

No. 896,361.

J. M. CAGE.  
SUBMARINE BOAT.  
APPLICATION FILED FEB. 21, 1906.

PATENTED AUG. 18, 1908.

3 SHEETS—SHEET 1.

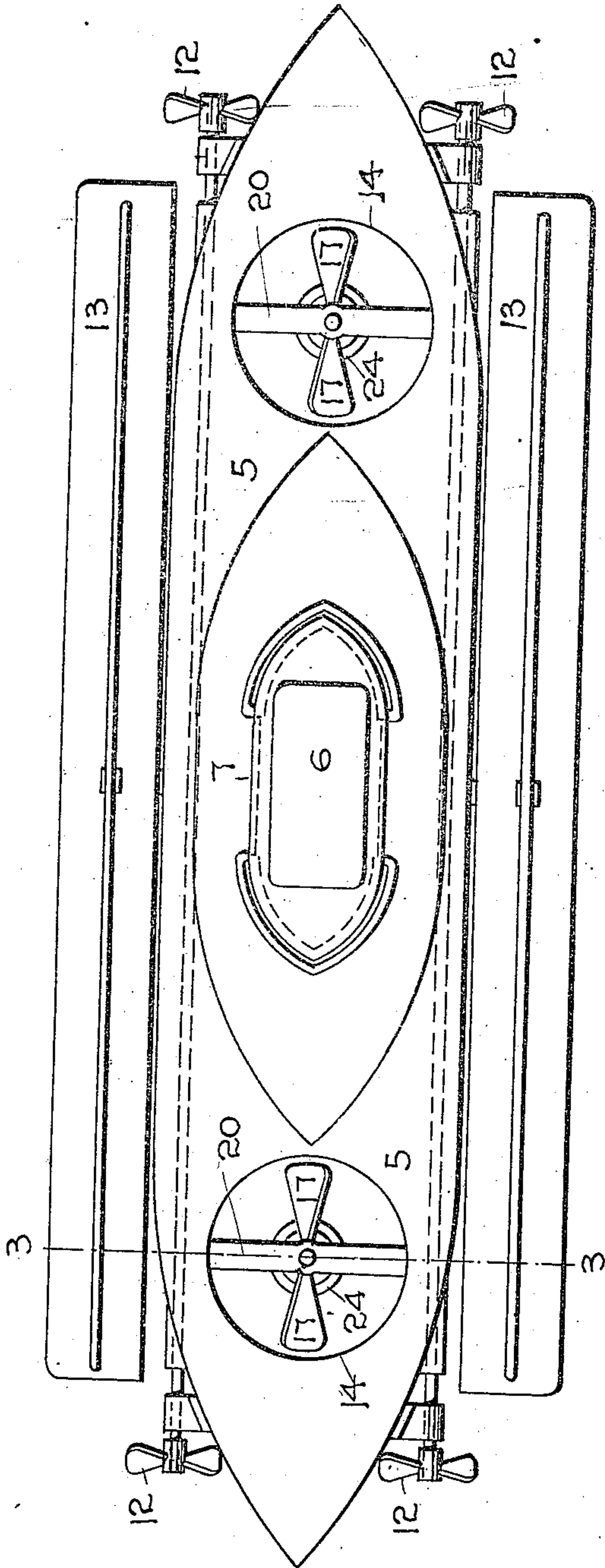


Fig. 1

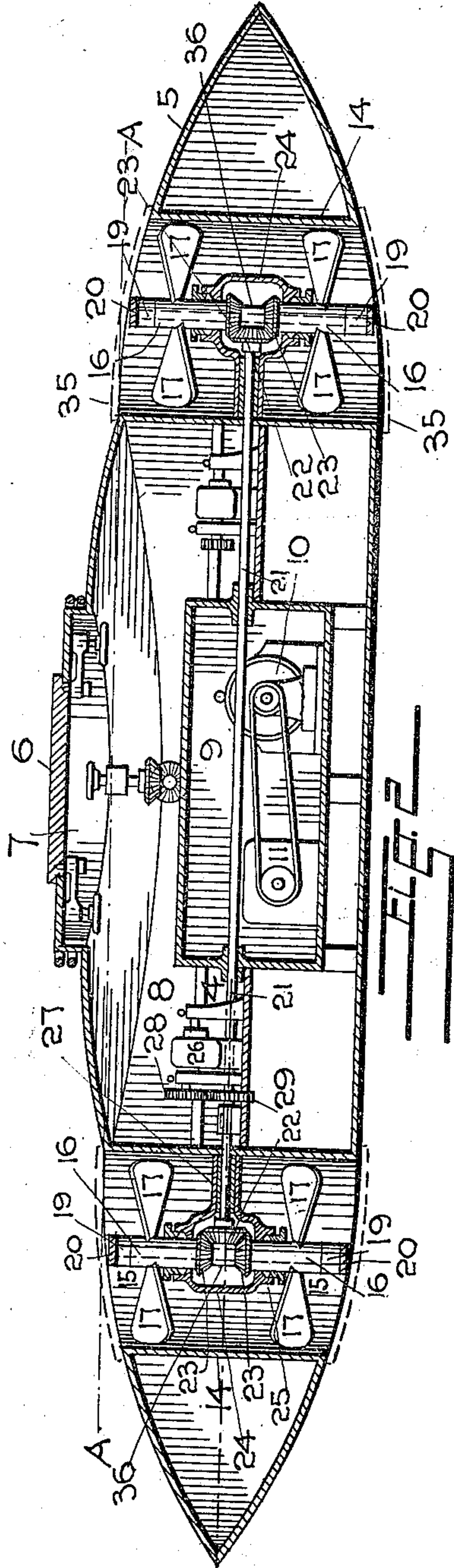


Fig. 2

WITNESSES:  
