Dealing Death with Depth-Bombs

How depth-bombs and new sea tactics are foiling the submarines

By Lloyd E. Darling

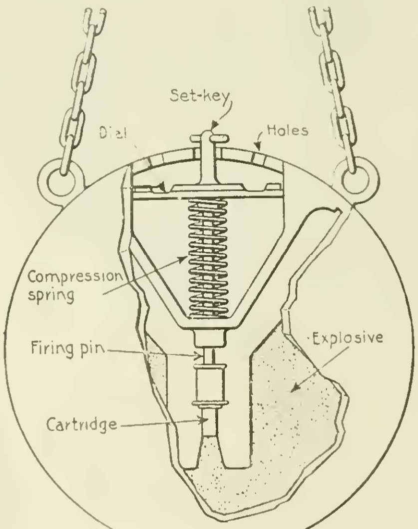
WHAT is the reason submarines have occupied less and less of the limelight recently? How does it happen that their ferocity has proven not so unconquerable as at first thought?

It's a good old American reason—pluck and inventive genius.

We should announce at the beginning that the tactics of American destroyers operating in the submarine zone are just the opposite of what has been current practice. Every time our destroyers see a submarine, they head straight for it. The old idea was to circle around and take pot shots every time opportunity offered. The new idea works havoc with the plans of underwater plotters.

But suppose our destroyers do head straight for the submarines—how do they do any exterminating even then? Answer: Depth-bombs.

Let us pause for a moment and consider how two American destroyers, the *Fanning* and the *Nicholson*, recently disposed of a U-boat with depth-bombs. The incident, as variously reported in the Associated Press despatches, was exciting. We may retell it as follows:



Depth-bomb mentioned by E. F. Chandler. Water enters through holes, pushes dial or diaphragm. Spring, regulated by set-key, opposes the pressure. At proper depth pressure causes explosion

Wherein One Submarine Succumbs

"Periscope two points off the starboard bow!" called a lookout on the *Fanning*. Instantly an alarm to general headquarters was sounded and the helm thrown hard over. Signal flags were swung out, notifying the sister ship of the exact location of the enemy. At the same time the heliograph began its staccato flashing of orders for a combined attack.

The submarine submerged. Straight for the spot where last it was seen went the *Fanning*. Arriving, the commander re-

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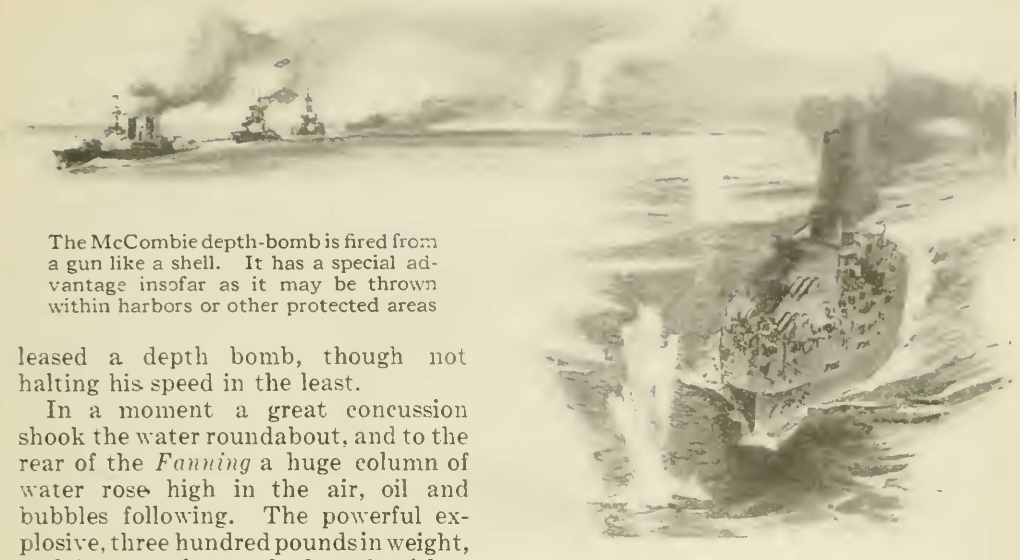
Submarine sinking for the last time. *Fanning's* gun at left means business

Crew of submarine surrendering to United States destroyers **Fanning** and **Nicholson**



