H.M.S. 'BASILISK'

(1848–1882)

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The Ship

Passing through the gates of the Portland Naval Base, one comes face to face with the figurehead of an old naval vessel. Hurrying by, few people ever seem to notice it despite its immaculate condition, and probably even fewer ever pause to contemplate the little bit of naval history that this beautifully carved piece of ship adornment bears witness to today.

For many years, wooden ships had carried figureheads on their stems just below the bowsprit, the practice continuing in the iron and steel ships of the Royal Navy until the *Warrior* and *Black Prince* of 1860-1 and finally the *Rodney* of 1884. H.M.S. *Basilisk*, the subject of this article, was no exception.

It is recorded that the ship was launched at the old Woolwich Dockyard on the 22nd August 1848, although *The Times* for 25th August that year stated that the launch 'will take place at 11 a.m. tomorrow (Saturday 26th August 1848)—the birthday of H.R.H. Prince Albert'. According to the dictionary, a basilisk could be either a fabulous creature about a foot long with black and yellow skin and fiery death-dealing eyes and breath; or an ancient brass cannon reputed to throw a shot of some 200 pounds weight. The ship in question was the seventh naval vessel to carry this name, the first dating back to 1695.

By builders measurement, she had a tonnage of 1031, a burthen (akin to the nett registered tonnage of today) of 1001 tons; was 190 feet long between perpendiculars; had a breadth of 33 feet (57 including paddle boxes); and a depth of hold of 21 feet 6 inches. Enjoying the benefits of both sail and steam she displaced 1473·4 tons at her mean load draught of 15 feet 6 inches.

Often accused, perhaps a little unfairly, of being rather conservative in their approach to innovation and change, the Admiralty accepted mechanical

FIG. 1—THE FIGUREHEAD OF H.M.S. 'BASILISK'

propulsion with some reserve and steam remained very much subordinate to sail for many years; in fact, sail was not completely ousted from the fighting ship until the 1870's. In the early days, steam warships were usually referred to as H.M. steam vessels and were not commissioned as H.M. ships until the end of 1827. They were often used to tow the conventional sailing ship in and out of harbour in times of calm or adverse wind, and the engines were used only when it was not possible to sail.

The paddle wheel was the first form of mechanical propulsion for ships and it held pride of place until superseded by the screw propeller. By 1840 the paddler was splashing its way along the Pacific coast of South America collecting mails from the isthmus of Panama for delivery to Valparaiso. In 1844 P & O were operating to India and China and, about the time that the *Basilisk* was launched, two Cunarders were running a twice-monthly service across the Atlantic in summer and once a month in winter. Although giving full credit to the little paddle steamer for its pioneering role, one is bound to concede with hindsight that this type of vessel was totally unsuited to deep-sea service. Many such ships vanished on passage without trace: some turned turtle or were shipwrecked; others were lost through fire.

Mechanical Propulsion

The ship was fitted with oscillating-cylinder steam engines by Miller and Ravenhill, a firm noted for the excellence of its machinery. Starting up in business as Miller and Barnes at Glasshouse Fields, Ratcliffe (Tower Hamlets) in 1822, they had achieved sufficient fame by 1835 to be approved, along

with the Millwall firm of Seaward and Capel and John Penn of Greenwich, as engine builders to the Royal Navy. Before this date, all naval engines were made by Maudslay, Sons and Field of Lambeth. In the same year, however, Barnes left the business and it continued as Miller and Ravenhill which firm, in 1839, also began building ships at Orchard Place, Blackwall, on the promontory between the Thames and Bow Creek.

When the *Archimedes,* a pioneer screw-driven vessel, broke an engine crank in 1839, she was taken to Miller and Ravenhill for a complete overhaul and for modifications to the propeller. The first oscillating paddle engines built at Ratcliffe were those for the *Basilisk*; one can visualize the monumental task of moving such a heavy piece of machinery from the factory to the river by road, and then bringing the partly completed vessel from Woolwich Dockyard up the London river for them to be lowered in by shear-legs. Although many other paddle engines of comparatively small proportions had been built at Ratcliffe before that time, after 1848 the firm built much larger engines, including oscillating paddle engines of 4751 i.h.p. for the 18-knot Irish packet steamer *Leinster* in 1860 and the 1610 i.h.p. engines for H.M.S. *Helicon* in 1865. After the *Basilisk's* engines, the next to come from the factory was a direct-acting screw engine for H.M.S. *Archer* in 1849 and many such screw engines were produced there for the Navy from then until 1867.

