To Foil Submarines With Undersea Searchlights

THE submarine and mine constitute two of the greatest menaces to warships and other vessels under modern war-time conditions and to offset the utility and efficiency of same has interested many inventors both in this country and abroad. Inventors and scientists have advocated from time to time various methods whereby they hoped to render the submarine at least an obsolete engine of destruction.

What bids fair to be a successful combatant of these submerged terrors of the sea is the invention recently brought out by Prof. Herschel C. Parker and Edwin G. Hatch, of New York, mechanical engineer, associated with Prof. Parker in his engineering and research projects.

The accompanying illustration will give an adequate idea as to the method of utilizing this arrangement as perfected by Messrs. Parker and Hatch. Simply explained, it makes use of a powerful searchlight beam which is projected through a suitable focusing tube, fitted with reflecting lenses and mirrors and an instrument termed a *mariscope* (but really the same as the periscope used on all submarines) is used to sight through the water along the light beam, aforementioned, and which is turned about on the axis of the projecting tube until it intersects a hidden mine, the hull of a submarine boat, etc. When the mine, or other engine of destruction, is accurately located by this apparatus, the range of same, as well as the angle at which it lies from the hull of the war vessel, is measured accurately by scientific instruments, such as used on regular cannon. These angle and range figures are communicated to the gunner, who then discharges a special form of projectile resembling a torpedo. This projectile, of course, is so aimed as to strike the mine or other submerged devise, and it is not detonated until it is close to the submerged body proper. It is then exploded by the gunner, who closes an electric switch, causing a current to flow along the attached wires to the projectile, fusing a fine wire detonator inside the missile.

On first sight this invention may seem to be a mere theorist's dream, but from tests that have been made in the taking of pictures under water by means of a powerful searchlight, it is definitely asserted that submerged objects can be seen in this way for distances of from 1,000 to 2,000 feet. These distances, of course, may be greatly increased by using a proportionately greater amount of energy in the searchlight projector. The larger projecting tube, into which is fitted the searchlight lenses, mirrors, etc., is termed a *helioscope*, and the instrument mounted in the smaller sighting tube through which the submerged body is viewed is called a *mariscope* by the inventors. In the illustration herewith given it is, of course, to be taken into consideration that the proportionate distance between the mine and war vessel proper is quite close, but in practise the distance would naturally have to be greater than that shown, for the reason that the explosion from such a device would affect the vessel undoubtedly unless it was more than 300 feet away. If this device is actually tried out and adopted by the navy it would have to be arranged most probably in some such manner as our illustration shows, so that a protection would be afforded the gunner and sighter from ordinary rifle and machine gun fire.

For details regarding this latest scientific invention for the detection of submarines, etc., the following considerations will help to make clear the *modus operandi* of the apparatus in general:

At the top of the tube, the latter being represented by the figure 10 in the diagram, is a powerful electric searchlight 11, of any approved kind, which throws its rays through lenses 12 and 13, arranged to hold the rays in parallel relation. These rays are directed against a mirror 14, which is arranged at an angle at the lower end of the tube, and refracts the rays through the lens at the outlet of the tube. This latter lens can be shaped to throw the rays in parallel relation or to give any amount of divergence desired.

Latest Scheme for Locating and Destroying Submarines, Mines, etc., by Means of a Powerful Under-Water Searchlight and Periscope Device. Developed by Prof. Herschel C. Parker and Edward G. Hatch, M. E., of New York.

The tube, with the searchlight, lenses and refracting mirror, is attached to the outside of the vessel. Inasmuch as the searchlight is to be used on deck, a light of the highest power can readily be used. The tube can be adjusted so that it may be raised or lowered to bring the light to any desired point. Likewise the mirror can be moved for the same purpose, but the details of this adjustment have not as yet been considered exhaustively, because they do not concern the general scope of the invention. If a light is projected on both sides of the bow, the field which it is possible to light is almost equivalent to the field of human vision.

When the submerged field is lighted, the next step is to observe it properly, and to

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this end the inventors make use of an observation tube. This can be any of the well-known devices for seeing beneath the surface, but they prefer the *mariscope,* shown at 16, arranged adjacent to the tube 10 and being curved at right angles 17 and 18 at top and bottom. A lens 19 is provided at the lower extremity of the tube, and opposite this is an inclined mirror 20, with another above, 21, at the upper end of the tube; from this the rays are refracted to the sight hole 22, at the end of the tube 17, so that when any object appears in the *illuminated field* its image, or at least a shadow of it, will be caught by the mariscope and seen in the sight opening 22.