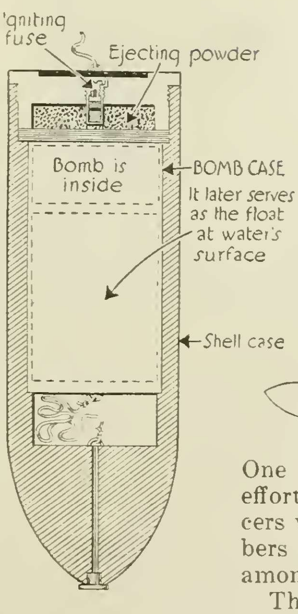
The McCombie depth-bomb is fired from a gun like a shell. It has a special advantage insofar as it may be thrown within harbors or other protected areas

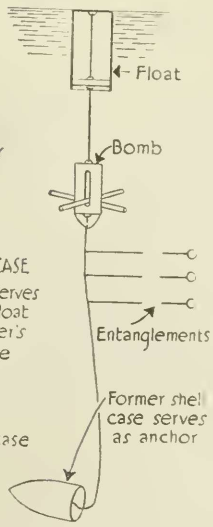
leased a depth bomb, though not halting his speed in the least.

In a moment a great concussion shook the water roundabout, and to the rear of the *Fanning* a huge column of water rose high in the air, oil and bubbles following. The powerful explosive, three hundred pounds in weight, and in a steel case, had sunk with a little splash into the destroyer's wake, bringing its message of death and destruction to the shark-like craft.

Meanwhile the *Nicholson* had arrived on the scene, and it too dropped a depth-bomb. Then both boats began circling the area waiting developments.

Inside three minutes developments came. With a splash of water the submarine suddenly appeared on the surface, like a great whale coming up to breathe. It behaved erratically; was evidently unmanageable. The *Fanning* again bore down, firing from the bow gun. The *Nicholson* also closed in. But only a few shots were necessary. Out piled the entire German crew, holding up their hands in token of surrender. Before they could all be transferred the U-boat sank from under them, never to return. Some of the American crew jumped into the water in an attempt to save stragglers.





Upon the McCombie bomb's alighting in the water, a water-ignited fuse sets off ejecting powder. Thereupon bomb separates into three parts, a float, the bomb, and outer shell-case itself

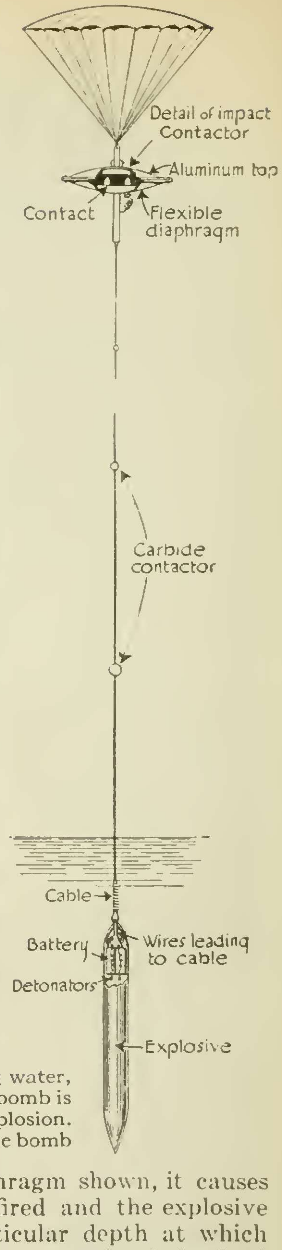
At center of page is bomb before separating into its three parts. Parts after separation are at left. Entanglements catch on passing ship, draw bomb against its side, projecting glass tubes containing fuse-mechanism break, and bomb explodes

One drowned however, in spite of these efforts. Another later died. Four officers were captured, and thirty-five members of the crew. The submarine was among the largest in the Germany navy.

This is one case of effective work on the part of depth-bombs, and of American sea strategy. It is typical.

Depth-Bombs Are of Many Kinds

What are depth-bombs? Trinitrotoluol or other high explosive in a container. Detonated under water, they cause a



Hallock parachute depth-bomb. Flexible diaphragm, upon striking water, closes a pair of contacts. Circuit through the electric cable leading to bomb is thus closed; bomb explodes. Length of cable determines depth of explosion. If the diaphragm contactor fails to work, carbide contactors set off the bomb

violent compressive wave to go out, caving in the side of a submarine in the vicinity as if it were an eggshell.

