The information for these presentations comes from a series of informational booklets published by His Majesty's Stationary Office in the 1940's. This is one of a number of books that were bought by my father during WW2. They were sold [usually for 6d or 1s] to keep people informed of various theatres of war and as a boost to morale.

These books have now been donated to the Imperial War Museum archives and other organisations, grateful thanks are due to Arthur for his sterling work in scanning them to digital format, which I appreciate, was no easy task.

PJS

HIS MAJESTY'S MINESWEEPERS

Prepared for the Admiralty by the Ministry of Information

HIS MAJESTY'S STATIONERY OFFICE

Published 1943

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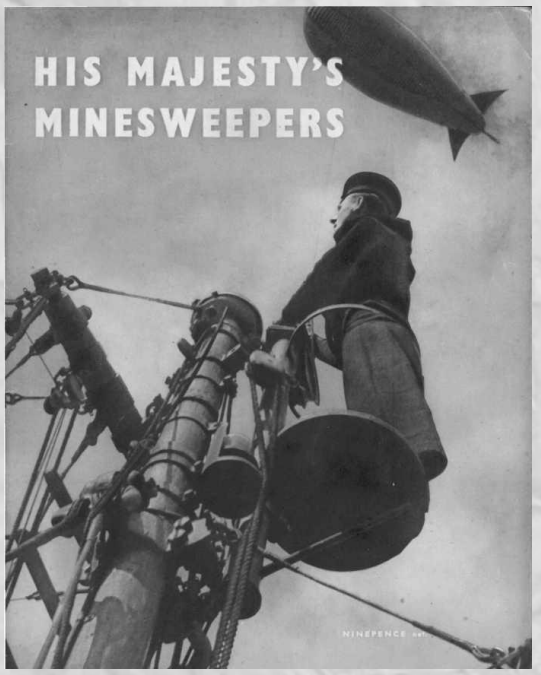
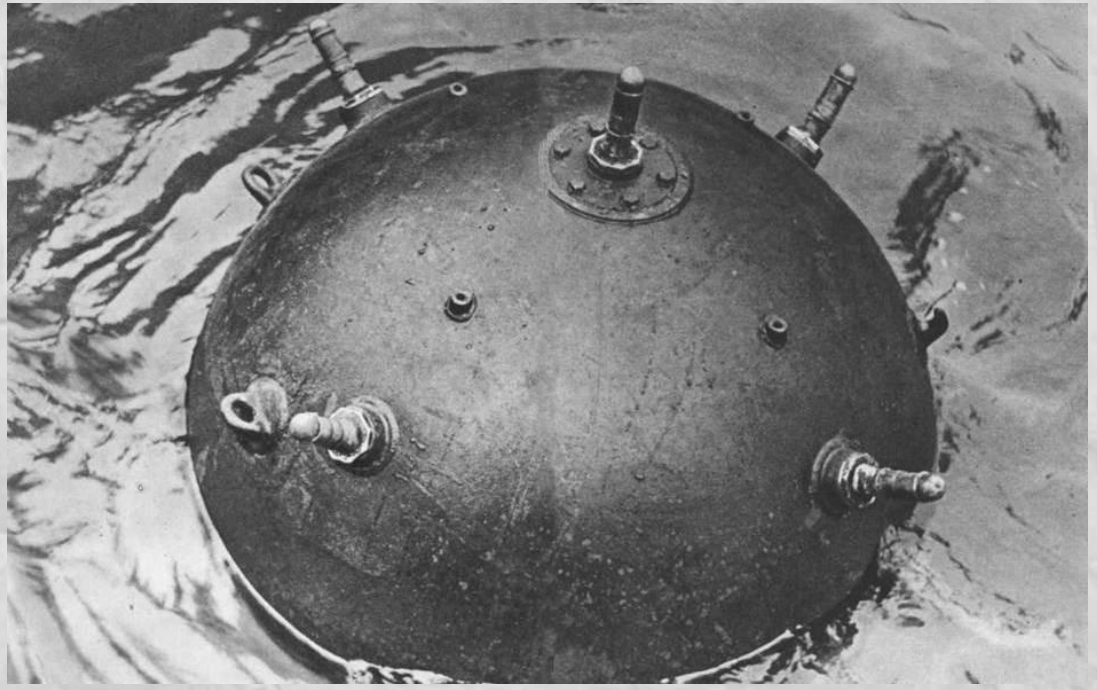
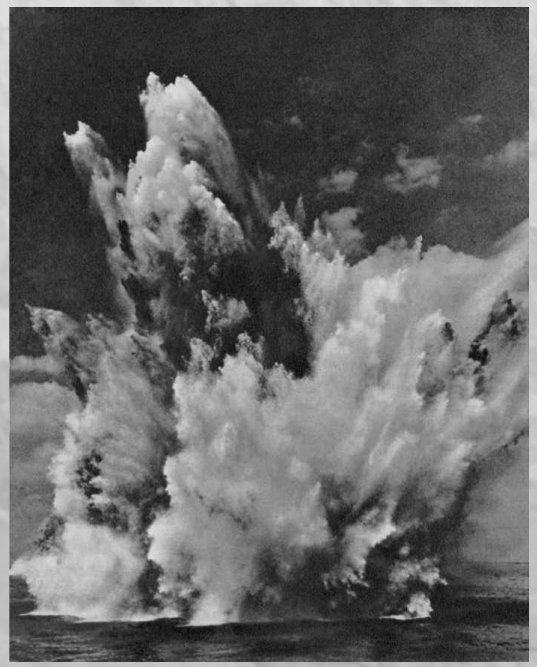






Fleet Sweepers on Patrol.

Minesweeping Trawler.

ALL THE VALOUR OF A BATTLE-CRUISER.

SKIPPER SPALL stood on his upper bridge one blustery morning in February, 1941, conning His Majesty's Trawler Stella Rigel into the War Channel, that buoyed and narrow seaway which encircles the British coast.

The hood of his sand-coloured duffle-coat was pulled over his naval cap, for he had no protection from the sting of the wind or the lash of the spray which was driving over the trawler's bows. He was a Grimsby man, not more than twenty-eight, but in peace-time he had commanded his own ship in the fishing grounds of the North Sea. The experience he had gained was serving him well in his daily search for German mines, and he was proud to wear the King's uniform.

The Stella Rigel was a fishing trawler which, like her captain, had entered the Royal Naval Patrol Service in the early days of the war. Officially she was classed as a "minor war-vessel," but she put to sea with all the valour of a battle-cruiser. For many months she had been sweeping her allotted area, a single unit in that great, tireless fleet of minesweepers which clears the sea-lanes for the convoys to pass in safety, that Britain may have food for her people, and fuel and munitions of war for her fighting forces. Systematically she had plodded to and fro a few miles off the Essex coast, her small company alert for a lurking mine and prepared for attack by aircraft, submarine or E-boat.

A few of the ratings, like their skipper, were fishermen by trade, but most of them had been landsmen until the outbreak of war. They had learnt to defend themselves as part of the day's work and the night's danger, and they worked as a team, happy in the friendliness of a little ship. Skipper Spall had confidence in them; they in turn looked to the bridge with equal confidence as they waited for his order that February morning. Once the trawler had reached her position in the War Channel it was not long in coming.

"Hands to sweeping stations!"

There was a scurry on deck as the hands turned to, each man at his place. Everyone in the ship, except the stokers on watch below, prepared to lend a hand. All had their lifebelts on, blown up ready; in a minesweeper things happen too quickly to take precautions afterwards. They wore blue jerseys, overalls, oilskins, and thick white stockings which covered the tops of their long sea-boots. The Second Hand took charge of the operations on deck. The Engineman was at the winch on which the sweep-wire was wound. The ratings stood ready to stream the grey torpedo-shaped float which would support the sweep and mark its position in the water. Even the cook left his galley as he heard the Skipper's next order:

"Out sweep!"

The float was lifted from its chocks by the davit and lowered over the side. There was little room for the men on deck to move, and the rolling of the ship might have sent the heavy float swinging against the bulkhead to crush the fingers of an incautious hand. But the men knew their work, and at an order from the Second Hand, the Engineman un-clutched the winch to allow the sweep-wire to veer astern.

As the trawler gathered headway the sweep was taken out 250 yards on to the port quarter by the otter-board suspended from the float, and the iron kite was lowered to keep the

inboard end of the sweep at the required depth. The float was now bounding along 500 yards astern, its red flag visible above a plume of spray. Once again the Stella Rigel had got "all her knitting out." A black ball was hoisted at the masthead and another at the port end of the yardarm to warn other ships of the side on which she was sweeping.

Now the hands could relax, but one was posted aft to watch the float, while the winch-man kept his eyes on the taut sweep-wire, ready to go into reverse should he hear it "sing" or see the sudden pull which would reveal that it had caught a mine. From time to time he slacked off a few feet to change the nip and prevent chafing.

All day long the Stella Rigel steamed up and down the War Channel, covering lap after lap, as a man might mow a tennis lawn. Skipper Spall remained on the bridge, navigating the ship with unceasing attention, so that there should be no "holidays" in the swept water where a mine might remain uncut, in wait for an unsuspecting steamer.

The day passed quietly, without a single mine detonating in the sweep or the welcome diversion of one cut from its moorings to be exploded by rifle-fire. From time to time a convoy steamed along the swept channel, a double column of grey merchant ships with their escort of destroyers and corvettes.

Dusk came; then darkness fell over the sea. The Stella Rigel did not put back to harbour, but worked on through the night. The ratings were apt to grumble at the monotony of their task, as seamen will, but they did not underestimate the enemy with whom they had to deal, for they had watched the suffering of their sister ships. They had seen more than one strike a mine and blow up, leaving behind scarcely enough timber to make a packing-case. They had seen a mound of water rising like a mushroom from the surface of the sea, and heard the thud of the explosion as a mine caught in a sweep detonated under a trawler's counter. They had seen others of their kind bombed from the air and sunk, and knew the risk from even a near miss as the ship lifted with the up-rush of water, her bows stove in below the water-line.

Skipper Spall kept a wary look-out as he passed each buoy, well knowing that an E-boat might be hiding in the shadow. He continued sweeping throughout the night, until the end of the Middle Watch – "that weary watch from twelve to four." Then he gave the order "In sweep." Speed was reduced to allow the kite to be hove up and the sweep-wire un-snatched. When the winchman had wound in the sweep, and the float and otter had been stowed, the anchor was dropped clear of the channel, and Skipper Spall told the tired hands to pipe down for a few hours' rest. Then he left the bridge for the first time since the Stella Rigel had put to sea. He did not go down below to his cabin, however, but remained on deck, near the Ooerlikon gun which was mounted aft and ready loaded.

There was no moon, and the night was dark. Suddenly he heard the drone of aircraft engines. He ran to the gun. Dark though it was, one of the aircraft seemed to have observed the deeper blackness of the trawler's form as she rode at anchor. It circled her three times, as though investigating, then approached from astern, about 500 feet above the deck.

Skipper Spall did not order "Action Stations," which would have brought his men from their bunks in the fo'csle below. To do that, as he explained afterwards, he would have had to run to the bridge to sound the bell, and by the time the hands had closed up the Heinkel "might have been back in Germany."

FIGHTING SHIP. trawlers do more than sweep. They Fight. With this Ooerlikon gun, the Stella Rigel struck down a Heinkel in a night attack in the War Channel. Back in her home port she proudly puts out her coloured badge and painted name. At sea, like other trawlers, she becomes a grey ship with a number.

Instead, he tipped the gun and fired half a magazine at the approaching enemy. He felt that he had sent some shells thudding into the Heinkel's fuselage, and exultantly he let go the rest of the pan in rapid fire. The Heinkel zoomed low over the ship, losing height, and a few moments later blew-up in the sea half a mile ahead. The action had been a matter of seconds, but the hands were astir. The Skipper went for'ard and shouted down the companion-way leading to the fo'csle.

"Just come up and have a look at this, lads!"

They tumbled up on deck to watch the Heinkel blazing in the sea.

That is how Skipper T.H. Spall, R.N.R., won the distinguished Service Cross. The story is told here not so much because his action was an outstanding episode of the war, but because it was characteristic of the indomitable spirit of the trawlers skippers; tough, brave, enterprising, accustomed to make fair weather of a foul wind, and modest above all.

When Skipper Spall made his report at the Base later in the day he was told the Port Minesweeping Officer that there was "nothing to make a fuss about." It had been, he explained, "just a damned lucky do."

"SHIP-DESTROYING ENGINES."

ALTHOUGH THE Stella Rigel and her sister sweepers must be constantly vigilant for some new form of mining offensive, the modern submarine is not a new invention so much as the product of four centuries of human ingenuity. During that time the scientists have fought an unceasing conflict of wits as one has produced a destructive device and another has encountered it.

It was one of Elizabeth's admirals, Sir William Monson, who first realised that a vessel is more vulnerable below the water-line than above it, although there is no record that he ever carried out his plan for firing a cannon from the hold of a barque which had been laid alongside an enemy ship. But at the siege of Antwerp in 1585 the Dutch destroyed 800 Spaniards by means of contrivance they called an "explosion vessel" fitted with clockwork mechanism.

Charles I gave his Master of the Ordnance a warrant "for the making of divers water-mines, water-petards and boats to go under water," and during the expedition for the relief of La Rochelle in 1628 the Duke of Buckingham, then Lord High Admiral, is said to have used these inventions, although without much success. In Cromwell's time Prince Rupert tried to blow up Blake's Flagship the Leopard, with an explosive machine concealed in an oil-barrel. Twenty years later he was still experimenting with "petards."

"Whatsoever vessel lies by the side of any ship and has the said petard on board, has it in its power to blow up the other," he assured Charles II.

In 1655 the Marquis of Worcester invented a "ship-destroying engine" which, like the Dutch device, was actuated by clockwork, but it required a diver to attach it to the ship which was to be attacked, and does not appear to have been used. Indeed, the problem which the early inventor failed to overcome was the elimination of the human agency necessary to operate the mine.

It was left to David Bushnell, the American, who has been called the "Father of the Submarine," to evolve the idea of detonating mines by contact. Even Bushnell's early attempts at mining were on the lines of his predecessors, and the object of his submarine, the Turtle, was to approach on enemy vessel under water so that the single operator, while submerged, could drive into the ship's side a wooden screw to which was attached a mine containing 150 lbs. of explosive with time-controlled mechanism. The Turtle was sunk after an abortive attempt to destroy the British 64-gun ship Eagle in the Hudson River during the American War of Independence, and Bushnell then invented what appears to have been the first contact mine; a keg with conical ends, filled with gunpowder, supported in the water by buoys, and fired by an ordinary gunlock and hammer.

His first attempt with one of these "trigger-mines" was in 1777 against the British frigate Cerberus while she lay at anchor in the Connecticut River, but the mine hit a schooner astern of the Cerberus, destroying her and killing three of her crew. After this Bushnell set a number of kegs afloat on the ebb tide in the Delaware River above the British shipping at Philadelphia. One of them blew up a boat with several men in it, thus giving the alarm which brought on the so-called Battle of the Kegs, when the British troops lined the ships and wharves, firing a wild fusillade at the invisible mines which, beyond causing panic, did little damage.

Twenty years later another American, Robert Fulton, better known as the designer and builder of the Clermont, the finest practicable steamship, invented a mine which he called and "explosive carcass" and a "plunging boat," the Nautilus, from which to fire it. This was the vessel which gave Jules Verne the idea for Captain Nemo's submarine in *Twenty Thousand Leagues Under the Sea*. Fulton interested Napoleon in his project and the French Government put at his disposal a schooner which he succeeded in blowing up.

His methods did not appeal to the chivalry of the French naval officers, however, and he betook himself to England, where he placed some of his inventions before the Admiralty. One of these was an explosive magazine known as a "catamaran," an oblong wooden vessel containing 40 barrels of powder. The withdrawal of a safety-pin caused a clockwork mechanism to revolve for ten minutes, then a gunlock hammer was released and hit a percussion cap, the flash causing the magazine to explode.

The possibilities of this device impressed the Admiralty and in 1804 Lord Keith used it against the French fleet off Boulogne. The catamarans were set adrift in pairs, but they were too close to the surface to be effective and the columns of water caused by the explosions made no impression on the stoutly-built French ships. The French protested indignantly against this method of attack.

In the following year, a few days before the Battle of Trafalgar. Fulton gave a demonstration of another explosive device for the benefit of Mr Pitt, who provided him with a strong Danish brig, the Dorothy, as a target ship. The brig was anchored off Walmer Castle, Pitt's residence, and was attacked by a carcass containing 170lbs of powder. A naval officer who was present remarked cheerfully that if such a contraption were placed under his cabin while he was at dinner he would feel no concern for the consequences. A few moments later the explosion lifted the brig almost bodily out of the water and she broke in two.

"She did not appear to make more resistance than a bag of feathers," wrote Fulton, "and went to pieces like a shattered eggshell."

Nothing came of the experiment, however, the Lord St. Vincent probably voiced the opinion of most naval officers when he declared that "Pitt was the greatest fool that ever existed to encourage a mode of war which they who commanded the sea did not want, and if successful would deprive them of it."

Fulton retired discomfited to the United States. He had proved the possibilities of submarine mines, but they were not used effectively until war broke out between Germany and Denmark in 1848, when Professor Himmly, unaware of either Bushnell's or Fulton's work, invented a mine which could be detonated by electric contact from the shore. These mines, the first to be laid as weapons of defence, were used to protect Kiel against the Danish fleet. The Russians also laid mines to defend the ports of Sebastopol and Kronstadt during the Crimean War.

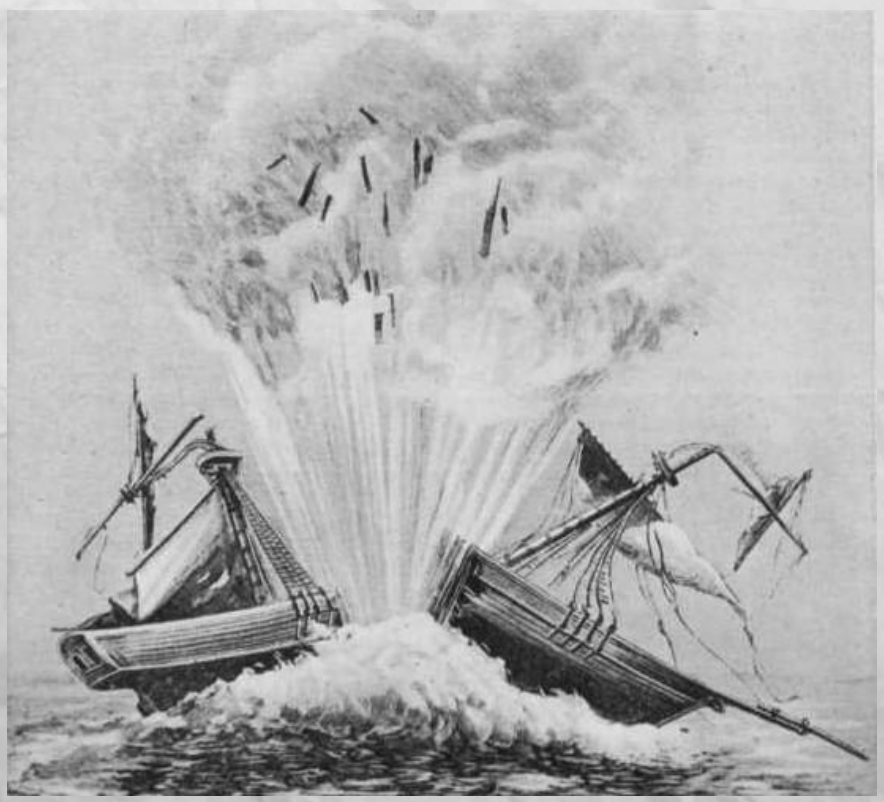
In the American Civil War the Confederates tried to equalize their inferiority in ships by mine laying, and although not a single vessel on either side was sunk by gunfire, nearly thirty were destroyed by contact mines. Some were made of beer-kegs with chemical fuses; others were truncated tin cones with gunpowder in the lower end and on the top an iron cap which was displaced on contact and pulled a friction tube, thus detonating the charge.

