SIR ALFRED YARROW, THE SHIPBUILDER

Read by Sir Alan Yarrow

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My Great Grandfather SIR ALFRED FERNANDEZ YARROW was born in London on 13th January 1842.

Alfred was educated, first, at a school at Holloway, then at Reigate, and finally at University College School. He was a very bright child, sensitive, inquisitive and inventive. His parents were going through very difficult financial times, so he went out to work rather than pursue further academic education.

At the age of fifteen he was apprenticed with the firm Ravenhill, whose business consisted almost entirely of the construction of marine engines for naval vessels.[1]

He was naturally inquisitive and attended every scientific lecture he could, and in the process became acquainted with Professor Faraday, for whom he had the highest regard. He, along with his close friend Walter Rutt, invented the first private electric telegraph, much to the consternation of their neighbours. Recognised in the Daily News 2nd August 1857.

In 1859, when eighteen, he, with Rutt, James Hilditch and a few others, founded a society - the Civil and Mechanical Engineers' Society - for the reading and discussion of papers on engineering and kindred subjects. The Society met in Stepney, and later in Cheapside.

On the completion of his apprenticeship, Yarrow, who was then twenty-one years of age, was looking for work. An offer was made by his employers, Ravenhill, of a post in their drawing-office at £100 a year, which he turned down.

The young man was at the time receiving small sums in royalties, payments for drawings and designs, in fees for inspections, and his main ambition was to obtain sufficient capital to launch his inventions and to open a small workshop in which he could execute any orders.

At a time when he did not know in which direction to look for financial resources, he quite unexpectedly received a present of £200 from a maiden aunt and a further contribution - even more unlooked for - of £200 from a black planter in the West Indies, who had been acquainted with his father in Jamaica, to help get him started.

1. In those days apprentices were allowed, unofficially, in their own time, to work out of hours on their own projects. Whilst there, young Yarrow further extended his experience by spending his Saturday afternoons at the establishment of a jobbing engineer-smith, since the apprentices at Ravenhill's were not allowed to enter their smiths' shop.

Mr. Ellis, an insurance underwriter, whose lectures he had attended, also unexpectedly came forward with an offer of £1000, or, if that were not enough, £2000 to help to start the workshop. Although the last generous offer was not taken, it was most gratefully acknowledged, and it materially assisted in stimulating Alfred's efforts.

About the same time, too, Messrs. Coleman, agricultural engineers, of Chelmsford, determined to take up the manufacture and sale of a steam plough which had been patented by Yarrow in conjunction with his friend Hilditch. The Chelmsford firm opened an office in London and agreed to pay Yarrow a salary of £100 a year for looking after it. The royalties on the plough patent amounted in a few years to some £600, which the inventors divided between them.

About that time, he, again in collaboration with Hilditch, designed and patented a steam carriage for use on the road. The invention was taken up by a Mr T W Cowan, of Greenwich, who agreed to pay a royalty on the vehicles.

One was built and ran between Greenwich and Bromley - a distance of ten miles - once a week, late in the evening. This steam carriage was shown at the International Exhibition of 1862, where it attracted a good deal of attention. It did not, however, receive any award for the somewhat peculiar reason that, the jury deputed to deal with engines considered the exhibit to be a Carriage, while the jury which had to do with carriages regarded it as an Engine! The vehicle therefore fell between two stools, though both juries wrote to Yarrow and Hilditch stating that they had closely inspected the carriage and that if it had come within their range they would certainly have made an award in its favour.[2]

Unfortunately, on one occasion the carriage when doing about 25mph met a mounted policeman. The horse took fright and the policeman was thrown to the ground, breaking his leg. This led to the Bill of Parliament forbidding the use of steam on the roads unless preceded by a man carrying a red flag.

