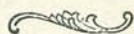


heavens, and then almost instantaneously there were the same kind of irregular lines darting from the clouds into the ground to the west of us, so that it circled over us. Electric light played about on the tyres of the cart-wheels, and on the barrel of the gun which I was carrying, so I put it into the cart. Suddenly there was a flash and a crash, and Sergeant K. fell over against me, and when he recovered himself said that he could not see, and I also had been blinded for a second or so. I had now to lead a blind man along, and this continued till we got to where our camp was. Towards evening he began to recover his sight, and this morning seems pretty well; but he will not go out observing for a day or two.

They say that during these thunderstorms, when a pan gets suddenly filled with water, fishes of large size, several pounds weight, are found in them. This is accounted for in two ways. Some fish, the Marsia, have large heads with a small reservoir of water in them, and when the pan dries up they burrow in the mud and lie there in a state of coma till the rains again fill the pan. The other way is, that when the pan fills there is a certain amount of overflow water which runs into the rivers, and that then the fish in the rivers quickly ascend these streams and so get into the pans; but if this latter explanation were correct, we should sometimes find fish stranded in the veldt on their way up.



## His Majesty's Submarines

By Herbert C. Fyfe

Author of "Submarine Warfare, Past, Present, and Future"

Illustrated by photographs by Stephen Cribb, Southsea

Only a number, not even a name,  
How shall posterity hear of my fame?  
Perchance it may still live, after the grave,  
In the name of an ironclad, under the wave.

THUS sings a modern poet of torpedo-boats, but the lines may serve as well for submarines. Battleships, cruisers, gunboats, and destroyers—these all have names—but on our torpedo-boats and submarines the Lords of the Admiralty bestow no names but only numbers.

Our first photograph shows "British submarine No. 3," and the number can be plainly seen near the bows.

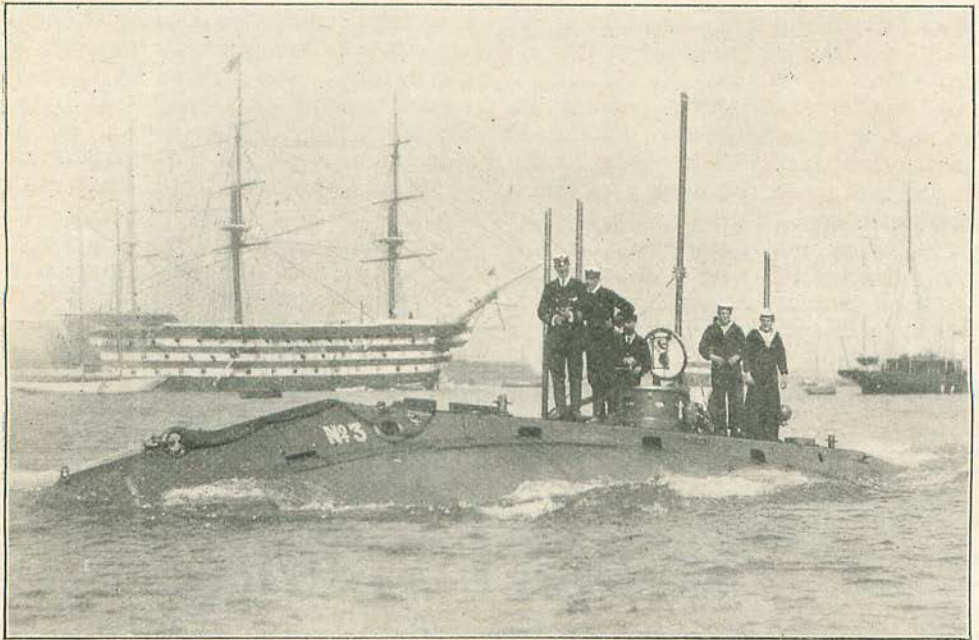
At the present moment Great Britain possess six submarine vessels. The first five, known as "Nos. 1-5," were ordered in the autumn of 1900 from Messrs. Vickers, Sons and Maxim, the European agents of the Holland Torpedo-boat Company. They are similar in most respects to the seven submarines building for the United States Navy, namely, *Adder*, *Moccasin*, *Porpoise*, *Shark*, *Grampus*, *Pike*, and *Plunger*.

