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FLASHLIGHTS ON THE BRITISH FLEET

1. SUBMARINE FLOTILLA.

Of all the units that go to make up the great British Navy there is nothing to equal the submarine in interest for the average landlubber. There is something so sinister, so mysterious, so awe-inspiring about the underwater fighters—their mission in life is so dreadful and their power so wonderful—that they command respect and attention wherever they appear.

It was only fourteen short years ago—to be exact, on October 2, 1901—when our first submarine took the water; just a puny, tubby little boat of 122 tons displacement. From this modest beginning we have gone stage by stage right up to the \$10-ton "E" class, which are at the present moment under construction.

Copying Other Nations
Though by no means a modern invention, the submarine can count its life as from the coming into being of the first French and American boats, and before we undertook the construction of submarine vessels, France and the United States had a considerable number built and working. We chose to copy the American type, and so the Holland, our first boat, came into being. Her engines, driven by gasoline, were able to propel her upon the surface at a speed of nine knots for a distance of 450 miles.

To-day the engines of the latest type of submarine can drive the boat for considerably over four thousand miles. One torpedo tube, not particularly efficient, was placed in the nose of the Holland, and one well-protected propeller took its place at the rear. She had no conning-tower, and her hatch, flush with the deck, prevented her from working in anything but the calmest weather; otherwise an unruly wave escaping below could instantly upset her delicate balance and swamp her.

Weatherly Boats
At the present day the "E" class have a lofty conning-tower and roomy bridge, and she can cruise to sea in practically all sorts of weather. In addition, the new vessels have been fitted with four torpedo tubes, splendidly efficient, and able to discharge the latest type of 18-inch Whitehead torpedo; furthermore, to protect her against the attack of the enemy's submarines and to give her sharp teeth the power to bite, the latest vessels of the "D" class and all the "E's" have been fitted with a beautifully modelled little 3-inch quick-firing gun, so mounted that when the vessel is about to dive the gun can be lowered inside the hull and the deck closed over it, to rise up quickly when the occasion demands.

The boats which quickly followed the original Holland belonged to the "A" class, and have a displacement of 204 tons, and were armed with two torpedo tubes in the bows. In 1904-6 the "B" class, with a length of 138 feet and displacement of 214 tons, quickly followed; and, yet again, came the famous "C" class, which had little difference to the "B's" except in the matter of speed. At length came the "D's," which are the most powerful boats at present in commission, with a displacement of 595 tons and a length of 150 feet. Twin screws now made their appearance, and the ballast tanks were placed outside the main hull of the boat in two long irregular-shaped tanks. At first confined to home waters, these submarines have scattered until we find that some are now stationed at Gibraltar, Malta, and even away with the Eastern fleet at Hong Kong, whither they proceeded without a hitch under their own power.

A Fleet of Sixty-Eight
In fourteen years we have overtaken the French—always the pioneers in these new ideas for either land, water, under-water, or air transport—and by the end of this

year we shall have at least sixty-eight boats completed out of the eighty-three on order.

It may not be generally known that the designers and builders of these sinister fighting machines are divided into two camps. One party hold to the submarine proper, which is circular in section with a cigar or spindle-shaped hull, its ballast tanks being found within the main hull and with its flotability limited. The other party take the view that the boat should follow the lines of the ordinary surface vessels. In this case the hull being double, either partially or completely, with the main ballast tanks formed between the inner and outer skins; and, owing to their boat shape, they are much better sea boats for surface work, and have a wider deck space for exercising their crews. It is not possible to go further into technical details for and against both these designs, but the fact remains that we have, right up to the coming of the "D" and "E" classes, pinned our faith to the cigar-shaped submarines, whilst the French and Germans, with several other of the Continental powers, have generally looked with favor upon the boat-shaped submersible.

The Coming of Oil Fuel
In the same way as the size and speed have developed, so have the engines. Originally fitted with electric motors only, gasoline engines were afterwards installed in the early French vessels, with the result that we followed suit with our first vessel at a later date. But gasoline was found to have its drawbacks. In a confined space the fumes of this extremely explosive fuel became dangerous to the men who were forced to breathe it; secondly, it exploded on more than one occasion with disastrous results.

In time it was discovered that engines could be made which used heavy oil, a thick, treacle-like fluid that had a comparatively low flash point and was not dangerous in any way; and with this type of engine all our later boats, and those building at the moment, are installed.

The electric motors with their accumulators likewise caused trouble at first, but nimble brains and hands have overcome these difficulties with the usual ingenuity of mankind. Next, the fitting of the heavy torpedo tubes and the placing of the spare torpedoes in both the bow and stern of the boat was a move in the right direction, for with all the heavy weight of two torpedo tubes in the pointed bows it was found that the vessel never really lifted her nose to the sea, but rather smashed through them in a drenching mass of frenzied water.

