

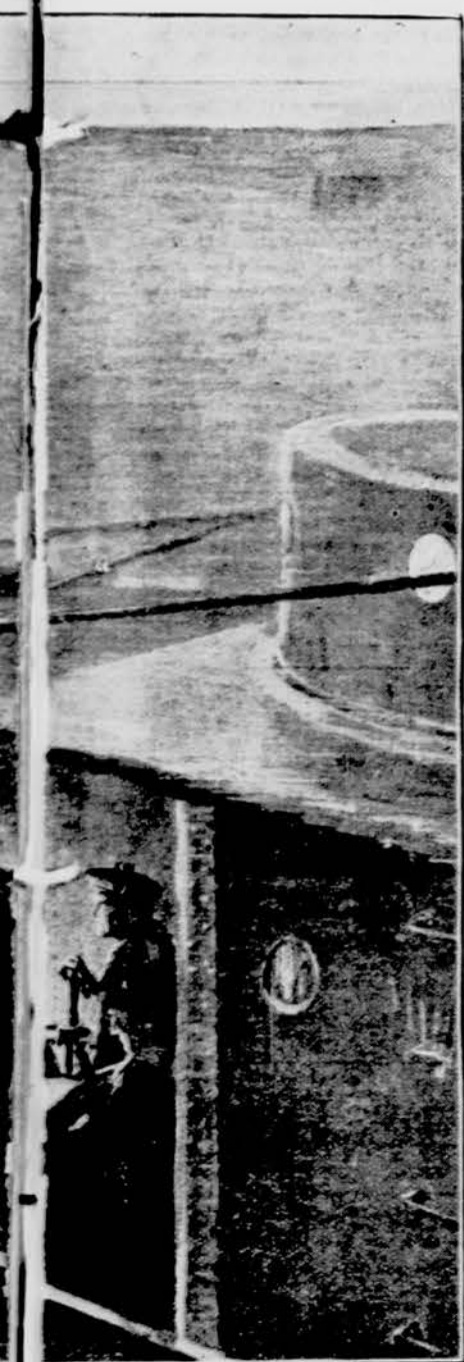
THE PLUNGER, IN WHICH PRESIDENT ROOSEVELT DIVED LAST SUMMER. Her torpedo tube door in the bow is opened, as is done when a torpedo is fired under water.



COMPRESSED AIR IN SUBMARINES. It furnishes motive power.



SUBMARINE GOING FULL SPEED ON THE SURFACE.



VIEW THROUGH PERISCOPE. —Illustration.

partially filled tanks, and this had caused us to lose control of the vessel.

"There are two main classes of submarines, the diving type and the even keel type. The type used in our navy carries little reserve buoyancy and submerges by pointing the bow down about eight degrees, using the horizontal rudder for this purpose, and for this work a man has to receive special training at the diving rudder. The motive power is a gasoline engine for surface running and a compressed air motor for submerged. The most vital part of the equipment of a submarine is this compressed air both for breathing and power purposes. This is stored in steel flasks.

"Trimming down ready for diving is usually done in smooth water, and is accomplished by filling the tanks so that only about four hundred pounds of positive buoyancy is left. When ready to dive the conning tower is closed and the main ballast and amidships tanks are blown or emptied; then the craft begins to sink. As she gains headway the diving rudder is put in operation and the vessel plunges down. The depth is regulated by the diving rudder, and a scale registers the descent. For returning to the surface the amidship tank is blown. For a run on top, after the vessel has regained buoyancy, the conning tower is opened and the gasoline engine put in operation.

"The boat is equipped for warfare with one torpedo tube, situated in the extreme bow. This has a watertight door which opens the moment of the discharge of a torpedo, which can be fired every ten minutes. For vision and getting ranges while submerged a high periscope, the end of which is supplied with a lens and prism, protrudes above the water line and reflects below the location of surface objects above.

"It is a difficult matter, however, to judge the crucial moment for firing a torpedo, as the craft has to be pointed up and at the same time kept at the requisite depth, so as to have the periscope lens just clear of the water. If the periscope is shot away the boat is useless until repaired, as a conning tower attack is impossible in the daytime.

"The estimated speed of the submarine is eight knots, and it is said to be able to run forty to fifty miles submerged. It is limited in active operation to about fifty miles from a base and about twenty-four hours of habitability. Its chief strategic value is centred in its invisibility, being capable of creeping up within a hundred

yards or so and delivering a blow to an enemy's battleship.

"In this particular branch of the service the United States government is behind that of other powers, such as France and England, who have done the most toward the development of the submarine. The French government is placing great dependence on these disappearing craft, having some forty built and thirty more on the ways. These are of various designs. Some of the new ones are to be of 800 tons displacement, the largest in the world. England has over fifty, perhaps twenty-five completed and the same number building. England began to construct these vessels in 1900, and has improved and perfected only one type, the same as that used in this country. Her more recent ones are of 300, 500, and 600 tons displacement, having an extensive superstructure, forming a bridge throughout their entire length, and with a speed of from fourteen to fifteen knots.

"The United States navy has built only eight, with four now under construction. The latter are somewhat larger than the present ones. Lieutenants Nelson and Shapleigh, of the Shark and Porpoise, are considered the foremost submarine commanders in the United States navy. The former manipulated the evolutions of the Plunger when the President took his dive in her off Oyster Bay, in the Sound, in August of last year. These officers are at pres-

ent conducting a series of endurance tests and runs at the Torpedo Station, Newport, with some new electric interior appliances lately installed in their vessels, after over a year's overhauling at the Brooklyn Navy Yard. These up-to-date improvements will be utilized in future submarines, which will bring both the new ones and the present ones to a higher state of efficiency than before, and lessen the chances of accidents.

