

H. O. EIANE.
SUBMARINE BOAT.
APPLICATION FILED SEPT. 12, 1904.

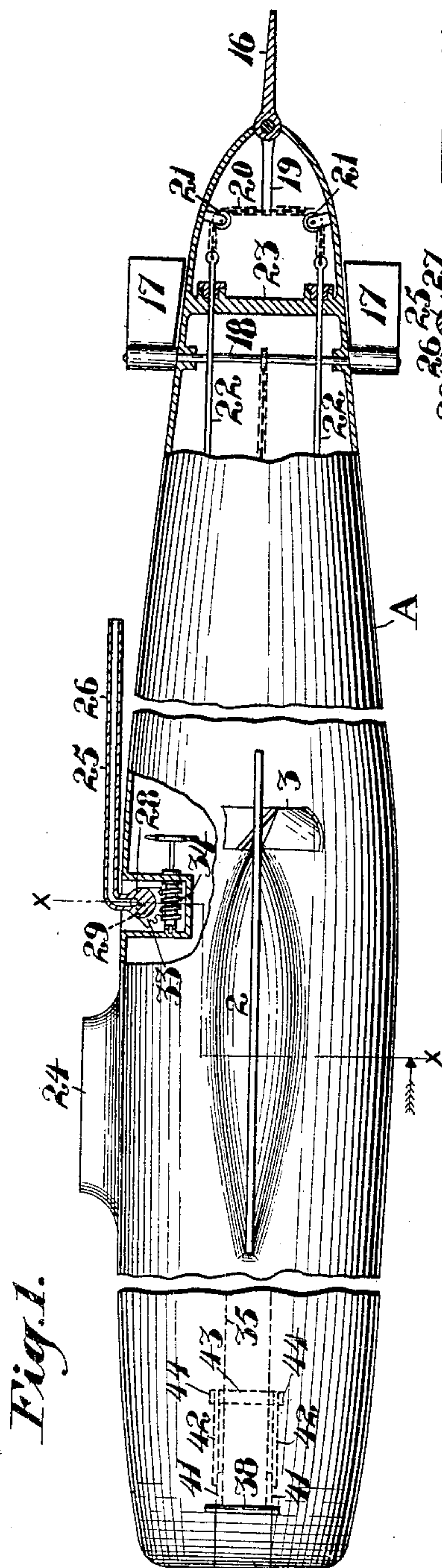


Fig. 1.