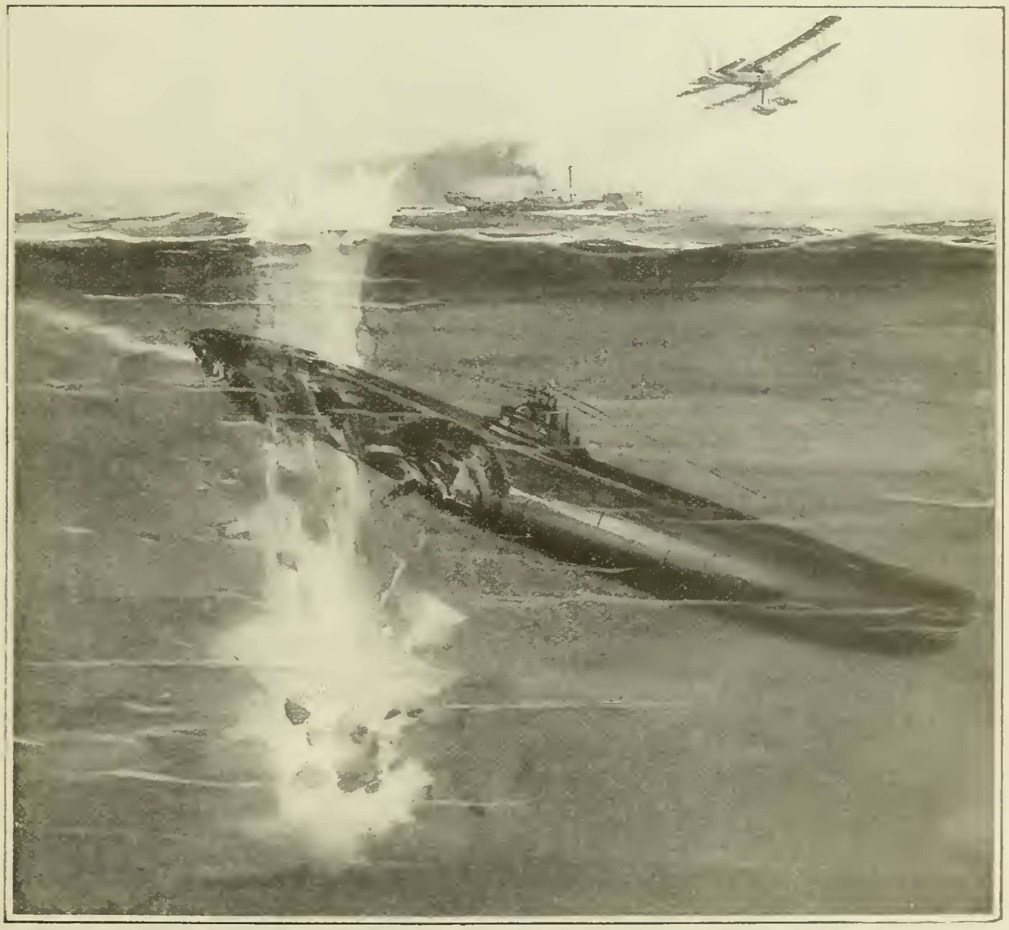
According to Edward F. Chandler, a New York expert on underwater developments, one type of effective depth-bomb depends solely on water pressure for explosion. The illustration on the right shows details.

The bomb may be of any convenient exterior shape, and is customarily equipped with two eyes for the attachment of supporting chains at the stern of a destroyer, or other convenient point. The underwater pressure acts simply. Pushing in on the diaphragm shown, it causes a detonator to be fired and the explosive set off. The particular depth at which detonation occurs may previously be fixed by adjusting the bolt which projects through the diaphragm and outer shell of the bomb. A graduated scale reading in feet makes this easy. The bolt tightens up or slackens the coil-spring pushing on the underside of the diaphragm, thereby making a correspondingly greater or lesser water pressure necessary to compress it and produce an explosion.