The most elaborate minefield of the war was a triple line laid before the fort of Mobile, which Admiral Farragut attacked in 1864. The monitor Tecumseh, leading the fleet, struck a mine and sank by the head, taking with her the captain and a large number of her company. More mines were reported ahead and the Admiral was faced with the alternative of ignominious retreat or taking his fleet through the danger zone. Undaunted he chose to advance and gave the order for full speed. Seldom has courageous decision been better justified by result. Although the mines could be heard bumping against the sides of the ships and grazing along their bottoms, not one exploded and the fleet went through unscathed.

When the Confederates first began to lay mines the Federals professed to be indignant as the French had been, but before hostilities were over they too had adopted this method of warfare. Immobile contact mines were also used by Paraguay in 1868 during the war against Brazil, and sank the Brazilian ironclad Rio Janeiro. During the Franco-Prussian War the Germans prevented the French from attacking their principal ports by defending them with contact and electrically-controlled mines.

The mine continued to be regarded as a weapon of defence until the Russo-Turkish War, when in May, 1877, a small party under a Russian lieutenant swam across the Lower Danube towing an electro-controlled mine, which they placed under the bottom of the Turkish monitor Dar-Mation. When the mine was fired the ship was blown to pieces and not a man on board was saved.

This was an isolated incident, however, and although the Russians are said to have been the first to sweep for mines-by towing weighted hawsers between a pair of tugs-when war broke out with Japan they confined themselves to protecting Port Arthur by an extensive minefield, on which their own armed minelayer, the Yenisei, was sunk.



"NO MORE RESISTANCE THAN A BAG OF FEATHERS." *So wrote Robert Fulton after William Pitt had let him explode a form of mine he had invented under the anchored brig Dorothy. This experiment was in 1805, a few days before Trafalgar.*

Five years previously, however, an Italian officer had invented a mine designed to be laid outside enemy ports for purposes of blockade, and demonstrated in naval manoeuvres that fleets could be forced over mined areas. It may be that the imitative minds of the Japanese adopted this idea, for they laid a line of mines outside the Port Arthur field. A decoy squadron then lured the Russian admiral out of the harbour, with the result that the flagship Petropavolosk struck two coupled mines and sank within three minutes. This was the first ship to be destroyed by a minefield laid in anything but defence, and other casualties followed. The Russians retaliated by laying mines in the open sea and sank two Japanese battleships in a single day.

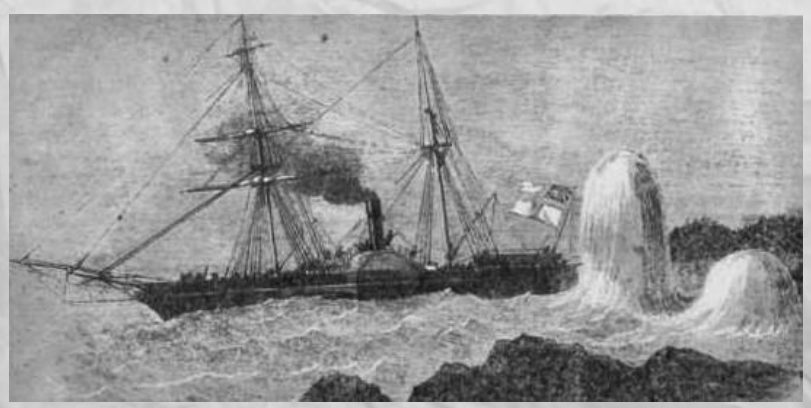
The mine thus became recognized as a weapon of aggression, and the Germans were not slow to mark the lessons of the war. They carried out elaborate experiments, made preparations for manufacture, and drew up plans for widespread mine-laying in the event of naval warfare.

The British admiralty was slower to act, not realizing the potency of the mine in the hands of an unscrupulous enemy and relying on the Hague Convention which stipulated that mines might be laid only in the territorial waters of an opponent. It was supposed that naval patrols would be able to deal with any surface mine-layers which approached the coast, and no one appears to have suspected that minefields could be laid by submarines.

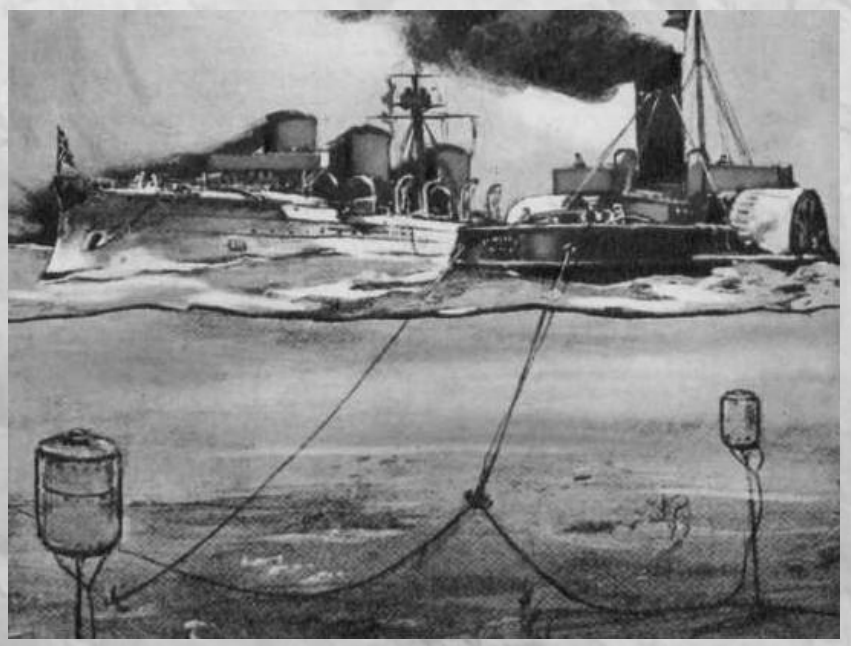
Nevertheless, Admiral Lord Charles Beresford foresaw the need of providing shipping with adequate protection against mine warfare, and after a visit he paid to the East Coast ports in 1907 when Commander-in-Chief of the Home Fleet, he recommended the use of Grimsby trawlers for minesweeping. He argued that in time of war many vessels of the fishing fleet would be inactive and therefore available for war service. Fishermen were more skilled than naval ratings in the handing of wires and trawls, and the employment of trawlers would free the small naval craft for other duties.

The admiralty hired two trawlers with their fishing crews, and sent them to Portland for minesweeping experiments. These trials were successful, and shortly afterwards the Trawler Section of the Royal Naval Reserve was formed. Arrangements were made for 100 trawlers to be mobilized on the outbreak of war and for the immediate enrolment of 1,000 officers and ratings. The rank of Skipper, R.N.R. appeared in the Navy List for the first time.

There was no lack of volunteers for the new Service. It was to be some years before they were needed, but Lord Charles Beresford's foresight was justified when the time came.



INFANCY OF THE MINE. *Water spouts from Russian mines around the crew of the British Warship Merlin, damaged in a minefield off Sveaborg during the Crimean War.*



THE FIRST SWEEPERS. *A Japanese minefield is swept with grappling hooks from the stern of a Russian tug during the Russo-Japanese War, 1904. The cruiser Novik stands by. Both Russian and Japanese heavy warships were sunk by mines during the war.*

THE SWEEPERS WIN A FOUR YEARS' BATTLE

ON THE OUTBREAK OF WAR in 1914, Germany immediately showed that she relied on the mine as a weapon of offence. Within a few hours of the declaration of hostilities a British trawler sighted the Königin Luise, a small converted mail steamer, laying mines thirty miles off the coast of Suffolk. British destroyers sank her, but the following morning the cruiser Amphion struck one of her mines and went down with the loss of 151 lives.

The regular minesweeping force then consisted of no more than six old torpedo-gunboats. But the Reserve was being mobilized, and by 8th August, 1914, fishing trawlers were at sea, sweeping for mines, manned by their ordinary crews of fishermen. Within a fortnight another hundred trawlers had been requisitioned. So eager was the fisherman's response that in eleven days the whole force was manned and fitted out at Lowestoft.

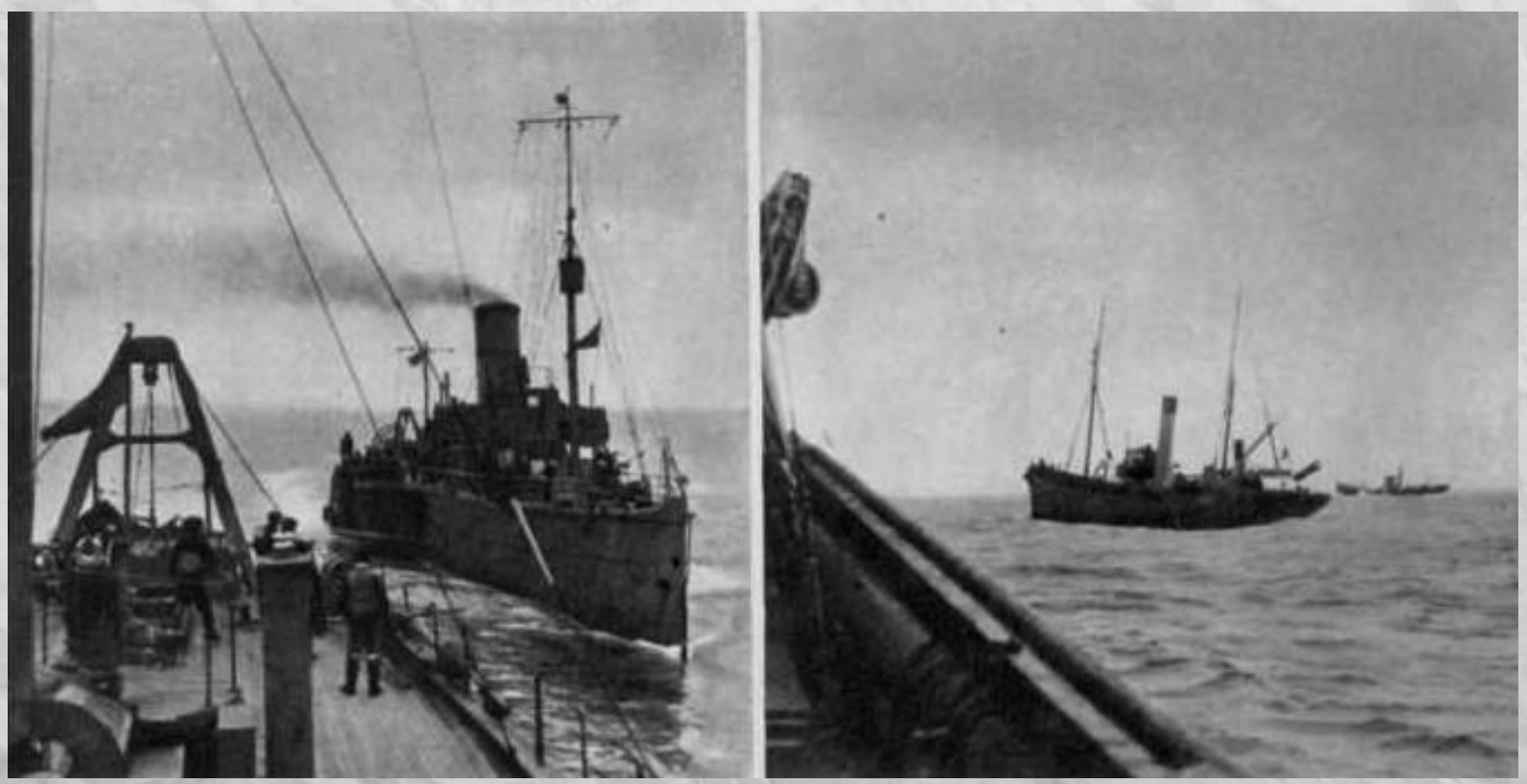
By the end of August a clear channel had been swept and buoyed, inshore of the minefield laid by the Königin Luise. This was the beginning of the War Channel which eventually extended from Dover to the Firth of Forth, a distance of 540 miles, and was swept daily. The forces employed on this service were based on the Nore, Harwich, Lowestoft, the Humber, the Tyne and Granton in the Firth of Forth.

The mines with which the sweepers had to contend were globular or pear-shaped, some three feet in diameter, containing about 350 lbs. of guncotton, trinitrotoluene [T.N.T] or amatol. This explosive, with the firing batteries, occupied about half the space available, the remainder being used as an air chamber to give buoyancy to the mine. On the upper surface were five or more leaden horns five inches long, each holding a glass tube; the released liquid then energized the battery, which fired the detonator. On one occasion a whale was killed by hitting the horn of a mine.

When the laying vessel dropped the mine, both the mine and the sinker to which it was attached went straight to the bottom. After a short interval, which allowed the ship to steam clear, the mine was automatically released and rose under its own buoyancy, unreeling its mooring wire, while the sinker remained below. The depth of the mine beneath the surface was regulated by a device called the hydrostat, which gripped the mooring wire when the mine had reached the required height.

The trawler's task was to cut this mooring wire so that the mine would either detonate in the wire sweep or rise to the surface, when it could be exploded or sunk by rifle-fire. To facilitate cutting, the Admiralty introduced a serrated wire, the effect of which was to saw through the cable. The sweep-wire was towed between a pair of trawlers about 400 yards apart, and held beneath the surface by a heavy kite, which dived under the water when in motion, just as an air kite rises in the wind. In order to cover as wide a front as possible two or more pairs of trawlers might work together. Germany began her mine-laying campaign with a flying start. She is known to have laid 600 mines off the East Coast alone by the end of August 1914. One of these, the gallant trawlers had been able to account for only twelve, at a cost of six ships and over half their crews. During the first two months of the war one trawler was sunk for every five mines swept.

It became clear that while the trawlers were invaluable for the routine sweeping of the traffic lanes, their average draught of 14 feet made them too vulnerable for clearing minefields.. For this purpose the Admiralty requisitioned a number of excursionist paddle-steamers, which were moderately fast and drew comparatively little water, while the torpedo-gunboats—little coal-burning ships 800 tons and more than 20 years old– were attached to the Grand Fleet, preceding the capital ships when they put to sea and searching areas where mines were expected.



A THOUSAND LITTLE VESSELS *like these fought the German mine campaign in 1914-18. The cost was high. one sweeper a week was sunk. But the mine was beaten. Left, paddle-minesweepers at Harwich. Right, armed trawlers in the North Sea.*

The first twelve of the regular war-built minesweepers, the Flower class, were ordered on 1st January, 1915, and thereafter their construction proceeded fast. As the war went on, 400 trawlers were built for the Admiralty; others were bought from Norway, Holland and Spain. The minesweeping force expanded so rapidly that it became impossible to man it with fishermen alone. Officers of the Royal Naval Reserve and the Royal Naval Volunteer Reserve joined the Service, while the ratings came from all walks of life and many parts of the Empire. In October, 1917, the operational side was brought under a single head when Captain [now Admiral Sir G. Lionel] Preston was appointed Superintendent, and later Director, of Minesweeping, which position he held until the end of the war, and subsequently when he was in general charge of mine clearance.

As the organisation grew, so did the menace of the mine increase. In June, 1915, the Germans began to use submarines for mine-laying. This increased the strain on the minesweeping forces at Harwich, the Nore and Dover, the first areas to be affected. By the end of 1915 the outlook was black. It became even graver as the months went by. In June, 1916, H.M.S. Hampshire, with Lord Kitchener on board, was sunk off the Orkneys by a mine which the U.75 had laid. As larger U-boats came into commission mines were laid farther and farther afield. The trawlers followed them. Their task was made harder still by the delayed-action mechanism which could keep a mine attached to a sinker for any period up to 30 days, so that some channels had to be swept repeatedly before it was certain they were clear.

At last a protection against moored mines was found. This was the paravane, invented by Lieutenant [now Commander Sir Charles] Burney, R.N. It was simple, inexpensive, and sure; a buoyant, torpedo-shaped body of welded steel, 12 feet long, fitted with horizontal rudders to keep it at the required depth. A pair of those devices was towed from the ship's forefoot, streaming out at an angle of 50 degrees on either bow. The towing wires acted like sweeps when they came in contact with a mine-mooring and protected the whole breadth of the vessel.