It will be noticed that the American Admiralty manage to find names for their boats and they may be congratulated on their choice.

Nos. 1-5 are diving torpedo boats of the Holland type. They were all built at Barrow-in-Furness and are now at Portsmouth carrying out experiments for the information of the Admiralty, and also serving as instructional craft for the officers and seamen who will serve in them. These volunteer for the work; for the Admiralty compels nobody to form one of the crew of an under-water vessel. Before being accepted they have to pass a strict medical examination and if they emerge satisfactorily they receive special pay. We believe that there has been no lack of volunteers and this is not surprising, for submarines are not such terrible weapons of warfare as some might be led to suppose, and it is possible that in the day of battle the young Lieutenant-Commander and his crew may cover themselves with glory. A lieutenant remarked once to the writer that he would sooner be on a submarine in action than in

the bowels of a great line-of-battleship. The engineers and mechanics in the engine-room and the stokers in the stokehold will inevitably suffer terribly when the "real

will disappear altogether, but it will rise once more to the surface, the commander will take his final bearings, the torpedoes will be fired, and the boat will then sink



(Stephen Cribb, photographer, Southsea)

The old and the new. Submarine No. 3 passing the old "Victory"

thing" comes, and, of course, the crew of a submarine will run great risks. Still there is a good chance of its escaping the quick-firing guns and the lyddite shells of the enemy, and of its delivering its torpedo and sinking an ironclad.

The modern diving torpedo-boat will for the most part be navigated on the surface. When it comes within range of the enemy's guns water-ballast will be admitted to the tanks and it will be submerged so as to run with only its little conning tower visible above the waves. In this conning tower will be the commander and he will command a view all round the horizon. In all probability a submarine attack will be made with three or four boats and their little towers will afford but small targets for the gunners on the battleship.

A little nearer the enemy the submarine

again entirely out of sight and will make off in a direction unknown to the enemy.

A submarine attack will be undoubtedly risky work, but success is possible and we may be sure that British officers and British seamen will do all in their power to attain their end.

Our second photograph shows a sailor about to descend into the interior of "No. 2." Let us follow him in order to see the mechanism of one of these "modern sea devils."

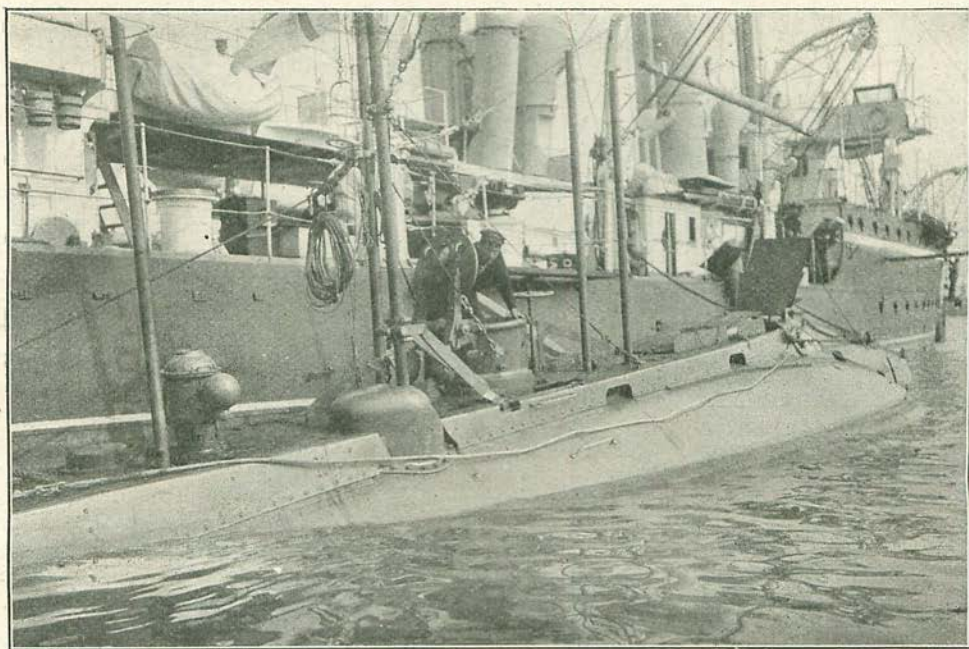
The interior is divided into three compartments. In the forward one is the torpedo expulsion-tube. The armament of every modern submarine, whether French, American, or British is the automobile fish torpedo. Before the invention of this intricate weapon—"the most wonderful machine in the world," as it has been