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*B. B. Urnaby*

INVENTOR:  
John M. Cage  
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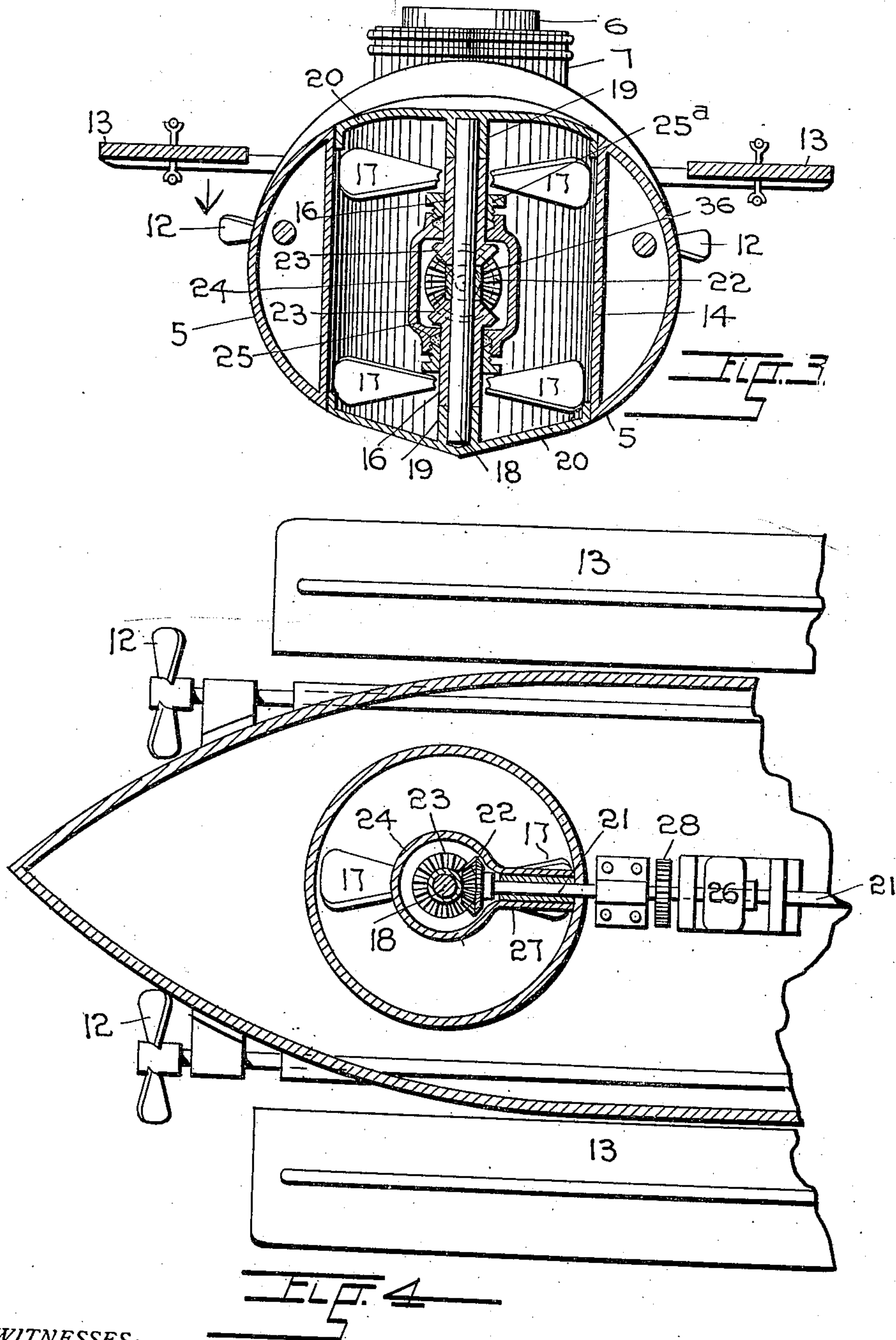
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3 SHEETS—SHEET 2.