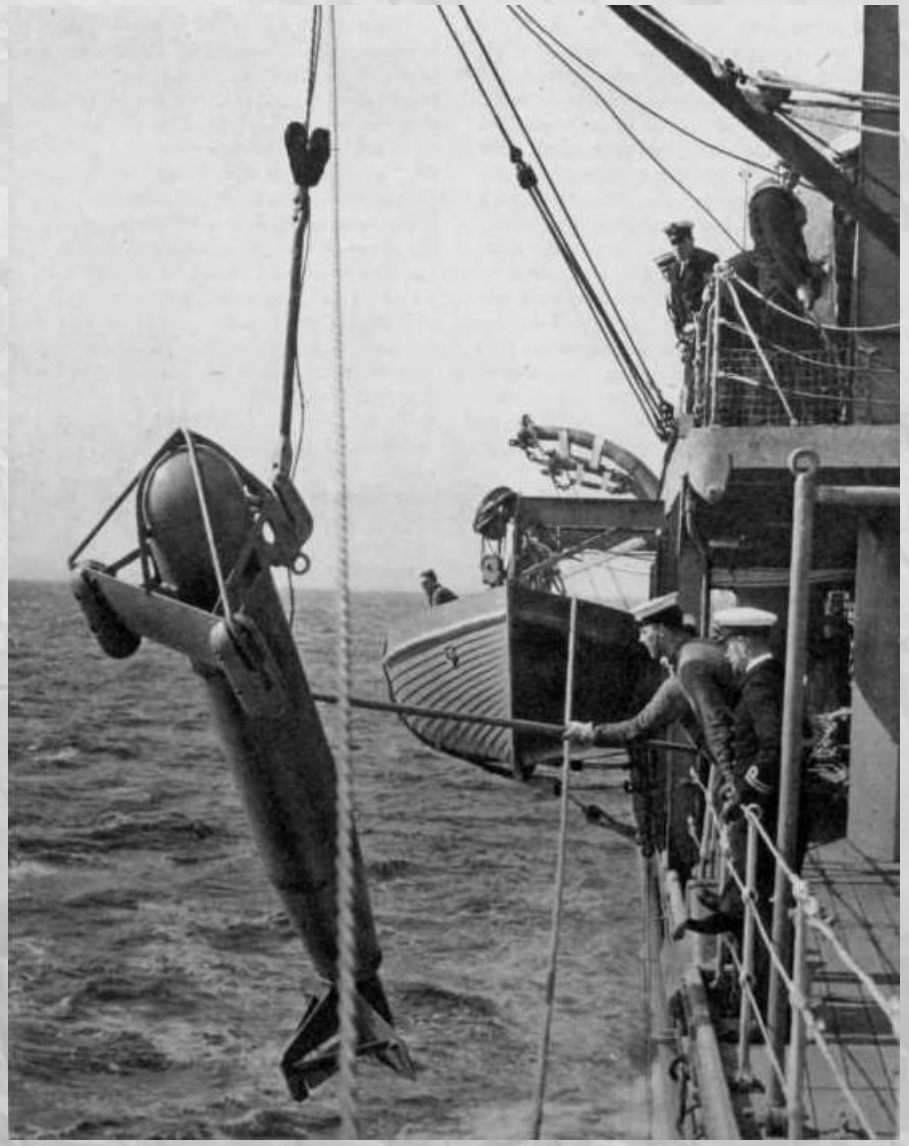
Extreme secrecy was preserved about this invention, and although the Germans became perturbed at the increasing immunity of ships in mined areas, they did not discover the reason until after the war. To-day all naval vessels, and all merchantmen whose course lies in waters likely to be mined, carry paravanes, which cannot, however, protect them against ground mines.

The unrestricted U-boat campaign of 1917 was accompanied by a vast increase in submarine minelaying off the British coast. Among the victims was the armed merchant-cruiser Laurentic, which struck a mine off Lough Swilly and sank in 40 minutes with gold to the value of five million sterling. In April alone 515 were swept, a total which far exceeded that for any previous three months of the war; but the cost was heavy; the losses were one sweeper a day for the greater part of that month.

To meet the attack the Admiralty took over every available paddle-steamer and motor-fishing-boat, while aircraft and motor launches were used for locating minefields at low water. By the end of the year over 1,000 miles of coastal water off Great Britain and Ireland were being swept.

On one occasion, off the south-west coast of Ireland, the sweepers merely went through the motions of clearing a dangerous area, left it intact, and steamed back to harbour to await results. It may be that the Senior Officer of the flotilla, had in mind Psalm XXXV, verse 8: "Let a sudden destruction come upon him unawares, and his net that he hath laid privily catch himself; that he may fall into his own mischief." At all events it was not long before the captain of the U.C. 44, under the impression that the field had been cleared, began to relay it. His submarine was blown up by one of his own mines and he was rescued by a naval patrol. He is said to have been indignant at the inefficient manner in which the British sweepers had done their work.

Enemy minelaying was not confined to British waters. German submarines laid mines off the coasts of France, Portugal, West Africa, the United States and Nova Scotia, throughout the length and breadth of the Mediterranean, and in the approaches to Murmansk and Archangel. The Turkish mines at Gallipoli, laid for defensive purposes, achieved their objective by preventing the British fleet from forcing the Narrows, German surface-raiders, notably the disguised merchant vessel Wolf, laid mines as far afield as the Cape of Good Hope, Ceylon, Australia and New Zealand.



THE SHARK-SHAPED PARAVANE, *invented in 1917 and kept secret from the Germans, gave warships and merchantmen their own protection against mines. One to port, one to starboard, they were streamed out at an angle from the bows at the end of cables that cut through the moorings.*

Germany had intensified mine-warfare as part of her policy of destroying British sea-borne trade. But the lessons of history, particularly those of the Napoleonic Wars, when the French pursued the same end, show that commerce-raiding cannot win a war without command at sea. Germany never secured that command, although during the spring of 1917 she came near to doing so. By the beginning of 1918 the inexorable pressure which the Royal Navy had been exerting for over three years was having its effect, and long before the Armistice British minesweeping had won mastery over German minelaying.

By November, 1918, the force which had been improvised from old gunboats saved from the scrap heap, fishing craft, and a few excursion steamers, had been expanded into a fleet of over a thousand vessels, stationed at 26 ports at home and 35 abroad, manned by a highly-trained body of men whose life was one of instant readiness, sleepless nights, hard lying, constant vigilance in stormy seas, and the strain of unseen danger.

Besides clearing the path of the merchantmen, the sweepers were always ready to help a ship in distress and their devotion to duty saved many lives. In December, 1917, the hired turbine-steamer St. Seiriol, while sweeping off the Essex coast, sighted the Frances Rose of Liverpool heading straight for a mine 400 yards ahead. It was about two hours before low water, blowing hard, with a heavy sea. Slipping her sweep, the St. Seiriol headed across the Frances Rose's bows and ordered her to anchor. The extent of the minefield was unknown. Patrol craft and trawlers were sent north and south to stop all traffic, but a few minutes later the Frances Rose struck a mine. The St. Seiriol went alongside the sinking vessel and took off all hands. By that time three mines were showing on the surface. The Commanding Officer gave the order "Stand by to blow up." But the St. Seiriol remained untouched [although sixteen mines were subsequently swept up in the area] and she proceeded to port at high tide.

The sweepers' losses were severe: 214 were sunk during the war, an average of one a week. Moreover, when the Armistice came the minesweepers work was not ended, for there remained the task of clearing the unswept minefields which had been laid by the Allies and the enemy. That entailed a close search of 40,000 square miles of sea.

The Admiralty appointed an International Mine Clearance Committee, on which 26 countries were represented. The Supreme War Council allotted each Power and area to clear, the largest falling to Great Britain. A Special Mine Clearance Service was established in February 1919, with special rates of pay and conditions of leave. There was no lack of volunteers, and the work was completed by the end of November, by which time 23,000 Allied and 70 German mines had been swept, with the loss of only half-a-dozen sweepers. In the meantime, the Americans had cleared the Northern Barrage between the Orkneys and the Norwegian coast, where 56,033 American and 15,093 British mines had been laid by the end of the war over an area of 6,000 square miles.
When the clearance was finished the inevitable cutting down of ships and men began. The trawlers were released to their owners and returned to the fishing grounds; those which had been built for the Admiralty were sold, together with many of the older fleet sweepers, others being broken up or placed into reserve. No fleet minesweeping flotilla was maintained in full commission, and the minesweeping Division at the Admiralty was disbanded. Later, one flotilla of fleet minesweepers was commissioned for the instruction of junior officers and ratings, and on the re-introduction of training in the Trawler Section of the Royal Naval Reserve, renamed the Royal Naval Patrol Service, three trawlers were attached to this flotilla and fortnightly and fortnightly courses were begun at Portland. But no fast sweepers were built until 1933, when four of the Halycon class were laid down; these were relieved by more modern vessels in 1939.

In the summer of 1937 the 1st Minesweeping Flotilla was employed on the Non-Intervention Patrol in Spanish waters. In the following year large-scale minesweeping exercises were arranged, and in June , 1939, a handling trial of a magnetic sweep—to be known later as the "Bo'sun's Nightmare"—was carried out. This shows that the Admiralty was not caught completely off its guard by the offensive that was shortly to be hurled against British and neutral shipping, although few realized how serious would be the onslaught when it came.

FIGHTING THE SECRET WEAPONS

EVERY AVAILABLE MINESWEEPER of the Royal Naval Patrol Service was at her war station by the end of August, 1939. During the summer, the Admiralty had bought 67 trawlers and had ordered twenty new ones from the shipyards. Others were taken over as they returned from the fishing grounds. As one naval officer said, "They threw the fish out and threw us in."

In every war since the days of Elizabeth, Britain has suffered from an initial shortage of small ships. But whereas the emergencies of 1914 had demanded improvisation, in 1939 those lessons had been learnt and plans had been made from the experience garnered. There was, moreover, an invaluable nucleus of officers and ratings who returned to the Service with practical knowledge of mine-sweeping in war, and also a number of patriotic and enthusiastic R.N.V.S.R. amateur yachtsmen who had learnt the elements of minesweeping during their holidays with 1st Minesweeping Flotilla at Portland.

The Minesweeping Division at the Admiralty once again became responsible for all vessels and material. The Director and his staff collected and disseminated intelligence regarding enemy minelaying, gave advice on tactical counter-action, and laid down the searched channels through which shipping might pass. In the Operations Room a permanent watch plotted the movements of the sweepers and recorded the position of every mine that the enemy was known to have laid, and every of every ship known to have been mined.

At each Naval Base a Port Minesweeping Officer took command of the trawlers which swept the new War Channel. On a mine being reported or swept, the position was buoyed, the local traffic diverted, and, if necessary, the port closed. If mines were found in the War Channel, the convoys were kept back until the dangerous area had been cleared. A priority message was sent to the Minesweeping Division, where its information was checked and then broadcast to all shore stations and ships at sea. Patrol vessels were posted near the dangerous area to warn merchantmen which might not have received the message. Whenever possible, the masters of sunk or damaged ships were interviewed as soon as they came ashore.

The first ship to be mined in the present war was the British steamer Madgepur, which blew up and sank off the East Coast on 10th September, 1939. Six days later the City of Paris struck a mine but escaped with little damage. As the weeks passed losses became more serious, and statements made a prisoner of war revealed that the enemy was discharging magnetic mines from submarines. This evidence appeared to be confirmed by a number of unexplained explosions and sinkings of the coast.

Hitler had boasted of his "secret weapon" and it seemed that this might be the magnetic mine. It was not, however, a new invention, for the Royal Navy had used magnetic mines off the Belgian coast during the previous war, and, so far from it being a secret, an American citizen, Mr Ceasar Marshall, had been granted a British patent for such a device in 1918. Other inventors had experimented with mines of similar type, and the Mine Experimental Department of H.M.S. Vernon was well aware of their existence; indeed, its own magnetic mines were in an advanced state of development.

The magnetic mine is so called, not because it is attracted to a ship's hull, but because it is detonated by a magnetic needle which becomes active when a large mass of iron passes into its field. When the mine is laid on the sea bottom it can operate only in comparatively shallow water, but within its range it can cause far more damage than the moored mine, since the moored mine blows a hole in a ship, usually for'ard, which may be localized, whereas the explosion from a ground mine strikes the vessel under her bottom amidships, opening up the plating of the hull, shattering the machinery and the pipes, and frequently breaking her back.

NECKLACE OF MINES *lying round the deck of a German minelayer in the North Sea It is September, 1939; the attack has begun. The crew stands ready.*

Against this weapon neither the existing sweeps nor the paravane availed. But counter-measures were taken, first with the "Bo'sun's Nightmare," which was still in the experimental stage. This was a wire sweep to which a number of magnetized bars were attached and towed between two ships just off the sea bottom. Large electro-magnets and barges with coils of wire were also used; even aircraft were employed. The first magnetic mine was detonated in the Bristol Channel, but although the sweepers were rapidly fitted with new devices and the officers given instruction in their use, none was wholly satisfactory and the sinkings continued at an alarming rate.

A doctor cannot prescribe a remedy until he has had the opportunity of diagnosing the disease, and the officers of the Mine Experimental Department of H.M.S. Vernon could not find the effective antidote to the magnetic mine until they had studied a specimen and discovered its mechanism. Every effort was made to recover a magnetic mine intact, but for some time without success.

Then it appeared that the enemy was dropping the mines from the aircraft. This was all the more serious, because it rendered our own mine barrages, which were a protection against surface-layers and submarines, of no avail. Between 18th and 22nd November, fifteen merchant ships were mined, including the Japanese liner Terukuni Maru and the Dutch steamer Simon Bolivar. H.M.S. Belfast was damaged and the destroyer Gipsy sunk.

The danger to shipping had suddenly become intensified, and it seemed that merchant traffic would be paralysed unless the remedy could be found. The men in the sweepers did all they could, but they were powerless against this weapon new to their experience. They looked to the scientists to give them the means to combat the offensive, but that the scientists could not do until they had discovered exactly what they had to fight.

The first definite evidence that the enemy the enemy mines were being laid from the air came on the night of 21st November, when aircraft, believed to be Heinkel 115s, operating from bases on the islands of Sylt and Borkum, were seen to drop mines in the Humber and in the estuaries of the Stour and the Thames. Observers reported that the mines looked like sailors' kit-bags suspended from parachutes. Officers from H.M.S. Vernon were sent to East Coast ports to investigate. They could discover no further information. None came in the next day. The situation had become very grave. Shipping in three rivers was held up. The Minesweeping Division at the Admiralty and all officers ashore and afloat were working under a severe strain. But as yet there was no conclusive proof of the nature of the mine.

Shortly after midnight on the morning of the 23rd, Lieutenant-Commander J. G. D. Ouvry, R.N., of H.M.S. Vernon, was called to the Admiralty from the London hotel where he had been awaiting such a summons. He packed his bag immediately and reported to the Director of Minesweeping. He was told that at ten o'clock that night sentries at Shoeburyness, on the Thames Estuary, had seen a German aircraft drop an object into the sea near the beach. At first they believed the dark shape to be a parachutist. They waded out into the water to investigate, but incoming tide forced them back. A report had been made to the naval authorities, who realized that the chance of recovering a magnetic mine intact had come at last. Lieutenant-Commander Ouvry was told that the mine should be uncovered at low water, which would be at 4 a.m. A car was waiting to take him and Lieutenant-Commander R.C. Lewis, R.N., also of H.M.S. Vernon, to Shoeburyness. Their orders were to examine the mine and recover it at all costs.

Two hours later they were met at Shoeburyness by a naval Staff Officer, a party of soldiers equipped with lights, ropes and stakes, and two photographers. It was a dark night, and rain was falling. In the river a large company of ships lay at anchor, unable to sail until the channel had been cleared of the unknown. A frozen-meat ship had caused a mine to fire as she swung to the turn of the tide.

Led by one of the soldiers, the party set off in the darkness, splashing through the pools left by the ebbing tide. At length the light of the torches revealed a black object lying partially embedded in the sand. The two officers advanced to the attack, while the soldiers in the rear illuminated the mine with an Aldis signalling-lamp.

THE "BOSUN'S NIGHTMARE", *so called because of its tangles, was the first answer to the magnetic mine. The cylindrical bar is the sinker. Oval-shaped floats are called "blobs." The wire sweep is magnetized.*

They found the mine to be cylindrical in shape, about 7 feet long, made of some aluminium alloy, with tubular spokes on the nose and a hollow tail containing a massive bronze spring for projecting the parachute. There were two sinister fittings near the fore end. One was evidently a hydrostatic valve. The other was impossible to identify. It was made of polished aluminium and secured by a screwed ring sealed with black wax. As this fitting seemed more likely to harbour a primer and detonator, Lieutenant-Commander Ouvry decided to tackle it first.

Lieutenant-Commander Lewis took an impression of the securing ring on a sheet from a signal pad in order that a brass [non-magnetic] spanner might be made to unscrew it. Flashlight photographs of the mine were taken from all angles, and measurements made for purposes of description. It was then decided to wait until noon, when the mine would be uncovered, and the soldiers tenderly lashed it down with the ropes and stakes. On their way back to the car the party came upon the parachute spread out on the sand. It was made of white silk and took eight men to drag it above high-water mark.

At 6 a.m. the Vernon officers had just finished breakfast when they received a message that another mine had been sighted about 300 yards from the first. They immediately set off again and waded out in the deepening water to find it. The occupant of a moored hulk nearby told them that it had been submerged for some minutes, and they decided to wait for the falling tide.
A preliminary report was them framed and sent by car to the Admiralty, together with copies of the photographs which had been developed and printed. At one o'clock both mines were uncovered. By that time the special mine-recovery party had arrived from H.M.S. Vernon, with Chief Petty Officer C. E. Baldwin in charge, bringing a set of non-magnetic tools as an addition to those which had been made at Shoeburyness during the night. A tractor lorry with a crane fitting was kept in readiness in a sheltered position on the foreshore. While daylight photographs were being taken of the first mine, the officers examined the second; it was found to be on a different slew from the first, with its nose inclined downwards, and was more battered.

It was then arranged that lieutenant-Commander Lewis and Able Seaman A. L. Vearncombe should remain on the foreshore while Lieutenant-Commander Ouvry and Chief Petty Officer Baldwin tackled the first mine. Lieutenant-Commander Ouvry outlined a definite sequence of events, which others would be able to observe clearly from the distance—"in case of a mistake on my part," as he put it.

He and the Chief Petty Officer then set out across the sand, having first emptied all metal objects from their pockets. It had been said that they volunteered for the task of rendering the mine safe. There was no question of this. It was the work for which they had been trained, the work for which they had been waiting to do for weeks. Whatever their feelings may have been, they accepted the risk, serious though it undoubtedly was. They had no means of knowing whether the mine had some special trap that would cause it to detonate should an attempt be made to dissemble it. They were like men who advance along a jungle path which may well be ambushed. But both were experts at their work; and they had their courage.

They started on the aluminium fitting on the upper part of the mine. The keep-ring unscrewed easily and there was no difficulty in raising the fitting. This Lieutenant-Commander Ouvry did, however, with the greatest caution, since he believed he was handling either a detonator or some sort of magnetic needle. It proved to be a detonator.

Confident that this operation had removed the principal danger, he summoned Lieutenant-Commander Lewis and A.B. Vearncombe to help him turn the mine so that he could reach the fittings hidden by the sand. This they accomplished without mishap, and a second detonator was discovered, of a type similar to that of the German horned mine. The fangs had now been drawn.

"We felt on top of the world!" wrote Lieutenant-Commander Ouvry afterwards.

By 4 p.m. they were satisfied that they had made the mine innocuous. It was hoisted on to the lorry, for dispatch with the parachute to the Vernon the following morning, and an hour later a report was made to the Admiralty that the mine had been recovered intact.

