0″ × 50′ 0″ × 33′ 9″	5368	Fratelli Cosulich	Trieste ..	Nov. ,,
424	,,	"Wyreema" ..	6926	400′ 0″ × 54′ 2⅝″ × 33′ 3″	6338	Australasian U.S.N. Co. Ltd.	London and Sydney	Feb. 1908
425	,,	"Hesperian" ..	8199	485′ 0″ × 60′ 3″ × 41′ 3½″	9599	Allan Line S.S. Co. Ltd. ..	Glasgow ..	April ,,
426	,,	"Makura"	9603	450′ 0″ × 57′ 8½″ × 34′ 9″	8075	Union S.S. Co. of N.Z. Ltd.	London ..	Sept. ,,
427	,,	"Bruxellesville" ..	5785	400′ 0″ × 52′ 2⅝″ × 35′ 3″	5799	C. Belge Maritime du Congo	Antwerp ..	April 1909
428	,,	"Mourilyan" ..	2127	220′ 0″ × 36′ 1⅝″ × 19′ 6″	1349	Howard Smith Co. Ltd. ..	Sydney ..	Aug. 1908
429	S.S.	"Koombana" ..	3953	340′ 0″ × 48′ 2¼″ × 23′ 6″	4399	Adelaide S.S. Co. Ltd. ..	Adelaide ..	Dec. ,,
430	T.S.S.	"Hollandia" ..	5200	420′ 0″ × 54′ 2¾″ × 37′ 6″	7291	Koninklijke Hollandsche Lloyd ..	Amsterdam ..	Mar. 1909
431	Sail Racing Yacht	"Coila II"	—	6 Metre International Class	—	F. J. Stephen	Glasgow ..	May ,,
432	S.S.	"Tortuguero" ..	3790	374′ 0″ × 47′ 8½″ × 32′ 6″	4161	Elders & Fyffes, Ltd. ..	London ..	April ,,
433	,,	"Romera"	2642	401′ 10″ × 52′ 2¾″ × 29′ 10″	4949	Maclay & McIntyre ..	Glasgow ..	Aug. ,,
434	,,	"Masunda" ..	2757	401′ 10″ × 52′ 2¾″ × 29′ 10″	4952	,, ..	,, ..	Sept. ,,
435	T.S.S.	"Levuka"	7460	400 ′0″ × 55′ 0″ × 33′ 3″	6129	Australasian U.S.N. Co. Ltd.	London and Sydney	April 1910
436	,,	"Zeelandia" ..	6213	440′ 0″ × 55′ 9″ × 37′ 0″	7958	Koninklijke Hollandsche Lloyd ..	Amsterdam ..	June ,,
437	S.S.	"Damara"	2437	401′ 10″ × 52′ 2¾″ × 29′ 10″	4988	Maclay & McIntyre ..	Glasgow ..	June ,,
438	T.S.S.	"Elisabethville" ..	6400	415′ 0″ × 55′ 3″ × 36′ 6″	7034	C. Belge Maritime du Congo	Antwerp ..	Dec. ,,
439	,,	"Abhona"	8950	390′ 0″ × 50′ 2½″ × 32′ 6″	4066	British India S.N. Co. Ltd...	London ..	Nov. ,,
440	,,	"Ellenga"	7000	410′ 0″ × 52′ 6″ × 35′ 3″	5196	,, ...	,, ..	Mar. 1911
441	S.S.	"Manzanares" ..	3750	376′ 0″ × 48′ 3″ × 32′ 0″	4094	Elders & Fyffes Ltd. ..	,, ..	April ,,
442	T.S.S.	"Ellora"	7000	410′ 0″ × 52′ 6″ × 35′ 3″	5201	British India S.N. Co. Ltd...	,, ..	June ,,
443	S.S.	"Clan Macnaughton"	4750	430′ 0″ × 53′ 6″ × 37′ 0″	4985	Cayzer, Irvine & Co. Ltd. ..	Glasgow ..	Aug. ,,
