

addition to his Majesty's grand fleet, have checked off more than their share.

The sea keeping qualities of these little giants cannot be overestimated. During one great Channel storm two of these tiny boats patrolled the raging waters ceaselessly for forty-eight hours, encountering mountainous seas and winds that blew hurricanes, yet both put safely back to port unsuccessful in their quest, in good shape. Not a plank was

type of motor boat engines in the world. They are the result of years of patient and exacting experimentation.

When the British first launched these 550 chasers against Germany's droves of submarines some people said: "Why didn't you make them more powerful?" They seemed to think that nineteen knots was slow speed. They wanted thirty, forty, fifty miles per hour. They had been reading in the newspapers

Thus was a revolutionary adaptation developed.

Shortly after this an English engineer visiting this country in the interests of his Government asked Mr. Sutphen if he could build such boats in large numbers. They talked the matter over with Irwin Chase, a naval architect in the company's employ. The result was that the Elco Company began preparing estimates for fifty submarine chasers.

The estimates were completed, submitted to the British Government and immediately accepted; whereupon the Elco Company found itself with a wonderful opportunity before it. These boats were to be delivered within one year and were to test out a minimum of 19 knots each.

Hundreds of problems presented themselves. Where was the material to come from? Where were the boats to be made? Where was the labour to be obtained? Would it be possible to fulfil the contract in time?

This is the way they went about it. They built a single boat according to plans. Then they took this boat as a model and proceeded to turn out fifty counterparts of each one of its parts. This single boat contained 500,000 separate and distinct pieces. Think of the proposition of turning out 25,000,000 parts! It meant the organization of a force of labourers, the gathering together of great quantities of timber, the assembling of hundreds of carloads of material.

The first thing they did was to erect a plant up on the shore of Levis, Canada, opposite Quebec. There they blasted a foundation in the solid rock and erected a factory, covering thirty acres. They then proceeded to mobilize 12,000 workmen, mostly French-Canadians, with a few American labourers interspersed.

For instance, from 8,000,000 to 10,000,000 feet of oak timber was required for hull construction. (It had been decided to build the boats of wood instead of steel for reasons of seaworthiness.) The Elco company got experts and set them to searching for this lumber. They found that there was an enormous quantity of oak to be had provided one knew where to go for it. From a single mill in Virginia came 4,000,000 feet of the best quality fine, hard oak.

Then there was the problem of metal, not so much steel—very little steel was used in the construction of these boats—but bronze—bronze for rudders and stanchions and staples. After a search all over Canada and the United States the requisite metal, moulded in the requisite shapes, was obtained.

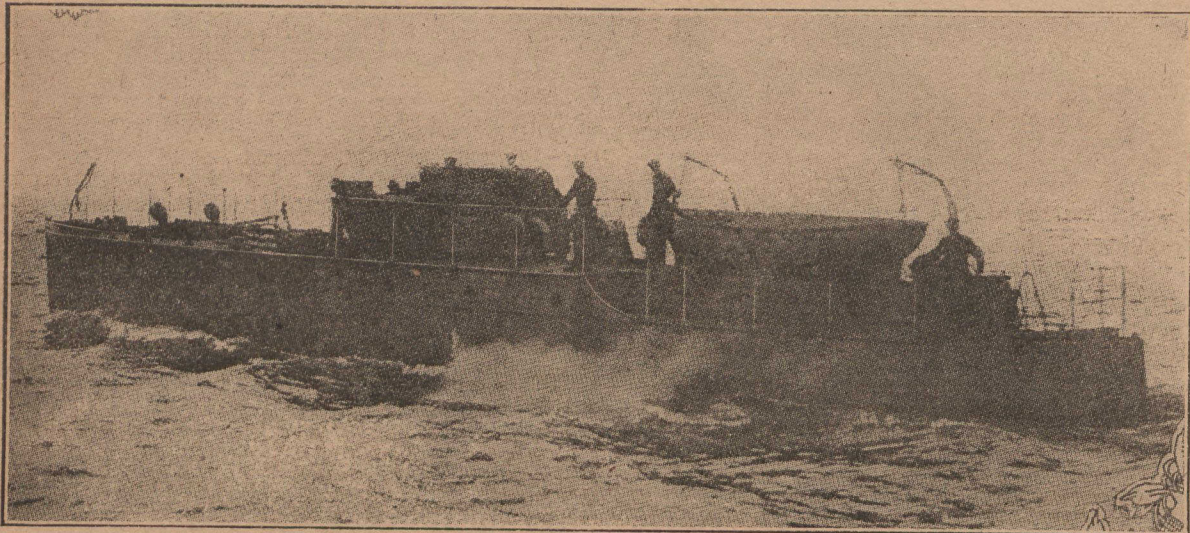
These were merely problems of getting together the raw material. When once the material had been gathered together even greater problems presented themselves—problems of specialization, of concentration. Special sections or gangs of men were formed to lay decks, others to hammer down interior planking, others to put together the engines, to adjust the brass fittings, etc. In all fifty specialized, distinct gangs were employed.