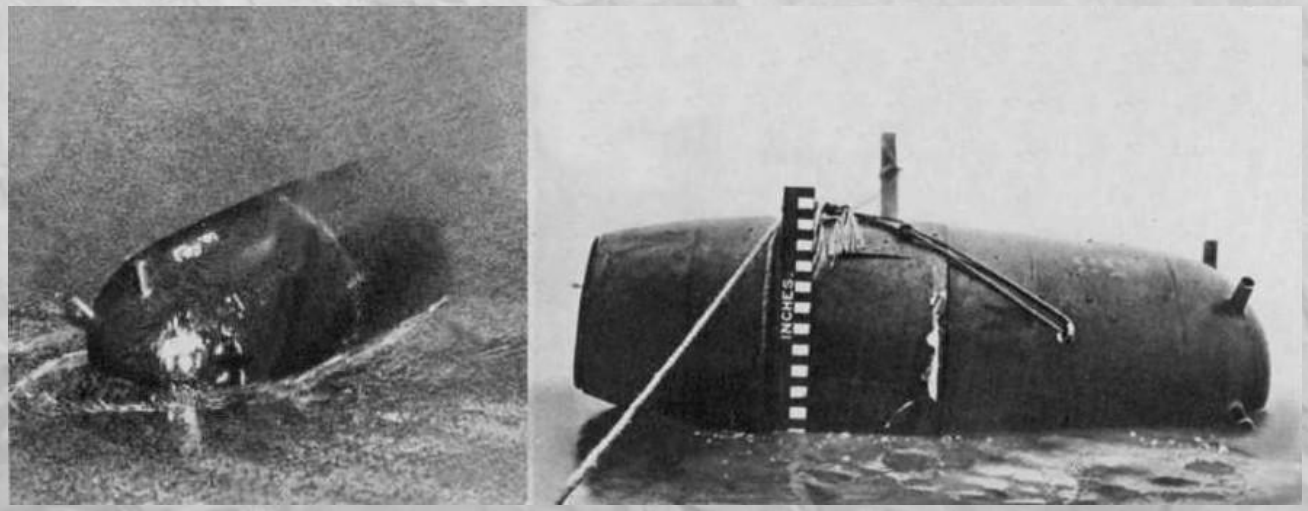
The mine reached Vernon next day. Its total weight was 1,128 lbs. and it carried an explosive charge of 660 lbs. in the fore end. The conical stern became detached when the aircraft dropped the mine, thereby releasing the parachute. When stripped down by the experts of the Vernon its mechanism proved to be what one of them called "a scientist's paradise." Mr Churchill had given orders that work was to proceed night and day until the answer had been produced. In twelve hours the solution was passed to the Admiralty; it was indeed a magnetic mine, and all its secrets had been laid bare.

Lieutenant-Commanders Ouvry and Lewis were awarded the D.S.O., C.P.O. Baldwin and A.B. Vearncombe the D.S.M. Lieutenant J. E. M. Glenny, R.N., who rendered the second mine safe received the D.S.C.

The recovery of these mines was not only among the most gallant deeds of the war, but was a turning-point in the long and bitter conflict between minesweeper and minelayer, Hitler had relied on the magnetic mine to destroy the British mercantile marine. It is on record that Captain Hans Langsdorf, of Graf Spee, assured his Captain Patrick Dove, master of S.S. Africa Shell, that Germany regarded it as the secret weapon which would be the decisive factor in winning the war. He declared that it had been invented eight years previously and that since then the cleverest German technicians had failed to find the antidote.

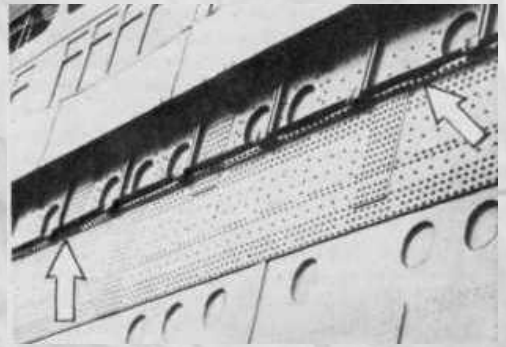
"Now the British Navy has to start where we began eight years ago," he said.

But what one man's brain can contrive, another's can resolve. There is a parry to every thrust, an antidote to every poison, once the analysis has been made, and as soon as the secrets of the magnetic mine had been discovered it was possible to provide the counter-measures.



DEATH BY FLASHLIGHT. *In the black ebbing waters of the Thames estuary before dawn on 23rd November, 1939 , lay this German magnetic mine, pictured left, the first to be recovered intact. The men of H.M.S. Vernon [a naval shore establishment, not a ship] were told to secure it "at all costs." Pictured right, lashed down in the morning light, the "secret weapon" is about to yield its secrets. The spokes on the nose are to prevent it rolling or washing away once laid.*

A PARRY TO EVERY THRUST. *The arrows point to the famous H.M.S. Vernon invention, the "degaussing girdle," around the liner Queen Elizabeth. This electrically energized belt neutralizes the ship's magnetism and gives her almost complete safety from magnetic mines.*



A new sweep was evolved, the principle being to create a magnetic field which would activate the needle of the mine, and the sweepers soon began to achieve satisfactory results. Moreover, since the paravane could give ships no protection against ground mines, they were provided with a simple but effective device known as "degaussing girdle," which could be fitted to vessels of any size; a band of wire fastened round the hull level with upper deck and energized by an electric current, which has the effect of neutralising the ship's magnetism and giving her almost complete immunity. At one time 1,200 miles of wire cable were being used weekly to fit the ships.

It was this degaussing gear which made it possible to send R.M.S. Queen Elizabeth on her maiden voyage to New York, and it has saved countless vessels great and small, from destruction. It seems ironical that the unit of magnetic flux, which is one of the means of countering the magnetic mine, should derive its name from a German scientist, Carl Frederick Gauss [1777-1855]. One Senior Officer of a minesweeping flotilla found it a name to conjure with when, after an abortive search for a magnetic minefield, he complained that he had been sent on a wild gauss chase.

Once the remedies had been found, the losses were far less disastrous. The sweepers, however, were faced with a resourceful and remorseless enemy, who knew how to vary his tricks and was deterred by no considerations of chivalry in his designs for paralysing British commerce. Time after time he launched an intensive mining campaign, and at one period attacked defenceless fishing craft to prevent their being used as minesweepers. Occasionally a mine or float would be picked up inscribed with threatening messages. One, scrawled in white paint, read, in somewhat ungrammatical German rhyme:

"Geb ich ein gut Geleite
Churchill hat dann grosse Pleite."

which may be translated:

"Guide me on my way aright
Then Churchill will be sad in plight."

It now reposes in H.M.S. Vernon's museum, alongside the most treasured "carcass" of all, the first magnetic mine.

The German occupation of Norway, Denmark, Holland,, Belgium, and France, and Italy's entry into the war, placed an even heavier burden on the sweepers. A new phase of mine-warfare began; the laying of contact mines by E-boats after a preliminary aircraft attack on the sweepers. In these offensives the sweepers gave a good account of themselves, although there were inevitable casualties, including one trawler sunk with nineteen of her crew. But many aircraft were brought down.

H.M.T. Berberis, who destroyed one and severely damaged another off the East Coast, received a signal of congratulation on her efficient gunnery from the Board of Admiralty, which also bestowed praise upon the whole Patrol Service in the Nore Command for its excellent spirit in the face of repeated air attacks. Nor was the campaign confined to the waters off the East Coast, for Dover, the Solent, the Bristol Channel, the Mersey and the Clyde were visited by minelaying aircraft. The Dover trawlers, besides being bombed and machine-gunned from the air, were under frequent shell-fire from the French coast.

The Admiralty's answer to this campaign was sweeping by night. This was unknown in the last war and it presented a complex problem, particularly in the tidal channels of the Thames Estuary. But it was mastered, under the pioneer leadership of Captain G.B. Hartford, D.S.O., R.N., and during the winter of 1940 the sweepers of one base covered 1,000 miles every week. The strain on officers and ratings was severe, and the work was not done without loss, but the casualties were far less than they would have been in daylight operations, exposed to air attack.

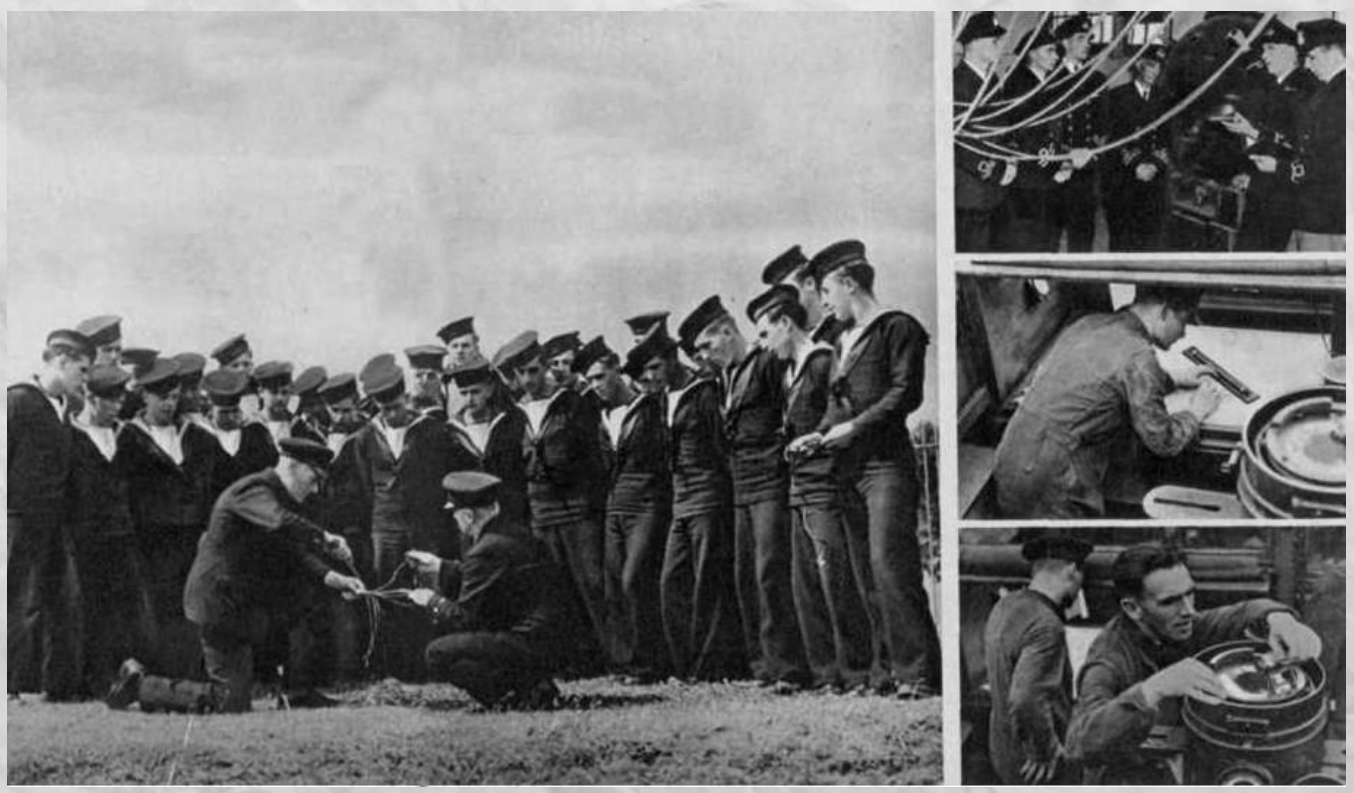
The result of the sweeping during the first twelve months of the war was an achievement of which the little ships could be proud, but for them there was no resting on their sweeps. From day to day there was no knowing what fresh "secret weapon" would confront them. None knew better than they that across the water the best brains in Germany were devising new engines of destruction, one of which at any moment they might have to meet.

In due course it came. Observers began to notice that minelaying aircraft would cut off their engines before releasing their mines. There were reports of more unexplained explosions, some of them in water which had been swept for ground and contact mines. The new type was found to be actuated by the underwater sound emitted by the passage of ships through the water. This became known as the acoustic mine. Once again the experts of H.M.S. Vernon tackled the problem and took measures—which of necessity must remain secret—to counter the new campaign

So the battle of brains goes on. It was certainly well for British shipping that the German claim to have sunk H.M.S. Vernon [in fact a shore-based establishment] was a Goebbels lie. While the Germans continue to produce their "ingenious variations," as Mr Churchill has called them, the men of the Vernon continue to lay their counter-plans, deducing from their experience what the next trap may be, so that they may be ready when it comes and, if possible, at least one jump ahead in their precarious work finding the right equipment to place in the hands of those whose duty it is to sweep the sea.

DEAD LETTER. *The German message on the captured mine says:*
"Guide me on my way aright then Churchill will be sad in plight."

THE NEW BROOMS



THE MEN OF THE SWEEPERS. *Learn to be masters of their dangerous job in H.M.S. Lochinvar a shore establishment. Top left, rating trainees are taught wire splicing. Above; the mechanism of a mine is explained to officers, seen through the shrouds of a mine-dropping parachute; an officer studies pilotage; another takes a compass bearing.*

THE TRAINING of the officers and ratings for the minesweeping Branch of the Royal Naval Patrol Service is carried out at the naval establishment known as H.M.S. Lochinvar, based on the shore of a Scottish Firth.

Every three weeks a score of officers arrive from H.M.S. King Alfred, where they have completed their cadet course; they have taken an additional gunnery course on trawler weapons in H.M.S. Excellent. All have served varying periods as ratings and have been commissioned as Sub-Lieutenants in the Royal Naval Volunteer Reserve. They have volunteered – or perhaps it would be more correct to say that they have expressed a preference for – the Minesweeping Service, of which some of them may have had experience on the lower deck.

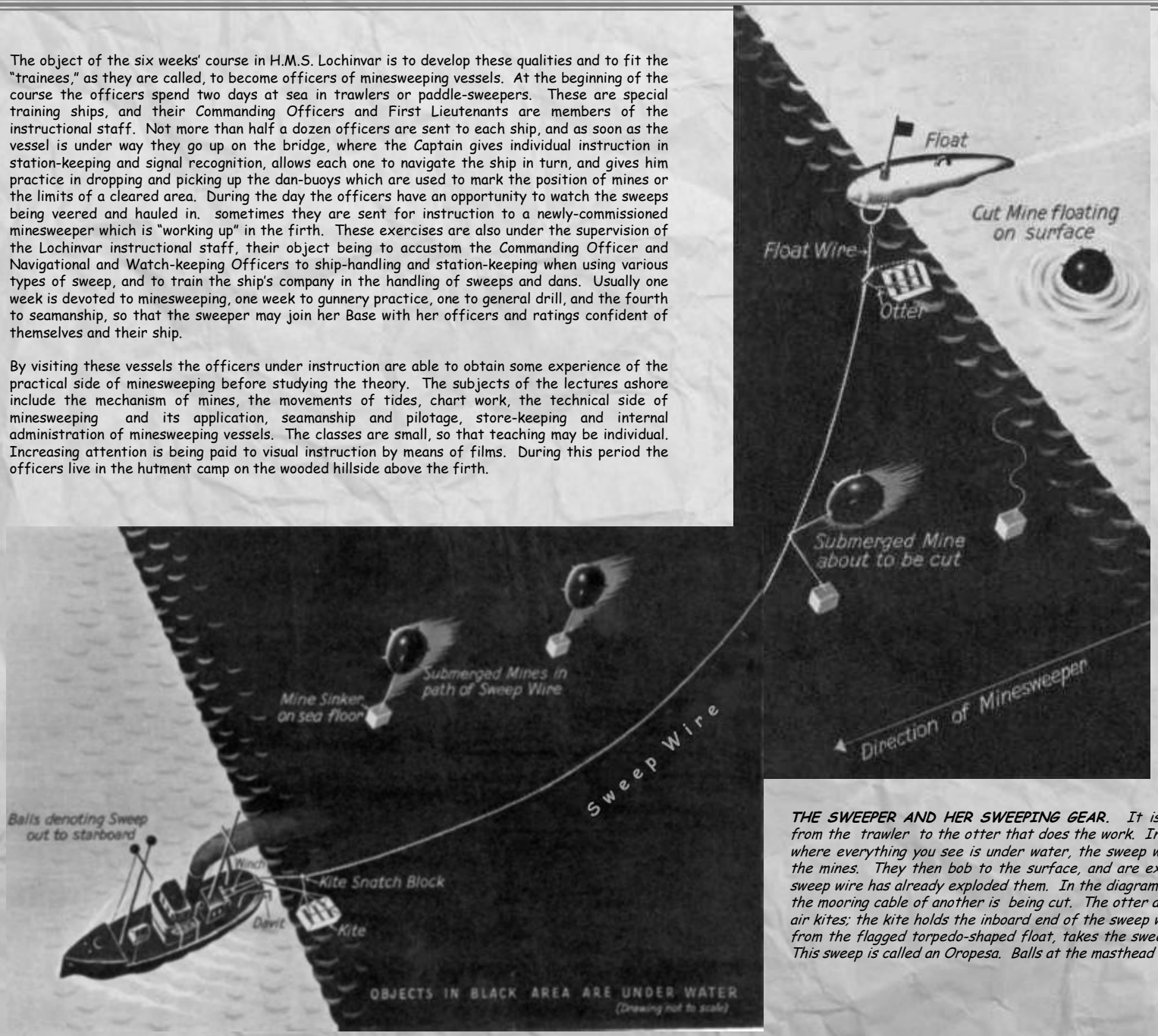
At the beginning of the war trawlers were regarded [by those who did not man them] as the lowest form of marine life; all they could do was to tow "a bit of wire." The sweepers themselves have changed all that. Now that the Navy has seen what they can do, there is competition to join them.

Some men prefer to serve in battleships and cruisers, but those who have shared the more intimate life aboard a sweeper believe their branch to be the finest in the Royal Navy.

The applicants are, however, specially selected, for the work makes peculiar demands upon a man besides those ordinary "officer-like qualities" which the Navy requires. A minesweeping officer must be a Jack of many trades and master of most. He must be technically minded, to understand the intricacies of the modern sweeping gear. He must have a bent for pilotage, for when in command of a sweeper he will be his own Navigator and must be familiar with particular navigational problems of trawlers. He must be competent to keep his charts up to date, to plot the position of a minefield, and to read signals. He will also be his own Gunnery Officer, and requires a sound knowledge of the armament used in minesweepers. And besides all this he needs the endurance of a strong body, the initiative of a quick mind, and the resolution of a gallant spirit.

The object of the six weeks' course in H.M.S. Lochinvar is to develop these qualities and to fit the "trainees," as they are called, to become officers of minesweeping vessels. At the beginning of the course the officers spend two days at sea in trawlers or paddle-sweepers. These are special training ships, and their Commanding Officers and First Lieutenants are members of the instructional staff. Not more than half a dozen officers are sent to each ship, and as soon as the vessel is under way they go up on the bridge, where the Captain gives individual instruction in station-keeping and signal recognition, allows each one to navigate the ship in turn, and gives him practice in dropping and picking up the dan-buoys which are used to mark the position of mines or the limits of a cleared area. During the day the officers have an opportunity to watch the sweeps being veered and hauled in. sometimes they are sent for instruction to a newly-commissioned minesweeper which is "working up" in the firth. These exercises are also under the supervision of the Lochinvar instructional staff, their object being to accustom the Commanding Officer and Navigational and Watch-keeping Officers to ship-handling and station-keeping when using various types of sweep, and to train the ship's company in the handling of sweeps and dans. Usually one week is devoted to minesweeping, one week to gunnery practice, one to general drill, and the fourth to seamanship, so that the sweeper may join her Base with her officers and ratings confident of themselves and their ship.