At the end of two years in charge of Coleman's London office, Yarrow found himself in possession of a capital of about £1,000, and he felt that the time had come when he could safely set up in business for himself. For this purpose, he entered into partnership with a Mr. Hedley. A small works on the Folly Wall was acquired, in the Isle of Dogs, right next to the London Museum today, consisting of a couple of old cottages and a few broken-down sheds.[3]

2. That, however, was cold comfort, and, on the whole, the attempt to introduce self-propelled steam vehicles on common roadways may be looked upon as one of Yarrow's few failures.
3. A few shipbuilding tools, which had been the property of a former tenant, were rented and put in working order and a small machine shop was built.

For the first year or so only a few small orders were booked. So far from its being entirely confined to the repair of river craft, as had been intended, it comprised such diverse things as the construction of a thief-proof door; the making and fitting of some overhead travelling pans in a sugar factory; an apparatus for roasting coffee and some match-making machinery. That first year was a period of great anxiety. During it, and for some time thereafter, Yarrow himself made all the drawings, kept the books, paid the wages, and looked about for orders, while Hedley's business was to oversee the workshop.

The second year was even more unprofitable than the first. With the object of extending the scope of their operations, the two members of the firm endeavoured to secure work on a larger scale. The result was disastrous, for at the end of the year their books showed a deficit of £2,000. Yarrow's father wanted him to give in and go through the Bankruptcy Court, but his mother, who had unbounded faith in him, encouraged him to go on.

The time was a turning point in the firm's career. While still at Ravenhill's, Yarrow and Hilditch had built a small steam launch called the "Isis" which had proved a source of great enjoyment, and, at the same time looking to find something which might result in profit, Yarrow suddenly had the idea that the building of small steam launches for use on the river might be a good one.

He accordingly inserted an advertisement in the papers and received an order from a Colonel Halpin for a 24ft. steam launch with a cabin to accommodate four passengers. The price was to be £145, and the boat, which took three months to build, actually cost £200….. not a great start.

However, the little craft was a great success. At the end of the summer, Yarrow bought her back for £100 and sold her the same day for £200. At the end of the next summer he again purchased her for £100 and sold her for £300 to a Russian who took her to St. Petersburg.[4]

For seven years after the first launch, the building of similar craft continued without a pause, and the initial mistake of the costs was not made again. Up to the end of 1875 no fewer than 350 steam launches were built.

4. Thus, although the boat was built at a loss, the firm did well, after all. In fact, if the original loss had not been made good, her construction would have been well worthwhile, for she proved to be the foundation on which was erected one of the most extensive and noteworthy businesses concerned with the design and building of fast steamships of all types - particularly torpedo craft and vessels for pioneer and general navigation on shallow rivers - that the world has known.

[5]In addition to steam launches for river and similar navigation, the building of special craft for particular services was undertaken. Among the first, of them was the "Ilala" designed for plying on lake Nyassa and among the sandbanks and rocks of the Zambesi, for use in the suppression of the slave trade in East Africa.[6]

The little boat was a great success and was followed by the "Pioneer," the "Adventure," and the "Dove" which were ordered by the British Admiralty. The last-named was propelled by side paddle-wheels and only drew 8in. of water and may be regarded as the ancestor of a long line of a variety of special vessels, particularly those for navigation on rivers abounding in shoals and rapids which were designed and built by Yarrow at various periods, some of which had stern wheels, and some side wheels.

Later, in 1883, he designed and built to the order of the King of the Belgians, who had acquired the services of Mr. Stanley to explore the Congo, a special vessel for that purpose. The boat was made in sections, which were themselves floating and which, while afloat, could be joined together by bolts and nuts so as to form a complete vessel. When it was needed to transport the sections over land, wheels were passed under and attached to each section while it was afloat, so that the sections were transformed into wagons which could be drawn along.[7]

At an earlier period of Yarrow's history - namely in March, 1874 - "Chinese Gordon," before proceeding on his first mission to Khartoum, asked him to call on him so that he "might obtain the fullest particulars as to the type of vessel which might prove most useful on the Nile." In view of the prevalence of the masses of floating vegetation or "sudds" in that river, Yarrow came to the conclusion that screw propulsion was out of the question, and decided to adopt a stern wheel, and he produced a design of boat which could be shipped in sections, each of which was light enough to be carried on a camel's back.[8]

The vessels were made, sent out to Khartoum, and put together on the banks of the Nile. They were subsequently used in the defence of Khartoum and were sent down the Nile to meet the relief expedition under Lord Wolseley. They also built the two gunboats "Sultan" and "Sheik", used by Lord Kitchener in 1897 in the relief of Khartoum.

