Combating the Torpedo*

By H. GERNSBACK

WAR after all is but a game of chess. The greatest generals of modern civilization realized this so profoundly that every one of them had been at one time a good chess player. In war, as in chess, luck plays but an insignificant part. Given like equipment, the general who has the greatest strategical ability will win, whether it be in the field or on the chessboard. Also, if both opponents can sufficiently anticipate each other's moves, no one will win. In this case there will be a *stalemate,* as it has existed for over two years in France. But stalemates necessarily always denote equal strength of both opponents and a stalemate often turns out to be a negative victory, for it is certainly not defeat.

The present submarine warfare is no exception to the rule of comparing war to chess, for the simple reason that it is an uneven game—all the powerful pieces are on the U-Boat's side and no Queen, Rooks and Knights on the other side of the board to defend the King. At least there was no defense worthy of the name up to a few months ago.

But science, as always, is progressing steadily and soon the submarine will have found its master, or at least its equal, with which to stalemate it.

Let me first correct a popular illusion. Almost every one of us thinks or speaks of the "deadly submarine," when, as a matter of fact, the submarine itself is not only not deadly but a very weak contrivance at best. Point a 3-inch gun at it and it will vanish instantly. Send a 20-foot motor boat chaser against its periscope and the "deadly" submarine at once becomes deader than the proverbial doornail.

It is the submarine's deadly weapon—the torpedo—that has so far out-generaled the cleverest brains and has given the greatest statesmen untold sleepless nights. To fight the submarine itself is comparatively easy, given good guns and good gunners on board the attackt ship, providing of course that the enemy submarine commander is foolish enough to expose his craft too much above the waves.

Several methods have been adopted of late to combat the submarine, none of which have been great successes.

First, we have the smoke-screen—perhaps one of the most effective schemes developed lately. By means of dense volumes of chemical smoke, blown around the ship by powerful exhaust pumps, the ship is enveloped almost completely in a fog-like screen and it becomes a very difficult target for a torpedo. The ship's bow, however, is nearly always exposed. The other method is to protect the ship with strong torpedo netting suspended by means of booms from the ship. The torpedo upon striking the net is thus rendered harmless, as it never reaches the ship, unless the netting is made of rope and the torpedo is equipt with cutting blades. In that case the torpedo will strike the ship and blow it up.

But the one great drawback of the netting is that it is almost impossible to use it on a fast moving ship. It is too cumbersome and most important of all it greatly retards the speed of the ship, due to the excessive friction of the netting against the water.

The next—and poorest—means to combat the submarine is our widely advertised mounting-guns-on-a-ship scheme. No submarine commander in his right senses exposes more than one or two feet of his periscope when making a torpedo attack. And remember no torpedo attack is ever made at a closer range than 800 yards. Two thousand, and even four thousand, yards are very common nowadays. Imagine a gunner on even a slightly rolling ship trying to hit an object one foot high and less than six inches in diameter, at a distance of 3,000 yards! It simply can't be done. Scoring a hit under such circumstances is pure chance, and don't forget that the periscope itself does not stand still either. It, too, bobs up and down. In fact, at such a distance it is often almost invisible.

Mounting guns on merchant vessels nevertheless is of distinct use, in so far as the guns will keep a submarine at a respectful distance and prevent the U-Boat commander from attacking the ship by means of his own gun-fire. But mounting guns on ships will never prevent a torpedo from finding its deadly mark. You can't shoot at a torpedo—the bullet is too small and the modern torpedo making 43 knots, i.e., 50 miles an hour, moves far too fast.

After much thought on the subject, I came to the conclusion that in the torpedo itself we have an effective weapon to combat the torpedo, strange as it may sound at first. You can combat a gun with another gun, and you can combat one rifle with another, as well as you can fight one aeroplane with another.

Why not combat the torpedo with another torpedo? It is all very possible and simple if you know how; as a matter of fact the idea struck me so favorably that I decided to apply for patents in all civilized countries.