By visiting these vessels the officers under instruction are able to obtain some experience of the practical side of minesweeping before studying the theory. The subjects of the lectures ashore include the mechanism of mines, the movements of tides, chart work, the technical side of minesweeping and its application, seamanship and pilotage, store-keeping and internal administration of minesweeping vessels. The classes are small, so that teaching may be individual. Increasing attention is being paid to visual instruction by means of films. During this period the officers live in the hutment camp on the wooded hillside above the firth.



THE SWEEPER AND HER SWEEPING GEAR. *It is the sweep wire curving back from the trawler to the otter that does the work. In the black part of the diagram, where everything you see is under water, the sweep wire cuts the mooring cables of the mines. They then bob to the surface, and are exploded by gunfire – unless the sweep wire has already exploded them. In the diagram one mine has been severed and the mooring cable of another is being cut. The otter and kite work on the principle of air kites; the kite holds the inboard end of the sweep wire down; the otter, suspended from the flagged torpedo-shaped float, takes the sweep out on the trawler's quarter. This sweep is called an Oropesa. Balls at the masthead show sweeping is in progress.*

"OUT SWEEP." *Above, the float with its flag is ready on its chocks. The otter is being lowered from the davit.*

Right top, launching the heavy Oropesa float needs both strength and care, especially in rough weather. The careless, if there are any, may crush their hands between float and vessel. Everyone lends a hand except the stokers below.

Right bottom, down the float goes. Soon it will be bounding along 500 yards astern and 250 yards out on the quarter.

At the end of their training "on the beach" they go afloat for three weeks' training in trawlers which are fitted with Gun Rooms to accommodate ten officers. There they form the non-specialist crews of the ships, veering the sweeps and doing the work of the men whom they will later be called upon to command. Much attention is also paid to gunnery, watch-keeping and pilotage, and each officer takes his turn of duty as the First Lieutenant.

On "Action Stations" they will range the guns on an imaginary submarine or hostile aircraft. Masked figures will race along the decks when the gas alarm is given, on fire duty or putting out collision mats. The commands "man Overboard" and "Away Seaboats" demand the appropriate drill. Sweeps are veered in various formations. Dan-buoys are laid and recovered, sights taken, the fog-buoy streamed, the anchor weighed by hand.

Thus are bodies and minds trained to be vigilant and alert, and all learn to work in the team. For this is the chief lesson which minesweeping training has to teach; efficiency is achieved not only by the Captain and the First Lieutenant knowing their job, but by the whole ship's company working together with the precision of a rowing eight and the co-operation of a rugger fifteen.

Having completed the course, the officers sit for a written examination. Those who pass [and few fail] go the Minesweeping Officers' Pool to await posting to ships.

In addition to the course for newly commissioned Sub-Lieutenants, a number of officers from different branches of the Navy come for a week's training in minesweeping, either as a refresher course, if they have been in the Minesweeping Branch and left it for a time, or for concentrated instruction if they are new to the work. Many officers of the Royal Naval Volunteer Reserves of Canada, Australia and New Zealand, and of the Royal Indian Navy, have taken this course, also those of the Allied Navies – Americans, Dutch, Belgians and Norwegians.

No less important than the training of officers is the training of ratings, of whom 50 arrive every week for a three weeks' course. To-day these are all "H.O." men – those who have joined the Navy for hostilities only. After receiving their general training in one of the establishments ashore they have been drafted to the Patrol Service in accordance with naval requirements, and, having been fitted up at the Headquarters, those who are destined for minesweeping are sent to H.M.S. Lochinvar for special training.

Like the officers, they spend two days at sea and acquire practical experience in the manual working of the sweeps, in splicing the wire hawsers, in steering the trawler, and in those deck duties which the Navy describes by the expressive term "pulley-hauley." Ashore, Petty Officers give them instruction in trawler gunnery, rifle practice, deck work and general seamanship, so that they may take their places as efficient members of any minesweeping ship, whether she be trawler, drifter, dan-layer, or fleet sweeper.

At the end of the course the majority return to their Headquarters to await drafting, but a certain number go to the ships of one of the training flotillas in the firth, where they too form the non-specialist members of the crews for a further three weeks. This practical instruction has proved immensely valuable and is being extended as more vessels become available.

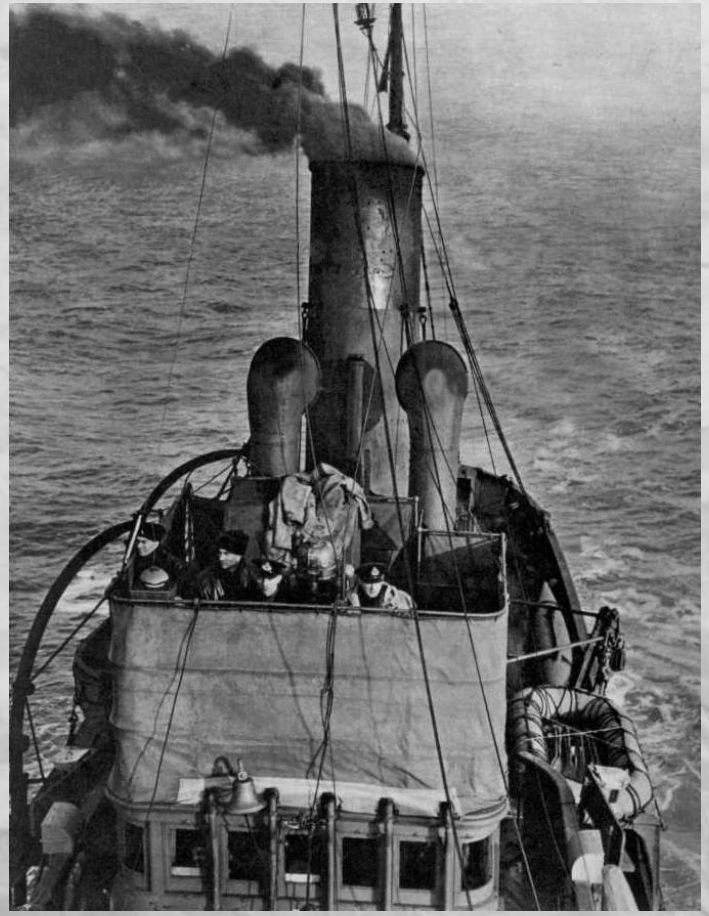
In this way nearly 2,000 officers and over 10,000 ratings have been trained in H.M.S. Lochinvar since the outbreak of war. Among them have been 500 Skippers, R.N.R., but to-day the newly commissioned officers all belong to the R.N.V.R. No officer who has passed the Lochinvar course has been found incapable of doing the duty required of him, and none has ever applied for transfer to another branch before sitting for his examination

One of the most remarkable aspects of the naval side of the war is the increasingly important part the R.N.V.R. officers are playing in all branches of the Service. In the last war there were very few in the minesweepers and there was a tendency throughout the Navy to regard them as amateurs. To-day the fine work they are doing is appreciated by their brother officers of both the Royal Navy and the Royal Naval reserve, and nowhere is it more valuable than in the minesweepers, the majority of which are now commanded by officers of the R.N.V.R., who have thus become entitled to regard themselves as much an integral part of the Fleet as officers who specialize in submarines or naval aircraft.

All the more credit is due to these young officers because, before they joined the Navy, the majority were landsmen who knew nothing of the sea and they have had to earn the respect of their men. On a single course in H.M.S. Lochinvar recently the R.N.V.R officers under instruction included those who in civilian life had been a Local Government clerk, a surveyor's assistant, a chemist, a shop manager, a schoolmaster, a chartered accountant, a printer, a bank cashier, a glove manufacturer, a cine-technician, a salesman in the woollen trade, an inspector of the Metropolitan Police, a fur-buyer, a display artist, a fiction writer, an architect, a cabinet maker, and an Australian sheep-farmer.

There is a Negro proverb "New broom sweep clean, but de old broom know de owner." The new brooms of the R.N.V.R and the old brooms of the R.N.R. are proving a formidable sweeping combination for the German minelayers.

SWEEPING THE WAR CHANNEL



THE MAJORITY of the officers and ratings who pass through H.M.S. Lochinvar are posted to trawlers, which in this war, as in the last, are the mainstay of the Minesweeping Service. These seaworthy little steel ships, with high bows, a length of about 140 feet and a displacement of between 200 and 300 tons, may be seen in scores at any of the minesweeping ports of Great Britain, lying three or four abreast alongside the quay, steaming out to their sweeping grounds, or returning to port after their spell at sea.

To-day they are painted grey and carry numbers, but when in harbour they display their names in white letters on a black board. These names are sometimes high-sounding, such as Earl Kitchener, Lady Philomena, Three Kings; sometimes poetic, such as Sweet Promise, Sea Holly, Waveflower. Some, like Stella Leonis and Stella Rigel, are the names of constellations; some of the jewels – Sapphire and Emerald, of trees –Acacia and Olive; of the Knights of the Round Table – Sir Gareth and Sir Lancelot; or of more mundane gentlemen, such as William Stephens.

Many of them have their own badges, perhaps designed by the Skipper, executed in colour by one of the hands and proudly displayed on the "verandah" which encircles the wheelhouse below the upper bridge. One has a representation of the Old Man of the Sea and a brush; another a brush, a mine and a flash of lightning [symbol of the magnetic sweep] with the motto *Mare clausum veni,* which the Skipper will translate for the benefit of the new hands as "The sea was closed to commerce before I came." The Stella Rigel has a mine below her starry cluster and the motto [disdaining Latin], "To hell with Hitler."

The trawler's usual armament is a 12-pounder on the whaleback in the fo'c'sle head, an Oerlikon [or twin ·5's] on the gun-platform aft, two Lewis guns on the "verandah" and a Holman projector, which fires shrapnel bombs for short range use against aircraft.

The normal complement of the minesweeping trawler is 23; the Skipper and the Second Skipper, who acts as First Lieutenant; the Second Hand, a Chief Petty Officer; two Enginemen, both Petty Officers; a signalman ["Bunts"], a telegraphist ["Sparks"], a gunlayer, a wireman ["Torps"]; a motorman, eight seamen, three stokers, a cook, and an assistant steward.

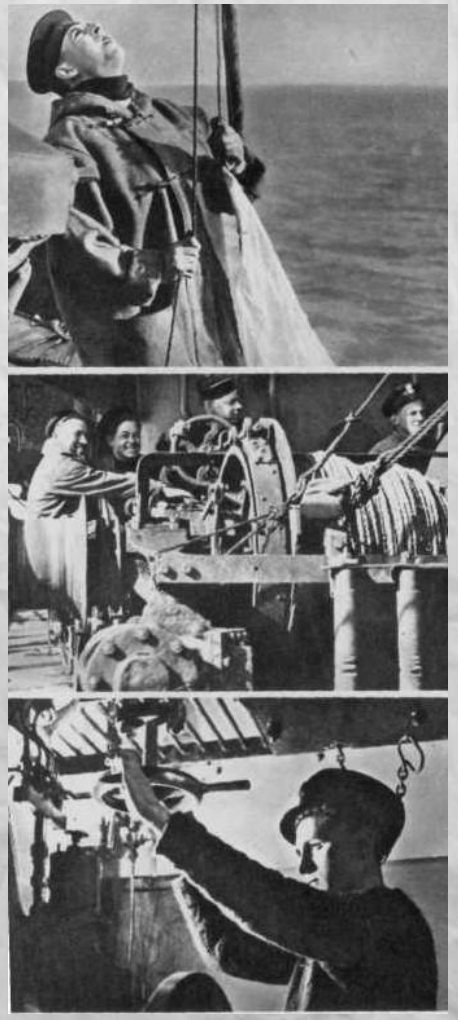
Every man has his own sweeping station, each seaman his own place at a gun. If the look-out sights an enemy aircraft, surface vessel or submarine, "Action Stations" is sounded by the alarm bell. The Skipper remains on the upper bridge. The Second Skipper is in charge of the 12-pounder. The Second Hand takes the wheel from the helmsman, who closes up to his gun position. One stoker remains below with the engineers. The others serve the 12-pounder ammunition from the magazine and stand by to put out fires on deck. The cook helps to serve the gunlayer, while the wireman fills the pans of the Lewis guns.

When a trawler has brought down an enemy aircraft she is entitled [by custom of the Service] to paint a swastika on her funnel, while the tally of mines destroyed is kept by chevrons and stars; a white chevron denotes a single min, a red chevron five, a blue star twenty-five, and a red start fifty. The record is held by H.M.T. Rolls Royce, which to date has a total of over 150 mines to her credit.

The ratings berth for'ard, every man with his own bunk – there are no hammocks. The Skipper's cabin is amidships, below the Chart Room, and there is a tiny Ward room. All aboard earn their "hard-lying money" – a shilling a day for ratings – although the accommodation is considerably more comfortable than it was in peacetime. The food is good and well cooked. The favourite recreations on board are draughts, dominoes, solo and cribbage. There is always a ship's cat, and often a dog as well. In one trawler a budgerigar flies about the mess-deck; another has as her mascot a large duck, which waddles pompously along the deck, swearing at the seagulls.

In peace time a trawler skipper is usually a man of substance. Some, particularly those who work in Arctic waters, earn £2,000 a year and more. Most of them have been at sea since they were sixteen, and have been in and out of ships all their lives. They have to spend four years on deck and one year as mate before they can sit for a skipper's tickets, which entitles them to take any ship into any waters, provided she is going fishing. The sea experience they gather with the years enables them to navigate by instinct rather than by chart.

The Skippers are independent by nature and conservative by tradition. When fishing they have their own methods of enforcing orders, much as the father of a large family has his; indeed, they are often related by birth or marriage to many of the crew and usually call them by their Christian names. All fishermen have an intensely developed civic pride and there is usually a friendly rivalry between a Grimsby trawler and one from Hull or Aberdeen. They are also extremely superstitious. The words pig and rabbit may not be mentioned aboard a trawler; and it is considered bad luck to go out of harbour astern, to put a hatch on upside down, or lay a broom across a trawl.



THE TEAM. *Top, running up signal flags. Centre, manning the winch which winds the sweep wire in and out. Bottom, down below at the engine-room throttle.*

On the outbreak of war, when many of the trawlers were taken over as minesweepers, the skippers were placed in command, with fishermen as ratings. Some of the skippers had been trained in the royal Naval Reserve, a certain number had served in the last war, others joined the Navy for the first time. They were given the rank of Skipper-Lieutenant or Skipper, R.N.R. Most of them were splendid seamen, but they did not take easily to filling in forms or writing official reports; they were often puzzled by the Confidential Books issued to them, and one was bewildered by a signal in which the word "rendezvous" occurred. They had but a hazy idea of naval discipline, and preferred their own way of handling their men.

On the morning war was declared the Commander M.S. of an East Coast port was on board one of the trawlers which had just been commissioned. He pointed out that the Skipper's duty was to read the Articles of War. The Skipper fished out the Articles from a drawer beneath his bunk, looked dubiously at their many clauses, then told the Second Hand to turn all hands up on deck. When they assembled he addressed them thus.

"Now lads, we've just heard over the wireless that England has declared war on Germany. I'm supposed to read you the Articles of War. There's a lot of 'em and most of you wouldn't understand nothing if I did read 'em. But what they really mean is this; now we're at war, this ship's yer home. Minesweeping's hard work, and fairly dangerous. I was blowed up twice last time, but I'm all right. You do yer duty and when you gets into harbour you has certain privileges. If you does yer work properly me and the Commander" [with a jerk of his thumb over his shoulder to indicate that officer] "will see as how you gets those privileges. That's all."

That was language the fishermen crew understood. But the Minesweeping Service expanded fast. As in the last war, it could not be manned by fishermen alone and there were more trawlers than skippers. As the organisation developed, two trawlers formed a unit, with a Skipper-Lieutenant, or a Lieutenant, R.N.V.R., in command, and two units made up a group, usually under a Lieutenant-Commander R.N.V.R. It was inevitable that the skippers should regard these officers, who were often much younger than themselves, with some suspicion. At first they tended to keep themselves apart, and in the local hostelries ashore they would collect in groups of their own, while R.N.V.R. officers formed theirs. But thanks to the tact of the younger officers and the readiness of the skippers to recognise efficiency when they saw it, gradually mutual confidence was born of experience and all came to work – and drink – together.

So it was with the H.O. ratings who were drafted to trawlers. They were new to the sea and ignorant of the traditions which fishermen held dear. There were times when, like a traveller visiting an unknown native tribe, they stumbled against a tabu and unwittingly gave serious offence. On one occasion a wireless telegraphist, not long transplanted from civil life, brought back to his ship a brace of rabbits under the impression that all on board would appreciate a change of diet. The trawler was the senior ship of the group, commanded by a Lieutenant, R.N.R., who heard a sudden commotion in the fo'c'sle. He summoned the Second Hand, who informed him that the men were protesting against sailing with the rabbits on board. The Group Officer was a man of experience and wisdom. He issued no orders. He merely called up "Sparks" and persuaded him to drop the rabbits overboard. That done, peace was restored.

As long ago as 1663, Sir Roger L'Estrange called the English fishery "the only common nursery of seamen," and the Navy is not likely to forget the fine men, both skippers and ratings, which the Fishing Fleet has given it in time of war. To-day, however, it is rare to find more than a couple of fishermen in a trawler and the ratings come from many trades – from butchers to bus drivers, from metal-workers to market gardeners. Men who work on the soil always take readily to the sea, but even a ladies' hat renovator is not unknown in a trawler. One coo's civil occupation was that of an asphalt-mixer. His rice puddings were said to run to trade.

It was not long before the skippers came to recognise the worth of those young men. Landsmen they might be, and lubberly at first, but they had joined the Navy to fight for their country and they were anxious to learn. Once they had shaken down they showed intelligence and initiative.

"You can take the average Englishman afloat and make a seaman of him in three months, once he gets over his seasickness," is the opinion of one trawler skipper. "Go far enough back and you'll find there was a seaman in his family. The biggest trouble is to make them keep their lifebelts on, or to make them realise there's any danger – until a mine goes up alongside."

After six at sea months at sea a rating earns the right to wear a badge of the Royal Naval Patrol Service; a shark with a marlin-like spike to represent the anti-submarine vessels, and a mine for the sweepers.

At first neither the skippers nor the fisherman ratings took kindly to naval routine, but they have come to take a pride in keeping their ships clean and in turning out in smart naval rig when they go ashore, while at Divisions on Sunday mornings the sweeper crews in port will vie with each other on the quayside and march past the Commander M.S. [to the music of a gramophone relayed by loud-speaker] with a swing that would not disgrace the men of a battleship.

The ratings are well looked after at each Base. There are ENSA concerts, cinemas, a well-stocked canteen, a comforts store and shower-baths. Football and cricket matches are played between ships and groups, with a cup given by the Captain of the Base, and when a trawler is due for her three-monthly boiler-cleaning one watch has five days leave. Boiler-cleaning is a mysterious word to many relatives of men in the Minesweeping Service. One lady defined it as "the time my old man comes home."