444	,,	"Anchoria" ..	4200	410′ 0″ × 53′ 3″ × 32′ 6″	5430	Anchor Line	,, ..	9th Sep.,,
445	,,	"Media"	4200	410′ 0″ × 53′ 3″ × 32′ 6″	5437	,, ,, ..	,, ..	Nov. ,,
446	S.Tug	"Campaigner" ..	700	107′ 0″ × 23′ 1″ × 11′ 0″	163	Steel & Bennie Ltd. ..	,, ..	June ,,
447	T.S.S.	"El Uruguayo" ..	7400	440′ 0″ × 58′ 11″ × 38′ 0″	8361	Furness Withy & Co. Ltd...	London ..	April 1912
448	S.S.	"Mascara"	2330	402′ 0″ × 52′ 3″ × 29′ 11″	4957	Maclay & McIntyre ..	Glasgow ..	Mar. ,,
449	T.S.S.	"Aronda"	8906	390′ 0″ × 50′ 2″ × 32′ 6″	4062	British India S.N. Co. Ltd...	London ..	May ,,
450	,,	"Anversville" ..	6940	440′ 0″ × 55′ 9″ × 37′ 0″	7645	C. Belge Maritime du Congo	Antwerp ..	Aug. ,,
451	,,	"Chagres" (1st) ..	5298	400′ 0″ × 51′ 3″ × 32′ 3″	5288	Elders & Fyffes Ltd. ..	London ..	Sept. ,,
452	,,	"Canberra" ..	8269	410′ 0″ × 57′ 3″ × 33′ 3″	7707	Howard Smith Co. Ltd. ..	Sydney ..	Mar. 1913

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, LTD., AT LINTHOUSE—*continued.*

Yard No.	Type of Ship	Name	I.H.P.	Dimensions	Gross Tonnage	Built for	Owners' Port	Completed
453	T.S.S.	"Bayano" (1st) ..	6500	417′ 0″ × 53′ 3″ × 32′ 6″	5948	Elders & Fyffes Ltd. ..	London ..	June 1913
454	,,	"Gelria"	11300	540′ 0″ × 65′ 9″ × 39′ 0″	14053	Koninklijke Hollandsche Lloyd ..	Amsterdam ..	Oct. ,,
455	,,	"Tubantia" ..	,,	,, ,, ,,	14061	,, ,, ..	,, ..	Mar. 1914
456	S.S.	"Clan Macquarrie"	4050	430′ 0″ × 53′ 6″ × 37′ 0″	5060	Cayzer Irvine & Co. Ltd. ..	Glasgow ..	Nov. 1913
457	T.S.S.	"Takada"	5200	430′ 0″ × 58′ 3″ × 40′ 0″	6949	British India S.N. Co. Ltd...	London ..	Mar. 1914
458	,,	"Tanda"	,,	,, ,, ,,	6956	,, ,, ..	,, ..	May ,,
459	Twin Geared Turbine	"Tuscania" (1st) ..	12000	548′ 0″ × 66′ 6″ × 45′ 0″	14348	Anchor Line	Glasgow ..	Feb. 1915
460	S.S.	"Umaria"	2700	410′ 6″ × 52′ 3″ × 30′ 6″	5317	British India S.N. Co. Ltd...	London ..	Aug. 1914
461	,,	"Umeta"	,,	,, ,, ,,	5312	,, ,, ..	,, ..	Oct. ,,
462	,,	"Chakla"	3150	330′ 0″ × 46′ 3″ × 32′ 0″	3081	,, ,, ..	,, ..	Dec. ,,
463	T.S.S.	"Camito"	6150	425′ 0″ × 54′ 3″ × 32′ 9″	6611	Elders & Fyffes Ltd. ..	,, ..	June 1915
464	,,	"Bayano" (II) ..	6230	,, ,, ,,	6788	,, ..	,, ..	Dec. 1917
