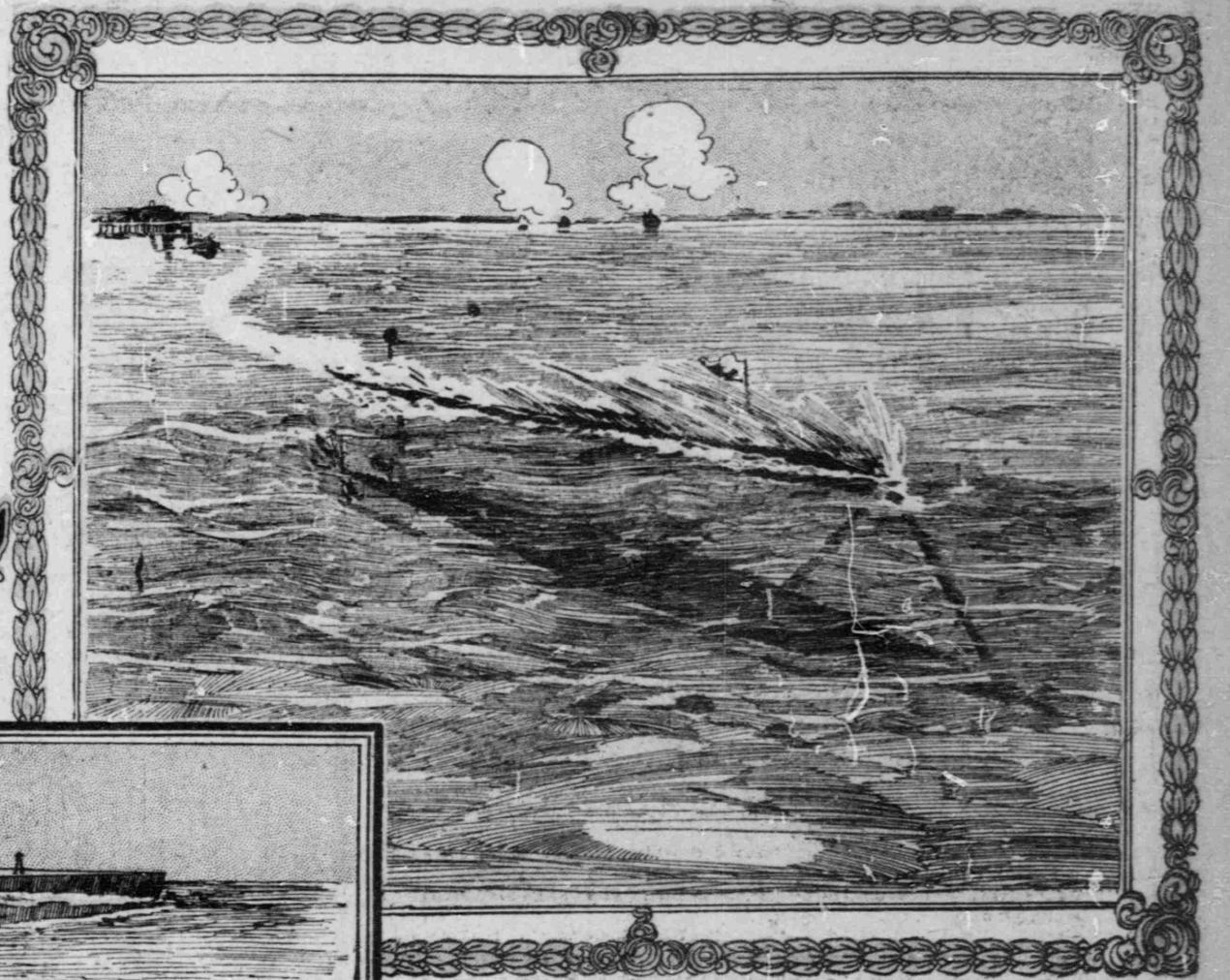


Their history and development, from the primitive device created by David Bushnell, to the terrible engines of destruction controlled by electricity and sent into battle by means of mechanism so marvelous in its ingenuity that the navies of the world are powerless against it.