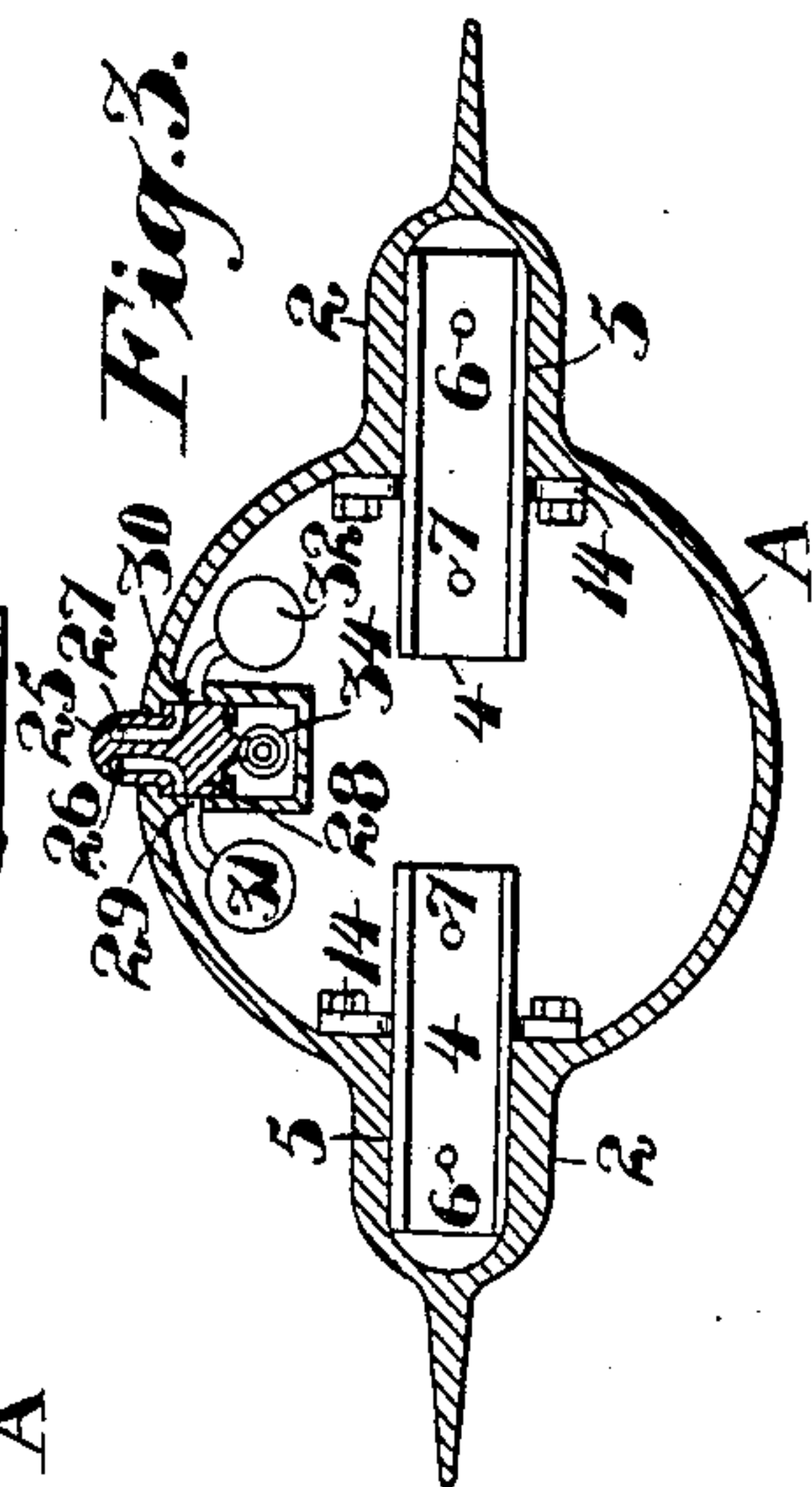


Fig. 3.

