

## A Submarine Boat.

BY HENRY HALE.

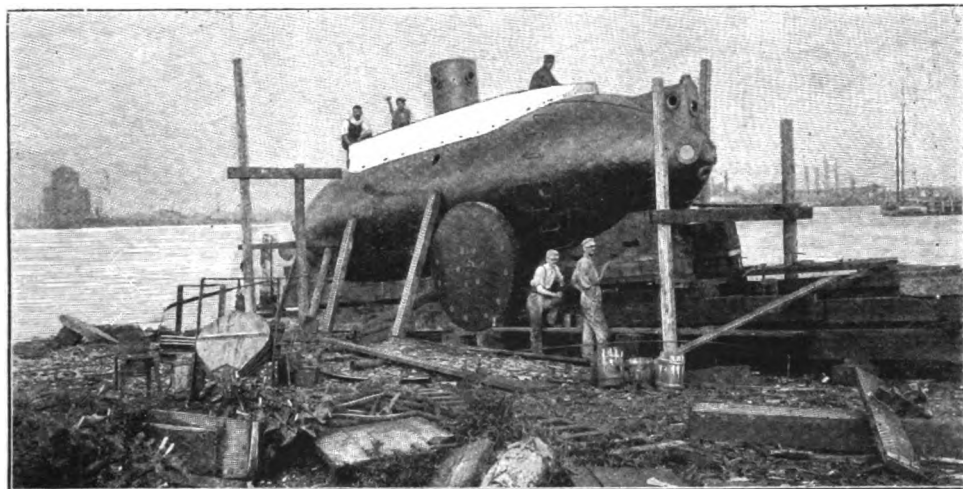


WHEN Jules Verne wrote his celebrated story, "Twenty Thousand Leagues Under the Sea," the submarine boat was but the invention of a fertile imagination. To-day, the submarine boat is an actual fact.

Two such boats have been proved successful within the past six months, one called the *Argonaut*, built by a Baltimore inventor named Simon Lake; and the other called the *Holland*, constructed by a New York inventor of the same name. The *Argonaut* is the result of fourteen years' labour on the part

against reason that a boat, with men living and working in her, could run along the bottom of the sea.

The launching, therefore, took place in the presence of a cynical crowd. But, as soon as the machinery and equipment were installed, and the trials were held, there was another tale to tell. These trials showed conclusively that the boat could be propelled as well under water as above water, that it can be submerged to the bottom of the harbour and readily raised in a few moments; and, in short, that a new era in the history of warfare and navigation had begun.



From a Photo. by

THE SUBMARINE BOAT "ARGONAUT" BEFORE LAUNCHING.

[Wagner, Baltimore.]

of Mr. Lake, and on December 18th of last year her capabilities were practically demonstrated in the harbour of Baltimore.

The appearance of the *Argonaut*, as she rested on the ways in the yard of the Columbian Iron Works, just before launching, is admirably shown in the accompanying illustration. She was not an imposing-looking craft. Her length gave her an extremely insignificant appearance, and she was dubbed "a cigar with a knob on top," just as, during the Civil War, the little *Monitor* was dubbed a "cheese-box on a raft." And, if truth must be told, the people who saw her while she was being built were not at all hopeful of her success. It seemed

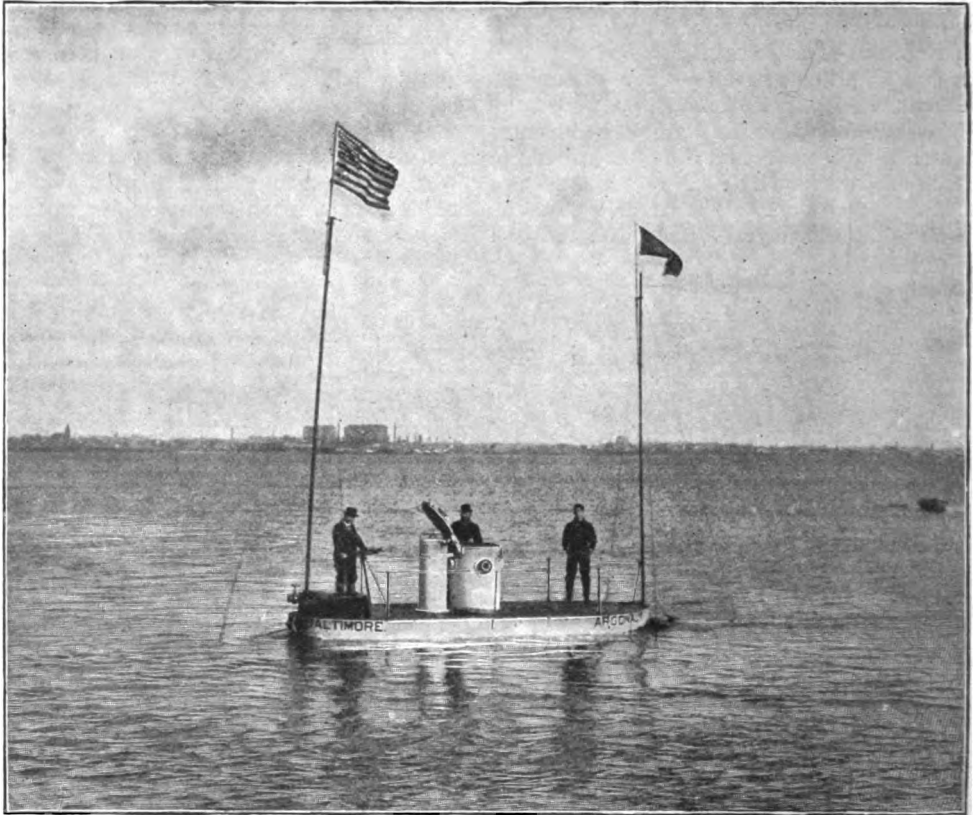
Vol. xv.—89.