The Sims-Edison Electric Torpedo

prophesied just such disaster as the Russians have suffered at the hands of Japanese torpedo boats.

By SIR J. O. HOPKINS,
British Admiral

I HAVE no opinion of submarine boats for sea work with a sea-going squadron, but for defensive work of ports, etc., their power for mischief cannot be ignored.

In my opinion the British Admiralty is doing the right thing in building submarines, as in habituating our men and officers to them we shall more clearly realize their weaknesses when used against us.

Even the weapon they carry (the Whitehead torpedo) is to all intents and purposes of unknown value for sea fighting.

by booms and intercepts the torpedo before it strikes the ship. If the battleship is under way the searchlight is brought into play. Every ship carries at least four powerful searchlights.

bank and by its light I discovered the unfortunate fact that there was a circle of logs around the Albemarle, boomed well out from her side with the very intention of preventing the action of torpedoes.

"I ran alongside until amidships, received the enemy's fire, sheered off, and as I turned the whole back of my coat was torn out by buckshot, and the soles of my shoes shot away.

"In another instant we had struck the logs and were over, with headway nearly gone, slowly forging up under the enemy's quarter port. Ten feet from us the muzzle of a gun looked into our faces.

"I stood in the bow, the heel jigger in my right hand and the exploding line in the left. We were near enough then, and I ordered the boom lowered until the forward motion of the boat carried the torpedo under the ram's overhang.

"The explosion took place at the same instant that 100 pounds of grape at ten feet range crashed into our midst, and a dense mass of water, thrown out by the torpedo, came down with choking weight."

All Captain Cushing's crew were drowned, shot or captured but himself. He managed by swimming all night and skulking in the swamps all day to get back to the Union fleet.

The Albemarle had a hole blown in her that a carriage could be driven through, and sank immediately.

Without doubt this is one of the most successful torpedo attacks, as well as one of the most daring exploits on record. Speaking of this exploit, John R. Soley says:

"The naval history of the world affords no other example of such marvelous coolness and professional skill as that shown by Cushing in the destruction of the Albemarle."

The spar torpedo culminated in 1878, when the Yarrow built a spar torpedo-boat for the British navy that could make 17 knots an hour. This "destructive" craft was the talk of the day.

In the meantime Robert Whitehead, who was acting as manager of an iron works at Fiume, a seaport of Austria, took up the matter of the fish shaped torpedo in collaboration with an Austrian artillery officer who has since died.

In 1870 Mr. Whitehead made an exhibition of the torpedo before the British Admiralty, blowing up an old hulk at the mouth of the River Medway. The officers were so impressed with the value of the invention that they gave him \$85,000 for the secret of it. Since that time a number of other nations paid liberally for the same secret.

Turkey gave the invention to the world, however. During the Russo-Turkish war a Russian vessel fired a Whitehead at a Turkish vessel. It missed its mark and floated ashore, where it was found.