Joseph Miller retired in 1852 and in 1855 the business (then Ravenhill and Salkeld) began trading at Newcastle-on-Tyne, while the London end of the firm continued producing marine engines. It is of interest to note that Alfred Yarrow, a name later to become synonymous with the three-drum water-tube boiler, served his apprenticeship with this firm.

A century ago, the banks of the Thames were virtually bristling with shipyards and marine engine builders. Unfortunately, their technical merit was not always matched by their business acumen; often contracts were taken on at prices which were totally unrealistic. Added to this, ships began to outgrow the river and many concerns declined, some to rally again before finally foundering. In 1872 while trading under the name of Ravenhill, Hodgson and Company, the business closed down having played a most commendable role in the development of the marine steam engine.

The paddle wheel had made its appearance about the beginning of the nineteenth century, and mechanical propulsion by 1820 had made sufficient impact in maritime circles to guarantee itself a future—in spite of fierce opposition from the supporters of sail. About 1850, the screw propeller began to supersede the paddle wheel; it was the activities connected with the slow transition from paddle to screw that helped to put *Basilisk* in the annals of naval history.

Basilisk's engines were of 400 nominal horsepower, though at full power they indicated 1033 h.p., with a cylinder bore of 6 feet 2 inches and a stroke of 6 feet. The 8 p.s.i. boiler pressure was maintained for a coal consumption of a little under 50 tons per day. The paddle wheels were 21 feet 9 inches in diameter and the floats on them were 9 feet 6 inches long and 2 feet 3 inches wide. When on passage under sail alone, it was the practice in these early vessels to remove several of the bottom floats from each wheel to avoid impeding progress leaving only the iron frame to trail in the water. In later years, the hoisting propeller was introduced into service for similar reasons. The paddle boxes themselves were not viewed with much favour in the nineteenth century naval scene, largely because they took up a substantial portion of the ship's side to the exclusion of guns. Also, the large sections of the boxes that projected up above the upper deck were something of an inconvenience for working sails; it is therefore reasonable to suppose that the advent of the screw propeller was greeted with some

alacrity by the Admiralty, since it promised to restore the full broadside once more and heralded a return to a clear upper deck for sailing.

The Oscillating-cylinder Steam Engine

The idea of a steam engine with an oscillating cylinder was originally introduced by William Murdock in 1785. Murdock, who was employed by Boulton and Watt for many years, constructed a wooden model of an engine employing this principle at their Soho factory at Birmingham; it does not appear, however, that he proceeded any further with the idea. FIG. 2 shows what is believed to be the actual model; it was loaned to the South Kensington Science Museum in 1894 by William Murdock of Abergavenny, the great-grandson of the inventor. The model has a $1\frac{1}{2}$-in. bore cylinder and two 'A' frames supporting the crankshaft which has at one end a flywheel a little over 12 inches in diameter and at the other end has an overhanging crank with a 2-in. throw. As Murdock is known to have used compressed air as a source of power, it is likely that he used this means for driving his model. Although the cylinder is carried by two centrally-positioned trunnions, only one was used to conduct the air into the cylinder via a long piston valve of square section. A feature of interest is the use of an eccentric on the crankshaft to drive a pump—fifteen years before it came to be used on a full-size engine.