called—under-water boats carried “mines,” or cases of explosive, which were either fastened to the side of a hostile vessel or else allowed to drift up to her. Nowadays there is nothing to equal the “Whitehead,” which is in fact a crewless submarine, propelling itself along under water and automatically steering itself towards its goal. Its range is about a thousand yards and it carries 200 lbs. of gun-cotton in its head; enough to send an ironclad to a watery grave. The British submarines carry five torpedoes; one is placed in the tube and the other four are carried side by side above the storage batteries. When the first torpedo is fired a sufficient amount of water to compensate for the loss of weight is automatically and almost instantaneously admitted into the tube, causing only a slight change of trim for a few seconds. Such compensation is necessary as the submarine is lighter than the amount of water it displaces, and the expulsion of the torpedo renders the boat lighter and tends to send it up to the surface. When the second torpedo is placed

in the tube the water is run into a special torpedo compensating-tank; of these tanks there are four and one is filled as each torpedo is fired. When the last torpedo has been ejected the expulsion-tube is filled with water and is kept thus until the end of the run.

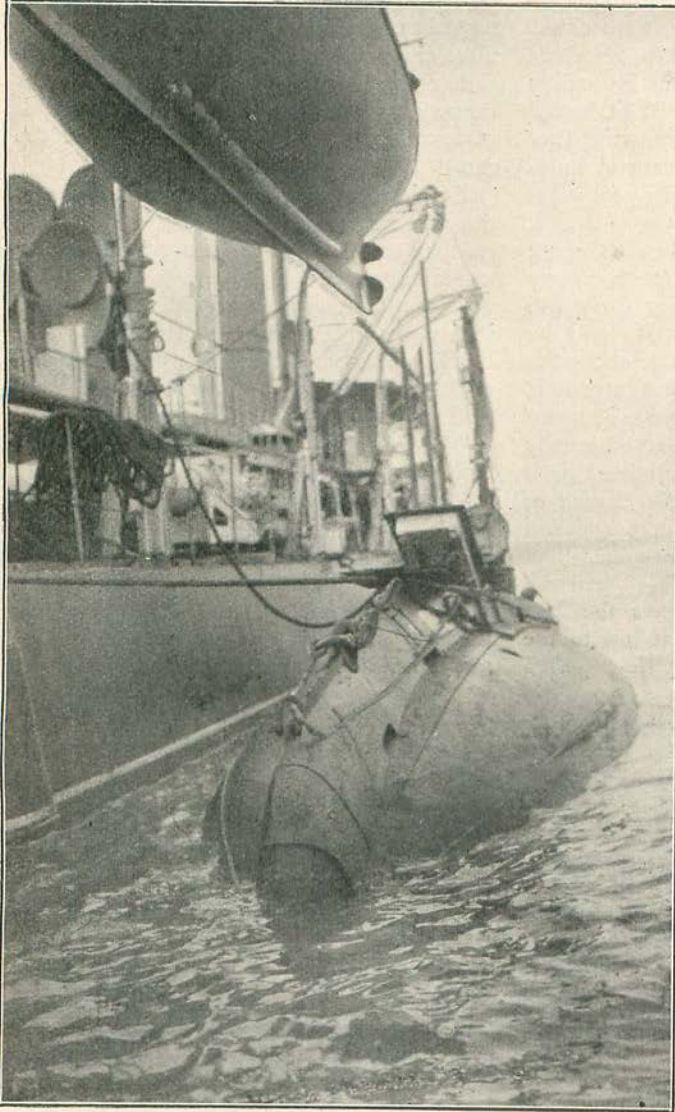
Besides the torpedo-tube there are also in the forward compartment some air flasks, a gasoline tank of 850 gallons capacity and a trimming tank.

