J. W. BOWEN, S. M. HART, AND J. E. BOWEN.

HYDROAEROPLANE.

APPLICATION FILED JAN. 3, 1922.

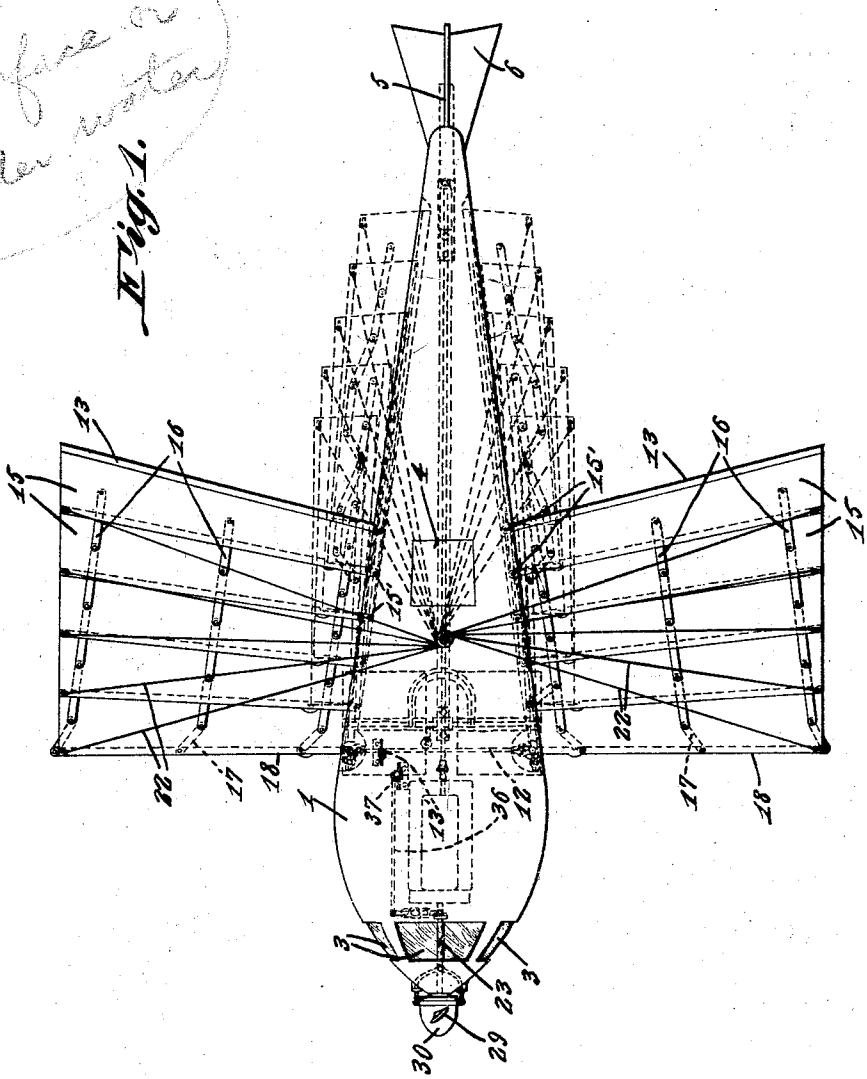
1,427,257.

Patented Aug. 29, 1922.

6 SHEETS—SHEET 1.

on surface or under water

Fig. 1.