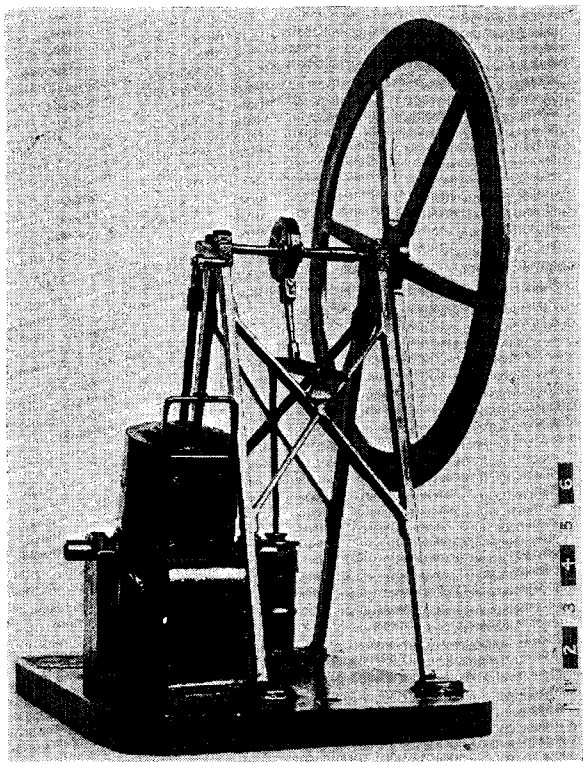

FIG. 2—MODEL OF THE MURDOCK OSCILLATING ENGINE 1785

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It appears to have been left to Shropshire-born Aaron Manby to take out a patent in 1821 for an oscillating engine. This, of 80 h.p., he installed in a vessel which bore his name and was tried on the Thames before being steamed to Paris—the first iron ship to make a sea voyage—where it remained in service to within six years of the launching of *Basilisk*. In 1827 while working in his father's Lambeth factory, Joseph Maudslay patented a similar type of engine in which the slide valves were worked by eccentrics. This engine, a model of which is shown in FIG. 3, was of 20 h.p. and was fitted in the steamer *Endeavour* which plied on the Thames until 1840.

However, as developed at this time, the engine became subject to a good deal of prejudice, largely because some engineers were suspicious of such large moving engine parts; it was therefore practically abandoned until improved upon and re-introduced by the Greenwich engineer John Penn round about 1836. Penn senior and his sixteen year old son John were able to board the *Aaron Manby* when it was assembled in 1822 at Deptford and it is likely that their examination of the engines then fired their imagination and led them to make their improvements. Penn junior, a Fellow of the Royal Society, founder member of the (Royal) Institution of Naval Architects,

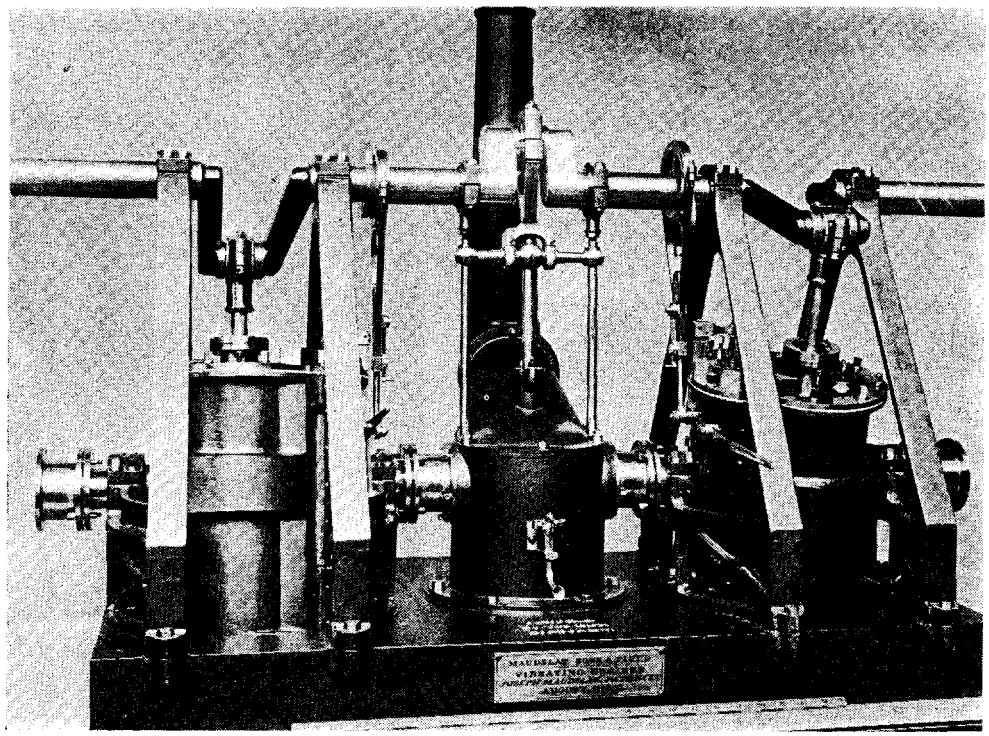

FIG. 3—MODEL OF THE MAUDSLAY OSCILLATING ENGINE 1827
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Member of the Institution of Civil Engineers and a President of the Institution of Mechanical Engineers (the Institute of Marine Engineers was not formed until 1899), was a brilliant engineer and, under his stewardship, the firm at the height of its success employed some 1700 men at Greenwich and the Deptford boiler works, building hundreds of sets of main engines and boilers for the Royal Navy and for the British and many foreign merchant fleets. Fortunately at least one example of his particular oscillating engine has been preserved for posterity. This, from the iron paddle steamer *Empress* built by Samuda Brothers in 1879 for the Weymouth firm of Cosens and Company, is now displayed in the Southampton Maritime Museum, having been restored in 1967–8 by cadets of the Marine Engineering department of the Southampton College of Technology under the direction of Mr. R. N. Cook, M.I.MAR.E. This wonderful vessel was in service for some 76 years. Her engines of 52 nominal horse-power had a cylinder bore of 30 inches, a stroke of 33 inches and at 26 r.p.m. with a boiler pressure of 25 p.s.i. gave the ship a speed of 11 knots.

