

ized June 7, 1900, are 63 feet 4 inches in length, 11 feet 9 inches in diameter and have a displacement, submerged, of 120 tons. When on the surface, they are driven by a single-screw, four-cylinder, Otto gasoline engine of 160 horse power. They are provided with a generator of 70 horse power, which may be either driven by the gasoline engine for charging the batteries, or, when the boat is submerged, the generator can be thrown onto the batteries and used as a motor for driving the propeller.

These six submarines are built with a double bottom and with three watertight compartments. In the forward compartment are the gasoline tank, the expulsion tube, and the air flasks for the discharge of the torpedoes. The amidship compartment contains the main ballast tanks, which are located in the double bottom, and above them are the storage batteries, the torpedoes, and the air flasks in which fresh air for the crew is stored at 2,000 pounds pressure. In the third compartment at the stern are the gasoline engine, the motor, the clutches and the steering gear. Submersion is achieved by trimming tanks assisted by a pair of horizontal diving rudders at the stern. The vessel is controlled from a conning tower protected with four inches of armor. Considerable experience has been gained with the "Holland," which has served as a school of instruction in which crews and officers are enabled to familiarize themselves with this type of craft. The most interesting experiment thus far was the recent sinking of one of the "Hollands" to the bottom of Peconic Bay, where she remained for fifteen hours without coming to the surface. The officers and crew experienced no inconvenience whatever from vitiated atmosphere. Whether the same immunity would be realized were the batteries and motor power in operation is, of course, an open question which could only be solved by an actual trial.

Torpedo-Boats and Destroyers.

TORPEDO-BOAT "FARRAGUT."

In the matter of torpedo-boats and torpedo-boat destroyers the United States navy has been content to pursue a conservative course, rather than rush into the wholesale construction of these craft with that precipitancy which has characterized some European navies. Up to the year 1890 we did not have a single torpedo-boat in commission, and at the present time we have but thirty-five of these little vessels, all told, on our naval list; whereas there are some navies which number them by the hundred. The value of the torpedo-boat is even to-day an unsettled question, and the complete loss of the destroyers "Cobra" and "Vi-

per" during the past few months, together with the severe straining which has taken place in heavy weather of other craft of the torpedo-boat destroyer type, has reopened the question of the proper design, size and strength of torpedo craft to render them serviceable and safe upon the high seas. Hence, it is a matter of congratulation that, if we decide to increase our torpedo fleet, we have the advantage of experience gained in the maneuvers of foreign fleets; while, on the other hand, should the torpedo-boat pass out of fashion, we shall not have a large tonnage of worthless material on our hands. Our thirty-five torpedo-boats vary in size and speed

trial a speed of 30.13 knots per hour. The bunkers have a capacity of 95 tons. The armament consists of two long 18-inch Whitehead torpedo tubes and four 6-pounder rapid-fire guns. She has a complement of 66 officers and men.

Of the total thirty-five torpedo-boats in our navy twenty-three have been commissioned or completed since the close of the Spanish war.

TORPEDO-BOAT DESTROYER "PERRY."

The torpedo-boat destroyer owes its existence to the theoretical prowess of the torpedo-boat. The torpedo-boat was one of those devices which periodically figure

in the scare-head lines of the daily press as "annihilators," and the torpedo-boat destroyer is the annihilator of the annihilator. As soon as a few of the early torpedo-boats were built and began to maneuver with the fleets, it was found that they were altogether unseaworthy, at least so far as maintaining their speed in a jump of a sea was concerned. Hence, the idea of the torpedo-boat destroyer—a larger edition of the torpedo-boat, armed with heavier guns, and, by virtue of her greater speed and weight, able to run down the torpedo-boat and sink her. As the tendency in the construction of torpedo

craft, whether of the torpedo-boat or destroyer type, has always been toward increase in size, our Naval Constructors when designing the sixteen torpedo destroyers, authorized May 4, 1898, very wisely made them considerably larger than the destroyers which were being built for foreign navies. We present an illustration of the "Perry," built by the Union Iron Works, at San Francisco, which was taken when she was making one of her trial runs at full speed. The cylinders of the "Perry" are 20½, 32, 38, and 38-inch diameter by 22-inch stroke. At 327 revolutions the horse power is about 8,000. The steam at the boilers is at 300 and at the engines 250 pounds pressure. There are four Thornycroft watertube boilers, two forward of the engines and two aft.

Nine of the destroyers are of 420 tons displacement and are designed for speeds of 28 and 29 knots with 8,000 indicated horse power. They are known as the "Bainbridge," "Barry," "Chauncey," "Dale," "Decatur," "Paul Jones," "Perry," "Preble," and "Stewart," being named after heroes whose names are associated with the most brilliant episodes of our naval history.