5. Just prior to his first marriage in 1875, it had become evident to Yarrow that his partnership with Hedley didn't work as smoothly as he wished, and the partnership was dissolved.
6. It was necessary that the vessel should be seaworthy and capable of steaming against a swift current, and that she should be built of light sections which could be disconnected at will and carried many miles through forests when rapids were encountered.
7. "Le Congo" as the vessel was called, which was propelled by a stern wheel, was a great success.
8. Nothing further was heard of the matter for many months, and then the Governor of the Equatorial Provinces was commissioned by Gordon to order from Yarrow four steamers which should be built to the designs submitted.

It would be impossible in such a talk to refer to every one of the other numerous and varied craft which were designed and constructed by Yarrow during his long career. Reference should, however, be made to the stern-wheeler which was built for the King of Burma in 1876; (over 27 boats were ultimately made for the Irrawaddy Flotilla Company) to the early battery-operated electric launch which was built in collaboration with Messrs Siemens in 1883; and to the shallow-draught gunboats "Mosquito" and "Herald" built for service on the Zambesi, which were delivered in the short space of twenty-five days from the receipt of the order.[9]

The types of high-speed vessels with which the name of Yarrow is more particularly identified by the general public, however, are torpedo-boats and destroyers - to give them their shortened title.

The firm's connection with torpedoes began in the year 1873, when Yarrow mounted a torpedo spar on one of his fast launches.

The first launches specially designed by him to carry torpedoes were ordered by the Argentine Government. That was the beginning, and during the two years 1877 and 1879 orders were received for torpedo craft from the Argentine, Austrian, Chilian, Dutch, French, Greek, Italian, Russian, and Spanish Governments.

The first Yarrow torpedo-boat to be ordered by the British Government was known as the "Admiralty Sample Boat." A similar order was given to any firm which was considered to possess a reasonable prospect of carrying out the work successfully. Each firm had to guarantee under penalty a speed of 18 knots. The Yarrow boat attained a speed of 21.9 knots, which is said to have been 3 knots in excess of the highest speed attained by any competitive vessel tested under the same conditions.

In 1877 the Russian Government ordered two torpedo boats from Messrs. Yarrow, but, in consequence of the outbreak of the Russo-Turkish War, these vessels were not allowed to leave this country and were acquired by the British Admiralty. The terms of payment stipulated for a heavy penalty if a speed of 18 knots was not reached. Yarrow agreed, only if it was a two way deal and a similar premium was granted for anything above that speed being achieved. Actually, the two vessels made 20.8 and 20.6 knots respectively, and the Admiralty had to pay £1,900 in excess of the price.

9. As a change from steam propulsion it may be recorded that a small yacht built by Yarrow and driven by internal combustion engines figured prominently on the Solent during Cowes Week in August, 1906. This little vessel had a flat bottom and developed a high speed of travel.

These two boats figured at a review of the Fleet held in the Solent in 1878, when they created a sensation. Commenting on the matter at the time, *The Times* remarked: "One of the features of the Review was the performance of two long, double-funnel torpedo-boats built by Yarrow, which have realised the extraordinary speed of 21 knots. The manner in which these malevolent-looking craft rushed up and down the lines and round the ships was the astonishment of all beholders."

These two little vessels, which Queen Victoria, who had seen operate, declared had her interest more than anything else at the Review, were instrumental in first bringing Yarrow's name prominently before the public. By this stage, one hundred torpedo-boats had been built in Russia to Yarrow's designs

In the spring of 1892 Yarrow, having paid a visit to some of the French shipyards, where he had seen some exceptionally fast torpedo-boats under construction, called at the British Admiralty to lay certain facts before Admiral Sir John (Jack) Fisher, and to offer to build boats which would he superior to those of the French.[10]

The new craft were to be designated "Destroyers," their purpose being to chase and destroy torpedo-boats, their speed being greater, and their armament heavier.