"To further insure the safety of the submarine and its crew the government tug Nina is just now being fitted with a special electric hoisting apparatus, consisting of a steel mast and outrigger boom, with a counterbalance weight of five tons, so as to raise quickly to the surface any disabled submarine. Ring holes have been fitted to the bow and stern for this purpose. All deep diving experiments in the future will be in the company of the Nina. Living quarters for two crews and several officers have been provided on her. Submarine crews are composed of nine or ten picked men, made up of the most intelligent and well trained electricians, machinists and gunners obtainable. The average pay is \$50 a month.

"Among the interesting naval relics on Cob Dock at the Brooklyn Navy Yard which strikingly shows the advance in submarine navigation is what is practically the first submarine built in America. This crude craft, named the Intelligent Whale, is made of wrought iron, 35 feet long and about 8 feet in diameter. Eight men operated her propeller by hand, while another did the steering. Two crews, fifteen men in all, were drowned while experimenting in this primitive boat. After many unsuccessful trials it was finally abandoned by the government, and now rests as a curious relic with a deadly record."

PERHAPS IT CURED HIM.

Captain Mark Casto was being congratulated on his gift of \$1,500 from the Carnegie Hero Fund for bravery in the wreck of the Cherokee.

"The gift was unexpected," said Captain Casto, with a modest smile. "It was as unexpected, though by no means as unpleasant, as the retort that a wife made to her husband when he came home at 3 o'clock in the morning.

"The man came home very quietly. In fact, he took off his shoes on the front doorstep. Then he unlocked the door and went cautiously and slowly upstairs on tiptoe, holding his breath.

"But light was streaming through the keyhole of the door of the bedroom. With a sigh he paused. Then he opened the door and entered.

"His wife stood by the bureau, fully dressed.

"I didn't expect you'd be sitting up for me, my dear," he said.

"I haven't been," she said. "I just came in myself."

WHAT WATER WILL DO.

Dr. R. A. Torrey, the evangelist, was condemning drunkenness in Philadelphia.

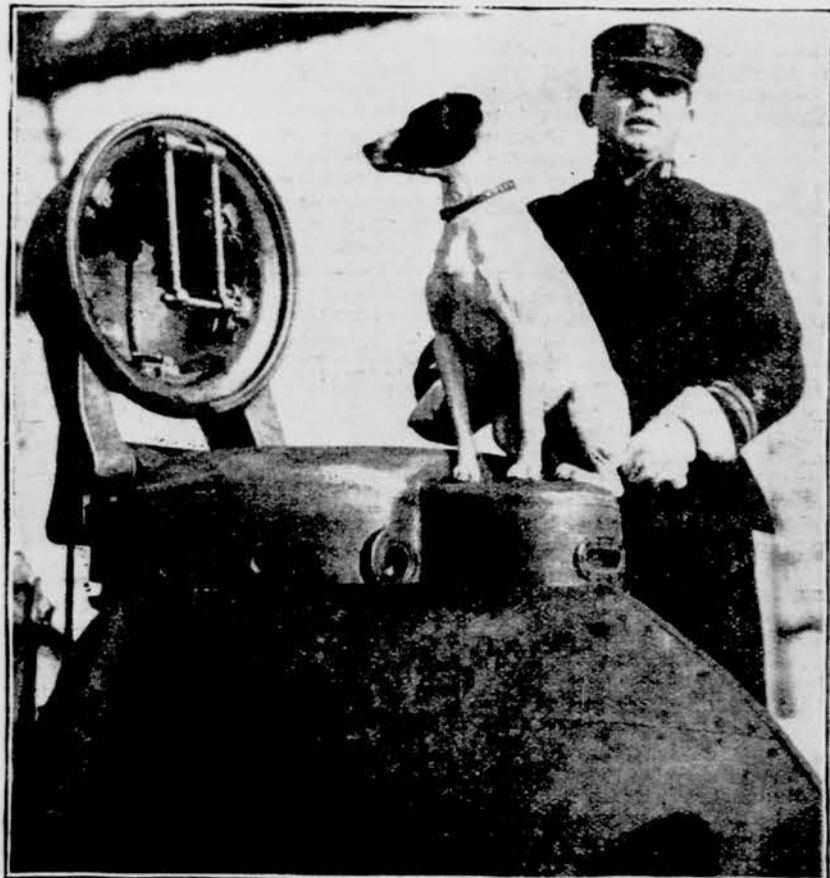
"For my part," he said, "I wish all the whiskey dealers were like a certain Western one, a hard-headed old Scot, who grew rich in the trade.

"After he had grown rich the old man built himself a fine house, a limestone mansion on the hill, with a park around it, with conservatories, stables and outbuildings—in a word, a palace.

"One day the old Scot rode in the omnibus past his fine house. A temperance man pointed up at the grand edifice and said, with a sneer:

"It was the whiskey built that, wasn't it?"

"Na, na, man; the water," the Scot answered."



LIEUTENANT SHAPLEIGH, OF THE SHARK, ONE OF THE FOREMOST SUBMARINE COMMANDANTS OF THE AMERICAN NAVY, AND HIS MASCOT, MING. This is probably the champion deep-diving terrier of the world. He accompanies his master below the surface on all occasions.