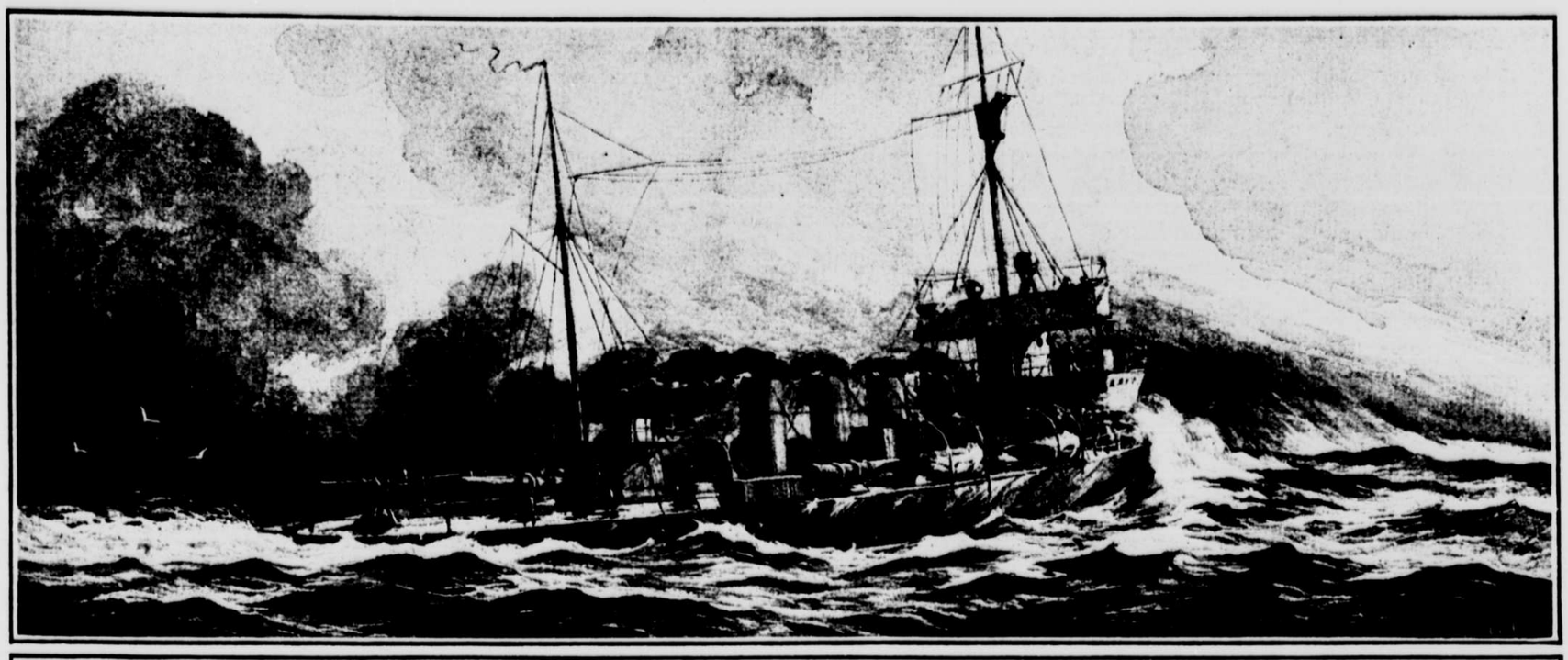
SUBMERGIBLE SUPPLY BASES FOR UNDERSEA FIGHTERS

Simon Lake, Inventor and Constructor of Submarines, Believes They Should Be Able to Sink to Sea Bed and There Replenish Fuel Tanks, Provisions and Munitions to Widen Their Field of Action



While the torpedo boat destroyer is wracking herself to pieces and wearing out everybody aboard, rushing about hunting for the telltale glimpse of a submarine's periscope, the under water boat can be resting upon the bottom undisturbed and taking on supplies and munitions to lengthen the period of her sinister activities.

"WHATEVER may be the fate of the Kaiser's U-boats, it is certain that the submarine has just begun to show the world what it can do," said Simon Lake, the inventor and constructor of undersea craft. "Life aboard underwater craft has been pictured as full of thrills and abundant hazards, and undoubtedly there are enough of these elements to-day to tax the nerves of the hardiest sailorman; but let me tell you that the submarine is coming into its own and hereafter will try to the utmost its surface pursuers.

"This may sound overoptimistic, because already several of the German U-boats have been rammed and sunk and their under water speed is indeed modest compared with that of the ordinary oceangoing fighting ship. They cannot hope to escape pursuit upon the surface and their only safeguard lies in getting below the waves where gunfire cannot reach them. Necessity has compelled the German undersea boats to operate at considerable distances from their bases of supply, and the fact that they have been able to travel far enough to strike in the Irish Sea should be significant.