Yarrow was confident that even the high speeds reached by these vessels could be improved upon if only material of a higher tensile strength than mild steel were to be used in the construction of the hull. He accordingly obtained from the Russian Government an order to build a vessel - to be known as the "Sokol" - which he guaranteed should reach a speed of 30 knots. The material which he used for the hull was a nickel steel which had a tensile strength of 35 tons per square inch, as compared with the 28 tons of mild steel.[11]

Of note, over ten vessels were made for the Japanese Government between 1895 and 1905 (out of a total of over 20), including the Sazanami which took the surrender of the Russian fleet at Port Arthur. Admiral Yamamoto sent a personal telegram to Alfred saying his destroyers did "excellent service during the war and were in good condition".

10. He was asked to make a report on the subject, and as a result suggested the construction of boats 180ft. long by 18ft. beam and having engines of 4,000 H.P.

11. Yarrow began his investigations into water-tube boilers in 1877, but it was ten years later before he put one of his boilers in a torpedo-boat, and another five years went by before, as we have seen, there was a Yarrow boiler in the British Navy. The Yarrow boiler proved to be a great success and it was soon adopted by the navies of several countries.

Yarrow began seriously to consider the transfer of his works on the Thames to some other locality. Economic conditions in the Isle of Dogs were making it increasingly difficult to carry on business there. He felt, however, that it would be a severe wrench to tear himself away from a spot which he had occupied for so long, and from works which he had seen grow from quite small beginnings.

It was ultimately decided to transfer the works "lock, stock and barrel" to the Clyde. Everything went by rail. Shipbuilding was started on the Clyde within a few months and, concurrently, the construction of machinery was carried on at Poplar until the last moment. The first contract for the Scotstoun yard was signed on February 24th, 1906, and the first destroyer was launched on July 14th, 1908.

Towards the end of 1913, when he was seventy-two years of age, Yarrow left Scotland to reside in the South of England, and thus ceased to be in personal touch with the works. He continued, however, to retain control of the firm's operations, leaving his eldest son, Harold in full charge.[12]

Then, in August of the following year, came the Great War, and Yarrow, with apparently renewed youth and vigour, plunged into all the work which was possible for him to do.

Just before the outbreak of war, Yarrow had approached the then First Lord of the Admiralty - Mr. Winston Churchill - and promised, if an order for three destroyers were given to him, that they would be the fastest ships afloat.

Later the "Tyrian," which would steam 1,000 knots (1,150 miles) distance without refueling, reached 40 knots (46 mph) speed when fully equipped. In addition to the destroyers, several other vessels of quite a different type were produced. No less than 29 destroyers, 16 gunboats, 1 submarine, 3 hospital ships and 1 floating workshop, left the Scotstoun yard during the war period. 27 of the destroyers for the British Navy, one for Japan, and one for Italy.

12. He considered it impossible completely to retire at a period when he felt so full of life and energy. He went on a journey through Canada with his other son, Norman, which resulted in the founding of a branch establishment of Yarrow in British Columbia, of which Norman Yarrow was in charge.

The construction of warships, however, by no means represented all that Sir Alfred did or devised during the war period. For example, he converted the Convalescent Home for Children at Broadstairs - about which we speak later - into a well-equipped military hospital; made several inventions of use to the Forces in the trenches; undertook the manufacture of artificial limbs and invented lifejackets, camouflage screens and many other useful things.[13]

Having during the course of his long and successful business career created a fortune of some size, Sir Alfred set about distributing it during his lifetime, and no talk would be complete without some reference to his philanthropy. He always bore in mind a saying of his friend, the late Canon Barnett, namely, that *it was difficult to make money honestly, but far more difficult to spend it wisely*.[14]

Every engineer, for example, has heard of the Convalescent Home for Children which he founded at Broadstairs. There is a photo of Barnardo, Lord Mayor Treloar and himself sitting on a bench at the time of its opening.