465	,,	"Vasna"	5400	390′ 0″ × 53′ 3″ × 34′ 3″	5767	British India S.N. Co. Ltd...	,, ..	June ,,
466	—	— ..	—	— — —	—	— — ..	— ..	—
467	T.S.S.	"Princesa"	7000	430′ 0″ × 61′ 3″ × 38′ 4½″	8731	Furness Withy & Co. Ltd...	London ..	July 1918
468	,,	"Nariva"	6500	430′ 0″ × 61′ 3″ × 38′ 6″	8723	Royal Mail S.P. Co. ..	,, ..	April 1920
469	,,	"Natia"	,,	,, ,, ,,	,,	,, ...	,, ..	Dec. ,,
470	T.B.D.	"Noble"	27800	265′ 0″ × 26′ 8″ × 16′ 3″	1000	British Admiralty	,, ..	Feb. 1916
471	,,	"Nizam"	,,	,, ,, ,,	,,	,, ...	,, ..	June ,,
472	,,	"Nomad"	,,	,, ,, ,,	,,	,, ...	,, ..	April ,,
473	,,	"Non Pareil" ..	,,	,, ,, ,,	,,	,, ...	,, ..	June ,,
474	T.S.S.	"Matakana" ..	5000	477′ 0″ × 63′ 0″ × 42′ 10″	8048	Shaw Savill & Albion Co.Ltd.	,, ..	Sept. 1921
475	T.B.D.	"Prince"	27800	265′ 0″ × 26′ 8″ × 16′ 3″	1000	British Admiralty	,, ..	Sept. 1916
476	,,	"Pylades"	,,	,, ,, ,,	,,	,, ...	,, ..	Nov. ,,
477	,,	"Sturgeon" ..	31000	,, ,, ,,	,,	,, ...	,, ..	Feb. 1917
478	,,	"Sceptre"	,,	,, ,, ,,	,,	,, ...	,, ..	May ,,
479	,,	"Tormentor" ..	,,	,, ,, ,,	,,	,, ...	,, ..	Aug. ,,
480	,,	"Tornado" ..	,,	,, ,, ,,	,,	,, ...	,, ..	Oct. ,,
481	,,	"Vesper"	,,	300′ 0″ × 29′ 7″ × 18′ 3″	1280	,, ...	,, ..	Feb. 1918
482	,,	"Vidette"	,,	,, ,, ,,	,,	,, ...	,, ..	April ,,
483	,,	"Voyager"	,,	300′ 0″ × 29′ 6″ × 18′ 3″	,,	,, ...	,, ..	June ,,
484	S.S.	"War Hunter" ..	3000	400′ 0″ × 52′ 0″ × 31′ 0″	5222	Shipping Controller ..	,, ..	Nov. ,,
485	,,	"War Gascon" ..	,,	,, ,, ,,	5228	,, ..	,, ..	May 1919
486	,,	"War Hussar" ..	,,	400′ 0″ × 52′ 0″ × 31′ 0″	5223	,, ..	,, ..	Aug. ,,
487	T.B.D.	"Sabre"	31000	265′ 0″ × 26′ 8″ × 16′ 3″	1000	British Admiralty	,, ..	Nov. 1918
488	,,	"Saladin"	,,	,, ,, ,,	,,	,, ...	,, ..	April 1919
489	,,	"Sardonyx" ..	,,	,, ,, ,,	,,	,, ...	,, ..	July ,,

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, LTD., AT LINTHOUSE—*continued.*

Yard No.	Type of Ship	Name	I.H.P. B.H.P.*	Dimensions	Gross Tonnage	Built for	Owners' Port	Completed
490	T.B.D.	"Saturn"	—	— — —	—	British Admiralty	London ..	*Not Completed*
491	,,	"Sycamore" ..	—	— — —	—	,, ...	,, ..	*Not Completed*
492	S.S.	"Piako"	5000	450′ 0″ × 58′ 0″ × 40′ 0″	8283	New Zealand Shipping Co. Ltd.	,, ..	Dec. 1920