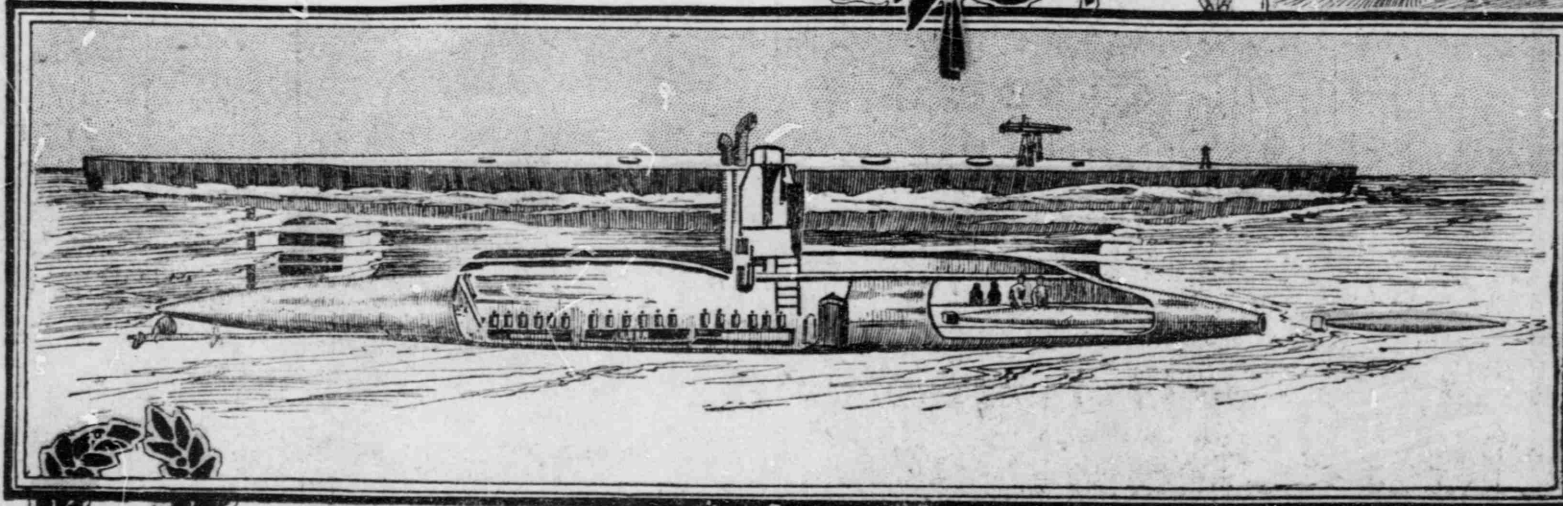
Lieut. Siesman, of the Ottoman Navy, examined the machine and wrote a most exhaustive book on it, which was translated into every language.

The Whitehead torpedo consists mainly of a steel outer shell, which is from fourteen to sixteen inches in diameter in the center, and thence it tapers to a point at each end. The length is either fourteen feet or nineteen feet.

It is propelled by means of two screws, which are actuated by a small engine, as in an ordinary steamboat. In place, however, of the boiler and furnace, which of course would be impossible in such a position, there is a strong reservoir made of Whitworth fluid pressed steel. Into this air is pumped until it has reached a pressure of about 1,000 pounds to the square inch, although in the most recent torpedoes the pressure has been increased by 200 pounds additional, bringing it to 1,200 pounds to the square inch.

In the front part of the weapon is placed the explosive charge. By making the bows bluffer, which however has not detracted from the speed, more storage room has been found for the charge, which now consists of 200 pounds of damp gun cotton. The original Whitehead torpedo carried only 33 pounds of gun cotton.