The "knob on top" of this strange-looking craft is the so-called "conning-tower" through which the inmates enter and emerge. The *Argonaut* is 36ft. in length and 9ft. in diameter. Constructed of steel plates  $\frac{3}{8}$ in. thick, her cylindrical shape adds to her power of resisting hydraulic pressure. Her construction outside skin is reinforced by knees and transverse work of steel, while the compartment partitions of the same metal, which extend from side to side, give additional strength. The interior is divided into the engine-room, the living-room, the divers'-room (with an intermediate air-lock compartment), and the forward look-out and operating compartment. A

small steam plant, consisting of a 30 horse-power engine and boiler, is used to operate the boat, when on the surface of the water, in the same manner as an ordinary steamboat; and when the boat is submerged, electricity is substituted. A dynamo, operated by powerful storage battery-cells, furnishes power for working the propeller when the craft is submerged, for turning the driving-wheels (shown in our first illustration) when the boat is

and at each end of the deck is a slender mast, the mast near the stern being hollow. The wheel, which may be controlled either from the outside or inside, is placed well aft.

There are a few words yet to say about that rear-mast. This hollow rod of steel contains a valve, which closes automatically when the vessel has reached a certain depth in the water, and the engine is supplied with compressed air — another noteworthy thing



From a]

THE "ARGONAUT" AFLOAT.

[Photograph.

moved or rolled along the bottom, and for illuminating the compartment by incandescent lamps. The cells contain enough electricity to supply the current for these purposes for a period ranging from sixty to seventy-two hours, allowing the boat to be submerged and its connection with the surface entirely cut off during that time.

The appearance of the *Argonaut* after she had been launched and equipped is shown in our second illustration. We may now note the construction of the "conning-tower," which is painted white, and contains four eyes. A rail surrounds the small, flat deck,

about the *Argonaut*. The air compressors and reservoirs are located in the engine room for replenishing the air vitiated by the crew, and to supply the divers when they are operating outside the vessel. The reservoirs contain air compressed to about one-seventieth of its bulk, and carry a supply for two or three days when under water.

Forward from the engine-room and separated from it by an air-lock compartment is the divers'-room. This room contains another of the remarkable features of the boat. It has a door opening outward in the bottom of the hull, large enough to enable



the diver to pass in and out without assistance. By means of the compressed air reservoir the atmosphere in this compartment can be maintained at a density equal to the pressure of water on the exterior, and the proper density is indicated by a series of delicate gauges. When the pressures are equal, the door can be opened and no water will enter.

When under water, the boat is controlled from the look-out compartment in the bow, the exterior of which we may see in our opening illustration. Here the atmosphere is normal, and one man can not only steer the boat and supply air to the divers on



THE "ARGONAUT" DESCENDING INTO THE WATER.  
From a Photograph.

the outside, but can govern its entire mechanism. In this room there is a window of thick bull's eye glass, through which are thrown rays from a 200 candle-power electric lamp. It illuminates the water for a distance of 35ft., and is utilized for discovering wrecks or other obstructions. The advantages of such a light are, of course, obvious; and experienced swimmers know the feeling of fear and oppression which comes to them when they are swimming at a distance of 10ft. or 12ft. below the surface of the water. This sensation comes over one who goes to the bottom for the first time in the *Argonaut*. The entrance to the boat through the conning-tower is closed by an air-tight lid, securely screwed down, a valve is turned, and you feel a scarcely-perceptible trembling, which shows

you that the trip has begun. The light through the thick glass bull's-eye window in the conning-tower becomes fainter and fainter, and electric light takes the place of the daylight which is being gradually shut out. You feel, indeed, as if cut off from all the world, and the sensation of loneliness is not diminished when you go into the forward compartment. When the boat reaches the bottom, an air-valve is opened which fills this compartment with compressed air. At first there is difficulty in breathing, but this gradually passes away and at times is replaced by ear-ache, caused by the atmospheric