Several navy experts have reported favorably on the idea, and while up to this writing no ships have been equipt with the device, I would not be at all surprised to see the idea put into practise very shortly.

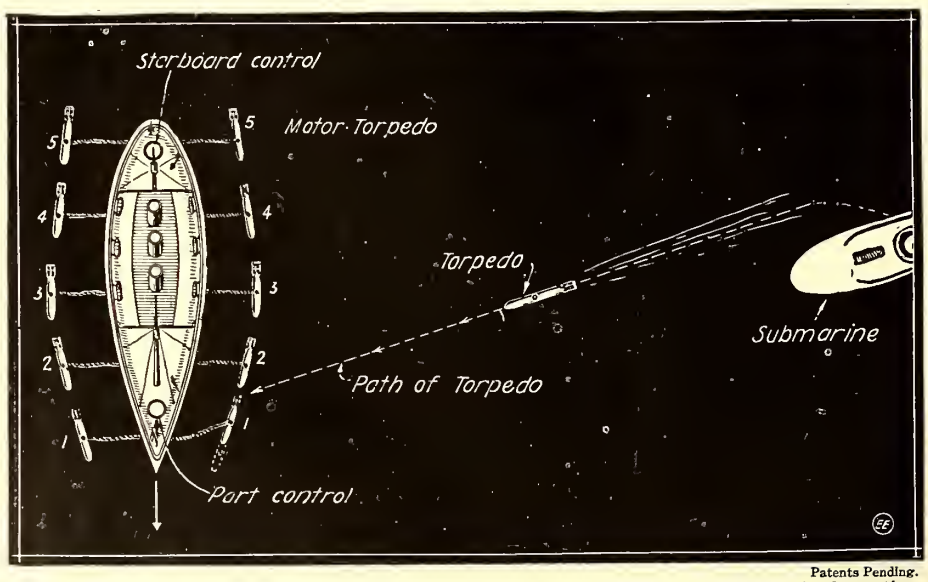
Our front cover and the two accompanying drawings illustrate the idea clearly.

The underlying idea of the whole scheme is that it takes the torpedo an appreciable length of time between the instant of being released from its submarine and the moment it strikes the attacked ship. Taking the closest range at which a torpedo can be fired as 800 yards—and it cannot be fired much closer successfully—this gives a time of 55/100th or over half a minute to cover that distance, short as it is. Taking the average range of 2,000 yards, it will take the torpedo 1¾ minutes before it will strike. These figures are for the latest type Bliss-Leavitt torpedo making 43 knots, i.e., 50 miles an hour.

But a torpedo, whether it runs on the surface of the water or submerged below it, always leaves a very noticeable "wake" in its course. Remember a torpedo is propelled solely by comprest air, comprest up to *2,200 lbs. per square inch.* This air must of necessity come to the surface of the water, as the torpedo runs over its course. The disturbance created thus gives rise to the almost snow-white wake, which is very noticeable from a distance. Thus a man stationed on a ship readily sees the wake as it comes nearer and nearer and he can gage pretty accurately just where the torpedo will hit. Escape for the comparatively slow-moving ship is impossible, even if the engines were reversed instantly. The vessel's momentum would still be so great

OUR readers will find much food for thought in this interesting article. While the idea may not effectively stop enemy submarines from torpedoing every merchant vessel, we feel confident that we have shown a fairly practical way to obtain satisfactory results.

Mr. Gernsback is donating his invention to the Nation and he wishes it to be understood that he will not require to be paid royalties or any other considerations from Amercian ship owners. Foreign ship owners are not included in the above.



Patents Pending.