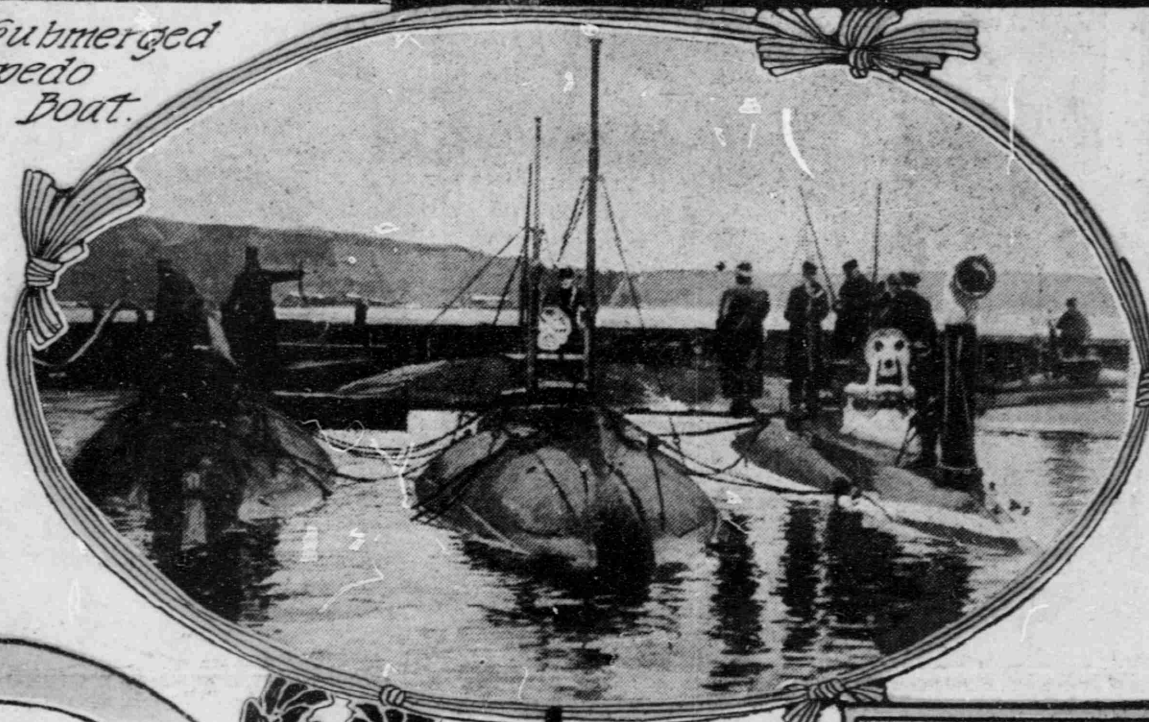
The range of these torpedoes a few



Semi-Submerged Torpedo Boat

By ADMIRAL COLOMB
Royal British Navy.

THE increased propulsive power of coal has, by adding to the speed of the torpedo boat, greatly strengthened the threat of that instrument of war against the battleship, and may, not impossibly, destroy that type.



Submarine Flotilla of the U.S. Navy

years ago was only 600 yards; to-day it is more than 1,000.

While the Whitehead torpedo was in a state of development and before it had reached its present state of perfection it had many competitors. The most promising of these was the Sims-Edison.

Mr. Sims claimed for his torpedo an effective range of two miles, a speed of twenty knots, instant control in starting, stopping, exploding and steering, power to dive and ability to carry 500 pounds of explosive.

All this was accomplished by means of electrical control through a wire, which was coiled in the torpedo and lay behind the torpedo as a cable as it progressed through the water.

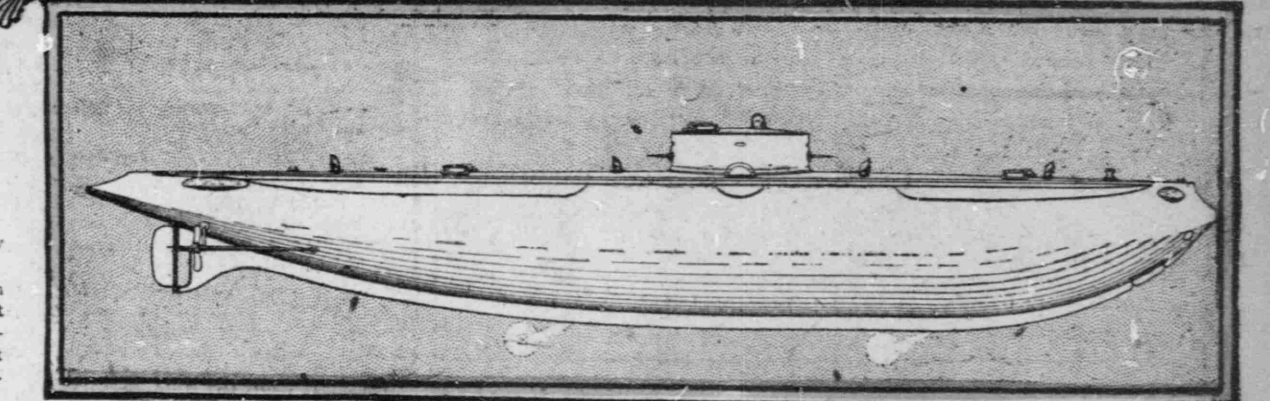
With the advent of wireless electrical communication, as perfected by Marconi, a number of inventors immediately went to work to perfect a wireless torpedo. Lewis Nixon, the celebrated naval architect, and Nicola Tesla have virtually completed one. While it is not ready for public gaze, both Mr. Nixon and Mr. Tesla vouch for the fact that it will do the absolute bidding of the operator.