As soon as they had devised a means of locating an object in the path of a vessel to be destroyed the inventors next foresaw the necessity for having some means at hand of attaining this end. They devised, therefore, a torpedo tube 23 at the bow of the vessel and adjacent to the means for locating the object. Our illustration herewith shows a torpedo being discharged. The inventors would have it understood, however, that their invention does not lie in any detail of the torpedo tube or of its location, but that any means of discharging a torpedo or other missile from the bow or from the submerged part of a vessel can be employed in connection with their means of *locating the object* to be destroyed and their invention of an electrical device for *exploding a discharged torpedo* when it hits or reaches the vicinity of the object to be destroyed.

As illustrated, the torpedo 24 has connecting wires 25 with any usual or preferred sparking device, wound into a cable 26, which is carried on a reel 27. The terminals 29 on board the vessel are connected by means of two wires with a source of supply of electricity provided with a controlling key 30. When it is seen that the torpedo is in the immediate vicinity of the submarine, mine or other object it can be immediately exploded by closing the circuit.

"We have shown our apparatus attached to the bow of a vessel," said Professor Parker, "but it is obvious that it can be applied to any other part as well, and thus provide a certain means of defense. As a means of offense the importance of the invention will be readily seen, and it will also be noticed that if several vessels equipped with the helioscope and mariscope were approaching abreast a mine field or fleet of submarines a very extensive field would be illuminated and placed under observation, so that the object of danger could easily be destroyed. Furthermore, it is apparent that where the objects of danger are readily located a surface vessel, because of its greater speed and mobility, can easily avoid such objects, even if it cannot destroy them."

ELECTRIC BRANDING IRON.

For branding hams, bacon and other packinghouse products, a new electrically heated iron has been invented, which receives its current from an ordinary lamp socket at a cost of but one-fourth of a cent an hour.

THE UNITED STATES ADVISORY BOARD AND ITS PERSONNEL.

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Society of America. He is also a member of other scientific societies, including the Aerodynamic Commission of the Aero Club of America. Besides his other numerous activities in the realm of flying machines and allied devices, he has investigated the determination of air pressure on arched surfaces, and is the inventor of a stepped aeroplane that is the lightest machine so far built, it is said.

From the realm of mining engineering the Naval Advisory Board has been happily favored with the selection of two eminent specialists nominated by the American Institute of Mining Engineers. These gentlemen are William Lawrence Saunders and Benjamin Bowditch Thayer, both of New York City. Mr. Saunders is a mining engineer of great prominence and was born in Columbus, Ga., in 1856. He graduated from the University of Pennsylvania and for some time was in charge of the hydrographic work of the National Storage Co. He is serving at this time as president of the Ingersoll-Sargeant Drill Co., the Imperial Tool Co., and the Ingersoll-Rand Co., and at one time he was editor of *The Compressed Air Magazine.* He is a specialist in the design of compressed air machinery and has invented many important devices in this field. Mr. Thayer was born in San Francisco and graduated from Harvard University. He is a well-known mining engineer and is president of the American Institute of Mining Engineers, and, industrially, he is president of the Anaconda Mining Co.

This brilliant staff of specialists includes two all-around men of science, as selected by the American Chemical Society, in the persons of Dr. Leo H. Baekeland, of Yonkers, N. Y., and Professor William R. Whitney, of Schenectady, N. Y. As a chemist of repute Dr. Baekeland is well known. He has also produced several important industrial productions based on chemical affinity. He was born at Ghent, Belgium, in 1863 and graduated from the University of Ghent, where he served later as Assistant Professor and the Associate Professor of Chemistry. He also has been Professor of Chemistry in the higher Normal School at Bruges. He is also the inventor of the well-known Velox gaslight paper so widely used by amateur and professional photographers, and besides invented the famous Bakelite used very extensively for all kinds of electrical and other insulating requirements. Professor Whitney was born at Jamestown, N. Y., in 1868 and graduated from the Massachusetts Institute of Technology, where he served afterward as Instructor, Assistant Professor and finally as Professor of Chemistry. The greatest electric corporation in the world—the General Electric Co. —now counts him as one of its most valued men, and he is the director of the research laboratory of that immense industrial and scientific organization, which has solved more problems of an electrical and other nature than probably any other industrial concern of similar age.

From the field of electro-chemistry there has been contributed to the Board two able authorities: viz., Professor Joseph William Richards, of South Bethlehem, Pa., and Lawrence Addicks, of Chrome, N. J. Professor Richards is the instructor in metallurgy and mineralogy at Lehigh University. He was born at Oldbury, England, in 1864 and his early education was obtained in the public schools of Philadelphia. He was honored with degrees from Lehigh University and later spent considerable time in advanced study at Heidelberg, Germany. Mr. Addicks is considered an authority on the metallurgy of copper, and acts in the capacity of superintendent of the plant of the United States Metal Refining Co. at Chrome, N. J. He was born at Philadelphia in 1878 and graduated from the Massachusetts Institute of Technology with the degree of Bachelor of Science in mechanical and electrical engineering. He has held important positions as consulting engineer