"Now Grand Admiral von Tirpitz has told us that the biggest of these subaqueous craft can circumnavigate England and when their crews are wearied the boats can sink to the bottom and lie there immobile while their tired officers and men can sleep and relax. Does this fact suggest anything else to you?

"As matters stand now, the U-boats are forced to return to their home ports to refill their fuel tanks, to take on fresh provisions for the men, and to replenish their exhausted ammunition and torpedoes. Thus, even though their personnel get relief by the boats' halting upon the sea bed, a cog is slipped in the matter of continued military efficiency. Without a fresh supply of fuel oil and more food and munitions of war the submarine is ineffective, and when her objective is a distant one she must draw heavily upon her stores to get her there and to carry her safely back to her revictualling base. Indeed, she may overreach herself through her commander's desire to strike his remote enemy and then find herself forced back to the surface and without the means to take her home again, floating impotently upon the sea and an easy target for attack, certain to be sunk or captured.

"These present handicaps need not be permanent ones, and there is no more reason why a submarine should not take on fresh stores in the open sea than a surface vessel. Indeed, a submarine should be able to replenish her fuel tanks and to ship provisions under some circumstances even more securely than its rivals that run upon the water.

"In short, a submarine should be capable of sinking to the sea bed and there, beyond the reach of its foes, of drawing new strength, so to speak, from a suitably designed submergible submarine supply boat. This scheme is not at all visionary. In part it has already been done in the past by vessels planned by me for commercial work, and there is no inherent difficulty in modifying both the military submarine and its revictualling consort so that they can thus function in unison for the purpose of giving the fighting undersea boat a wider field of action.

"While the torpedo boat destroyer, the submarine's logical pursuer today, is battling with wind and wave, jarring well nigh her insides out, and hunting over the tumbling seas for elusive periscopes, the submarine can lie in ambush upon the ocean bed, if the water be not too deep, thus conserving her energies so that when she does rise for a peep through her observing instrument she can strike more certainly with all of the sinister force of her chosen weapon of attack. She can lurk in wait for her quarry not only for one day but for weeks at a time, especially when sand banks a hundred feet below the surface offer the needful haven. This is probably a phase of submarine warfare that you have not thought of, and yet it is the logical employment of this particular order of fighting craft.

"My first practical venture in submarine navigation was for commercial ends. I aimed to do salvage work under entirely new conditions. Instead of operating upon a sunken wreck by getting down to it from a surface craft, I planned a submarine that could travel on the waterbed and reach the cargo to be recovered by working right alongside of the wreck and below the surface.

"I built the boat I called the Argonaut for this purpose, and in Chesapeake Bay alone I travelled many hundreds of miles upon the sandy bottom. In order to make this vessel of service when submerged I equipped her with a diving compartment which was, in effect, substantially a diving bell made an integral part of the boat. To reach the waterbed a door was opened in the floor of the diving compartment, and this provided a passageway for a diver suitably clothed in the conventional dress for such service. Perhaps you would like to know how this chamber in the Argonaut was operated?

"You know enough about the principle of the diving bell to realize that the air inside of it must balance in pressure the hydrostatic force of the water at any depth of submergence. Then the sea cannot enter and the diver can pass out from his shelter and return to it without any difficulty. Of course, the bottom door of a submarine equipped with a diving compartment could not be opened until the air pressure inside equalized the pressure of the water without tending to hold the door closed. Therefore, my first boat and all that I have built since have been equipped with a special gauge provided with two index hands of different colors.

"One hand marks the sea pressure at the point of submergence and the other moves upward as compressed air is turned into the chamber. When both hands are at the same point I know that the desired equilibrium has been established. At the same time, a second gauge, an air gauge, tells me how much reserve energy I have in the flasks from which I draw to battle with the sea that would rush into the chamber if the pressure fell sharply.

"Now let us go a bit further with these operative details. Lest the combined gauge err or halt, there is in the bottom door a little petcock, and by opening this water can be admitted forcibly if the air pressure does not balance the sea pressure, and feebly if the exterior force is almost neutralized by the pent up air. This eliminates all uncertainty, but we can get a much better idea if you will come with me aboard one of the boats we have here in Bridgeport and see the whole performance for yourself."

We went into the diving compartment of the submarine which Mr. Lake speaks of as No. 7, a boat built ten years ago. The securing hooks were removed when the chamber was filled with compressed air, and by that time the visitor had gone through the motions of swallowing copiously in order to relieve the sense of pressure upon the throat and to equalize the force of the air on both sides of the eardrums. With the hooks shoved clear, the big door of heavy steel swung down and open like the cavernous mouth of a whale.