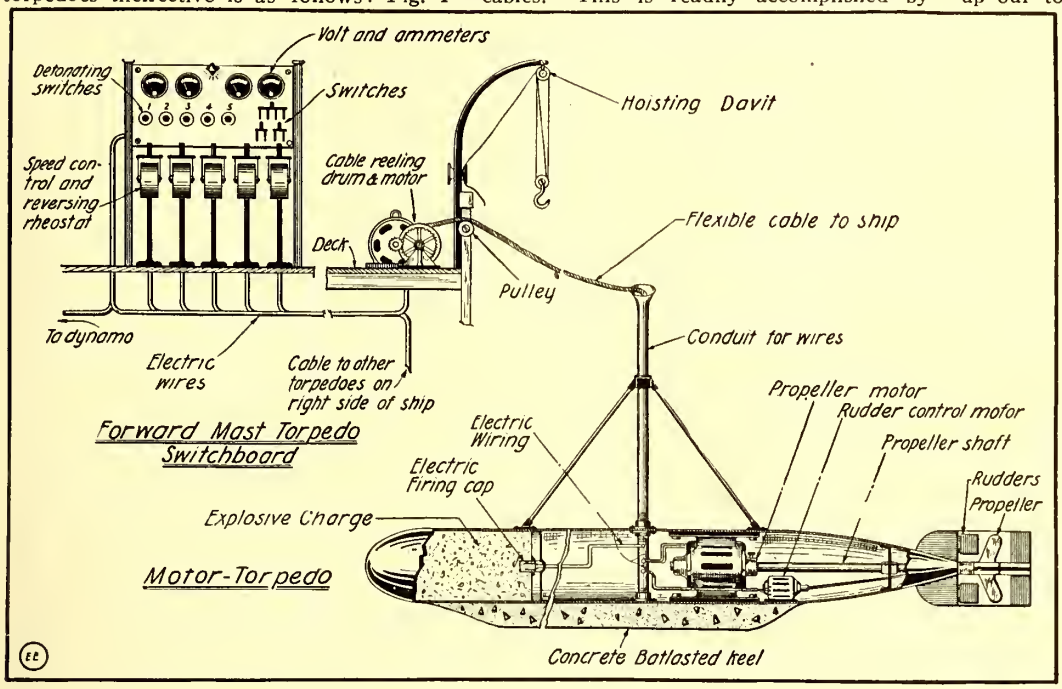
Top View of Ship with its Ten "Motor-Torpedoes" Which Operate Independently from the Steamer. An Approaching Enemy Torpedo Is Blown Up or Thrown Off Its Course by Exploding One or More of the Little Motor-Torpedoes at the Critical Moment. Note that the Modern Torpedo Leaves the Submarine in a Curved Line After Which Its Gyroscope Rights It on the Final Straight Run. (Fig. 1.)

This article appeared originally in the Sunday "New York American" of April 15th.

that the deadly torpedo would surely find its mark.

My proposed means of rendering enemy torpedoes ineffective is as follows: Fig. 1 shows the plan view of an average steamer, 600 feet long. On each side we observe five (or more) independent, electrically propelled torpedoes. Fig. 2 shows the construction of the torpedo itself. Briefly, it is built along the shape of the regulation torpedo and measures from 15 to 20 feet in length and from 3 to 5 feet in diameter. It has a 12 horse-power electric motor geared to the propellers and there is also a little ½ H.P. motor geared to the rudder with which to steer the torpedo. Most of the space between the *warhead* and the motors is taken up with the usual charge of gun-cotton. This torpedo, unlike its other brethren, has a heavily weighted keel to prevent it from rolling over, for reasons which will be apparent later. On the back of the torpedo is mounted a steel mast-like structure thru which the control cable passes. This cable then runs to the deck of the ship over pulley arrangements as shown in Fig. 2. There is also a drum to take up the slack of the cable, or to play out more cable should the occasion arise. The cable then runs up on the mast into a special turret located as high up as is feasible. Here we find one or more operators sitting in front of the electric *control-board*. All the cables from the star-board side torpedoes run into the forward mast-turret, while all the cables from the port side torpedoes run into the rear mast-turret. Thus each set of operators watches out for the safety of his side of the ship.