Captain Joseph Cosens began to pioneer the paddle steamer in Dorset three years before the *Basilisk* was launched. In fact, a month before the launching and before the railway reached the island, a four-times-a-day service was started between Weymouth and Portland for a fare of as little as three pence (3d). In the following year, on the 25th July 1849, Prince Albert came to the Naval Base and laid the foundation stone of the Portland Harbour breakwater at a spot immediately outside what is today the Distilling Experimental Station. One can visualize the Portlander at that time trudging down from Tophill and picking his way across the rail tracks of Merchants Incline, with its constant traffic of quarry stone for Castletown Pier and the new breakwater project, to board the paddler *Highland Maid* and thus avoid the laborious journey across the rough tracks of Chesil Beach and the small mouth of Ferrybridge. The Cosens company, whose staff are often to be found in the Naval Base today carrying out repairs to vessels of

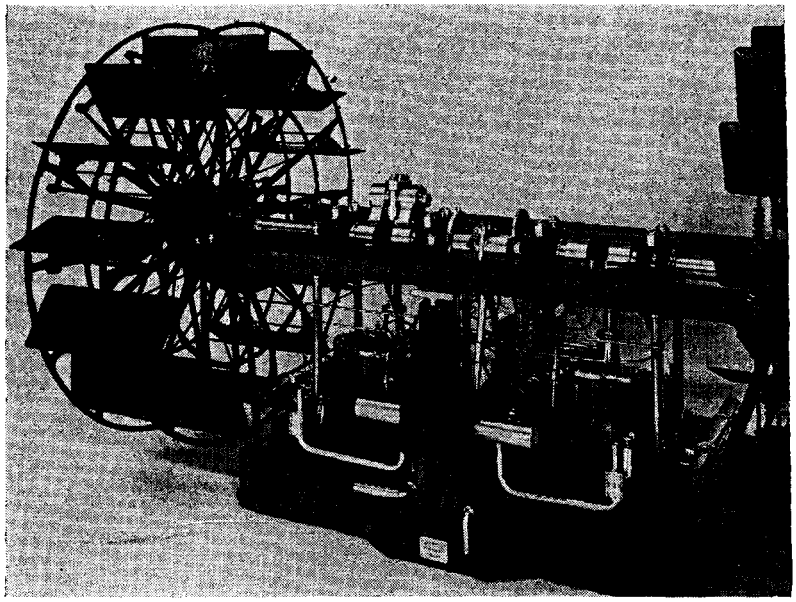

FIG. 4—MODEL OF THE RAVENHILL, HODGSON AND CO. OSCILLATING ENGINE FOR 'LEINSTER' 1860

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the Royal Fleet Auxiliary, ran paddle steamers for over 120 years in and around Weymouth; at least four of these steamers had engines by John Penn.

Engines of the oscillating type were particularly suited to the paddle steamer in which the crankshaft-cum-paddleshaft was, of necessity, placed transversely high in the engine room with the cylinders inverted at floor-plate level. Since the compound working of steam engines was not at that time envisaged, these early marine prime movers were simple expansion engines, each cylinder taking steam independently from the main steamline and then exhausting directly into the condenser. The latter was normally of the 'jet' type, the kind in general use until superseded by the surface condenser round about 1860, and comprised a cast-iron structure containing, to provide its vacuum, a vertical air pump actuated by the crankshaft. On passing into the condenser through the hollow trunnions, the exhaust steam was condensed by direct surface contact with jets of sea-water coolant. This condensate-coolant mixture was cleared into a hotwell by the air pump and then returned to the boilers, the surplus being discharged overboard.