In the flask, air at 2000 lbs. to the square inch pressure is stored, and this is used for breathing purposes, for firing the torpedoes, and for blowing the water out of the ballast tanks when it is wished to bring the boat to the surface. The central compartment contains in its double bottom, the main ballast tanks and a circular compensating-tank. Above the double bottom and below the axis of the vessel are located the storage batteries; beneath the surface the propelling power is electricity, the electric motor being of 90 horse-power, capable of giving a speed of about nine knots, and the storage



(Stephen Cribb, photographer, Southsea)

Submarine No. 2. Jack going down to his new home



(Stephen Cribb, photographer, Southsea)

Submarine No. 3

batteries having sufficient capacity for a speed of nine knots or a four hours' submerged run. Above the batteries are the four torpedoes and in the same compartment are more air flasks. In the rear compartment is the 160 horse-power, single-screw four-cylinder Otto gasoline engine capable of

minutes to disappear from sight. The French boats are driven on the surface by a steam-engine, fed with liquid fuel, and before submerging, the chimney has to be unshipped, and the engine and boiler allowed to cool. Up till now the French have not adopted the gasoline engines for their submarine boats.

giving a speed of eight knots on the surface, the radius of action being about 400 knots. Here is also the electric motor, another trimming-tank, and other small pieces of machinery. The British boats go under at an angle and dive by the bows, and they are brought to the level at the required depth either automatically, or by hand-operated mechanism. At the rear of the boat are four rudders, two vertical and two horizontal. The former steer the boat to right and to left, whilst the latter steer it up or down. When running submerged the boat has a "reserve buoyancy" and will come to the surface unless kept under by the vertical rudders. The reserve buoyancy is a great safeguard for if anything were to happen to the craft it would at once come to the surface like a cork, except of course the hulk were so much damaged as to admit the water in large quantities.

During their trials both in the Irish sea and in the English Channel the British submarines have shown that they can dive and rise again to the surface with great rapidity, and in this respect they appear to be greatly superior to the French "submersibles" which take at least four

Our third photograph gives us another view of No. 3, and it cannot be said that it (one does not like to think of a submarine as a "female" though perhaps one should speak of the craft as "she") is a picturesque looking object. It looks in fact very much like a whale or some sea-monster, and one can sympathise with the writer, who said, "The submarine craft is a miracle of ingenuity, though Nelson and his hearts of oak, fighting only on deck in God's free air, and with the 'Meteor flag of England' fluttering overhead, would have loathed and scorned her burglarious area-sneak dodges down below."

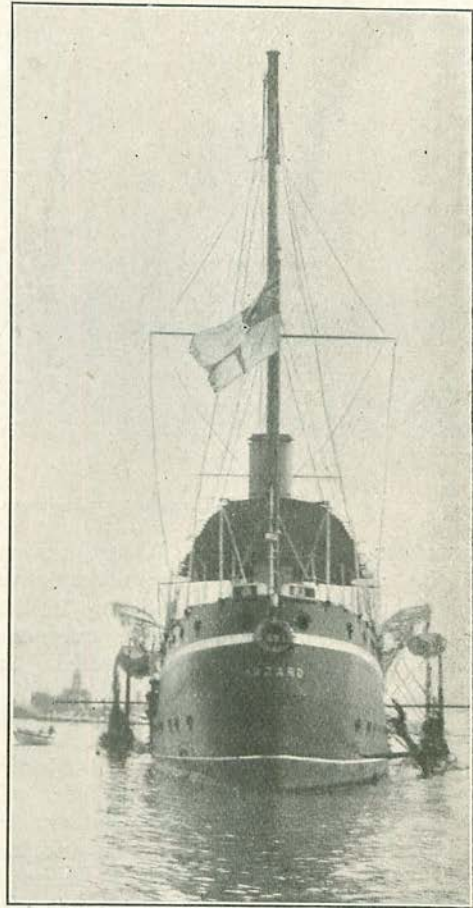
The next photograph shows his Majesty's torpedo-gunboat *Hazard* and her two "babies," submarines Nos. 2 and 3 alongside. The *Hazard* has been acting as "mother-ship" to the Mosquito craft and on her the crews of the submarines live and draw their necessary supplies. There are those who believe in carrying a certain number of submarine boats on a "mother-ship" and is thus transporting them to foreign waters.