Perhaps the greatest problem was that of getting these boats safely to England. Remember they were eighty feet long. A steamer could accommodate only four at a time. So you can see that the problem was no slight one. Moreover, each boat had to be given an exacting individual trial.

Yet in spite of all difficulties the boats were delivered safe and sound to the English Government in eight months, or four months before the allotted time limit of one year expired. Moreover, every single one of them exceeded nineteen knots in speed. These boats cost the British Government \$40,000 apiece, the contract representing in all \$2,000,000.

But here is the point: Before any of these boats had been delivered to the British Government, Germany had sent the Lusitania to the bottom and revealed conclusively to the world her menace. England saw with clear vision the part that submarines were to play in the months to come. She sensed the value of the submarine chaser and on faith alone she turned to the Submarine Boat Corporation, builders of fifty "sea wasps" she had never even seen, and placed her order for 500 more of precisely the same craft, to be delivered by the fall of 1916. This represented a contract of \$20,000,000.

The builders of the first fifty accepted this order without a tremor, realizing full well that they stood face to face with a proposition altogether new. Previously to this boats had been built. But to turn



550 of these sea-hornets, the submarine-killers, were built by the United States as Britain's counter-stroke to the German sub. menace.

started. Not a stay was loose. Not a drop of water was in their bilge holds. And during that same storm larger and supposedly more seaworthy craft found their way to the slimy ooze and sticky chalk of the Channel bottom.

A feature of these boats that makes them specially adapted to seeking out and destroying submarines is their extremely light draught. A torpedo fired from a submarine, or, for that matter, from a battleship or a torpedo boat destroyer, generally travels from 16 to 18 feet below the surface. This of course is to enable the explosive charge to reach the vulnerable part of the warship, its prey, as battleships have heavy armour extending 10 feet below the surface. Therefore this submarine chaser, drawing only 4½ feet of water, is immune from the danger of being torpedoed.

True, a torpedo may be regulated to swim at any distance below the surface; but, when the distance is less than 10 feet, it is apt to jump out of the water and become unmanageable, since it travels at a high speed. Torpedoes fired to keep 6 feet or so below the surface have been known to turn completely around and boomerang back to the vessel that discharged them. This, in the case of a German war torpedo loaded with 500 pounds of extremely irritable gun cotton, would be a nerve racking experience for the most coldblooded German U-boat crew. Therefore, the "sea wasps" need have no fear of torpedoes, but may approach to within 100 feet of a hostile submarine and deliver the contents of their deadly guns into its very entrails.

The only fear these little motor launches have is of a direct hit by enemy gunfire, and such a thing is extremely improbable; because a submarine has to be completely out of the water before she can mount her guns for action; and in 99 cases out of 100 she would be submerged. All you would see would be a tall, tapering tube (her periscope) and a miniature rippling wake. This manifestation of the genus U-boat is all any good English "sea wasp" captain wants. It is easy to plug a submarine when you can see her battle eye. All you have to do is to aim the gun and open fire. At the rate of twenty shots per minute from a 3-inch gun the rest is a matter that need not require much imagination.

These boats are essentially American. Evolved from successful pleasure boat models known for their speed and seaworthiness the world over, their success in their new field has even exceeded the wildest hopes of the motor boat enthusiast. I say motor boat, for they are motor boats. They burn gasoline, not oil, as do their enemies, the submarines. Each one of them houses a power plant delivering 500 horse-power. This power plant consists of two very efficient gasoline engines of 250 horse-power each. These engines represent the very highest

about the wonderful speed of American racing boats. But the English engineers quickly explained, and the performances of the little boats backed them up. Greater speed could only be given at a sacrifice of gun power and seaworthiness.

Boats of this type can be made to run at amazing speed. But such boats are mere shells—tin cans with a cyclone inside them. They can perform their wonderful feats only on the still waters of some river or bay.

The British knew what they wanted. And they got it.

The idea of the submarine chaser originated with Henry R. Sutphen, vice-president of the Elco Company of Bayonne, N.J., a branch of the Submarine Boat Corporation. I called on Mr. Sutphen the other day. He told me that he had been designing motor boats chiefly of the pleasure type for over twenty years, when in the spring of 1915 the idea entered his head: Why not design a motor boat similar to the successful pleasure type, give it a reasonable speed, make it thoroughly seaworthy, mount a substantial gun on it and send it out to fight submarines?



The Irate Grocer (to motor-bus Jehu): "You've missed your vocation, young man, you 'ave. You ought to be driving a Tank!"

—Drawn by Alfred Leete in the Sketch.