For a moment there was a gurgle of moving water, like the deep tone of a giant demijohn emptying itself, and then all was silence again as the sea halted at the lower edge of the open hatchway. The bottom could be seen with measurable distinctness only a few feet away, and inquisitive fish came into the path of light cast from the chamber, paused for an instant, and then darted away when one of us tapped sharply upon the metal work with a bit of steel. The inner surface of the open floor formed of itself a ladder down which a diver could clamber to the waterbed, and what seemed little short of a miracle was then an easily grasped fact.

"Now you will observe that there is a second small chamber just to the rear of this diving compartment," Mr. Lake went on. "It has two doors, and thus constitutes an air lock, so that once the diving door is open and the chamber is filled with air this lock, taking but a small volume of compressed air, can be used as an exit back into the boat or from the body of the submarine into the diving chamber.

"To pass from where we are now into the boat the lock would be filled with compressed air at the same pressure, and then, and only then, could I open this door right back of us and enter the lock. Next, the diving chamber door would be closed and the air in the lock would be exhausted into the free space within the submarine. With this done, and atmospheric balance being obtained between the lock and the interior of the craft, the second door would be opened and admission gained to the living space adjacent. By reversing these operations any one back in the submarine can pass into the diving chamber when the bottom door is open. Now we come to the practical application of the system.

"Shortly after 1900 I remodelled the Argonaut and brought her up to Long Island Sound and organized a salvage company to operate her. We located the wreck of a sunken coal barge after a submersible tender had been built to work in conjunction with the submarine. The Argonaut towed its cargo carrying consort out to the wreck, both boats sank to the bottom, the diving door of the submarine was opened, and a diver passed out and over to the coal hulk, connecting a pipe line for pumping coal.

"Inside of fifteen minutes we transferred nine tons of coal from the wreck to the tender, and under circumstances that would have made it difficult if not impossible to do the same thing from the surface with ordinary salvage facilities. Our apparatus was in some respects a trifle crude, but what we did then blazed the way for what I now propose as a means of vastly widening the military usefulness of submarines of my design.

"Indeed, I am not so certain that the Germans have not already made use of my patents and my plans, for as you know I spent some years in Berlin when building boats for the Russian Government and the great firm of Krupp was then negotiating with me for the right to build submarines after my plans. There is another reason why the Kaiser's boats should have diving compartments, because the pioneer in this particular combination of submarine boat and diving bell worked upon the problem in behalf of Prussia sixty-five years ago. Let me read this bit of history to you from Commander Seuter's book on submarines:

"In 1850 we again find two European countries at war, a phase of which was the rigid blockade of the German coast line by the Danish fleet. It fell to the lot of a non-commissioned officer of the artillery, a Bavarian by birth, named William Bauer, to bring his genius to bear on the problem of how to act secretly against the Danish fleet and prevent the havoc and hardship that a rigid blockade always imposes on coast towns.

"'Several influential citizens backed up the ideas of Corporal Bauer, with the result that a submarine was laid down in the yards of Messrs. Schuffel & Hovald at Kiel in 1850. She was hastily constructed of sheet iron and was launched under the name of Sea Diver. The moral effect of a submarine at that time being very great; and once the secret of the boat's existence became known the ships could only be seen in the offing.'

"In order to get out of the boat to place mines under the enemy," said Mr. Lake, "Bauer equipped his craft with side doors below the middle line of her height, and designed that the whole of the inside of his craft should be used as an air chamber, counting upon the incoming water to compress the air to the balancing point within the upper half of the craft's shell. Unfortunately, the imperfect construction of the boat proved her undoing, and after she had been down for five hours one fateful afternoon the boat burst through the force of her pent up air and blew Bauer and his two companions to the surface, fortunately.

"What I propose to-day is to provide every seagoing submarine with one or more mobile submergible bases of supply in the form of boats without motive power of their own which can be towed by the military underwater boat and sunk upon the sea bed at convenient points where they will best suit the purposes of the subaqueous torpedo vessel. Naturally, you ask, what would happen if an enemy's scouts should sight a submarine towing a convoy of this sort? Wouldn't the submarine have to desert her supply vessels and sink alone beneath the surface? My answer is no.

"Of course, this assumes that the submarine at the time is traversing waters that are not too deep for her to go to the bottom. She would take her tender or tenders down with her under such circumstances, for you must remember that the supply boats would be built to stand safely the test submergence of the military submarine, that is, a depth of 200 feet. I see you are still puzzled, for you wonder how I can control the sinking of the crewless consorts, holding as they would only supplies and having none of the operative mechanisms that constitute a necessary functional part of the fighting undersea boat.