493	,,	"Tortuguero" ..	4500	400′ 0″ × 51′ 0″ × 32′ 11″	5285	Elders & Fyffes, Ltd. ..	,, ..	Nov. 1921
494	T.S.S.	"California" ..	13500	500′ 0″ × 70′ 0″ × 42′ 9″	16792	Anchor Line	Glasgow ..	Aug. 1923
495	,,	"Caledonia" ..	,,	553′ 0″ × 70′ 5″ × 38′ 9″	17046	,, ...	,, ..	Sept. 1925
496	,,	"Mulbera" ..	4000	465′ 0″ × 59′ 9″ × 36′ 0″	9200	British India S.N. Co. Ltd...	London ..	June 1922
497	Motor-Ship	"Dalgoma"	3160	430′ 0″ × 54′ 6″ × 32′ 4″	5953	,, ,, ..	,, ..	May 1923
498	S.S.	"Famaka"	3150	390′ 0″ × 55′ 0″ × 30′ 0″	5815	Khedivial Mail Steamship Co. Ltd.	London and Alexandria ..	Dec. 1922
499	,,	"Fezara"	,,	390′ 0″ × 55′ 0″ × 30′ 0″	5809	,, ..	,, ..	Feb. 1923
500	Sail Racing Yacht	"Coila III" ..	—	6-metre International Class	—	Fred J. Stephen	Glasgow ..	May 1922
501	T.S.S.	"Cavina"	4700	425′ 0″ × 54′ 6″ × 32′ 9″	6908	Elders & Fyffes Ltd. ..	London ..	May 1924
502	S.S.	"Toward"	1770	270′ 0″ × 37′ 0″ × 18′ 6″	1571	Clyde Shipping Co. Ltd. ..	Glasgow ..	July 1923
503	,,	"Bulan"	850	220′ 0″ × 35′ 0″ × 15′ 0″	1048	P. & O. S.N. Co.	London ..	June 1924
504	T.S.S.	"Chitral"	11000	525′ 0″ × 70′ 0″ × 46′ 0″	14997	,, ...	,, ..	June 1925
505	S.S.	"The Cable" ..	1250	228′ 0″ × 35′ 3″ × 24′ 3″	1534	Eastern Extension, Australasia & China Telegraph Co. Ltd.	,, ..	Oct. 1924
506	,,	"Induna"	1800	402′ 0″ × 52′ 0″ × 29′ 10″	5086	Maclay & McIntyre Ltd. ..	Glasgow ..	May 1925
507	T.S.S.	"Ariguani" ..	6200	425′ 3″ × 54′ 0″ × 30′ 3″	6745	Elders & Fyffes, Ltd. ..	London ..	Feb. 1926
508	S.S.	"Britannia" ..	5400	460′ 0″ × 59′ 0″ × 29′ 6″	8463	Anchor Line	Glasgow ..	Mar. ,,
509	Tug	"Forceful"	1000	115′ 0″ × 27′ 2″ × 13′ 4″	288	Australasian U.S.N. Co. Ltd.	London and Sydney ..	Dec. 1925
510	S.S.	"Tucurinca" ..	3750	400′ 0″ × 51′ 0″ × 33′ 0″	5411	Elders & Fyffes Ltd. ..	London ..	Mar. 1926
511	Yacht	"Mingary" ..	400*	116′ 3″ × 20′ 6″ × 10′ 25″	222	Kenneth Clark	Ardnamurchan	June ,,
512	,,	"Vadura"	30*	65′ 0″ × 19′ 4″ × 13′ 3″	40	J. H. Maurice Clark ..	Glasgow ..	May ,,
513	S.S.	"Chagres" (2nd) ..	3750	400′ 0″ × 51′ 0″ × 33′ 0″	5406	Elders & Fyffes Ltd. ..	London ..	Feb. 1928
514	S.S.	"Telde"	2400	300′ 0″ × 44′ 0″ × 25′ 0″	2519	,, ,, ...	,, ..	June 1927
