

# Detector That Doomed the Hun U-Boat

By Brewster S. Beach



CAPTAIN R. H. LEIGH, U.S.N.

WHATEVER plans Germany may be making for the "next war," if in truth she is or ever will be capable of carrying them out, it is certain that the submarine will play no part in her schemes.

The submarine is dead. The U-boat peril has vanished forever, never to be resurrected.

The collapse of submarine warfare during the closing months of the European conflict and the prediction that its resumption may never be seriously feared again, was the result of the invention in the United States of a wonderful listening device, or submarine detector, which came very close to driving the Hun submersible from the ocean, and would have done so, in the opinion of naval experts, had the war continued through another summer.

As soon as the United States entered the war the navy department formed a special board to develop ways and means for combating the U-boat peril, then growing to alarming proportions.

This board consisted largely of officers from the bureau of steam engineering, of which Rear Admiral R. S. Griffin is chief. It called to its assistance in an advisory capacity many noted engineers and scientists from industrial concerns, including the General Electric company, represented by Dr. W. R. Whitney, director of that company's research laboratories.

Commander C. S. McDowell, U. S. N., served as executive secretary of the board, while the other advisory members were Col. F. B. Jewett of the Western Electric company, and Prof. R. A. Millikan of the University of Chicago.

Development headquarters were established at New London, Conn. The General Electric company in conjunction with the Submarine Signal company of Boston started an experimental field station at Nahant, Mass., and were later joined by experts from the Western Electric company.

Out of the activities of these two groups of scientists there was developed the American listening device, an instrument which proved to be able successfully to detect submarines while submerged within range of anywhere between 3 and 12 miles.

Even with the signing of the peace treaty little can yet be known of the details of this device. It is, however, an instrument using the principle of sound-wave transmission through water in a new and startling way and it depends for its direction-getting qualities on the peculiar and little-understood faculty of the human ear to detect the direction of sound by the shifting of sound from one ear to the other as the instrument was revolved.

As soon as the device was considered practical the General Electric company undertook its manufacture on a large scale in Lynn, Mass., developing three kinds of listeners: One which was hung overboard from the deck of submarine chasers, another which could be trailed off the stern and a third which protruded through the hull of the vessel. American destroyers, chasers and submarines were at once equipped with the instrument.

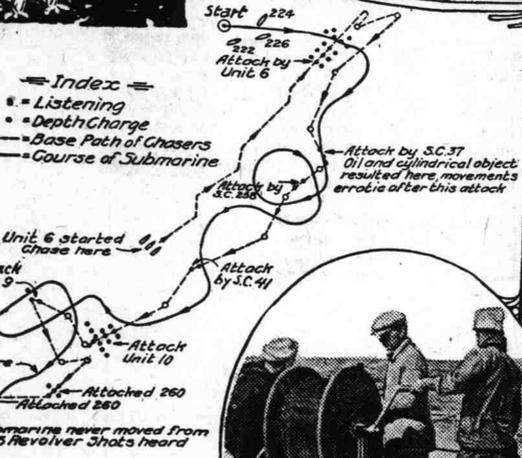
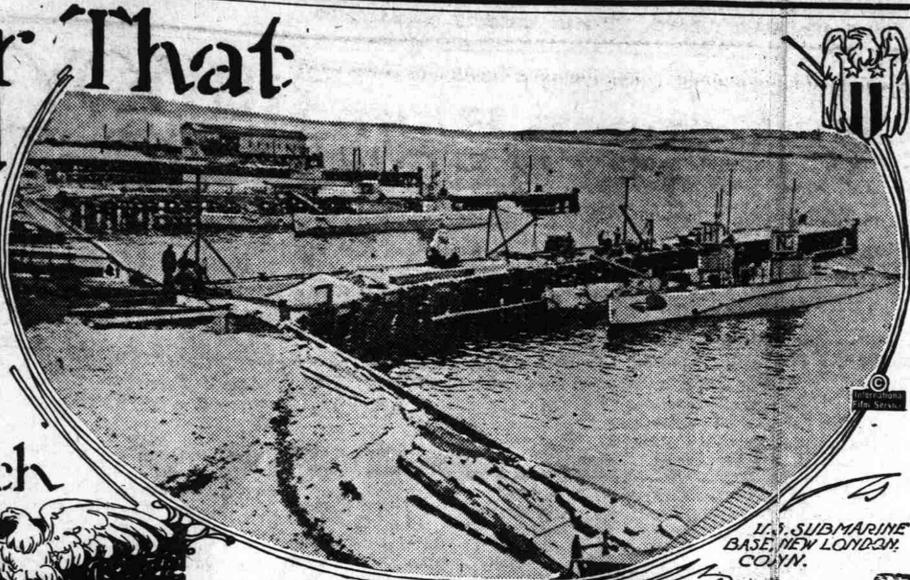
When the submarine detector had been turned out in sufficient quantity, the navy department believed that the allies should get the benefit of the invention at once. A special service party, in charge of Capt. R. H. Leigh of the bureau of steam engineering, was formed to take samples of the apparatus abroad and test it under actual conditions before the British admiralty.