At every port there are always a number of trawlers with steam up at instant readiness for sea; the remainder proceed at their appointed time, and thus they keep the 1,700 miles of War Channel clear for shipping, sweeping day and night. Only exceptionally hard weather will confine them to port, and then only because they cannot sweep efficiently in a high sea. Their losses have been considerable, both from mines and aircraft attack, but the skippers and their crews remain imperturbable.

The presence of R.A.F. fighter protection gives a sense of security and is much appreciated, but the trawlers have to accept the risk of sweeping alone and then rely upon their own armament. They have accounted for many enemy aircraft, and one skipper, who has several to his credit, was once asked to explain his technique to ratings under gunnery instruction. His lecture was as follows;

"I sees an enemy aircraft ahead. It gets a bit closer, so I calls my mate Bill and says, 'Enemy aircraft on the port bow, Bill. Get on the gun.' So Bill gets on the gun. Then I says, 'Shoot the beggar down, Bill.' And Bill shoots 'un down."

On another occasion two trawlers, the Syringa [Skipper W.T. Richie, R.N.N.] and the Reboundo [Skipper H.A. Catchpole, R.N.R.], were sweeping in company in the Channel, when they sighted an aircraft, which appeared to be a Junkers 87, approaching from the south-eastward and flying at about 300 feet. The Reboundo challenged, was answered by a burst of machine-gun fire, and then opened with her 12-pounder and Lewis gun and dropped a salvo of five bombs on either side.

It then attacked the Syringa, whose armament also went into action, spraying the bridge and deck with machine-gun bullets, and dropped two more salvoes, one missing to starboard, the other to port. Turning away to starboard it again bombed the Reboundo without damaging her, but a machine-gun bullet wounded Skipper Catchpole in the thigh.

Then came the Syringa's turn again. Seaman-Gunner Colyer, at the Lewis gun was killed by a burst from the German rear-gunner as the aircraft passed over the trawler, and a bomb pierced the engine-room casing. It landed on the platform on the fore side of the engine, but failed to explode.

THE BOMBER SWOOPS. *In the tiny-looking British trawler, men are rushing to the guns. The German bomber takes their picture as it races down upon them.*

"ACTION STATIONS." *The gunners are at the · 5 machine guns aft, the 12-pounder on the whaleback in the fo'c'sle head, and the Lewis gun by the bridge.*

The aircraft then returned for a third .attack, this time on the Syringa only. As it approached, it appeared to be losing height until eventually it came within range of the Syringa's low-angle gun, which opened fire. After the second round the German crashed into the sea a mile from the ship.

Skipper Ritchie then went down to the engine-room, where Stoker Petty officer G.H. Wood, R.N., had remained at his post throughout the engagement.

"With the assistance of Chief Engineman E.C. Clinton," wrote the Skipper in his official report, "I carried the bomb on the deck and threw it overboard."

The Navy is accustomed to understatement, and Skipper Richie's succinct account of how he disposed of the unexpected bomb as though it had been a dead rat did not blind the Board of Admiralty to his courage, or to the Stoker Petty Officer's calm bravery in remaining at his post with the bomb lying at his feet. Skipper Richie was awarded the D.S.C., Clinton and Wood the D.S.M.

Intensified mining by aircraft and E-boats stretched the minesweeping resources to the limit and involved heavy additional sweeping. With the aim of causing the utmost danger and destruction to merchant shipping the enemy was accustomed to chose as his objective a river estuary of the approaches to a busy port. Sometimes these minelaying offensives would continue at intervals for several weeks. At such times the trawlers might sweep continuously for 48 hours, covering 250 miles.

One such attack came when a strong force of enemy aircraft dropped an exceptional number of mines in port approaches on the East Coast. All the trawlers in the roads opened fire, but without appreciable results, since their armament is designed mainly for defence against dive-bombing.

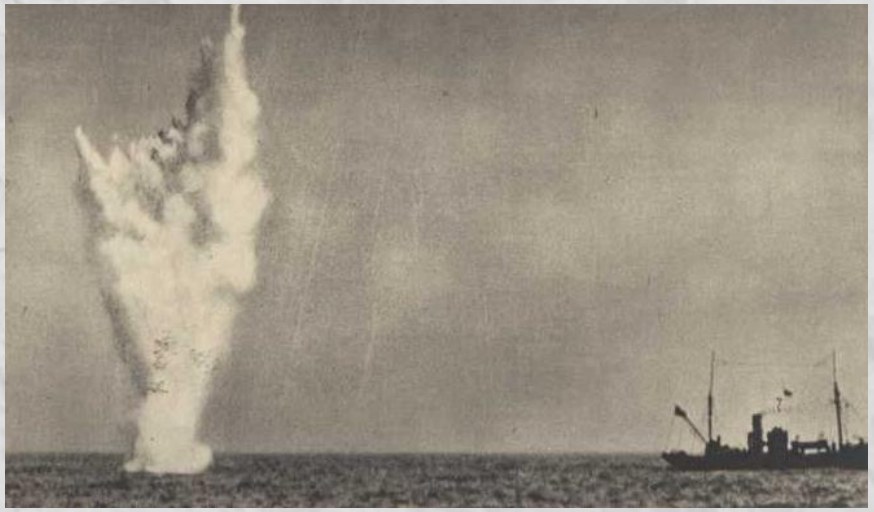
The port was closed that night, but next morning the sweepers were under way at the first sign of dawn, and hopes were high for a record bag. Results were soon forthcoming . Half an hour before sunrise H.M.T. Fitzgerald detonated the first mine, and so began a momentous day. Until eleven o'clock there was one explosion after another. In a single half hour no less than nine mines were destroyed, and twenty had gone up before lunch-time.

"Then came a lull, perhaps welcome to everyone," wrote the officer in charge of the operations. "Even mines themselves seemed to be taking a long dinner-hour, nevertheless the sweepers toiled on, and by this time the full force were on the job. At 14:52 the sweepers seemed to get their second wind, and the buildings ashore once again felt the shock of mine detonations. This brought the grand total up to twenty-seven mines for the day, which smashed all previous records. Sweeping continued up to dark, and then only were the sweepers satisfied with their day's work. One trawler was seen trailing forlornly into harbour about 21.00 hours, having toiled all day and caught nothing, but she knew her that her job of work had been just as useful as that of the Cayrian who could boast twelve mines in the day. One mine, apparently overcome with depression at the fate of his fellows,, threw in the sponge and detonated of his own accord."

Day after day the clearance went on, the sweepers once beating their own record. The men felt that they were masters of the mines and the general attitude was, in the words of the official report, "Let 'em all come! We can deal with the mines faster than they can lay them, and we can keep it up longer."

The account of the last day's operations is best described by a quotation from the same report:

"The pack moved off soon after nine o'clock, led by the veteran Cayrian, closely followed by Strathborve and Gwenllian. If sport was to be shown, these were the ones to show it. The first covert was drawn blank, and the pack moved onto the next. Cayrian could do no good; it was not her day. Nose to the ground, she searched the covert from end to end without success. It was nearly



***GOODBYE** to the old mine, on to the new.*

one o'clock and still a blank day. Then Strathborve gave tongue and the hunt was on. For the next two and a half hours the pace was killing, but the sweepers plodded on until the area was combed. Thus ended what must have been another record day."

When the clearance was complete at the close of play score, as the Commander M.S. puts it, varying his metaphor, was well over a century for no wickets. Not a single sweeper had been damaged and the one casualty to shipping was a fishing trawler. Only a part of her was visible when the spray subsided five seconds after the explosion, and nothing was picked up but a man's cap.

As against this loss many merchant ships and fishing craft had entered port and sailed while the clearance had been in progress, swept in or out by the trawlers. The fate of the fishing vessel suggests the destruction that might have been caused to shipping had the sweepers not been there to do their work, which is but a single instance of their devotion to duty since the war began.

The destroyer has often been called the maid-of-all-work of the Navy; the minesweepers might be called the charwomen of the sea. In every town and city these hardworking women are up with the dawn, sweeping and clearing passage and office before their betters are abroad. Most people take their work for granted. Few know how they live; few even see them, save perhaps for a glimpse of one adjusting her bonnet as she departs. They are sturdy, weather-beaten and good-humoured. Rain, hail or snow finds them at their task; and when there is a blitz they take it with a jest.

Like them, the minesweepers are as undeterred by blizzards as by bombs, and they have a spirit and a tradition of their own calling, for by the time the big ships are due their sweeping is done, their gear packed, and they are under steam for home.

DANGEROUS AREAS

THE WORK OF THE FLEET SWEEPERS

BESIDES THE TRAWLERS, a number of other vessels are employed on the routine sweeping of the War Channel; the motor minesweepers, which have a displacement of 200 tons, used mainly to sweep ground mines in the shallow waters of river estuaries and port approaches; the whalers, many of which burn oil fuel, a matter of importance when a small crew is required to steam the ship on a long passage; and the drifters, which in peace-time fish for herring with drift nets, their size making them handy ships for sweeping in confined areas.

These vessels are not usually employed in clearing extensive minefields laid outside narrow, a duty which is the function of the fleet minesweepers.

In the earlier days of the war the auxiliary paddle-sweepers were used for clearances. In fair weather a well-trained flotilla would carry out this work satisfactorily, and when mined they were difficult to keep afloat, so that as more fleet sweepers came into commission they were relegated to other, but no less useful, duties.

The fleet sweepers do not belong to the Royal Naval Patrol Service, but are R.N. or "General Service" ships, and are classed as "major war-vessels." The oldest type is the Albury class, laid down towards the end of the last war, and named after inland towns in Great Britain – Pangbourne, Derby, Ross. They have a displacement of 710 tons, a speed of 16 knots, and are the only coal-burners left in the Royal Navy; hence their nickname "Smokey Joes."

Next come the Halcyons, named after minesweepers of 1914, somewhat larger and faster than Alburys, while the new Algarine class is the largest and fastest of all. Between the two are modern Bangors, called after British ports, which have been encouraged to adopt the ships of their own name, send them comforts and books, and raise money on their behalf in Warship Weeks.

IT IS A TRICKY SWEEP. *The enemy had laid a minefield overnight. Chart and rule before him, dividers in hand, the Senior Officer [centre] plans the clearance with commanding officers of his flotilla.*

The larger and fastest of these minesweepers operate with the Fleet. Their speed enables them to sweep ahead of the capital ships when necessary, and their size fits them to carry an increased offensive armament of guns and depth-charges, so that when not minesweeping they can undertake escort and anti-submarine duties, particularly when the Fleet is covering the passage of an important convoy.

One of them recently rammed and destroyed a German submarine in Arctic waters, and when H.M.S. Edinburgh was torpedoed three of the Halcyons put up a spirited fight against superior forces. The Flag Officer in command had given orders that they should retire at full speed under a smoke screen if attacked by surface-craft. These orders never reached them. When the Edinburgh was hit, instead of turning away they turned towards the enemy destroyers, "going in like three young terriers," as the Admiral said, and firing whenever visibility permitted. Then while one made a smoke screen, the other two went alongside the sinking cruiser and took off the whole ship's company. The Admiral was among the last to leave. As he stepped on to the sweeper's quarterdeck her Commanding Officer saluted:

"Everything correct, sir. Your flag is hoisted."

The Admiral looked upwards. Flying at the masthead was the Cross of St George, with two red balls in the upper and lower cantons. Its ragged edge suggested that it was a Senior Officer's pendant from which the tails had been cut, and the red balls looked as though they had been hastily daubed on with red paint. But there was no mistaking it for anything but a Rear-Admiral's flag.

It was a gesture which no German could hope to understand; but one that Nelson himself would have appreciated.

The smaller fleet sweepers do not normally accompany the Fleet to sea or perform escort work, but nevertheless must have a speed which enables them to tow their sweeping outfit through the water faster than the trawlers, and sufficient fuel endurance to remain at sea during protracted clearance operations. They must be good sea-boats, handy, with a low silhouette, equipped to hunt and sink submarines, with ample close-range weapons against aircraft, since when sweeping their restricted freedom to manoeuvre makes them an attractive target for dive-bomber.

The Bangors fulfil all these conditions. They run smoothly as a sewing-machine, and although lively movers in rough weather, they go with the sea rather than argue it and their buoyancy saves them from shipping green water. They cost about 150,000 each, have a displacement of about 700 tons, and their main armament is a three-inch gun forward and a pom-pom aft.

The bridge is covered and the helmsman has a steel protection round the wheel. The Commanding Officer's quarters are immediately below the bridge, the Ward Room aft, with the officer's cabin-flat below. There are eight messes, but when the ship is sweeping only the special minesweeping mess-decks aft are used, the others being closed and made watertight.

The Bangors carry a total complement of about 80, including five or six officers. The First Lieutenant is responsible to the Commanding Officer for all the minesweeping gear on board. There is one Gunnery Officer to each flotilla; one, or sometimes two, Surgeons, with a sick-berth attendant in the Senior Officer's and Doctor's ships.

The principal Chief Petty Officer is the Bo'sun's Mate [known as the Buffer], who, under the First Lieutenant, supervises the hands engaged in sweeping operations. The Coxswain is the senior helmsman and the ship's housekeeper. The Chief Stoker is in charge of the engine-room ratings under the Commissioned Engineer and supervises the big winch on the quarterdeck when the ship is sweeping. About fifty per cent of the ship's company are "Active Service," or R.N. ratings, the reminder "Hostilities Only." There are about 36 deckhands, the others being signalmen, engine-room and technical ratings, cooks and stewards. When the sweeps are out every man not on watch is at his action station or on look-out, except the engine-room ratings and the two cooks.

Like the trawler hands, the men in the fleet sweepers are well cared for. Each ship has her own NAAFI canteen, and clothing may be bought [without coupons] at the Base "Slop Shop."

During the sweeping operations the Bangors usually anchor for the night, and, as in the trawlers, one watch goes on leave when boiler cleaning comes round, so each man has five or six days' leave about every six months and three weeks' during the annual refit.

When in port the ratings have shore liberty; entertainments are arranged and there are plenty of opportunities for sport. On board the favourite recreations are ludo, darts and tombola, the only form of lottery recognised in the Navy. Each ship has a library, kept by the sick-berth attendant or a Petty Officer.

Since a flotilla is seldom at sea for more than four days at a time there is always plenty of fresh food on board. Each mess appoints its own caterer. The Coxswain issues meat, potatoes and fresh meat daily; tea, sugar and tinned milk twice a week. As in all naval ships, every man is entitled to a tot of rum daily at 11:30, or an allowance of threepence in lieu.

BETWEEN SWEEPS. *The crew of a minesweeper relax on one of the mess decks of H.M.S. Rothesay. Fleet Sweepers carry about eighty men.*

Two men from each mess are detailed every day to prepare the food, which they deliver to the cook in the galley. When the ship is sweeping, the men feed as opportunity offers, but an electric heater ensures a hot meal at any hour.

The officers have much the same food as the men, cooked in the same galley. Their Ward Room is small but comfortable, usually equipped with a dart-board and a wireless set, which is seldom silent. A fleet sweeper does not mark her score of mines on the funnel, but it is often to bee seen in neat black letters on the white paint of the Ward Room bulkhead.

Sometimes the Ward Room rations are supplemented by a parcel, particularly when there is a Sub-Lieutenant from one of the Dominions on board. They are good parcels, put together by people of imagination, and the senders would be gratified if they could be there to see the reception they receive.

There is much friendliness between the officers of the flotilla. When in harbour the ships lie abreast in pairs, so that the Ward Room of one of the nearest the quay forms a natural port of call. Nearly everyone has a hobby to which he can devote any spare time he may have on board. Making ship-models is popular, and some enthusiasts have revived the old craft of inserting them in bottles, as fine a test of patience as any devised by man. In one ship the First Lieutenant, who left the Stock Exchange for the sea, has imbued the members of his Ward Room with a passionate but academic interest in the movement of stocks and shares, and one Senior Officer amuses himself with the compilation of "Famous Last Words" as applied to minesweepers, from which may be quoted "No mines there, we swept there yesterday" – "They won't bother us, we're too small" – "He won't have any bombs, he's going home" – and "It's only the engine room fans."

There are eight ships in a flotilla of fleet sweepers, under the Senior Officer. Each flotilla works directly under the orders of the Commander-in-Chief of the Command in which it is required to operate. Its main function is to clear an area which has been declared dangerous.

The successful clearance of a minefield is the result of careful planning, meticulous training and rigid discipline. Lessons learnt in the last war must be studied, later technical developments efficiently applied. With perhaps as many as a dozen ships working together, it demands navigation and seamanship of a high order. A Faultless clearance does not appear spectacular, but is the result of the skill and leadership of the Senior Officer, combined with the team-work of every officer and rating in the flotilla.

Such an operation may be described to show the work which the Bangor sweepers are called upon to do. One morning, when the flotilla is in port, signals begin coming in to the Base showing that there is trouble in the War Channel. Two merchant ships in a south-bound convoy have been sunk, and one of the escorts damaged. It becomes clear that E-boats have laid a minefield during the night. The trawlers are on the spot and have swept the area for ground mines with negative results. As yet it is impossible to define the limits of the minefield, and the Commander-in-Chief directs the flotilla of fleet sweepers to make a hundred per cent clearance. Meanwhile the convoys which are in transit or about to sail are held back.

The Senior Officer of the flotilla, having been given his orders and told approximate position of the dangerous area, is left to make his own dispositions. He summons his commanding officers to a conference in his cabin or in the Ward Room of his ship. With a chart spread before him on the table and a pair of dividers in his hand he tells what has to be done and how he proposes to do it. The operation is regarded as "tricky," and every precaution is taken against risking the ships unnecessarily. Each captain is given his orders, certain ships being detailed to act as dan-layers, others to follow the sweepers for mine-disposal.

The commanding officers return to their ships and in their turn call their officers together. The First Lieutenant is told the general plan so that he may know what sweeps to have ready. The Navigator is shown the position of the area to be cleared. The Commissioned Engineer is warned to have steam at the time of the appointed sailing.

HER BOWS ALMOST BLOWN OFF by *a mine and her deck plating almost buckled back like a tin cover over her bridge, a British fleet sweeper limps for home. This is one of the risks the sweepers face daily.*

Before the flotilla puts to sea, the First Lieutenant gives orders for the watertight doors on the mess decks to be closed. This tells the ratings that they are going into a dangerous area. There is a hum of expectancy and everyone is on his toes.

As each ship leaves port she "embarks" a balloon. The flotilla is a brave sight as it steams out from the coast on its mission, keeping accurate line and station. The Senior Officer has arranged the hour of sailing so that the flotilla may begin sweeping with the benefit of the extra depth of high water. When it reaches the area, the limits of which have been marked by dan-buoys, the sea is still covered with wreckage from the ships that have been lately sunk – rafts, water-logged lifeboats, spars, hatch-covers, packing-cases, and tables floating with their legs upturned to the sky.