The Torpedo Boat.

While the torpedo itself has advanced tremendously, it is the development of the torpedo boat that has played the most important part in torpedo warfare.

From Cushing's open launch to the submarine boat of the Holland or Lake type is a far cry.

The original function of the torpedo boat was coast defense. It was hardly thought they would ever be used outside of harbors. They were meant to resist invaders, not for aggression.



Lake Semi-Submersible and Submarine Cruiser

AN efficient vessel of this type is thoroughly seaworthy and capable of carrying sufficient fuel to make long voyages. Its radius of action is 4,000 knots. It would develop a speed of from fifteen to eighteen knots an hour on the surface, twelve knots semi-submerged and seven knots entirely under water.

It can travel fifty miles on the bottom on one charge of batteries, and carry a sufficient air supply to stay submerged forty-eight hours without surface connection.

By automatic means any desired depth can be maintained, yet the boat is prevented from going beyond a safe depth. By means of a trap in the bottom divers can readily enter and leave the vessel while submerged.

The early types of torpedo boats displaced from ten to twenty-five tons. The ill-fated battleship Maine carried two of them as originally designed. The size developed rapidly, however, and to-day 250 to 350 tons is not unusual.

As the size of the boats increased, so did their speed. From 30 to 32 knots is expected of the thoroughly up-to-date torpedo boat.

So dangerous have torpedo boats become that experts predict that in the future the battleship can only be used for siege purposes, or for the bombardment of fortifications after all torpedo and submarine boats are disposed of. Thus the battleship will be in the rear line of defense in the future, instead of the front.

Naval experts have long feared and

For this last purpose an optical instrument of peculiar construction is mounted at the very top of a tube, which stands up like a tiny smokestack, and in which mirrors, or prisms, transmit the picture to an observer inside the boat. The method of discharging a torpedo is the same with a submarine as with a battleship.

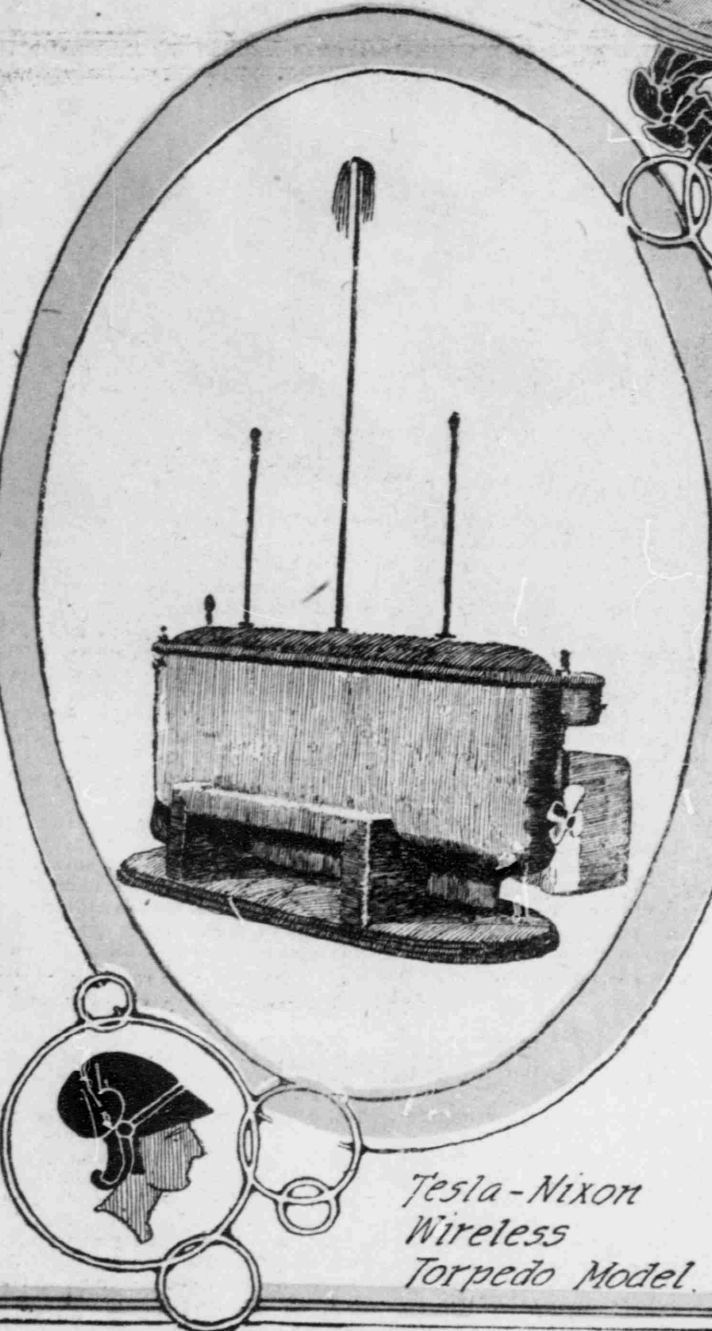
Suspicion has been expressed by experts that the damage done at Port Arthur could have been done by no other agency than submarines. There is hardly sufficient data as yet to determine this.