515	,,	"Orotava"	,,	,, ,, ,,	2518	,, ,, ...	,, ..	July ,,
516	Sail Racing Yacht	"Coila IV" ..		8 Metre International Class	—	F. J. Stephen	Glasgow ..	May ,,
517	Oil Tanker	"Victolite"	3300*	510′ 0″ × 68′ 0″ × 38′ 0″	11410	Imperial Oil Ltd.	Toronto ..	Mar. 1928
518	,,	"Vancolite" ..	,,	,, ,, ,,	11403	,, ...	,, ..	May ,,

SHIPS BUILT BY ALEXANDER STEPHEN & SONS, LTD., AT LINTHOUSE—*continued.*

Yard No.	Type of Ship	Name	I.H.P. B.H.P.*	Dimensions	Gross Tonnage	Built for	Owners' Port	Completed
519	T.S.S. Turbo-Electric	"Viceroy of India"	17000*	612'0a × 76' 0" × 45' 6"	19648	P. & O. S. N. Co.	London	Mar. 1929
520	S.S.	"Taif"	900	236' 0" × 39' 3" × 25' 6"	1590	Khedivial Mail Steamship Co. Ltd.	"	June 1928
521	"	"Talodi"	"	" " "	1585	"	"	June "
522	"	"Jumna"	2400	423' 6" × 55' 9" × 31' 4"	6078	James Nourse, Ltd.	"	April 1929
523	"	"Nicoya" (2nd)	3750	400' 0" × 51' 0" × 33' 0"	5363	Elders & Fyffes Ltd.	"	Mar. "
524	"	"Masunda"	2400	402' 0" × 54' 9" × 31' 0	5250	Maclay & McIntyre, Ltd.	Glasgow	Aug. "
525	T.S.S.	"St. Patrick"	5500*	280' 0" × 41' 0" × 17' 0"	1922	Great Western Railway Co.	London	Mar. 1930
526	Tug	"Carlock"	1000	121' 6" × 27' 0" × 14' 2"	300	Australasian U.S.N. Co. Ltd.	London and Sydney	Oct. 1929
527	Yacht	"Rover"	3000	265' 0" × 40' 0" × 23' 1"	1851	Earl of Inchcape	Glenapp Castle	July 1930
528	S.S.	"Corrales"	3750	400' 0" × 51' 0" × 33' 0"	5362	Elders & Fyffes, Ltd.	London	Mar. "
529	T.S.S.	"Kenya"	10000*	470' 0" × 64' 0" × 41' 0"	9890	British India S.N. Co. Ltd.	"	Dec. "
530	"	"Karanja"	"	" " "	9891	"	"	Mar. 1931
531	Motor Ship	"Orari"	9000*	470' 0" × 67' 0" × 40' 0"	10106	New Zealand Shipping Co. [Ltd.	"	Feb. "
532	"	"Opawa"	"	" " "	10107	"	"	April "
533	Yacht	"Golden Hind"	60/80*	72' 0" × 20' 0" × 16' 2"	82	Commander Kitson	Loch Hourn	April "
534	T.S.S.	"Corfu"	14000*	518' 6" × 71' 0" × 46' 0"	14293	P. & O. S.N. Co.	London	Sept. "
535	"	"Carthage"	"	" " "	14305	"	"	Nov. "
536	Sail Racing Yacht	"Maida"	—	6 Metre International Class	—	J. G. Stephen and others	Glasgow	April 1932
537	S.S.	"Gazcon"	2200	394' 0" × 52' 10" × 34' 0½"	4130	Cie De Navigation d'Orbigny	Paris	April "