If the Senior Officer were making a search, he might take his ships over the area in line abreast with both port and starboard sweeps out, but since he has to sweep water which has already been declared dangerous he adopts an echelon formation, whereby only the leading ship –his own – is in unswept water during the initial lap. One of the danners - a millionaire's yacht in peacetime – follows the outside ships to buoy the limits of the area swept. These dans are steel canisters attached to long flagged poles, strings of elliptical pellets to show the direction of the tide. A third vessel will weigh the dans when they are no longer required.

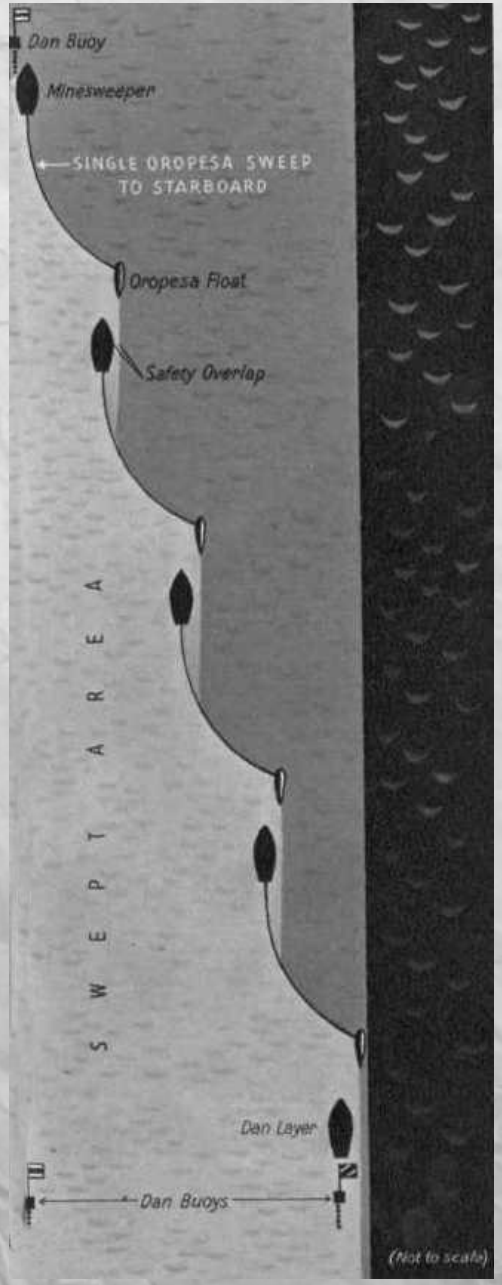
The flotilla approaches the dangerous water in formation. There is a signal hoist from the senior ship. In each sweeper a quartermaster pipes the order "Hands to sweeping stations." The First Lieutenant takes charge of the quarterdeck, the Buffer superintending the sweeping party, the Chief Stoker the winch.

The dangerous area is some eight miles in length and six in breadth. When the sweepers have completed the first lap – one length – they haul in their port sweeps, turn on to the second lap, the senior ship following the line of dans, put out their starboard sweeps, and begin again.

On the first two laps the sweeps draw blank; the Senior Officer has been cautiously edging on to the dangerous water. But the first mine is cut soon after the ships have started on the third lap. It floats up to the surface, shiny black with protruding horns, half above, half below the water. A signal goes up, "Mine to starboard." All hands off duty come up to watch.

A cut mine is a free target for all, and a difficult one in rough sea; when hit it will either explode or will sink as the water washes through the holes drilled by the bullets. The rifles of a destructor ship astern open fire, but the captain treats the mine with respect. He does not close to under 200 yards, and every man on deck wears his steel helmet. Suddenly there is a thud against the ship's side. A snowy mound of water rises from the surface of the sea, shaking the ship's gear. The mould swells into a mountain, then breaks into great columns of water and flying spray, high above the mastheads of the ships, as the crash of the explosion comes. If the ship is in luck she will have time to gather a haul of fish.

Mines soon begin to go up at frequent intervals, until the sea resembles what the Senior Officer calls " a veritable sago pudding of mines," but there is no damage. One sweep hauls in a waterlogged lifeboat. On the fourth lap the look-out of one ship reports that the float is no longer "watching"; it has suddenly disappeared. There is no knowing what may have happened. There may be a mine caught in the sweep, or only a piece of wreck. The First Lieutenant orders the winchman to haul in. The wire comes in bright and burnished, proof that it has been running along the bottom.



SWEEP IN PROGRESS. *When an area known to be mined is swept, the sweepers adopt an echelon formation, so that only the leading ship, that of the Senior Officer, enters unswept water. The others follow, each leaving a safety overlap, so that the ship herself is in water already swept by the ship ahead. Last of all comes the "danner," laying buoys to mark the area. When one length has been completed, the flotilla turns and repeats the sweep in the opposite direction, the process continuing until the whole area has been cleared.*

"Clear the quarterdecks!" commands the First Lieutenant.

The sweeping hands retire [but not far], leaving the First Lieutenant and the Buffer at the stern, peering intently for a sign of any object caught in the sweep or the otter as the winch hauls slowly in. Most of the ship's company line the starboard guard-rail, watching.

"It's wonderful what them wires'll tell you," says one, with his eyes on the sweep. "They generally start singing if there's a mine there. But you can't be sure till you've hove in."

The next moment the float reappears, bobbing and plunging through the water like a hooked shark, the staff of the green flag cutting a veil of spray either side. It is drawn closer and closer to the ship's quarter, but it is impossible to see the wire itself; the danger is that the mine – if mine there be – will be hauled out of the water under the counter before anyone can see that it is there.

When the float is about 30 yards from the stern it leaps out of the water and the otter rises for a moment above the surface, clear of whatever obstruction that caused it to sink. The ratings return to the quarterdeck to get the sweeping gear in. By the time the fourth lap has been swept dusk is falling. Half the area has been cleared. The flotilla anchors inshore for security and continues operations at daybreak next morning, sweeping till dark with satisfactory results. The last lap is covered, the dans weighed. The Senior Officer's signal "In Sweeps" is hailed with relief, for it has been a long day for every man in the flotilla.

The Senior Officer makes a laconic signal to the Base: "Area cleared." The Bangors steam back to port at full speed in line ahead, taking flurries of spray over their bows. As they go, they see far away on the horizon two great convoys – one from the northward, the other from the south – approaching the water they have lately cleared. Not an hour has been wasted in speeding the trade on its way once it is safe to pass.

When the flotilla reaches port the Senior Officer receives a signal from the Flag officer in command of the Base:

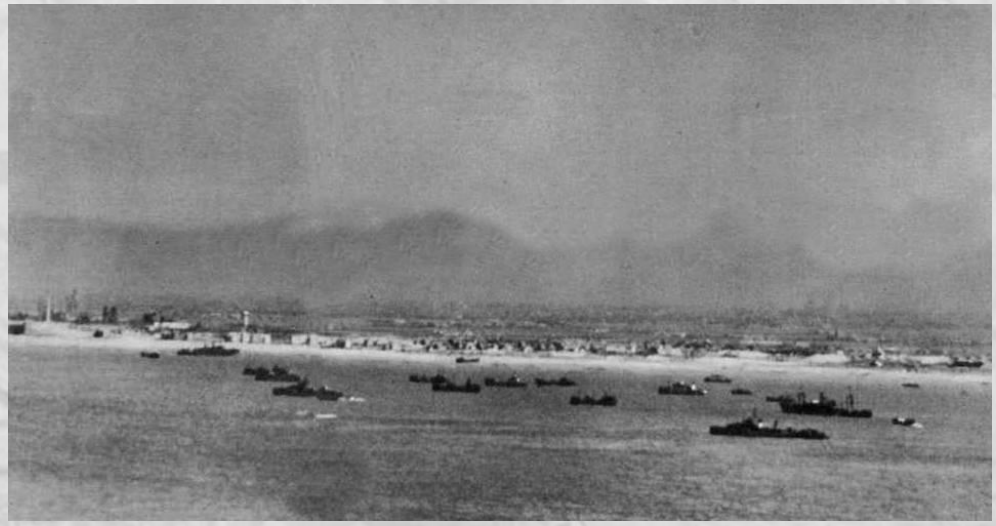
"In these days of rationing, I congratulate you and your ships on the number of eggs found during the last two days. You are entitled to crow."

"Many thanks," he replies, "fortunately we were not broody."

MARKING THE SWEPT CHANNEL. *Behind the last of the sweepers comes a special vessel, the "danner." She lays dan-buoys, seen here on deck, along the limits of the safe area.*

"OPERATION DYNAMO"

THE SWEEPERS AT DUNKIRK



ALTHOUGH THE CHIEF DUTY of the fleet sweepers is to clear dangerous areas, there have been times when they have responded to a call which was beyond their normal experience and made the utmost demand upon their endurance.

Such was Operation Dynamo; the evacuation of Dunkirk. Among the ships which brought the British and French troops to safety the minesweepers have a proud record.

The "Smokey Joes" were there, among them H.M.S. Pangbourne [Commander Douglas Watson, R.N.], a veteran of the last war. When she reached Dunkirk on the afternoon of her first day she went alongside the mole and embarked 200 unwounded British troops. Later, under shell-fire all the time, she moved to the jetty on the south side of the harbour where a long line of ambulances was waiting. The cot cases were stowed side by side on the quarterdeck; the walking cases found room where they could. There were fifteen men in each officer's cabin, others in the baths, round the funnel and round the "bandstand" of the gun.

It was still dark when the Pangbourne steamed out of harbour, expecting to take her direction from a green light outside. Unknown to Commander Watson, the buoy had been bombed. He followed what turned out to be the starboard light of a steamer, and the ship ran aground on a sandbank. Fortunately the tide was flowing and she backed off two hours later. The exhausted soldiers did not realize that they had been aground.

The Pangbourne reached Ramsgate, disembarked the troops, and returned for more. One sergeant, who had tucked himself away in a corner, slept so well that he found himself back at Dunkirk.

S.S. Clan MacAlister, which had been bombed at anchor outside the mole, was on fire aft and the German gunners were ranging on her. The Pangbourne took of the Master and twelve men. This time Commander Watson sent his whaler and motor boat to the beach. A score of dive-bombers circled overhead, peeling off one by one to attack their targets. One dropped five bombs close to Pangbourne. The explosions lifted her out of the water, and the men in the boats thought she had gone. Four of the gun's crew were killed, and the gun would not train. The First Lieutenant and the Sub-Lieutenant were wounded. A second aircraft bombed the ship beam on, but the only damage was from splinters, which tore up the degaussing gear and holed the hull in over a hundred places above and below the water-line.

Commander Watson then gave the order to weigh, while the engineers plugged the holes with chips of wood. The boats brought of a number of soldiers. Many French and Belgians, most of them wounded, climbed aboard from small boats. There was no surgeon on board, but they were made as comfortable as possible.

By that time it was 7 p.m. Commander Watson decided to return to Dover. On the passage he fell in with the Gracie Fields, a new paddle-sweeper which had been hit in her engine-room. The Pangbourne took off most of her people, leaving a skeleton crew aboard, and began to tow her with the sweep-wire. Her rudder was jammed, so that she towed out on the starboard quarter, sinking slowly. After an hour she had to be abandoned. The Pangbourne took off the skeleton crew, and since her compass had been knocked off the board by the bombing she steered by "lamp-post navigation" – from buoy to buoy – for darkness had fallen.

She approached Dover in the misty dawn, to be told that magnetic mines had been laid during the night in the harbour approaches. Her degaussing gear being wrecked, she had to steam in a circle until trawlers had swept the channel, but was able to disembark her troops later in the morning.

Meanwhile the paddle-sweepers were playing their parts beside the "Smokey Joes." The first on the scene came from Dover. They arrived each day at dusk, spent the night filling up with troops and tried to sail before daylight. There was no time for organized meals, but although they had only enough food on board for their crews, somehow every soldier was given at least a bowl of soup and a hunk of bread.

The senior ship of the flotilla, the Sandown [Commander K.M. Greig, R.N.] had a dachshund who became known as "Bombproof Bella." The ship was bombed repeatedly on every passage, but was never hit, and the ratings ascribed her preservation to their mascot. Two other ships of the flotilla were not so fortunate. The Gracie Fields, which the Pangbourne tried to save, sank on her second trip. The Brighton Belle struck a wreck on her first return passage. As she was sinking, the fourth ship of the flotilla, the Medway Queen [Lt. A.T. Cook, R.N.R.], went alongside and took off all the survivors. The Medway Queen herself made seven trips to and from Dunkirk, which was the sweepers' record.

Another flotilla of paddle-sweepers, consisting of the Waverley, Marmion, Duchess of Fife and Oriole, reached Dunkirk from Harwich. On the first day the Waverley [Lieutenant S.F. Harmer-Elliott, R.N.V.R., Senior Officer] had embarked 600 troops when twelve Heinkels made a concentrated attack on her from a height of 8,000 feet. For half an hour she evaded the salvoes showered upon her crowded deck, but finally a bomb struck her on the port quarter and after wrecking the Ward Room flat passed through the bottom of the ship, leaving a hole six feet in diameter.

Four soldiers were killed and several wounded. The attack continued for another fifteen minutes, the bombers machine-gunning the upper deck, but the Waverley kept up a rapid fire with her 12-pounder and Lewis guns, supplemented by rifle-fire from the troops. No further bombs hit the ship, and Lieutenant Harmer-Elliott had hopes of keeping her afloat until he fell in with another vessel to which he could transfer the troops. Soon, however, she became unmanageable and would not answer to the wheel; then began to sink rapidly by the stern. Within one minute of the order "Abandon Ship" she had disappeared.

Lieutenant Harmer-Elliott went down with her, holding on to the bridge rails, and kicked himself free of obstructions as she heeled over to port. When he came to the surface he saw many of the troops trying to keep afloat, but the numbers thinned out within twenty minutes. The first ship to arrive was a French destroyer. Later, guided by aircraft, several drifters and a tug picked up more survivors. Lieutenant Harmer-Elliott was rescued after being in the water for 45 minutes, but many of his ship's company perished and with them between 300 and 400 of the troops. He paid a high tribute to the soldiers, who behaved "with the highest courage and calmness and obeyed all orders implicitly," and of his own men he wrote, asking that the survivors might be allowed to serve together again, "It has been my privilege to command one of the finest ship's companies."

The Marmion [Lieutenant H.C. Gaffney, R.N.V.R.] and the Duchess of Fife [Lieutenant J. Anderson, R.N.R.] fared better, each making three trips and bringing back over 2,000 British and French troops between them. Lieutenant Gaffney mentioned the fine spirit shown by his officers and men, many of whom were under shell-fire for the first time, in what he called "the somewhat arduous conditions," and Lieutenant Anderson reported that when he had sent his sea-boats off to the beach to embark troops his junior engineer, Mr. V.N. Wood, volunteered to take the 13 foot skiff ashore. In this way Mr. Wood and the Second Engineer, Mr. A.R. Japp, with the Coxswain, Petty Officer A. Brassington, brought off 30 men in parties of six at a time.

Lieutenant E.L. Davies, R.N.V.R., who was commanding the Oriole, finding on his arrival that there was a scarcity of power boats, and having none himself, took the responsibility of deliberately running his ship ashore, so that she could be used as a pontoon to evacuate the men on the beach. In this way he distributed 3,000 troops among the vessels in the offing, although the Oriole was being continually straddled by bombs. He refloated his ship in the evening during another severe bombing attack, returned to England with 700 soldiers and nurses on board, and then went back.

THE SWEEPERS WERE THERE. *With all the other "little ships," vessels of the Minesweeping Service helped to bring home the British Army from Dunkirk. These men are safe on the deck of the drifter Fidget.*

The Captain M.S., Harwich, wrote of the Oriole's company;

"There's was no question of their requiring rest, but only a burning desire to get their ship coaled and turned round in order that they might get back to Dunkirk in the shortest time."

During these operations the men in the three surviving paddlers of the flotilla worked for four days and nights without sleep, almost without food, and between them brought 4,755 troops safely home.

Some of the minesweeping drifters also took part in the evacuation. Towards the end of 1939 H.M.S. Vernon had specially equipped a flotilla of five East Coast herring drifters with the object of recovering ground mines by trawling. The flotilla consisted of the Lord Cavan, Silver dawn, Fisher Boy, Jacketa, and Formidable whose name was subsequently changed to Fidget, a blow from which her Skipper never fully recovered. In May 1940, this flotilla, which had come to be called "Vernon's Private Navy," was operating from Ramsgate under Lieutenant-Commander A.J. Cubison, D.S.C., R.N., with Lieutenant R.S. Armitage, R.N.V.R., as Second-in-Command. The individual ships were commanded by Skippers, R.N.R., from the Grimsby and Hull deep-sea fishing fleets, and carried a crew of ten: mate, chief engineer, signalman, cook, four deckhands and two stokers.

When the evacuation began, the Mine Recovery Flotilla was sent over to Dunkirk with orders to act as ferry vessels between the harbour and the larger ships lying outside. On the evening they arrived they warped up to the East Mole, where the troops were lined up ready for embarkation. The drifters took 150 men each and then set out to unload them into such larger ships as they could find. This proved difficult in the darkness. For a while they made determined efforts to discharge their troops into a merchant ship and were aggrieved at her apparent lack of interest, until they succeeded in finding suitable ships, and returned to the harbour for a second load.

It was then decided that the Lord Cavan should remain at Dunkirk with Lieutenant-Commander Cubison, and that Lieutenant Armitage, in the Fidget, should sail the remainder of the flotilla back to Ramsgate with the troops. On the two following days the four drifters continued their work, sailing from Ramsgate in company, splitting up on the other side, collecting men as and how they could, and returning independently as soon as each ship was loaded. Although their instructions were to limit their loads to 100 men,

Although their instructions were to limit their loads to 100 men, they usually took over 200, the record being made by the Silver dawn, who on one passage carried 312. Such loads would have been unsafe in anything but calm weather, but even so a number of soldiers who had swum out to the ships had to be refused passage. Lieutenant Armitage described these men as being "amazingly philosophical," and they swam back to the beach with cheerful comments on the wetness of the water.

Although subjected to incessant bombing attacks the only one of Lieutenant Armitage's drifters to suffer damage was the Silver dawn, who lost a propeller blade on some wreckage in Dunkirk harbour on the third day, but succeeded in reaching Ramsgate with her troops on board.

On their outward passage on the last day the remaining three drifters came up with a large troopship, the Scotia, which had sustained five direct hits from bombs, and was lying on her side burning fiercely. The sea was full of French troops, whom German aircraft were machine-gunning as they struggles in the water. Having rescued everyone alive, the three drifters turned back with the survivors, most of whom were severely wounded.

In all, the four drifters brought back 4,085 soldiers. The Lord Cavan was sunk by shell-fire, but the entire ship's company returned safely.

The trawlers also did valiant work, although many of the skippers were over fifty years of age and most of the junior officers and ratings had previously seen nothing of war. Eight trawlers alone brought back 1,606 British, French and Belgian troops. Losses were severe. One Skipper, as he was picking up soldiers from the water, saw a bomb strike a sister ship. There was no sign of her when the smoke of the explosion had cleared away. Another sank near the East Pier alongside the wreck of a British destroyer, her White Ensign still flying just above the water throughout the evacuation.