The instrument was likewise demonstrated to the French and Italian navies. The party consisted, besides Captain Leigh, of Lieutenant Carter, U. S. N., Ensign Welch, U. S. N. R. F., six enlisted men, C. E. Eveleth, C. F. Scott, and T. P. Collins of the General Electric company, representing the Nahant group, and W. L. Nelson of the Western Electric company, who was connected with wireless development.

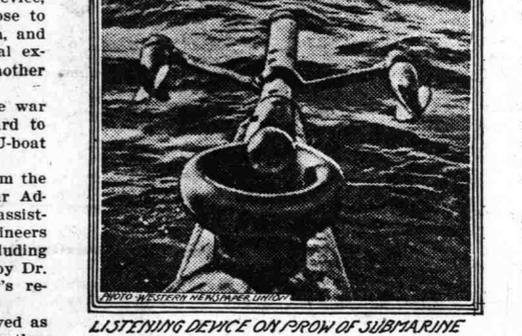
They sailed November 22, 1917, and joined the British grand fleet at Scapa Flow in the Orkney islands during the first week of the following month.

The admiralty and the supreme war council shortly afterward adopted the American device and from that time on submarine patrol work was revolutionized.

Defensive tactics which had been employed since 1914 were now no longer the sole reliance. The war was carried into the enemy's territory. Fighting ships, instead of patrolling the steamship lanes looking for a stray "sub" to poke its



LISTENING DEVICE ON PROW OF SUBMARINE



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periscope above the waves, were augmented by submarine chasers equipped with listening devices, and hunted the submarine in its underwater lair.

Up to this time the British had been frankly disappointed in results. It had been a rare thing for a submarine chaser to actually see a submarine. Days would go by without sight of one. Yet sinkings continued to multiply, tonnage decreased alarmingly and the rates of destruction and construction constantly approached the danger point.

It was apparent that if an improvement in this situation could not be effected the allies faced privation, if not actual starvation, and any material help from America either in the form of men or supplies would be impossible.

The success of the device is well illustrated by the chart shown herewith which gives a vivid picture of the chase of an enemy U-boat in the English channel and demonstrated the ability of the listeners to keep hot on the trail of the submarine, doubling and crossing in an effort to escape.

This dramatic incident—one of many—is vividly described in the following report of the engagement in question:

"At 1:25 o'clock unit No. 6 'fixed' (located by triangulation) a submarine directly ahead at a distance of 100 yards; immediately carried out three-boat barrage attack, each boat letting go three stern charges and 'Y' gun. Pattern laid symmetrically, thoroughly covering any possible maneuver of the submarine. Stopped and listened. No hearing for about 20 minutes. Then got contact. Distinct sound of submarine making noise as if shafts were badly bent. Also giving out squeaking sound. Submarine sounded as if having great difficulty in keeping propeller going. She stopped frequently. We followed. . . . Heard submarine hammering, squeaking, straining, running intermittently, apparently with great difficulty and for short periods.

"The second depth charge of this attack threw into the air a 50-foot to 60-foot cylindrical black object about the size of a depth charge. . . . Another depth charge attack carried out. Submarine had gradually been making shorter turns for some time. . . . From this point on believe submarine bottomed and was never able to move except to start and scrape along the bottom a short distance. Noises indicated this."

Word was then sent to Penzance for additional depth charges and a radio dispatched to the base for a destroyer post haste.

"Subsequent events," continues the report, "show that submarine never moved from this spot. Noises indicated repair. Occasional unsuccessful attempts to start motor . . . sounds rapidly becoming less frequent."

When morning came the submarine chasers and the destroyer which had been sent to their assistance gathered near the spot where the crippled submarine was resting at the bottom. Sounds of



LISTENING FOR U-BOAT

feverish activity within the submarine's hull were distinctly heard.

Suddenly there was a dead silence. Then 25 revolver shots rang out—three first, followed by 22.

"Taking into consideration all circumstances and events," continues the account, "conclude submarine damaged externally, unable to start motor after repeated attempts. Unable to rise to surface and is on bottom in the vicinity. Reports of listeners substantiate this conclusion."

As a matter of fact, the British naval intelligence department learned later that the crew of a German submarine had been lost in the English channel about this very time. The report, as they obtained it, indicated that the Hun boat had been trapped on the bottom and so seriously damaged she was unable to rise.