WITNESSES:  
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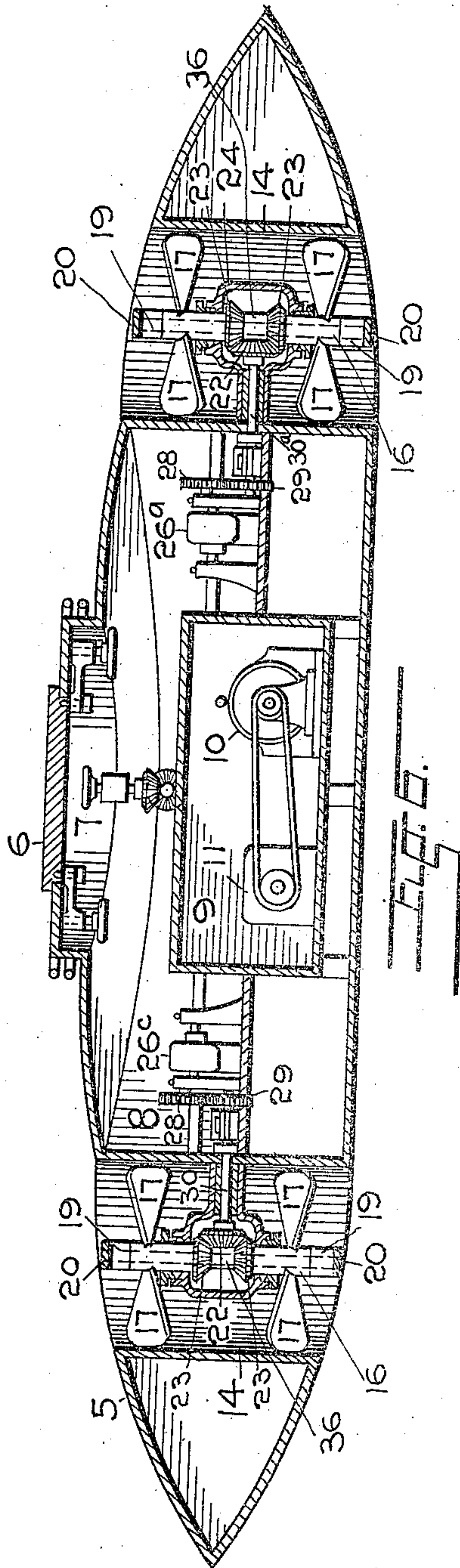
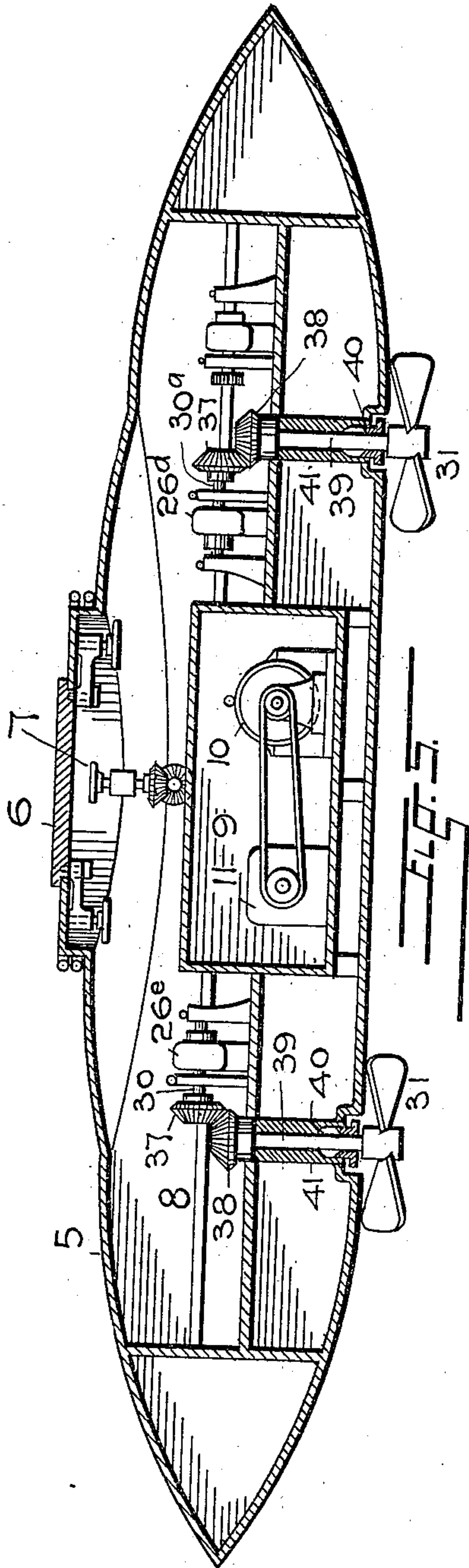