Each destroyer carries on the main deck two torpedo tubes for the discharge of the 18-inch Whitehead torpedo. The armament consists of two 12-pounder rapid-fire guns carried, one forward and one aft, above the conning towers and protected by shields. There are also five 6-pounders carried in broadside on the main deck. These vessels have a length of 245 feet, a beam of 23 feet 7¼ inches, and a draught of 6 feet

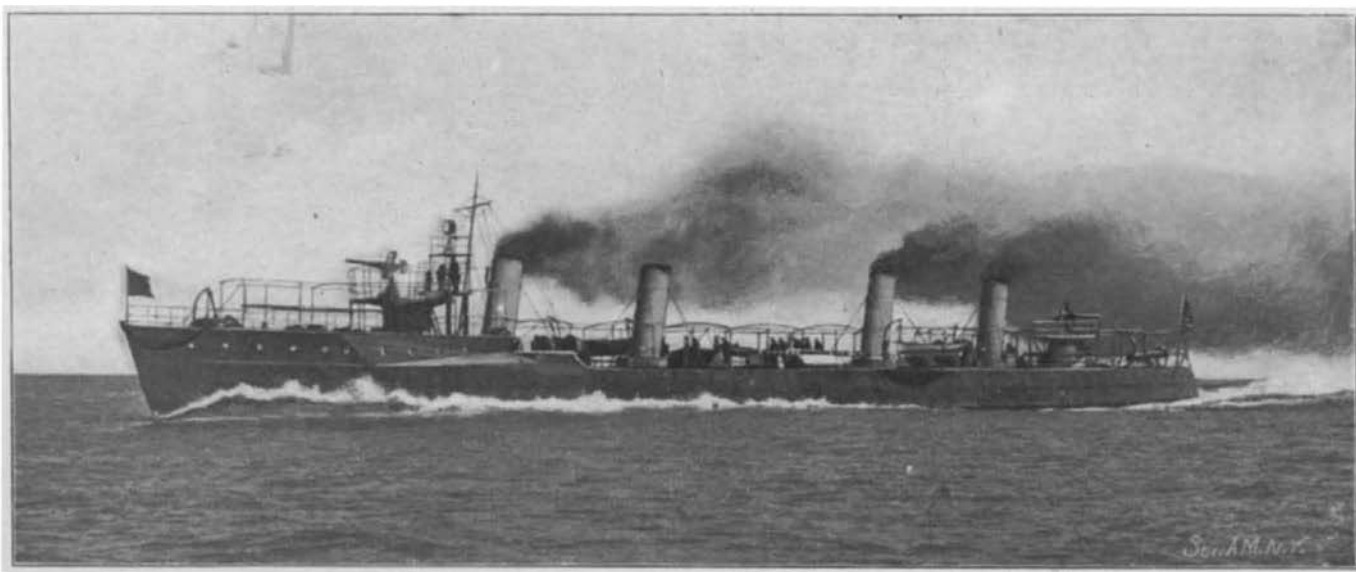


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Length, 213 feet. Beam, 20 feet 7¼ inches. Mean Draft, 6 feet. Displacement, 279 tons. Speed, 30.1 knots. Bunker Capacity, 95 tons. Armament: Two 18-inch Whitehead torpedoes; four 6-pounder R. F. guns. **Complement, 66.**

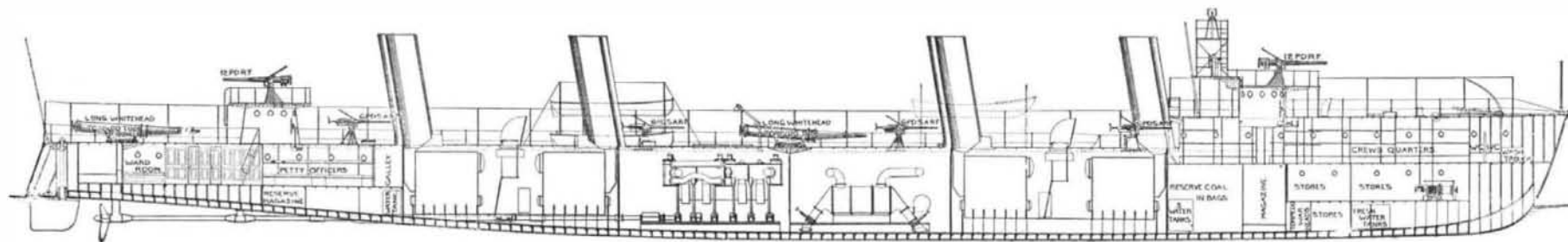
TORPEDO-BOAT "FARRAGUT."

from the "Gwin," of 46 tons and 21 knots speed, to the "Stringham," of 340 tons and 30 knots speed, and the "Bailey," "Goldsborough" and "Farragut," of 247 to 280 tons displacement and 30 knots speed. The last three craft were originally designed as torpedo-boat destroyers; but our Naval Constructors reached the conclusion that the destroyer, to be fully equal to its work, should be a larger and more powerful vessel, and consequently when the sixteen torpedo-boat destroyers of the "Bainbridge" type were designed the four vessels named above were relegated to the torpedo-boat class. As torpedo-boats they will be the largest in the world; indeed, they will exceed in size many of the destroyers in other navies. The "Farragut," which is herewith shown after her launch from the Union Iron Works, San Francisco, is typical of the larger torpedo-boats. She is 213 feet in length, 20 feet 7¼ inches in beam, and has a mean draft of 6 feet, at which draft she displaces 279 tons. She is driven by twin-screw, vertical, triple-expansion engines of 5,600 horse power, and she has made on



Length, 245 feet. Breadth, 23 feet 7¼ inches. Draft, 6 feet 6 inches. Displacement, 420 tons. Contract Speed, 29 knots. Bunker Capacity, 139 tons. Armament: Two long 18-inch Whitehead torpedo tubes; two 3-inch R. F. guns; five 6-pounders. **Complement, 73.**

TORPEDO-BOAT DESTROYER "PERRY"—"BAINBRIDGE" CLASS OF SIXTEEN VESSELS.



LONGITUDINAL SECTION, SHOWING INTERNAL ARRANGEMENTS OF TORPEDO-BOAT DESTROYERS.