FIG. 4 shows a Science Museum model of the engines previously mentioned which were built for the *Leinster* in 1860 by Ravenhill, Hodgson and Company. These magnificent engines, which give a good impression of those used for the *Basilisk*, had two cylinders of 8 feet 2 inches bore, allowing the pistons a stroke of 6 feet 6 inches; each cylinder weighed 20 tons. The condenser between them itself weighed 22 tons and the eight boilers generated steam at 20 p.s.i. At full power the engines indicated 4751 h.p. and gave the *Leinster* a speed of 18 knots. This vessel, like the *Empress* of Messrs. Cosens, was built by the Jewish firm of Samudas of Poplar to a design by Oliver Lang, a retired Chief Constructor in the Admiralty service, and was considered to be one of the most beautiful paddle steamers ever built. Lang was also the designer of *Basilisk* and the Admiralty drawings of the ship bear his name.

Dockyard Paddle Tugs

As a Second Engineer in the Captain of Dockyards Department at Devonport round about 1951 and before the formation of the present Port Auxiliary

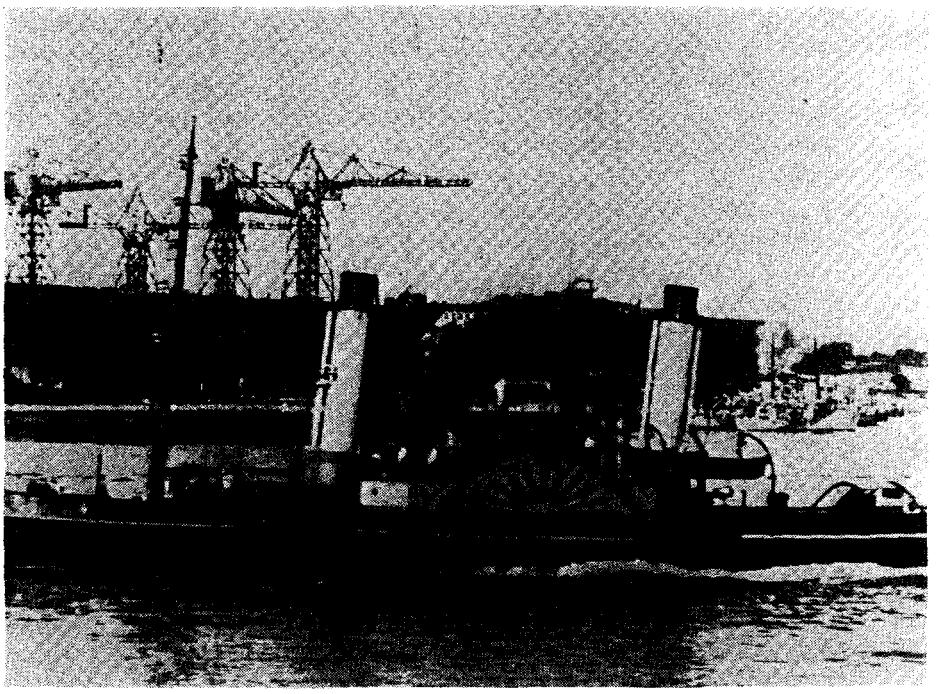

FIG. 5—H.M. TUG 'INDUSTRIOUS'

Service, I had the good fortune to serve for a short time in the *Advice* Class tug *Industrious,* nicknamed 'Dusty', and built about the year 1905—one of three steam paddlers borne in the port. FIG. 5, loaned by Mr. Ken West of the Devonport PAS Engineers' Office, shows this wonderful old vessel pounding up the Hamoaze with the building slip and Mount Wise signal tower in the background. She was fitted with oscillating cylinder engines, identical in their basic features of design to those of *Basilisk,* except that they were compound engines. These were often shown with pride to aspiring engineers from the nearby Royal Naval Engineering College, as being amongst the finest examples of a dying breed of marine engine. Needless to say, the engines of the *Industrious* were a considerable improvement in many respects on the earlier engines of the *Basilisk,* not the least because there were two entirely separate compound engines, each with its independent crankshaft. Thus, she had the edge over the 1848 sloop in as much as she could go ahead on one engine and astern on the other at the same time; a feature of the dockyard paddle tugs which made them very manoeuvrable and unbeatable for the alongside towing of aircraft carriers and other warships in the confines of the harbour. Whereas in the early oscillating engines the cylinders were arranged abreast of one another immediately beneath the crankshaft, in the later compound versions the cylinders were arranged in an inverted 'V' formation and were referred to as diagonal engines.