C. S. Scott, engineer of the General Electric company and member of the special party sent abroad, contributes this incident which happened in the Adriatic sea:

"We had 36 chasers based in a little bay on the island of Corfu and the barrage of boats extended across the Straits of Otranto, a distance of about 40 miles. The chasers were operated in units of three, which on patrol kept about one mile apart. A distance of five miles was kept between units. Conditions in the Adriatic were ideal for hunting submarines. The water was very deep, ranging from 400 to 600 fathoms, which meant that the submarines when hard pressed could not seek shallow water as was their custom in the English channel and the North sea. Due to less shipping traffic in these waters there was practically no sound interference, which made for very good listening.

"Many successful attacks were made in these waters, one in particular being quite exciting.

"One of the ships in a unit heard what sounded like a submarine. In a few minutes all three listeners had picked him up and the bearing of his course was being plotted. The middle chaser, the flagship, was getting readings showing that the submarine was in a direct line astern and steaming toward her.

"The sound was very loud, as if the sub must be very close. Suddenly the water began to slap the bottom of the boat, so that everyone could feel it; and the next moment the observer reported that his bearing on the submarine had changed from 180 degrees, which was dead astern, to three degrees, which was on our bows. The submerged submarine had passed directly under the center boat. All three boats were immediately got under way and the attack was delivered. After all the depth charges had been dropped, the ships were stopped and observations again taken. A propeller was heard to start up and ran for about 30 seconds; and then a crunching noise was heard. It was quite evident that the sub, having been put out of control, sank to the bottom and had collapsed due to the tremendous pressure at these depths. We went back to the spot next morning and found an oil slick two miles long by 800 yards wide on the surface of the water."

The development of the submarine detector was the result of the foresighted vision of the navy department and the generous co-operation extended by private manufacturers who had placed their entire organizations at the disposal of the government for the period of the war.

Large electrical manufacturers with exceptional facilities for research and experimental work were able to render invaluable assistance in cracking the submarine "nut."

In fact, it may be said that "big business" in the commonly accepted meaning of the term, will be found to have contributed a very large share toward winning the war when the whole record of this war's inventions comes to be written.

## COMFORT OF HOG MOST DESIRABLE

Well-Made Sanitary Wallow Is Like Coney Island Bathing Beach for Porkers.

## CONCRETE TYPE IS POPULAR

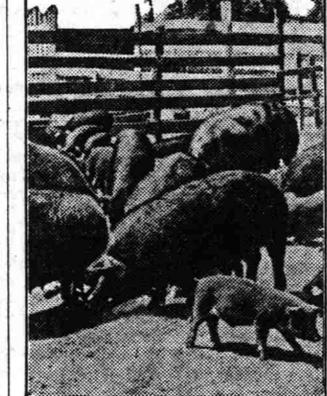
Grower Faces Two Temperature Extremes in Many of Pork-Producing States—Many Farmers Neglect Proper Shelter.

(Prepared by the United States Department of Agriculture.)

It is as natural for the hog to want to wallow as it is for the small boy to scurry to the old swimming hole with the first breath of spring. Hot weather is hard on fat animals, the portly porker included. That is why a well-made, sanitary hog wallow is like a Coney Island bathing beach for the hogs. A popular and serviceable type of wallow advocated by the United States department of agriculture should be made of concrete about 12 inches in depth and large enough to accommodate the herd of hogs. The wallow should be supplied with a satisfactory intake and outlet so that it can be filled about two-thirds full of water and drained every few days, or as often as is necessary to keep the pool fresh and clean. At the present time a test is being made at the experimental farm of the department of agriculture at Beltsville, Md., to determine the value of the cement hog wallow as a comfort for hogs. The results of this investigation will be published upon completion early in the fall.

## Temperature Extremes.

The hog grower in many of the leading pork-producing states faces two temperature extremes during the year. During the winter, unless he provides comfortable houses and warm quarters, his hogs are likely to suffer from the cold, while in the summer season he must handle the animals under conditions of extreme heat. Any animal as fat as the average hog which is to be marketed in the late summer or early fall suffers greatly during hot weather, and unfortunately many hog farmers neglect to provide shelter and protection for their hogs from the extreme



Some of Uncle Sam's Porkers at Beltsville, Md.

heat. During hot weather hogs need an abundance of shade—natural shade, such as is furnished by trees and bushes being the best.

## Temporary Shelter.

Where natural shade and shelter are not available, the hog owner should put up a temporary shelter by building a framework about 4 feet high and thoroughly covering the top with brush, straw, grass, or hay. This inexpensive sunshade should be of sufficient size to protect a herd of hogs in comfort as they lie under it. As a rule, the ordinary hog house should not be used for shade purposes during the summer. Each year hog mortality is comparatively heavy due to "porker sunstroke" induced by maintaining the hogs in the open without sufficient protection from the ruddy glow of Old Sol's furnace.