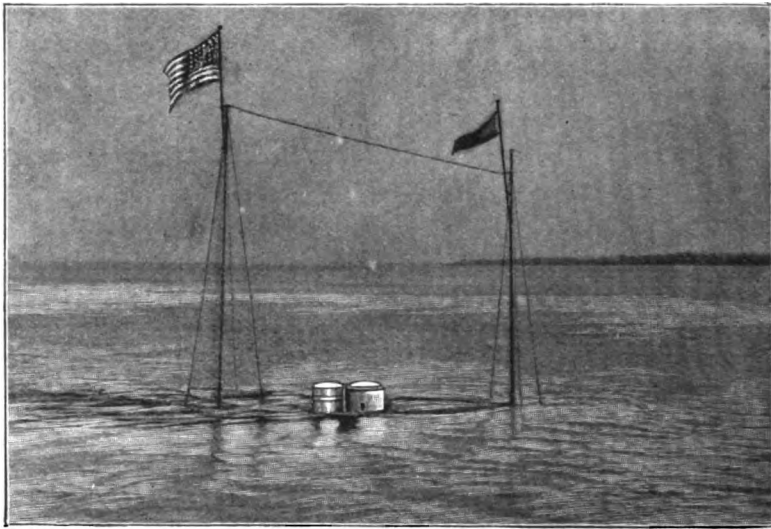
pressure on the drum of that organ. Those who have gone under several times sometimes place cotton in their ears, thus preventing the unpleasant feeling.

On the boat there is a fixed keel extending over two-thirds of the length, and a set of water-tanks in the floor. The boat is sunk by filling the tanks, and rises when this water is blown out of the tanks. To assist in keeping the boat stationary at any desired level, a pair of weighted anchors is provided. Under normal conditions, these are drawn up into pockets in the keel by electric motors, and when the boat is ready to be anchored at a desired level, the anchors are let down to the bottom. The exact level of flotation is then attained by winding or unwinding the winches to which the anchors are attached.

It is well known that the limited time during which diving operations can be carried on in open water is one of the most potent drawbacks in that branch of business; and this difficulty is most prominent in work on sunken ships, and in building submarine foundations of lighthouses, piers, and work of that class. The long distance between the diver at work and the scows or boats with which he is connected is the reason for this drawback. Consequently, the need of a submarine boat which may be placed at the bottom of the sea in proximity to the wreck or lighthouse foundation has been generally felt, and the advent of the *Argonaut* is an event of no small importance.

moments the boat is on the surface of the water, at rest in the light of day.

The fact that the craft can remain under water such a length of time, and can be propelled under water or partially submerged, as shown in the illustration, has attracted the interest of several foreign Governments, who have sent their naval *attachés* at Washington to examine its plan of construction. The destruction which such a boat could accomplish is realized especially by Great Britain and Japan, whose representatives have obtained plans and estimates of its cost. By the use of a compass and distance indicator or log, the *Argonaut* could proceed under water fifteen or twenty miles in any direction with-



From a]

THE "ARGONAUT" SUBMERGED.

[Photograph.

The divers' apartment is, as has been said, close to the keel, and is air-tight. When the diver is ready for his work, he enters this compartment, and the door is closed. When sufficient air has been forced in, the diver opens the outer door, and goes out upon the bed of the sea. The air-supply is always under his own control, and he is always near the *Argonaut*, with whose occupants he is able to carry on conversation, and with the tools of his trade near at hand. The door through which he goes out may be left open for an hour or more; yet the compartment remains dry, except when the diver returns from his work and shakes the water from his armour. The door is then shut carefully, the air allowed to escape from the compartment, the water ballast expelled from the vessel, and in a few

out the captain finding it necessary to go to the top. Consequently she could approach a war vessel or fortification undetected within a few feet, or near enough to launch a torpedo or locate a mine. The fearful disaster to the *Maine* in Havana harbour could be readily duplicated by the use of such a craft.

Another point is worth considering. It is said that the world's annual loss of vessels and cargoes is about one hundred millions of dollars. Much of this is still lying at the bottom of the sea, and the submarine boat is destined to recover these riches. The bed of Old Ocean is dotted with jewels and gold, and the Jasons of the nineteenth and twentieth centuries will be the divers and wreckers who go out in modern *Argonauts* in search of this golden fleece.