The last photograph has an interest because it will give the reader some idea as to how submarines may be destroyed in time of war. You cannot fight submarines with submarines, because both are blind and the "antidote" to the under-water fighting vessel must be looked for in some other direction. Although the British Navy has adopted the submarine torpedo-boat it recognises that it will have to devise some method of destroying the submarines that may be brought against our vessels by foreign powers. The officers of the *Vernon*, the torpedo-school of the Royal Navy, have been carrying out some submarine-destroyer experiments with a "spar-torpedo" fixed on to a torpedo-boat-destroyer.

A spar-torpedo may be seen on a small launch. It consists of a charge of explosive carried at the end of a long pole, and in action the launch would rush up to the enemy, run out the boom and explode the charge against the sides of the hostile vessel. This sounds rather a desperate game to play, and indeed there is little likelihood of such a form of warfare ever being employed.

In the experiment here referred to a spar-

torpedo was fixed on to his Majesty's destroyer *Starfish*, shown in our last illustration and the submarine was represented by a cask. The *Starfish* charged down on the cask and



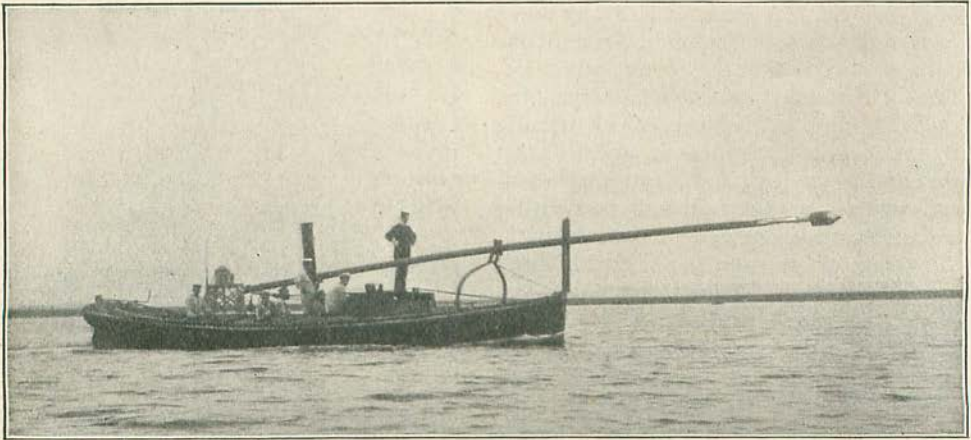
(Stephen Cribb, photographer, Southsea)

The "Hazard," the mother-ship to the submarine

exploded its spar-torpedo as it passed it. The result was that the cask was blown to atoms. The submarine boat—say the staff of the *Vernon*—must come to the surface before it discharges its torpedoes and directly it is sighted the destroyer armed with spar-torpedoes, will rush on the unfortunate vessel at a speed of thirty-five miles an hour, and will either blow it into the clouds or send it direct to the bottom.

Now all this reads very well on paper, but it must not be forgotten, that if the destroyer sights the submarine, the submarine will also sight the destroyer and will dive before the

must also be remembered that submarines will probably act in conjunction with destroyers, and it will be the business of the latter to attack the destroyers with which



(Stephen Cribb, photographer, Southsea)

The spar-torpedo designed to destroy the submarines

latter can get up to her. What the effect of the discharge of 200 lbs. of explosive would be on a submarine, and how far the "dangerous zone" extends, are questions which have so far gone unanswered. It

the enemy is intending to attack our submarines. All this sounds rather complicated, but then the next great naval battle between first-class Powers will undoubtedly be a very complicated affair indeed.



### Eclipse

I saw the shadow of eclipse last night,  
 Noiseless and lurid creep across the moon,  
 And all her radiance sickened, and a blight  
 Withered her beauty. In a waking swoon  
 Of some dull spell she stared upon the earth  
 Whose grim projecting shadow held her fast,  
 And had no light to give, and in her dearth  
 The whole world darkened and was overcast.  
 Then did I say—O Light and Very Sun,  
 My lunar self with its reflected ray  
 Faints also in earth's shadow, and undone  
 Thy splendour dies from off my lonely way.  
 Losing Thy Light, I perish in my place,  
 Athwart I see the mighty shadow loom,  
 And, hiding from the Sun my darkened face,  
 Mirror world's evil and give gloom for gloom.  
 O Light of Light! Can this strange horror be,  
 That aught should come between my soul and Thee?

L.H.