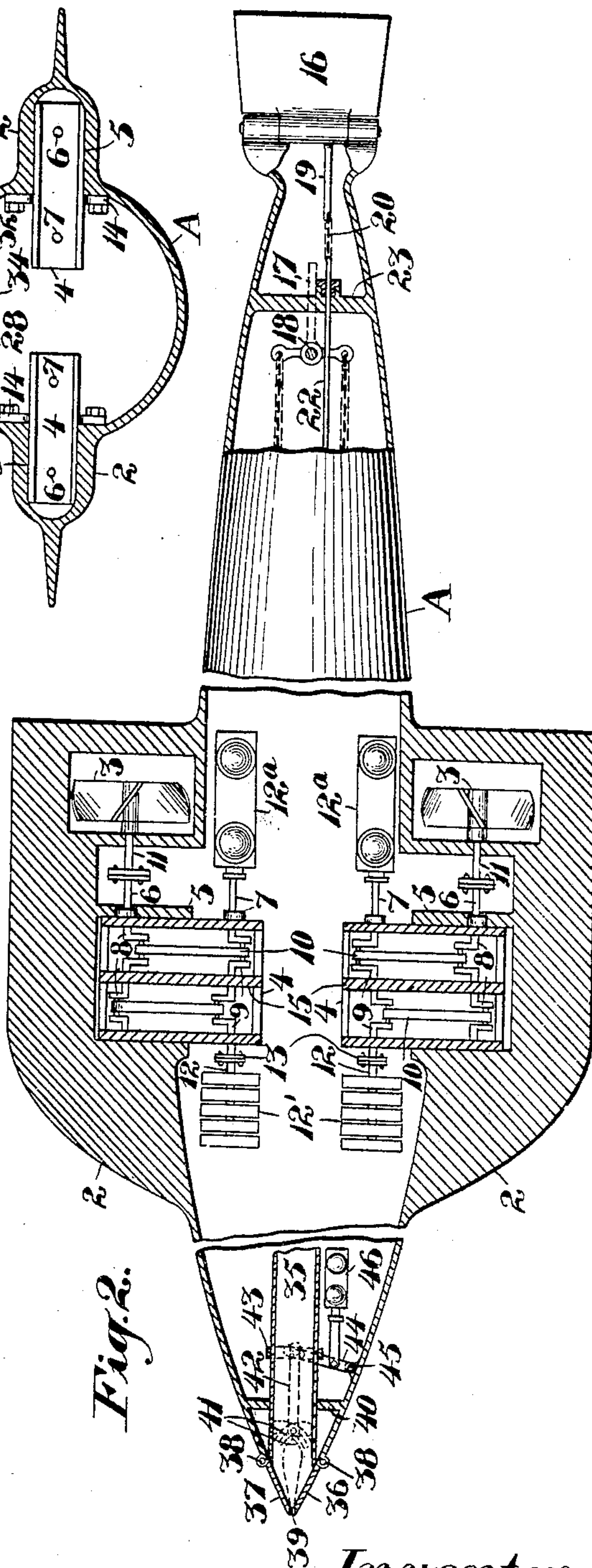


Fig. 2.

Witnesses:
F. C. Fiedner
J. H. Morse

Inventor:
Habor O. Eiane
By Geo H. Strong

UNITED STATES PATENT OFFICE.

HALVOR O. EIANE, OF THE UNITED STATES NAVY.

SUBMARINE BOAT.

No. 803,885.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed September 12, 1904. Serial No. 224,105.

To all whom it may concern:

Be it known that I, HALVOR O. EIANE, of the United States Navy, a citizen of Norway, stationed at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Submarine Boats, of which the following is a specification.

My invention relates to improvements in submarine vessels or those capable of traveling at will either beneath or on the surface of the water. Its main objects are to provide a vessel or boat of this character which will be capable of a wide range of action, being quickly turned about in either direction and easily and quickly raised or lowered, which will necessitate a minimum intake of water for purpose of submergence, which will enable the replenishment of the air-supply from the surface when submerged, and which will have a novel form of closure for the torpedo-tubes.

It consists of the parts and the construction and combination of parts, as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved vessel with part broken away to show the operation of the rudders and of the air-tube. Fig. 2 is a longitudinal horizontal section of the vessel. Fig. 3 is a vertical cross-section on line *xx* of Fig. 1.

A represents the hull of my vessel, which in shape is suggestive of a great fish. It is more nearly round in cross-section and has gracefully-tapered extremities and is provided with the hydroplanes 2, which extend lengthwise and about centrally on each side of the hull.

The propellers 3 instead of being located at the stern are on either side and are carried and protected by the hydroplanes, which latter are hollow to support the crank-cases 4.

The interior of the vessel is constructed with the usual compartments and fitted with suitable motive power to operate the propellers. It is also ballasted in a manner best designed to preserve its equilibrium, whether beneath or on the surface.

Suitable guides, as 5, are formed in or on the walls of the cavities or recesses of the planes 2, and the cases 4 have corresponding guides to engage the guides 5 and prevent either lateral or longitudinal movement.

A case 4 incloses two crank-shafts 6 7, each having, respectively, a pair of cranks 8 9, the

cranks of each pair disposed at right angles to one another, and the cranks on one shaft connecting with corresponding cranks on the other shaft by means of the connecting-rods 10. The ends of the crank-shaft are suitably journaled in the sides of the crank-case. Shaft 6 is detachably connected with a propeller-shaft 11, while shaft 7 has its ends adapted to be similarly connected with the engine or motor shaft 12. The respective shafts are shown as having abutting flanges 13, adapted to be bolted together. The crank-cases are each flanged, as at 14, to permit them to be bolted to the inside of the vessel and securely held in position. By loosening the bolts holding a crank-case to the side of the vessel and detaching the crank-shafts 6 7 from the respective shafts 11 12, the entire case may be withdrawn at any time and access had to the cranks for any reason.