Against torpedo attacks battleships have several means of defense. If the battleship is lying stationary a large net of tarred rope is hung around the ship. It is held out from her sides

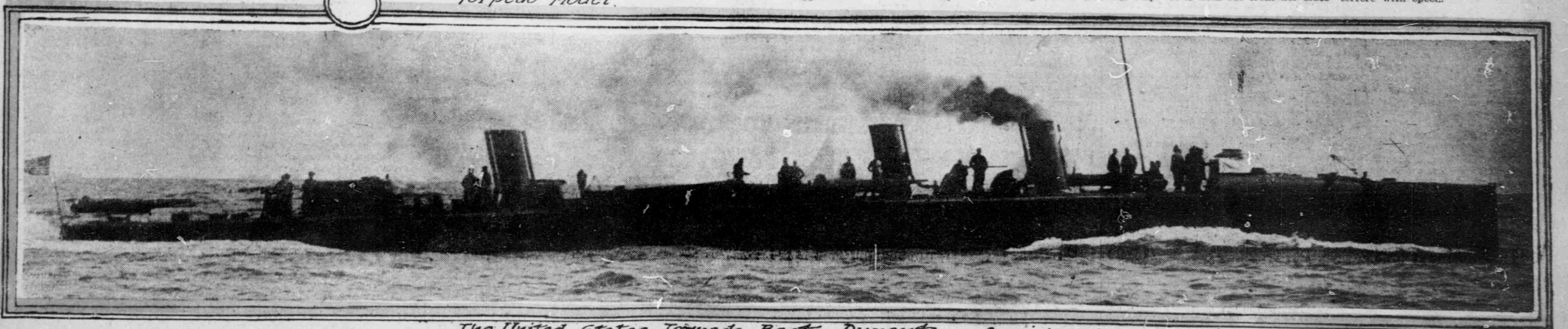
The torpedo boat may be painted some neutral color like olive green or gray, but a vigilant watcher can pick them up with a good searchlight at half a mile. It is only necessary then to train a machine gun on the torpedo boat to sink it instantly.

A single machine gun of the Maxim-Nordenfeldt type discharges more than one hundred shots a minute, any one of which hitting the torpedo boat would be more than apt to put her out of commission.

Naval experts have had lengthy discussions as to the advisability of putting armor on torpedo boats. It is hardly likely that this will be done, as speed is the greatest defense the torpedo boat has, and weight would of necessity interfere with speed.



Tesla-Nixon Wireless Torpedo Model



The United States Torpedo Boat Dupont Copyrighted by E. H. Miller 1902.