This Home, which was intended for the reception of some 100 children, the sons and daughters of people who might be unable to afford the full expense of a stay at the seaside, so necessary for recovery after TB or an operation.

Again, he gave to the London Hospital a sum of £25,000.[15]

Further, the sum of £20,000 was in 1908 given to the same hospital to found a research fund. When the firm migrated to Scotland he gave £24,000 to be used partly in adding to the Nurses' Training Home at Govan and partly in grants for establishing such nurses in the isolated Highlands and islands of Scotland.

He also financed and liberally endowed a Girls' School at Chislehurst. After a visit to Girton College, Cambridge, he decided that a debt of £24,000, which had been incurred by that institution, must he paid off, and offered, anonymously, that if £12,000 could be collected in three months, to make up the balance. The sum was duly subscribed. He also gave a further £10,000 to the College to aid students in research work.

13. We have already referred to Sir Alfred's belief in research work, and a tangible example of his desire to assist it financially was the experimental tank at Bushey, which he gave the funds to build, because he couldn't persuade his fellow shipbuilders to participate. Deeming it hopeless to look for assistance from those directions or from the Government, he decided to finance the proposal himself and ultimately made to the Royal Society an offer to build a tank at an estimated cost of £20,000, provided that a similar amount, sufficient to cover the working expenses for ten years, was guaranteed. The offer was accepted and the National Physical Laboratory at Teddington was chosen as a suitable place for the tank, which was opened on July 5th, 1911. There is no need for me stress the enormous value to the industry as a consequence of this decision.
14. It would be impossible, of course, to put on record all the examples of generosity that he showed during his lifetime; some of them never became known, but some of them were world-famous.
15. On condition that a sufficient sum should be subscribed in addition to that amount to build and equip an out-patients' department, and the building was opened by the late King Edward in 1903.

A much larger gift was the £100,000 presented in 1923 to the Royal Society - of which he had been made Fellow in 1922 - the income to be used to pay for Chairs for research, so that their entire time might be available for their investigations.

He gave a convalescent home on the Isle of Dogs for the benefit of children; residences for soldiers' widows in Hampstead Garden Suburb (the Barnett Homestead, Erskine Hill) a school, Bearwood College.[16]

In the foregoing brief summary of the life story of Sir Alfred Yarrow much has been left out. It has been impossible, for instance, to review his feelings - and he had them! - regarding education, especially the education of young engineers, which were of a clearly defined character, and in which he was by no means always in agreement with other educationalists.

Nor has space permitted the giving of an account of his feelings for, and treatment of, his loyal employees, of his attitude during the engineers' strike of 1897, nor of the campaign to disseminate propaganda in neutral countries during the war.

I have, I hope, said enough to give some idea of the general direction, taken by the numerous activities of this very remarkable man, in which he was engaged throughout the whole of a lifetime that extended far beyond the usual limit. He was created a baronet in 1916.

Admiral Lord Fisher in his memoirs said "Sir Alfred Yarrow, I select for mention, for without him Mesopotamia would have been a bigger crime than it was. He did this with his astounding push, and without regard to red tape, thanks or recognition. Sir Alfred <u>should</u> have been made a Duke and I wrote to Sir John Jellicoe and told him so. The history of the Flotillas of light-draught gunboats built both for Mesopotamia and the Danube will ever be associated with the good service done by Sir Alfred Yarrow for which he was **only** made a baronet."

He reached the age of ninety years at the time of his death on January 24th 1932

Today's value of his donations is well over £85 million.[17]

16. Finally, reference may be made to the £20,000 which he presented in 1926 to the British Association, the capital sum and the interest on it to be devoted to the advancement of science, a condition being that the amount should be exhausted by yearly payments spread over a period of 20 years.
17. My thanks to Elanor Barnes, to her book, "Alfred Yarrow: His Life and Work" (Arnold). I am indebted for much of the information given in this memoir, to the Royal Institute of Naval Architects, The Memoirs of Admiral Lord Fisher and many other sources.