To stand in the engine room of one of these paddle vessels when under way was an unforgettable experience: the cylinders gracefully bowing to one another across the tops of the condensers, and the air pumps, feed pumps and bilge pumps in the wings operated in a vertical plane from the crankshaft—in fact, with virtually nothing in the engine room stationary. Recently I asked Mr. Stan Green of the Portland PAS Engineers' Office about his recollections of the old oscillating paddle tugs: he remarked that, when working, everything in the engine room was on the move—except the hand rails. I don't think I can put it better than that. I have vivid memories of sitting at floor plate level in the driving position of the 'Dusty's' starboard engine, with the HP cylinder on my immediate right, and operating the

'all-round' reversing gear to warm through. Since vacuum was not available until the engine had made many revolutions, the pistons had to be impulsed by admitting high pressure steam (70 p.s.i.) to get the engine crank to go over the top, and it was certainly an odd sensation to close a cylinder drain which was mounted on a 'bucking bronco'. Normally, when getting under way, the LP pistons would crash down onto accumulations of water in the bottoms of the cylinders with a thunderous *thwump*!! and the Leading Stoker, who normally drove the port engine, would be dispatched hot-foot to the far end of the engine room to open the LP cylinder drains while the water was impulsed out. The ship's two boilers were of the cylindrical, return-tube type and were positioned one forward and one aft of the engine room in separate boiler rooms. Due to the low deckhead there was little room to operate, let alone refit the stop valves.

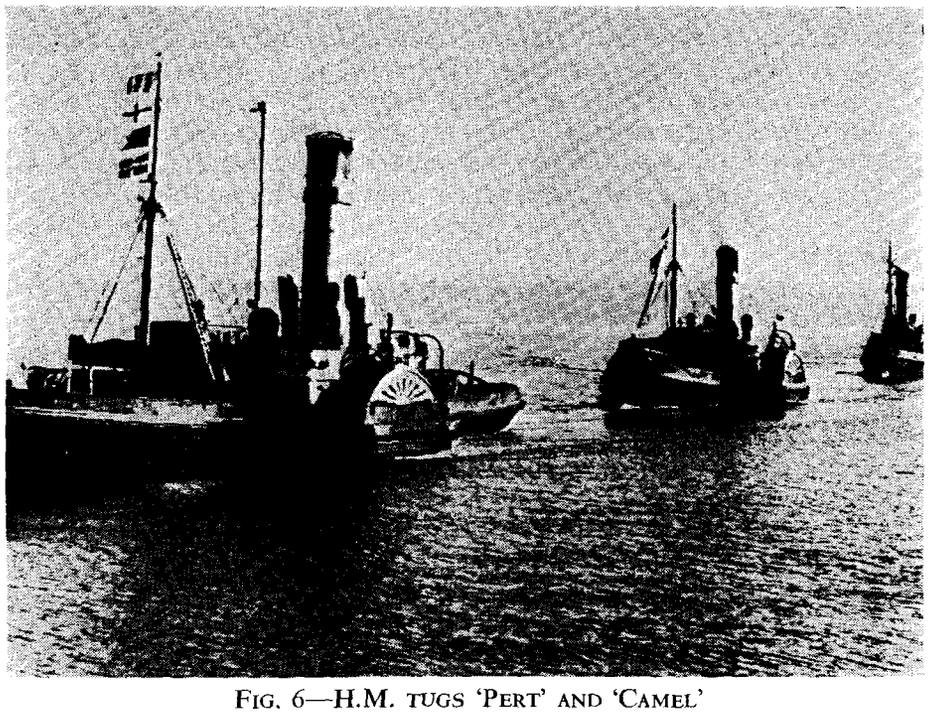

FIG. 6—H.M. TUGS 'PERT' AND 'CAMEL'

The 2000 h.p. Devonport tug *Pert,* however, had two small boilers and one large one, nicknamed 'Jumbo', and her driving controls were positioned at upper-deck level, just below the bridge, where it was possible to sit and almost anticipate the Master's telegraph instructions. Her engines, however, were of the more conventional type employing a crosshead and so did not attract the same novel interest. It is interesting to note that the *Pert* (length 178 feet and tonnage of 1023) was similar in size to the *Basilisk* (190 feet and 1031 tons) although her 14-feet diameter paddle wheels were much smaller.

The *Advice* Class tugs were scrapped during the 1950's and the remainder of the steam paddlers—the *Camel* Class and *Pert,* the Navy's largest ever paddle tug—were phased out early during the 1960's. The Royal Navy had used steam paddle tugs from as early as 1822 until 1962, by which time they had been replaced by the diesel-electric paddlers *Faithful, Favourite,* and others of the *Director* Class.

The Complement and Accommodation

In the ship's Muster Book of *Basilisk* for the years 1856–60, the officers were divided into four separate lists. The first of these was for Commissioned Officers of the Military Branch, which included the Commander, the