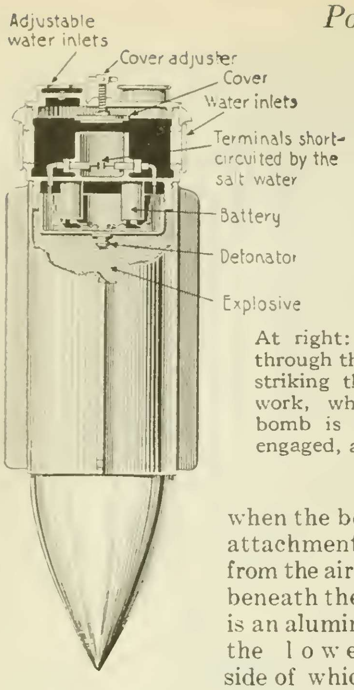
Evidently the type described by Mr. Chandler is the result of evolution, and it probably is the most effective yet developed. However, many other kinds have been patented. A Virginia man named Dunlop produced the one depicted on page 566. This is exploded through the driving in of a pair of wings upon the bomb's striking the water. These wings release a suitable clockwork, which must run a short time before the primer is set off. Meanwhile the bomb is supposed to be sinking as a result of its initial velocity in striking the water. Whether or not it would always do this, and whether the complicated clock mechanism would always run properly is open to doubt. But obviously a clockwork is one way of exploding a depth-bomb and probably many working on the general principle are in current use. None of the Allied governments will tell precise details of the latest developments in depth-bombs, for the Germans would be too interested. But from a consideration of general types already known in the depth-bomb field, an idea of the underlying and fundamental principles may be obtained.

Airplanes Use Depth-Bomb

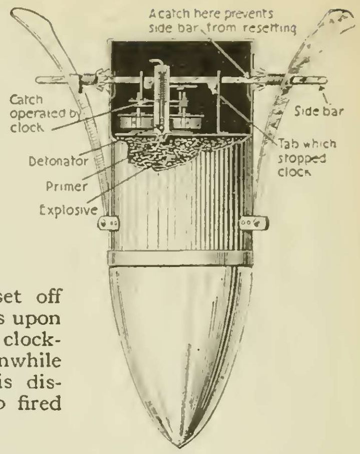
Not all depth-bombs are dropped by destroyers. Airplanes have used them with great success. On page 564 we show a type produced by W. J. Hallock of Jersey City. The explosive is contained within a long, pointed cylinder at the upper end of which is a detonator and a small electric battery. An insulated electric cable containing two wires is attached to the upper part of the cylinder, and leads to a relatively small parachute which serves to straighten out the cable



How an airplane "gets" a submarine. A depth-bomb causes a tremendous explosion caving in a submarine anywhere in the vicinity. No wonder German submarine crews mutiny!



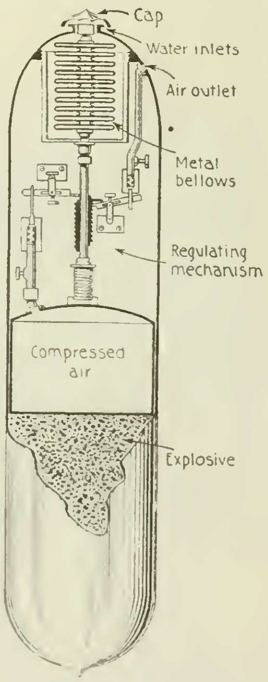
At left: Another Hallock depth-bomb. This one explodes through the action of salt water entering through the sides and top of the upper end and short-circuiting a pair of terminals. Depth of explosion is regulated by adjusting the openings at which the water enters



At right: Dunlop bomb, which is set off through the driving in of a pair of wings upon striking the water. Wings release a clockwork, which runs for a time (meanwhile bomb is sinking), then a firing-pin is disengaged, a primer set off, and the bomb fired

when the bomb and its attachments descend from the airplane. Just beneath the parachute is an aluminum disk on the lower side of which is mounted a flexible diaphragm. When the diaphragm strikes the water in trailing along after the bomb at the end of the cable, it is driven inward, and causes an electric contact to be made between the ends of the wires coming up through the cable, which, in turn, causes the bomb's explosion at a depth below the surface determined by the cable's length. Should this impact contactor at the diaphragm fail to set off the bomb, other pairs of contacts are provided at intervals along the cable's length. These are separated by pieces of calcium carbide, or starch, and are suitably protected from mechanical injury. The carbide or starch dissolves, allowing the contacts to come together and explode the bomb.