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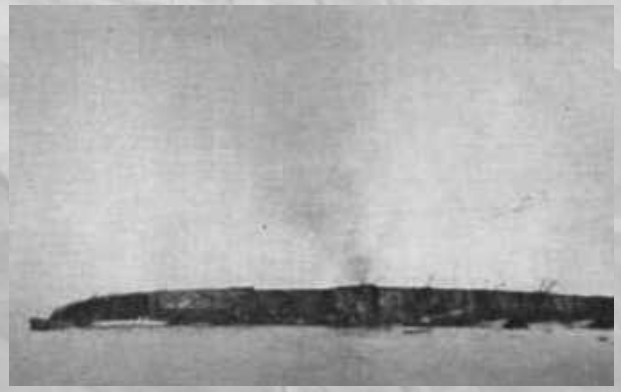


THE END OF THE SCOTIA. *From this large troopship, wrecked by enemy bombs, everyone alive was rescued by three drifters usually employed for mine recovery by H.M.S. Vernon. These three drifters and two others [one was Fidget] were known as "Vernon's Private Navy."*

Perhaps H.M.T. St. Melanté had the most varied experience of all. She had been sweeping off the Hook when the Germans invaded Holland. A near miss from a bomb wounded both the Skipper, the Second Skipper and three seamen, and flung Second Hand [now Skipper] F. Hayward violently on his back. Hayward gave the men first aid and took them to hospital. He refused to remain himself, although in great pain, since there was no one else to take charge of the ship. Next day the Germans captured the hospital and his shipmates became prisoners of war.

The St. Melanté, with her consort the Arctic Hunter, then went to Flushing, where she was bombed and raked by machine-gun fire, and later reached Zeebrugge. The water was thick with mines, and ships were going up every hour. The trawlers swept the harbour approaches and took on board the crew of a bombed Greek ship, then they were ordered to return to their Base. On arrival both ships' companies were given five days' leave. An hour later leave was cancelled and the St. Melanté was told to proceed to Dunkirk.

There was no need to look at the chart, for over Dunkirk hung a pall of smoke which could be seen for miles. Bombs were dropping as the trawler reached the quay, where she embarked 600 troops. The men were worn out but revived once they were on board, under the impression that they were "safe with the Navy." They were distributed along the deck, in the cabin, in the stokehold, and on the gun-platform. The ship was bombed the whole way back to Dover, but there were no casualties.

The St. Melanté's next duty was to sweep at Le Havre. As she approached the harbour the oil tanks were blazing, and on arrival she was ordered to St. Valery, where 6,000 troops were believed to be surrounded on a strip of beach. The relief force consisted of a score of small vessels; trawlers, sloops and a destroyer. They reached the rendezvous at midnight and sent the boats in. But the beach was empty. When dawn broke there was no sign of troops. All had been taken prisoner. During the night the St. Melanté found a French yacht adrift. She was intact, but everyone aboard was dead. They looked as if they had been murdered.

The St. Melanté then returned to Portsmouth and was ordered to St. Nazaire in company with the trawler Asama. They reached the harbour to find the quay lined six deep with troops, who extended as far as the eye could see. The t. Melanté took 670 on board. The Asama, a destroyer and a French tug took others, and ferried them to transports waiting in the harbour. The ships were bombed all the way out, but the soldiers stood the ordeal unflinchingly.

This work went on for three days and nights. There seemed no end to the troops. The St. Melanté's men found themselves "napping on their feet," as Skipper Hayward put it. They saw the Lancastria go down.

Skipper Hayward was beginning to lose the use of his legs from the effect of his fall, but he refused to go to hospital. Then a fleet of trawlers arrived, with civilian crews and their fishing gear still on board, and the evacuation was at last completed. But the troopships still had to be taken safely out of harbour, the approaches to which were suspected of being mined. Skipper Hayward was told, "Although your crew are off their feet, you must sweep us out."

At dawn the St. Melanté and the Asama went ahead of the great convoy – twenty merchant ships packed with troops, with ten fishing trawlers and destroyer escorts. They swept from the lock gates into the open sea; then took up their position on either side of the convoy and steamed with it to Plymouth.

That, so far as Skipper Hayward was concerned, was the end of what he called "all that bother across yon side."

He was loud in his praise of his men. They were all landsmen except the Leading Seaman, a giant with ginger hair, who, when he sighted enemy aircraft, would man the gun and bawl imploringly, "Come over 'ere! Just come over a little closer!"

"Yes, the men behaved as though they had a job," said Skipper Hayward.

"UNTIL IT BE THOROUGHLY FINISHED"

THE BRITISH AND FRENCH armies had cause to be grateful to the minesweepers at Dunkirk and St. Nazaire; and there have been times when the trawlers have been able to pay the Royal Air Force a trifle on account of their debt for fighter protection, since their prompt action has saved the lives of many friendly pilots –or "Kates" as the Navy calls them – in the Channel or the North Sea.

One trawler picked up a pilot off the East Coast without interfering with her sweep, and when a Spitfire was forced down near H.M.T. Staunch, Leading Wireman A.L. Elliott, with two other ratings, dived into the sea, swam to a Carley float which had been slipped, and rescued the pilot, who had been badly shaken in the crash.

There are also naval ratings who owe their lives to the sweepers. After the destroyer Wren had been sunk by enemy aircraft, a trawler sent her boat away to pick up survivors. The boat's crew saw an exhausted man struggling in the oil fuel which lay thickly on the sea where the destroyer had gone down. Second Engineman B.E. Bemment, R.N.R., who had rushed up from below and jumped into the boat as it was putting off, saw that they could not reach the spot on time. Without a lifebelt he dived overboard, swam to the drowning man, and at the risk of being blinded and choked by the oil-covered sea kept him afloat until the boat reached them.

When a hospital ship had been crippled off Tobruk by 18 dive-bombers, a minesweeper saved the entire ship's company, including her cat, and then escorted her while she was being towed to Alexandria.

Another sweeper, a South African whaler, went to the rescue of a petrol-carrying steamer which had been torpedoed off Tobruk. The blazing petrol tins which floated out from an enormous hole in the ship's hull had set the sea on fire all round her, the flames shooting 300 feet into the air. The whaler approached to within 300 yards, picked up 31 men from a boat and two rafts, and then cruised for an hour in search of seven missing members of the crew.

The sweepers are as ready to save ships as men. H.M.T. River Clyde [Lieutenant-Commander J.A. McArthur, R.N.] saw a merchant vessel hit three times by enemy aircraft. The after hold was flooded and she was down by the stern, but Lieutenant-Commander McArthur believed that if the after bulkhead held she might at least be beached. He towed her for seven and a half hours through the night until he was able to hand her over to a tug in coastal waters.

Many deeds of gallantry have been performed in saving the sweepers themselves. While carrying out a clearance off the east Coast, H.M.S. Selkirk, one of the Albury class, found a mine in her sweep. She was steaming at speed in an attempt to cut the mooring when the sinker of the mine broke surface. In the hope of recovering it, a signal was sent to Base.

Within twenty minutes of receiving the signal, Commander W.R. Bull, D.S.M., R.N., the Port Minesweeping Officer, had collected a tug [the Sunbeam II] and was under way. On reaching the Selkirk he found that a shackle on the mine had caught in one of the cutters. He had the sweep hove in so as to place the mine about five fathoms astern of the ship. A boat was lowered and, assisted by Able Seaman E.J. Quick and J.W. Clark, Commander Bull proceeded to salvage the sinker, mine and mooring. Although the sea was calm, there was a strong tide running and enough lop to make the operation extremely hazardous. One of the seamen had to hold the horns of the mine away from the boat, while the other dealt with recovery wire. Both sinker and mooring wire were secured without mishap, and the tug towed the mine back to harbour for disposal. This was the first German live moored mine to be recovered complete with its sinker. For his courage and resource Commander Bull was awarded the D.S.C., and his two assistants received the D.S.M.

The work of the sweepers is not confined to British waters. They have had to clear minefields laid by Italians in many parts of the Mediterranean; the approaches to Valetta Harbour have been swept regularly in spite of constant raids on Malta. As in the last war, surface minelayers have at times been active in distant waters, and mines have been swept off the coasts of Africa, Australia and New Zealand. The Indian Ocean has not remained uncontaminated, and there the sweepers of the Royal Indian Navy have been at work. During the Japanese attack on Malaya, mines were laid in the South China Sea, and sweepers, many of them manned by men of the Malayan R.N.V.R., worked gallantly until the end.

A QUIET JOB. *At first it looks a casual scene. But note that the men in the dinghy wear steel helmets and life-belts, that their eyes are glued on the white object in the water. It is a tell-tale parachute. Below it is a live mine.*

Minesweeping in Arctic waters became increasingly important with the sending of convoys to Russian ports. This work was allotted to fleet sweepers of the Halcyon class. The first sheet ice they encountered was in October, 1941, and was three inches thick. At first they nosed their way through it with infinite care, until a Norwegian officer serving in one of the ships said that these conditions were nothing compared with what they might expect later. Then they took to driving through the ice contemptuously at full speed. Soon it became thicker and more widespread until, as the Senior Officer put it, "bogey" for the 24-mile course along tortuous approaches to Archangel rose to 48 hours. There were times when the ratings had to dig holes in the ice before they could weigh anchors. It was disconcerting to have to sound the sirens to remove people, and even horses, from the ship's course, and strange to pass a market in full swing on the ice a few yards away.

Thus the sweepers are doing their full share in the struggle to deny the Axis Powers command of the sea and to foil the onslaught on sea-borne trade, and neither the Fleet nor the Merchant Navy could do without them.

Minesweeping demands not only courage of a high order, but also integrity and precise navigation to ensure the safety of the ships which follow. The work must often be done in the face of air attack, and the slightest error of judgement may expose a ship and sink all aboard her. The sweepers fight an enemy who, although unseen—except in the air—is always potentially present beneath the surface of the sea.

For them there is none of the excitement of battle, yet, unless they are constantly alert, at any moment the foe may take them unawares. Their unspectacular task is no measure of the peculiar strain to which they are subjected. Since the war began more than one hundred of them have been lost, but others have filled the gaps, and month by month the Service is expanding in ships and men.

Of those men, none deserve the nation's thoughts more than the engineers and the stokers who wok below. Theirs is the most perilous work of all, for if a sweeper is mined or hit by bombs they have the least chance of survival. Bursting pipes, scalding steam from damaged boilers, closed hatches, ladders wrenched from fastenings: these are risks they accept every time they put to sea, yet they never fail.

"He kept the machinery running while working up to his waist in water after his ship had been hit during a bombing attack." Thus runs one official recommendation for an award to a trawler's engineman. There have been many such.

When the engine-room of H.M.T. Edwardian began to make water fast after a near miss from a heavy bomb, First Engineman William Gray, alone and in complete darkness, stopped his main engine, although well aware that the aircraft might return, and then filled the hole with canvas, feeling his way over the flooring supports, since there were no engine-room plates left in position. After stopping the main flow of water he completed his work with a saw and a dan-staff, and so saved the ship

Those on deck, confident of the steadfastness of their comrades below, can thus do their duty with cheerful hearts, and so earn words like these: "He was ready at all times, at whatever hour of the day or night, to engage the enemy."

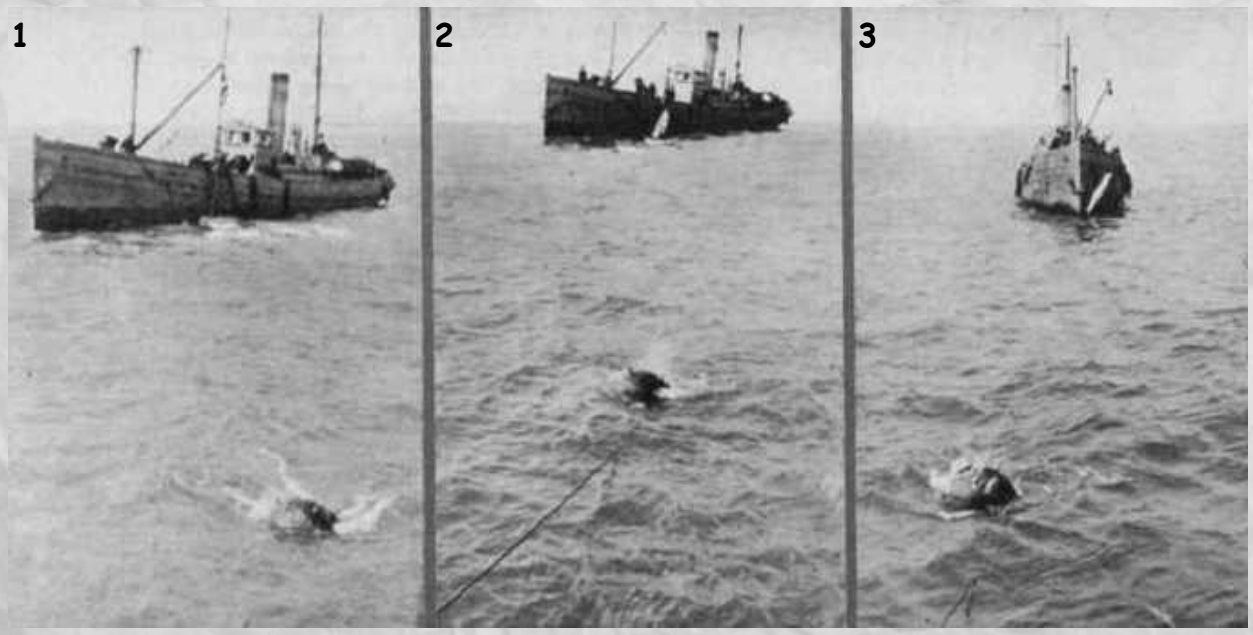
Over 25,000 men are now engaged in the Minesweeping Service. Every month new ships go from the yards to join those which have been sweeping since the war began. The fleet sweepers and the trawlers, paddlers, motor minesweepers, whalers and drifters have been engaged on continuous sweeps, almost entirely in the channels used by shipping. The value of that service has been incalculable, for every mine found and detonated may mean a ship saved, and every minefield cleared is a battle won.

Truly as Fluellen said in King Henry V, "it is not so good to come to the mines," and to-day there are even less according to "the disciplines of war" than he envisaged. This does not deter the sweepers from tackling them wherever they may find them, in order that the Psalmist's comfortable promise against workers of iniquity may be fulfilled and that they may "soon be cut down like grass."

Unremitting vigilance in tempest and fair weather, tribulation and unceasing danger, are the sweepers' portion, and their work must go on, day after day, week after week, so long as the sea holds mines. For them there can be no respite. Until peace comes, their task cannot know the culmination of success; and although they will have their part—a great one—in the final victory, even so their work will not be over, for then they must glean from the seas those mines which, still unswept, would remain a menace to peaceful merchantmen.

Drake before Cadiz is said to have prayed that his men should understand that it is not the beginning but the continuing of any great matter "until it be thoroughly finished" which yields the true glory. His Majesty's Minesweepers have learnt that lesson, and it is one which they are not likely to forget.

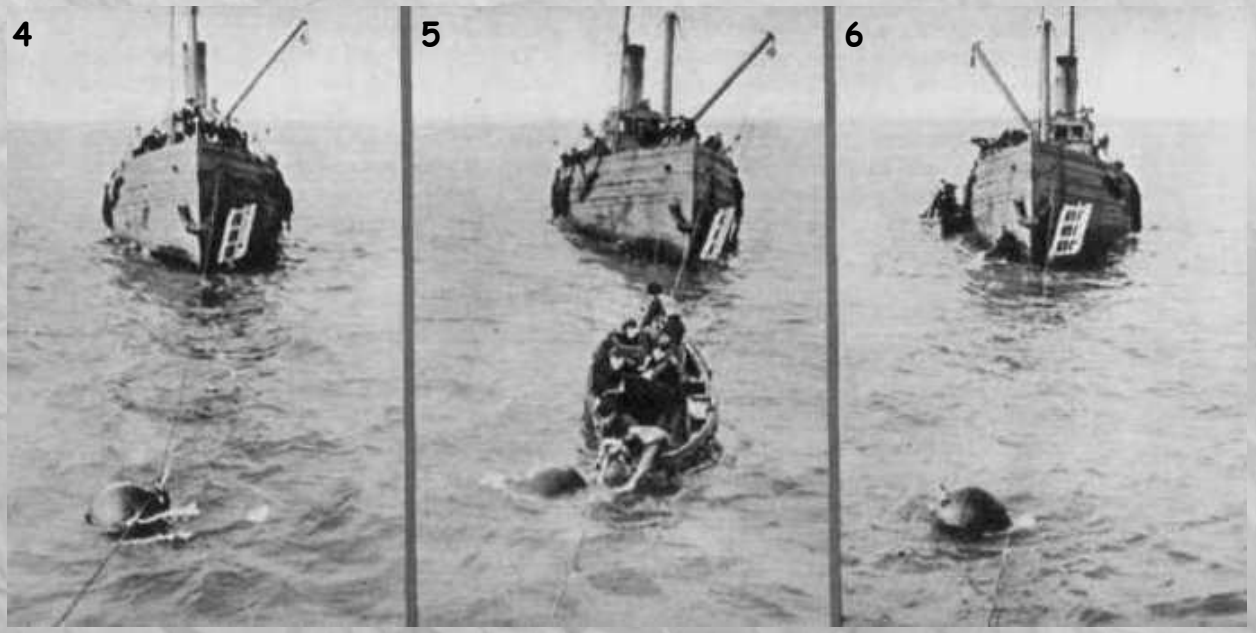
THEIR LIVES IN THEIR HANDS



1. The men of the tug Sunbeam II methodically prepare to recover (in August, 1940) the first live German mine to be captured complete with mooring and sinker of this type. It is going to be a difficult operation.

2. Mine and sinker are both entangled in the sweep of the minesweeper Selkirk, from which these pictures were taken. The tug is securing the far end of the Selkirk's sweep-wire by hoisting the float inboard.

3. Next, the otter is hauled aboard. Note the strong tide breaking past the mine, now suspended with its sinker on the wire running between the two ships. The head-plate of the mine can be seen.



4. A wire is passed from the Sunbeam around the mine mooring and back to the tug. The crew try to pull both mine and sinker clear, but the sinker is too heavy. Pulling only brings the tug dangerously close to the mine.

5. A new method is tried. A boat is launched, and while one man holds the horns of the live mine away from the bows, another unfastens the sinker chain from the mine and fastens it to a direct wire from the tug.

6. This is successful. The sinker is being hauled up the tug's starboard bow. Next the recovery wire was attached to the mine itself. It was towed safely back to Harwich, and the sinker taken ashore to be examined.


"IT IS UPON THE NAVY, UNDER THE GOOD PROVIDENCE OF GOD, THAT THE
WEALTH, SAFETY AND STRENGTH OF THE KINGDOM DO CHIEFLY DEPEND"

WORLD WAR II

1939 - 1945

Presentation by
the2xislesteam