Thus we come to the time when disasters began to fall upon us, and we began to pay the dreadful toll in life that man has always to forfeit for every new invention before he can profit by his losses through experience and improvement.

Germany has built a salvage ship *Vulcan*, which it has had to use on at least one occasion. Here it must be said that, notwithstanding the fact that our submarine fleet is so vastly superior in numbers to the "underseebooten" of the Fatherland, we do not at present possess a salvage ship of a like nature, though the new motor-ship *Adamant* has a derrick erected over her stern, and a new salvage lighter has just joined the fleet, and did good work a short time ago when sudden disaster came to the *A3*.

Life-saving Helmets
For the safety of our boats' crews we rely upon the wonderful *Hail-Rees* life-saving helmets, which are placed in all our newest type of submarine. This device consists firstly of an air-lock, which is so placed that when the vessel founders and fills with water the men can quickly

reach this lock, and there find sufficient air imprisoned to keep them alive until they are able to don their suits.

These suits consist of a light helmet and a waterproof jacket which is fastened round the waist. The helmet is fitted with a device which purifies the breath of the man, so that he can breathe the same air over and over again. When he is ready he gropes his way to the conning-tower and opens the lid, and then inflates his costume and instantly rises to the surface, where he is kept afloat until rescued.

In the boats of the "D" class there are eight costumes placed "forrard," nine under the conning-tower, and eight at the after hatch.

At Fort Blockhouse, the headquarters of the Portsmouth Submarine Division, there is a diving tank (it was formerly used to store submarine cable), where the men are constantly being trained and made familiar with the invention upon which at any day and hour their life may depend.

In addition to this, the lights are at times turned off, and the crews of the boats are not only trained to work the boat and go about their duties in total darkness, but, further, they are taught how to get into the air-locks and don their costumes without confusion in the awful blackness of the interior of a submarine.

We will now, in imagination, take a closer peep at these fearsome naval fighters, and a first glance at the calm, clean-shaven fellows who have so readily offered themselves for the service in which they have made themselves masters.

Gingerly we take a walk up a swaying plank and reach the long, narrow, steel-clad space that is dignified by the name of "deck." Standing six feet or more above this deck is the small bridge perched on top of the conning-tower. Here stands the officer and helmsman when the boat is in service trim. The wheel is of polished brass, gleaming brightly against the grey paint of its surroundings—a wheel that, like the stanchions and other devices not necessary for under-water work, is removed when the boat is about to go below.

Now let us descend a naked steel ladder and leave the daylight behind. As the torpedo hatch is closed, a gentle burr-burr-burr of the big oil engines tells us that we are getting away to sea. Right forward are the two bow tubes, each with its spare torpedo gleaming at its breach; aft in another tube and another torpedo outside, instantly ready for use.

On every hand is a wonderful array of copper tubes that seem to shine from every direction; the wheel of the hand-pump is at our right hand, and great compressed air cylinders take up a considerable amount of room.

A Camera Obscura
The man at the wheel, when at work below deck, has no compass, but keeps his eye upon the iron beam before him, where the card of the compass is reflected by a neat arrangement of mirrors from the compass placed outside the hull of the boat.

Alongside him an officer grasps the handles of the box-like base of the periscope. This is a long tube which extends right up high above the boat, and when she is submerged is the only thing that is above the surface, and is practically invisible at a distance.

Inside the periscope are a wonderful series of mirrors; by which the whole of the surface of the surrounding sea above the boat is reflected before the officer's intense gaze, and by which he searches the horizon with more ease and accuracy than if he was on deck looking through a telescope.

After the first momentary tightness about the chest has passed away, the air is breathed regularly, as if you were on deck. Near at hand a lever is gleamingly at rest, but with a single movement the main ballast can be blown out and the boat instantly sent to the surface.

The Electric Kitchen
For cooking purposes the crew are supplied with electric apparatus, and for sleeping have the usual Navy hammock. The boat is one whole compartment, and so the officers and crew learn to know each other as they never do in any of the big ships of the line, and with the better acquaintance comes better understanding.
There is a great future before the submarine. This belief is held by the greatest naval experts in the world. For notwithstanding the fact that waterplanes are able to "spot" the submarines by flying over them, the under-water ship will do all its deadly work in the darkness, where the aeroplane would be useless.

SUBMARINE FLOTILLAS OF THE GREAT NATIONS.

	Built.	Bldg.
Triple Entente		
Great Britain	64	22
France	73	8
Russia	29	19
	166	49
Dual Alliance.		
Germany	18	14
Austria	6	..
	24	14
Neutral Powers		
Italy	12	8
Japan	13	2
United States	25	22
	50	32

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