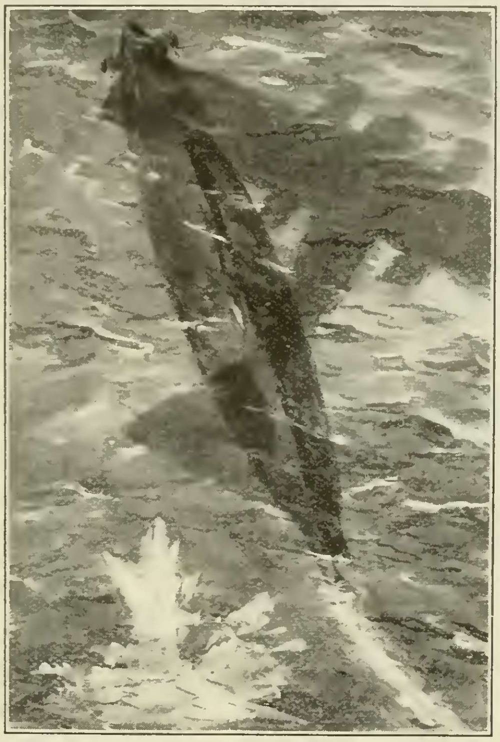
Another of Mr. Hallock's inventions is shown above. This one is without a parachute and explodes by the action of salt water entering at the sides and top of the upper end, and completing an electric circuit through the pair of electrodes shown. The depth at which the bomb is to explode is regulated by adjusting the size of the openings admitting water. The smaller the opening the longer the bomb can descend as a result of its initial velocity before flying into atoms.



The Leon depth-bomb—one type. U. S. Government has experimented with these considerably during past year. Here regulating mechanism for keeping bomb at a pre-determined depth is shown. Pressure of water actuates a bellows. This opens and closes a compressed air supply just enough to keep bomb at depth desired. Firing mechanism not shown

It is a curious fact, discovered since the war began, that an airplane when high in the air, can frequently see a submarine plainly, even though it be submerged as much as one hundred feet. Naturally the depth varies with the clearness of the water in any given region, but surprising results have been attained. A submarine is visible under water from a height for the same reason that a nickel is visible in a pan of water when your eye is directly over it. Should you get your eye off to one side and almost to the level of the water in the pan, refraction (light-bending) effects would enter in, as well as reflection of other objects to your eye from the water's surface. In consequence you could not see the nickel. It is for the same reason that one can rarely see the bulk of a submarine under water from the deck of a ship, though it may be perfectly visible from an airplane. The man on the deck can see only reflections from the choppy waves. He is too near the surface.

K. O. Leon, a Swede, has patented in this country an unusual depth-bomb mechanism. The sketch on page 566 gives details. The Government has experimented extensively with this type and its variations. The peculiar feature about this machine is that it is designed to keep a depth-bomb at a certain predetermined depth beneath the surface, to remain there until contact with an underwater prowler sets it off. A metal bellows at the top of the bomb is filled with air and is surrounded by sea-water which enters through the topmost point of the bomb's case. Naturally, the pressure which this water is capable of exerting varies with the distance the bomb happens to be beneath the surface. Mr. Leon has not disclosed in his patent the particular type of firing mechanism he uses with his bomb.



How a submarine under water looks to an airplane above. It makes a fine depth-bomb target

T. G. Fitz G. McCombie has invented a type of depth-bomb to be fired from a gun. The bomb can thus be dropped among enemy ships with the readiness of a shell, yet possesses the submerged exploding feature so destructive to a ship's plates beneath the water line. The figure on page 563 shows details.

All reports from the zones where submarines are operating indicate that depth-bombs are almost the universal means of going after and "getting" underwater prowlers. While other means for exterminating U-boats will be evolved during the war, few can be so simple and effective.

The War Hath Slain Its Millions, but the Nursery Its Ten-Millions

WHO is the safer, a soldier in a Flanders trench, or a baby in an American cradle? Statistics would seem to show that the soldier has much the better chance of living to a green old age.

The statement recently made by Secretary of War Baker, and the statistics published by the Prudential Insurance Company of England, both agree that the mortality among the men at the front is just about twenty out of a thousand — two per cent. On the other hand the death-rate among babies, before they reach their first birthday, is one hundred and forty out of a thousand — fourteen per cent. It will thus be seen that a soldier has a sevenfold better chance of living than a baby.

The worst part is that all this baby-killing is due to ignorance and negligence. Improper foods and clothing, and the criminal ignorance of both midwives and mothers are the underlying causes. Food is one of the things about which the greatest ignorance is displayed. Conditions can be imagined when a certain city found it desirable to print notices saying "Beer and Pickles are Bad for Babies!"

It is estimated that at least fifty per cent of infant deaths are preventable, proved by the fact that in other countries the death-rate for the first year of life has been cut to half that of the United States and that certain cities in the United States have cut their infant death-rate to less than half the average for the country at large.