"Let me tell you how I controlled the submergence of the tender with which I salvaged the coal from the sunken barge in Long Island Sound years ago. That cargo boat had tanks into which water could be admitted from the sea and certain of the inlet passages were closed by means of check valves, which were automatic, seating themselves by the tension of springs. In order to submerge the boat it was only necessary to admit water purposely and to open a valve on the deck for the escape of the air as the water entered.

"To refloat the tender after it had reached the bottom and was loaded a diver went from the submerged Argonaut by way of the diving compartment and attached a hose to the deck vent. This hose was then connected to the compressed air flasks in the submarine. The air was blown down through the pipe into the ballast tanks and the water forced outboard, past the check valves that yielded in that direction, but reseated and closed themselves as soon as the air pressure stopped. In this fashion buoyancy was reacquired and the tender rose to the surface.

"Of course the initial sinking operation required the presence of some one aboard the tender I have just described. This would not be feasible in case of the military supply boats I have in mind. These must be made to sink by suitable controlling devices manipulated from within the military craft, but in principle the cycle would not differ from that which I have described.

"The deck valve allowing the air to escape from the tanks and the inlets admitting sea water could be operated by suitable electrical mechanisms, and, once opened, the sea water would enter and destroy the reserve buoyancy, thus causing the tenders to sink. Again, compressed air supplied from the submarine or compressed air carried by the supply craft themselves could be turned on by electrical control and the boats brought to the surface at the will of the military commander.

"The supply boats, like the fighting submarine, would have diving compartments, but these would be arranged so that the bottom door could be opened from the outside by divers, who, by manipulating suitable valves, would fill the chambers with compressed air and thus permit the door to be opened and allow entrance into the tender. An air lock would then facilitate a passage into the inside of the craft, where stores would be stowed. This air lock would have to be operated, as we have already described, each time materials were brought into the diving chamber for transfer to the submarine.

"The provisions and other portable supplies would be packed in metal cylinders capable of keeping out the water at any depth in which a diver could work safely. I should count upon carrying on this transfer of provisions, &c., in depths of water of 100 feet and less, but deep enough to constitute a sufficient cover against detection by aeroplanes. To facilitate disguise in clear water the tenders could be painted mottled colors which would make them blend into the background of the sea bed, much after the fashion of a flounder.

"These provision tanks, when loaded, would have a negative buoyancy of only a few pounds, just enough to make them sink, and a diver would have no trouble in either carrying or dragging one of them from the tender to the open diving compartment of the submarine. Only food, potable water, the ammunition for guns and the disjointed sections of torpedoes need to be transported in this way. Fuel oil for the engines and even lubricating oil could be sent from the tender to the submarine in a very simple manner.

"The outboard connection of the oil tanks of the supply craft would have hose joined to them leading to the fuel tanks of the submarine.

"The supply boats will have fenders in the shape of long metal rods reaching out from the bow and the stern and both sides. These give the tenders the appearance of gigantic waterbugs, but they serve to form smooth surfaces over which the loop of the sweep would glide freely without encountering any projections to which it could cling. Thus, while the sweep would certainly pick up a floating mine it would pass without warning over a submerged supply base capable of holding stuff sufficient to keep a submarine going for weeks without return to her home port.

"With such a system of revictualling submarines should be able to operate secretly for long periods and virtually to hold the sea the entire time, doing in that interval what would be absolutely impossible for any type of surface fighting craft of kindred displacement and military power. The submarine commander would be the only one having knowledge of the position of his submerged supply bases, and he could place them under cover of night just where they would contribute best to the carrying out of the operations planned for him.

"On almost every coast there are areas where submarines could sink safely to the bottom in moderate depths of water, and there are also quiet coves but little frequented where ideal resting places could be found for the submerged supply boats. With these fading, however, the tenders could be sunk to the waterbed in the open sea, and with their bottom wheels to rest on, working upon pneumatic buffers, they need not fear any vertical motion of the sea even in the stormiest weather. I have found that such motion actually exists forty feet and more below the surface when the ground swell is deep.

"Of course the submarine must rise to the surface from time to time in order to draw in fresh air to fill her pressure tanks and also to recharge her storage batteries. The electrical accumulators, as you probably know, are charged by means of the oil motors, and these engines are so greedy for air that they must have the free atmosphere to draw upon when working. Therefore the submarine would rise to the surface to perform these services during the night time, and boats that seek submarines after dark have a task cut out for them pretty much like that of hunting for the proverbial needle in a haystack.

"This is putting submarine warfare in a new light to you, isn't it? And yet all of this may be an accomplished fact to-morrow."