All of the torpedoes are painted in such a color that the operator can watch them readily and guide their individual course. Sitting at the control-board the operator sees to it that the speed of each torpedo keeps up exactly with the speed of the ship, for there should never be a drag on the cables. This is readily accomplished by means of rheostats, one for each torpedo. By cutting in more or less resistance the 12 H.P. motor can be made to run faster or slower and the torpedoes are thus easily controlled as to speed. By means of a double-pole, double-throw switch the little ½ H.P. motor is revolved in either direction, thus effectively steering the little craft so that it will always keep at a distance of some fifty feet from the mother ship. On the control board furthermore there is a switch connected to a storage battery from which wires are run thru the cable into the torpedo and thence into the *detonator* placed in the gun-cotton charge, Fig. 2. Throwing this switch will blow up our torpedo.



Patents Pending.

Fig. 2. The Electrically Propelled and Electrically Steered Gernsback "Motor-Torpedo." It Is from 15 to 20 Feet Long and Runs Independently from the Mother Ship. An Operator High Up on the Ship's Mast Blows Up the Motor-Torpedo by Electric Contact as Soon as the Enemy Torpedo Approaches Within 15 Feet. Both Torpedoes are Thus Destroyed.

The war action of the idea is as follows: Our ship has left New York with all of the motor torpedoes hoisted out of the water and lashed securely to the decks. The moment the need arises the torpedoes are lowered quickly into the water and the control operator starts the machinery of each torpedo, and in less than two minutes all of them should be running smoothly. fifty to seventy feet distant.

Suddenly the outlook scanning the waters with his binoculars sights the periscope of an enemy submarine and in less than a minute later our operator observes the rapidly lengthening wake of a death-carrying enemy torpedo. High up as he is located, he calculates that in less than two minutes the enemy torpedo will strike somewhere between his motor torpedoes Nos. 1 and 2 (see Fig. 1). By cutting in resistance into rheostat No. 1, he immediately slows up motor torpedo No. 1 thereby intercepting the path of the enemy torpedo. Or if, for certain reasons, he wishes to use his motor torpedo No. 2, he leaves No. 1 in its original course but by cutting out more resistance from rheostat No. 2, he speeds up the latter with the result that it advances faster than the ship and in this case as well it will intercept the course of the enemy torpedo.

Suppose he decides to use motor torpedo No. 1. He has nearly two minutes to jockey it for position and he will find little trouble to intercept the course of the hostile engine of death. His eyes glued to the enemy torpedo (or to its wake), his

(*Continued on page 68*)