The case has a central web or partition 15, which serves as a bearing for each shaft 6 7 between their several cranks and also operates as a brace to support the hydroplanes against collapse, as when the boat is submerged and the external pressure of the water becomes very great. The two ends of the crank-shafts 7 are separately connected up with a source of power, so as to be driven either by electric motors 12' or gas or other engines 12^a.

The disposition of the propellers at either side in the manner shown enables the application of power midway of the ship to propel it, back it, and to turn it about very quickly and in a very small compass.

The steering is done by two sets of rudders 16 17. The rudder 16 being disposed in a horizontal plane is for purposes of descension and ascension. The regular steering-rudders 17, of which there are two, are disposed in a vertical plane one above and one below the hull and both mounted and turnable in unison on the rudder-stock 18. Normally the several rudders and the hydroplanes would be submerged.

Any suitable form of gear may be employed to operate the rudders. I have simply shown the stock of rudder 16 as having a forward projection 19, to which are connected the chains 20, passing around pulleys 21. The chains connect with the rods 22, which run in suitable stuffing-boxes in the bulkhead 23. The rods 22 are reciprocated by any suitable power well known in the art and controlled from any convenient point on the vessel. The stock 18 of rudders 17 works in suitable wa-

ter-tight boxes in the hull and is operated within the vessel in the usual manner.

24 is the conning-tower.

25 represents an arm of considerable length 5 fulcrumed in suitable water-tight boxes in the deck or upper portion of the boat and adapted when the vessel is submerged to a depth of six or eight feet, more or less, to be elevated and to admit of the maintenance of a circulation of air between the interior of the vessel 10 and the upper atmosphere. This arm has two longitudinal channels 26 27, one for the intake of fresh air and the other for the egress of air from the vessel. These passages are adapted 15 to communicate through the pivots 28 of the arm with corresponding ports 29 30 in the walls of the pivots, against which the pivots have a snug fit. The passages in the pivots and the respective ports 29 30 are disposed 20 eccentric in relation to the axes of the pivots, but are so arranged that they register when the arm stands upright or nearly so. At all other positions communication through channels 26 27 with the interior of the vessel is cut 25 off, so that the vessel may be submerged to a depth greater than the length of the arm and still not allow access of any water to the interior. Port 29 communicates with a suitable suction apparatus 31, by which air may be 30 drawn into the vessel and thence distributed as wanted. An exhaustor or aspirator 32 acts to withdraw the foul air from the vessel and expel it through port 30 and passage 27 when said port and passage are in communication. 35 The raising and lowering of the arm may be effected by a variety of ways. A convenient means for the purpose is afforded by providing the lower end of the arm with a segmental rack 33, engaging a worm 34. By 40 turning the worm in one direction or the other the arm is raised or lowered at will.

Like most vessels of its class, this one is provided with a torpedo-tube 35 at the bow opening under water. Except during the time 45 of discharge of the torpedo the tube must be closed to prevent ingress of water to the vessel. Various styles of torpedo-tube closures and modes of operating them are in vogue; but I have devised the following simple, 50 strong, and easily-operated closure:

36 37 represent two jaws pivoted, as at 38, on each side of the vessel close to the mouth of the tube 35 and adapted when closed to fold A-shaped over the end of the tube and 55 approximately in continuation of the lines of the vessel. For this purpose their adjacent faces are lined with rubber or equivalent, as indicated at 39, which seats close over the tapered edges of the mouth of the tube and 60 makes a perfect seal against ingress of water to the tube.

A bulkhead 40 closes off a small compartment from the rest of the vessel. The jaws have crossed slotted projections 41 behind 65 their pivots extending into this compartment

and on either side of the tube. The parts 41 are pivoted together in their slots, and a rod or rods 42 extend from these pivots through water-tight boxes in the bulkhead 40 and connect to a ring or sleeve 43 on the tube. A 70 reciprocation of ring 43 causes the opening and closing of the jaw-closures 36 37. To reciprocate the ring, I have shown a forked lever 44, fulcrumed at 45 and operated by any suitable means, as the compressor 46. 75

With a vessel of this construction, having the centrally-disposed longitudinally-extending hydroplanes on each side, together with the horizontally-arranged propellers, the vertical movements of the vessel may be easily 80 controlled and ascension or descension quickly effected with the requirements of a minimum intake of water in submerging, since with powerful propellers the side planes and horizontal rudder may be made to coöperate to 85 force the vessel downward.