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3 SHEETS—SHEET 3.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

JOHN M. CAGE, OF DENVER, COLORADO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE SUBMARINE NAVIGATION AND MANUFACTURING COMPANY, OF DENVER, COLORADO.

## SUBMARINE BOAT.

No. 896,361.

Specification of Letters Patent.

Patented Aug. 18, 1908.

Application filed February 21, 1906. Serial No. 302,242.

*To all whom it may concern:*

Be it known that I, JOHN M. CAGE, a citizen of the United States of America, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Submarine Boats, of which the following is a specification.

This invention relates to improvements in submarine boats, its principal object being to produce means through instrumentality of which, the vessel may readily and speedily be submerged, be held at any desired depth or be returned to the surface, and which thus obviates the use of means for varying the weight of the boat, such as the trimming-tanks employed on the majority of submarine boats now in use. I attain these objects by the mechanism illustrated in the accompanying drawings, in the various views of which like parts are similarly designated and in which

Figure 1—represents a plan view of my improved submarine boat, Fig. 2—a vertical, longitudinal section therethrough, Fig. 3—an enlarged vertical cross section taken along a line 3—3, Fig. 1, Fig. 4—an enlarged horizontal section taken along a line 4—4, Fig. 2, Fig. 5—a vertical longitudinal section showing a modified manner of arranging the submerging appliances, and Fig. 6—a similar section illustrating a different mode of actuating the submerging means.

Referring to the drawings, 5 represents the double-conoidal or cigar-shaped hull or shell of a submarine boat, access to the interior of which may be had by means of the normally hermetically closed hatch 6, which opens into the upper surface of the conning-tower 7.

The interior of the boat is divided into two compartments 8 and 9, the former of which constitutes the operating room, while the latter being preferably located in the middle of the boat, contains a suitable dynamo electric machine or generator 10, driven by a gasolene engine 11 and by means of which the motors employed to operate the propelling-, submerging- and steering-appliances of the boat are energized.

Four screw-propellers 12 and two longitudinally disposed, horizontal rudders 13 are arranged for the propulsion and guidance of the boat while floating upon or below the surface of the water and have been made subjects of separate applications for patent.