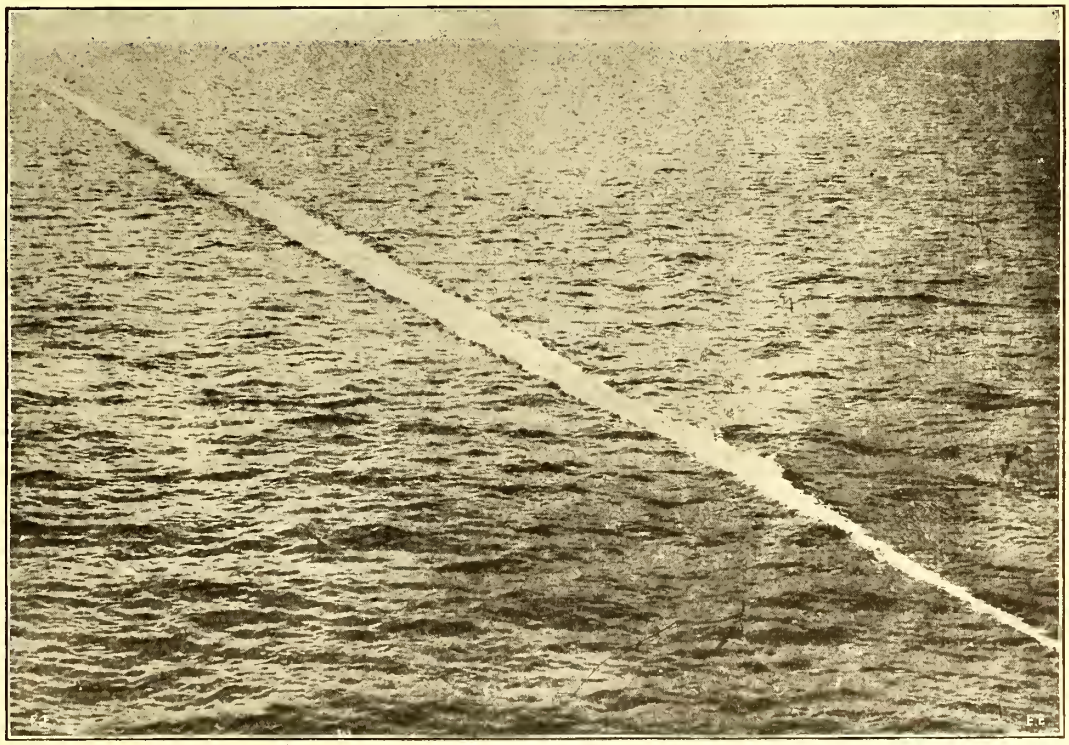


Photo by Paul Thompson.

An Actual Photograph of the "Wake" of a Modern Torpedo. Attention Is Called to the Fact That This Particular Torpedo Ran About 10 Feet Under Water, Having Been Fired by a Submerged Submarine.

"You poor stupid blockhead," he laughed, slapping me on the back, "don't you see yet?"

"No, I don't see at all," I admitted.

"Let me tell you so you can wireless the whole thing back to the papers. You understand how that feeler works?"

"Yes, perfectly," I said.

"Well, up on the bow we have a big coil just like that, mounted on a universal joint so it can be raised or lowered or swung around at any angle in the vertical or horizontal, except directly back. That coil takes about two thousand kilowatts of current which is supplied to it by a big alternator put in the old torpedo room forward."

He paused.

"Well?" I demanded.

"Don't you see now?" he asked.

"No, I don't, go on," I commanded.

"Oh, man, you haven't a bit of imagination," he groaned.

"Well, we can swing this coil around and send a current thru it," he went on. "If an enemy ship comes within one hundred yards of us, the same thing will happen that happens in an induction furnace. *We can send enough eddy currents thru his hull to melt out a whole section of the plates.* Now do you understand?"

But I was at the key, pounding out the message.

COMBATING THE TORPEDO.

(*Continued from page 11*)

hand on *Detonator switch* No. 1, he calmly waits. When the hostile torpedo is but ten feet distant from motor torpedo No. 1, he throws the switch. There is a terrific explosion and a huge column of water is thrown up several hundred feet into the air. Motor torpedo No. 1 has vanished, so has the enemy torpedo. The ship for the time being is safe. Instantly the crew has lowered away a new motor torpedo to take the place of the one just destroyed and long before it touches the water it has been electrically connected to the control board. But this would be necessary only for a large ship with a very valuable cargo. A small steamer would have enough torpedoes left to cope with the enemy. By this time, too, enough time has elapsed for the ship to alter its course and run in a zig-zag line, making it very difficult for a submarine commander to hit the fleeing vessel with the next torpedo. But in case of necessity the other motor torpedoes are still "in the ring" to successfully grapple with the enemy. Even where two torpedoes are sent simultaneously against the ship the scheme will work out satisfactorily. In that case the operator at the control-board simply has to work two rheostats and two detonator switches instead of one and given a level head and a good eye for calculating distances and speeds, the task is not such a very difficult one.

There are a number of firing positions and schemes and while as a rule only one motor torpedo would be used to destroy the enemy torpedo, Fig. 1 shows how two motor torpedoes could be brought close together (see dotted lines of No. 1) to intercept the deadly missile. In that case torpedoes No. 1 and No. 2 would be freed simultaneously and leave little chance for the enemy torpedo to escape.

It is, however, not always absolutely necessary to actually destroy the hostile torpedo. Suppose that the submarine fires from a close range, and suppose that the selected motor torpedo cannot be speeded up fast enough—even by overloading its motor 100 per cent by raising its voltage—to come closer to the enemy torpedo than, say, thirty feet. Even in such an extreme case—tho quite possible in rough weather—the control operator fires his tor-

(*Continued on page 70*)