Initial submergence may be effected as well as continued submergence maintained to a certain extent by the propellers even against the natural tendency of the vessel to stay on the 90 surface, the depth of submergence being regulated by the horizontal rudder.

The shell of the vessel would preferably be of metal and the hydroplanes would be extended outward horizontally beyond the com- 95 partments for the crank-cases in the form of thin flat stiff blades.

It is obvious that the invention is capable of embodiment in a variety of forms without departing from its principle, and I do not 100 wish to be understood as limiting myself to the particular structure or form herein described and illustrated.

Having thus described my invention, what I claim, and desire to secure by Letters Pat- 105 ent, is—

1. In a submarine boat or vessel, the combination of a hull, laterally-disposed hydroplanes beneath the surface of the water, propellers arranged at the sides of the vessel, said 110 hydroplanes being chambered and removable crank-cases in the chambers of said hydroplanes and accessible from inside the hull, connections between said crank-cases, the propellers and a source of power. 115

2. The combination in a submarine boat or vessel of a hull, laterally-disposed hydroplanes having chambers extending beyond the lines of the hull, removable crank-cases in said 120 chambers, propellers at each side of the hull, propeller-shafts therefor, a crank-shaft in each of said crank-cases, detachable connections between said crank-shafts and their respective propeller-shafts, and connections between said crank-shafts and a source of power. 125

3. In a submarine boat or vessel, the combination of a propelling and steering means, of an air-tube pivoted in the body of the vessel, means for causing said tube to stand at 130 various angles relative to the axis of the ves-

sel, and air-passages in said tube connecting through water-tight connections with the interior of the vessel.

4. In a submarine boat or vessel, the combination with suitable propelling means of an air-tube having a plurality of air-passages extending longitudinally through it, said tube pivoted in the body of the vessel, connections between the air-passages of the tube and the interior of the vessel, and means for turning said tube about its pivots.

5. In a submarine boat or vessel, the combination with suitable propelling means of an air-tube having a plurality of air-passages extending longitudinally through it, said tube pivoted in the body of the vessel, connections between the air-passages of the tube and the interior of the vessel, means for turning said tube about its pivots, said means including a segmental rack on the tube and a worm engaging said rack.

6. In a submarine boat or vessel, the combination with suitable steering and propelling means of an air-tube pivoted in the vessel and adapted to be projected outwardly from the vessel, said tube having a plurality of air-passages, and a plurality of air connections and valved connections through the pivots of the tube between said air-passages and the interior of the vessel.

7. In a submarine boat or vessel having suitable propelling and steering means of a torpedo-tube opening beneath the surface of the water, a closure for the mouth of said tube, said closure comprising a pair of hinged, oppositely-operating jaw-plates having rearward extensions, and means engaging said extensions

for operating the said jaw-plates in unison from the interior of the vessel.

8. In a submarine boat or vessel having suitable steering and propelling means, a torpedo-tube and a closure for the outer end of said tube, said closure comprising two plates hinged at opposite sides of the vessel and having rearward extensions, said plates adapted to close over the end of the tube, and means engaging said extensions for operating said plates in unison.

9. In a submarine boat having suitable steering and propelling means, a torpedo-tube opening at the prow of the vessel, a closure for said tube, said closure comprising two hinged jaws coöperating to fold over the end of the tube, said jaws having rearward extensions, and means for operating said extensions from the interior of the vessel to open and close the jaws simultaneously.

10. In a submarine boat having suitable steering and propelling means, a torpedo-tube opening at the prow of the vessel, a closure for said tube, said closure comprising two hinged jaws coöperating to fold over the end of the tube, said jaws having slotted crossed rearward extensions, and means for operating said extensions from the interior of the vessel to open and close the jaws simultaneously.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HALVOR O. EIANE.

Witnesses:

HENRY P. TRICOU,
S. H. NOURSE.