## APPLY MANURE IN ORCHARDS

Failure of Many Trees to Produce Fruit Is Due to Lack of Necessary Plant Food.

Undoubtedly the failure, or partial failure, of many fruit trees to bring forth a crop is due to lack of plant food. Professional orchardists look after this matter, but the average farmer who has a few trees, which he dignifies by the name of "orchard," gives scant heed to providing them with fertility. He may turn the sheep or the calves in among them but such fertility as they add is apt to be of slight value, comparatively speaking.

## YOUNG ANIMALS NEED CARE

They Should Be Given Such Attention as Will Insure Them Most Favorable Start.

The young animals should require such care and attention as will give them a favorable start. Every practical animal husbandman knows that unless he is in a position to give his young animals plenty of the right kind of feed and protect them from cool rains and other animals they will not thrive. This is where a good beginning means a favorable ending.

## PURE SORGHUM SEED BY ROGUEING PLATS

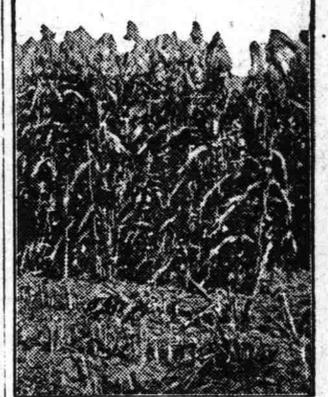
Go Over Field and Carefully Remove Off-Type Plants.

Work Can Be Done Easily by Man on Foot With Dwarf Varieties, While With Taller Sorts It Is Practical to Use Horse.

(Prepared by the United States Department of Agriculture.)

In order to obtain pure sorghum seed it is usually necessary to go over the field carefully after it has headed out and remove the rogues or off-type plants. Every plant which does not conform to the type which is desired should be cut down, or, better, pulled up so that there will be no danger of the production of seed from tillers produced by the rogue.

In dwarf varieties the rogueing can be done easily by a man on foot, but in the taller growing sorts it is most practical to ride through the field on horseback so that the workers can see



Superior Sorghum Field.

over the top of the field and thus more readily determine the position of the rogues which must be removed. The horse can be securely muzzled to prevent injury other than that occasioned by the tramping down of plants.

It is not profitable to rogue fields which are intended for the production of grain or forage, but in the producing of seed, either for home planting or the market, careful rogueing gives returns both in dollars and cents and in the satisfaction of growing pure seed. Sorghums being open-pollinated are subject to almost endless hybridization if stray plants of other varieties are allowed to mature in the field. This intermixing of varieties results in lack of uniformity in ripening as well as in the size of the plants, thus causing difficulty in harvesting and marketing the crop. The use of pure seed varieties which are known to be adapted to the farmers' climatic conditions will be rewarded in bigger and better crops.

## EXAMINE LAND FOR ALFALFA

Frequent Borings Should Be Made With Auger to Determine Character of the Soil.

In examining a tract of land for alfalfa frequent borings should be made with a soil auger to determine the character of the soil and subsoil as well as the drainage conditions. This instrument usually will be of greater value in determining the adaptability of a particular tract to alfalfa than a chemical analysis of the soil. A common 1 1/4-inch auger with the shank lengthened and a suitable crossbar for a handle is practical for this use.

## FULL-CROP YIELD OBTAINED

Sufficient Fertilization, Pure Seed and Careful Cultivation Are of Importance.

There are three agents that are sometimes neglected, but through which the full-crop yield can be obtained. They are, sufficient fertilization, pure seed and careful cultivation. The proper use of fertilizer will make the stalks and stems stronger and thus more impervious to the attacks of vegetable parasites or the spittle of insects. It will give weight, color and size to the fruit and materially hasten maturity.

## GOOD STRAWBERRY TILLAGE

Always Run Cultivator or Rake Through Patch Same Way to Permit Runners to Set.

Let the strawberry runners set at will within the row. In tilling strawberries, always run the cultivator or rake through the same way each time. This allows runners to set which would be uprooted by a reverse tillage. But when a row is matted over two feet deep, stretch a line and chop off and hoe up all outsiders.

## BURN DEAD WOOD IN ORCHARD

When Allowed to Lie in Heap It Furnishes Breeding Place for Insects and Rodents.

All dead wood should be burned at once, preferably in the orchard. If it is allowed to lie in a heap, it furnishes not only a breeding place for vegetable and insect pests, but a home for rabbits, mice and other animals.