The means employed for submerging the boat consist of two or more horizontally extending, revoluble, spiral blades resembling in construction and action the screws used for marine propulsion. The submerging screws 15 consist of a hub 16 from which extend the diametrically arranged spiral blades 17. They are preferably arranged in pairs inside two vertical cylindrical conduits or funnels 14, which extend transversely through the boat in proximity to its prow and to its stern.

Hubs 16 are revolubly mounted in superposed relation within the funnels on vertical, centrally located shafts 18, the extremities of which extend in sockets 19 secured by braces 20, which extend transversely of the orifices of the conduits. The screws in each funnel may be actuated through instrumentality of a horizontal shaft 21, the extremities of which extending in proximity to shaft 18, are provided with bevel gear wheels 22, which mesh into corresponding gears 23 secured to the opposite ends of the superposed hubs 16. A sleeve 36 surrounding shaft 18 between the hubs, supports the upper screw-propeller to avoid detrimental friction of the gears.

The gearing in each of the cylindrical conduits is preferably inclosed by a water-tight housing 25 provided with aligned packing-boxes 25<sup>a</sup>, through which hubs 16 extend and secured to the wall of the conduit by a laterally extending sleeve 27, which surrounds and supports shaft 21. A suitable electric motor 26, which receives its energy from the before named generator 10, is connected with shaft 21 by gears 28 and 29 to impart a revoluble movement thereto when it is desired to actuate the submerging screws.

The submarine boat is sufficiently buoyant to cause the conning tower to extend above the plane of flotation, which, approximately, extends along a line A—A, Fig. 2, when the submerging screws are at rest and the vessel floats in consequence on the surface of the water. To submerge the vessel, which normally is impenetrable to water, the submerging-screws are actuated by manipulation of a suitably located switch, electrically connected with motor 26. By action of the spiral blades, the water below the boat is displaced and thrown upward to subsequently cause submergence of the vessel by reaction on the screw-blades and the upper



surface of the shell. As the speed with which the boat descends is dependent on the velocity of the submerging-screws, the vertical movement of the vessel is under absolute control of the operator, who, in consequence, may hold the boat at any depth by modifying the speed of the motor, or cause it to return to the surface by arresting the movement of the submerging-screws. In place of the shaft 21 which simultaneously actuates the submerging-screws in both funnels, it may be desired to employ two independent shafts 30 and 30<sup>a</sup>, respectively actuated by separate motors 26<sup>o</sup> and 26<sup>a</sup> as illustrated in Fig. 6. This arrangement not only obviates passing the shaft through the engine-room, but also permits independent operation of the screws in the two funnels when it is desired to by these means, raise or depress the nose of the submerged vessel.

Fig. 5 shows the submerging-screws 31 applied below the keel of the boat, an arrangement which may be found of advantage in smaller boats where saving of space is of paramount importance. The operation and effect of the screws when in this position is similar to the one heretofore described. They may be actuated by means of motors 26<sup>a</sup> and 26<sup>o</sup>, the gears 37 of which engage corresponding gears 38 at the extremities of the vertical screw-shafts 39 which, passing through stuffing boxes 40, are revolvably mounted in boxes 41. It should be understood that, although the submerging screws have been shown to consist of two blades,

their number may be varied and that the arrangement of the screws and the manner of actuating them may be altered without departing from the spirit of the invention. When the boat is propelled along the surface of the water, funnels 14 may, if so desired, be closed by suitably operated covers, as indicated by the broken lines 35 in Fig. 2.

To avoid confusion the electrical connections between the dynamo and the various motors, as well as the operating switches and rheostats have been omitted from the drawings.

Having thus described my invention what I claim is:

1. A submarine boat having a vertical tube adjacent each end thereof and two sets of horizontal spiral blades pitched oppositely in respect to each other and arranged within each tube to move in opposite directions about a common vertical axis.

2. A submarine boat having a vertical tube adjacent each end thereof, and two sets of horizontal spiral blades pitched oppositely in respect to each other and arranged within each tube to move in opposite directions about a common vertical axis, and removable covers for each end of each tube.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHN M. CAGE.

Witnesses:

G. J. ROLLANDET,  
K. M. STUMP.