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49

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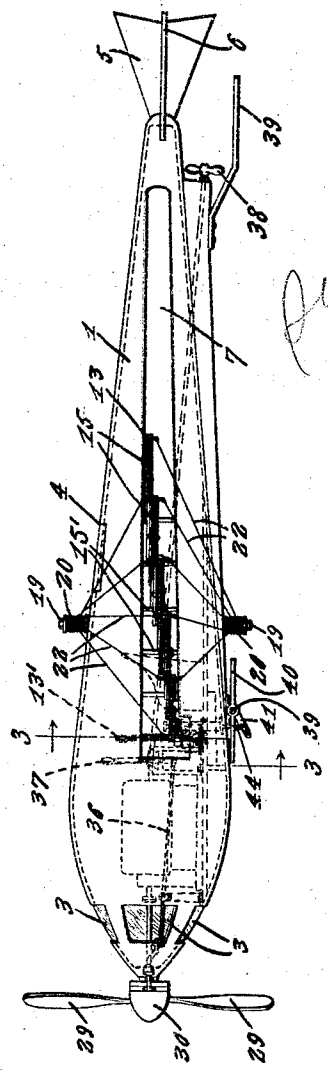

Fig. 2.

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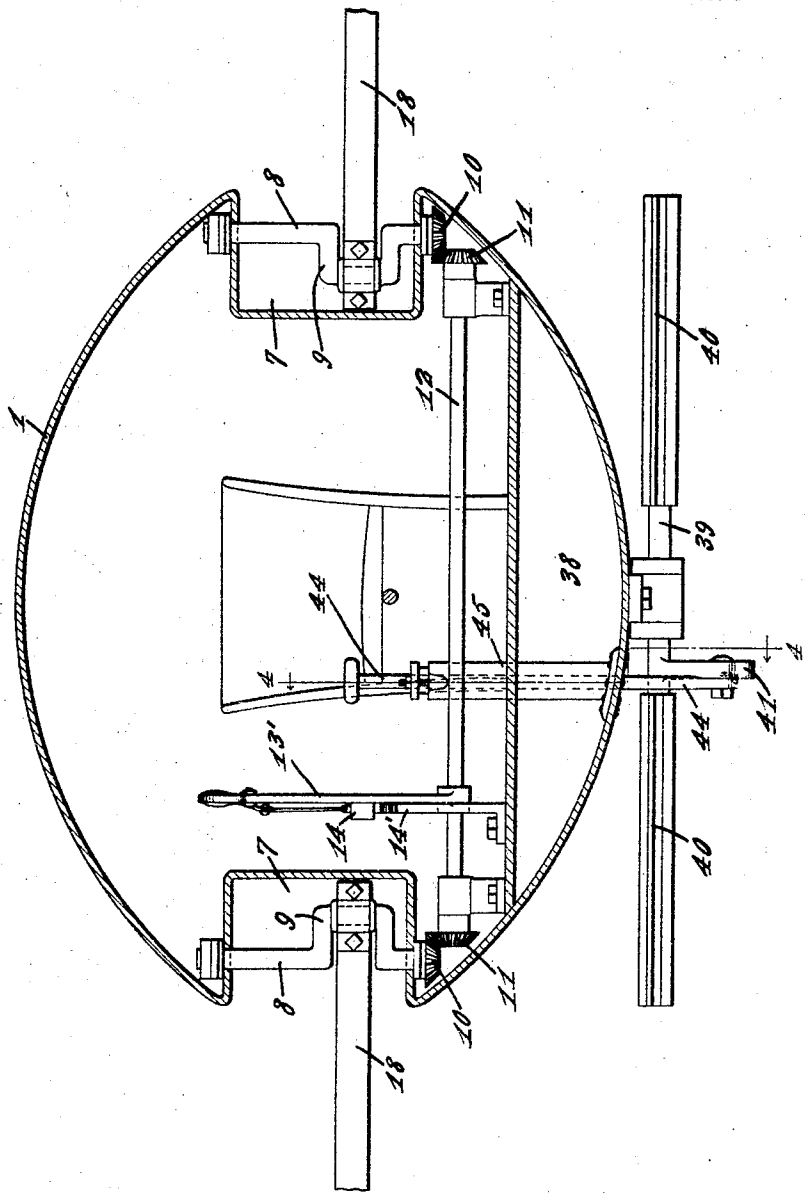
6 SHEETS—SHEET 3.

Fig. 3.



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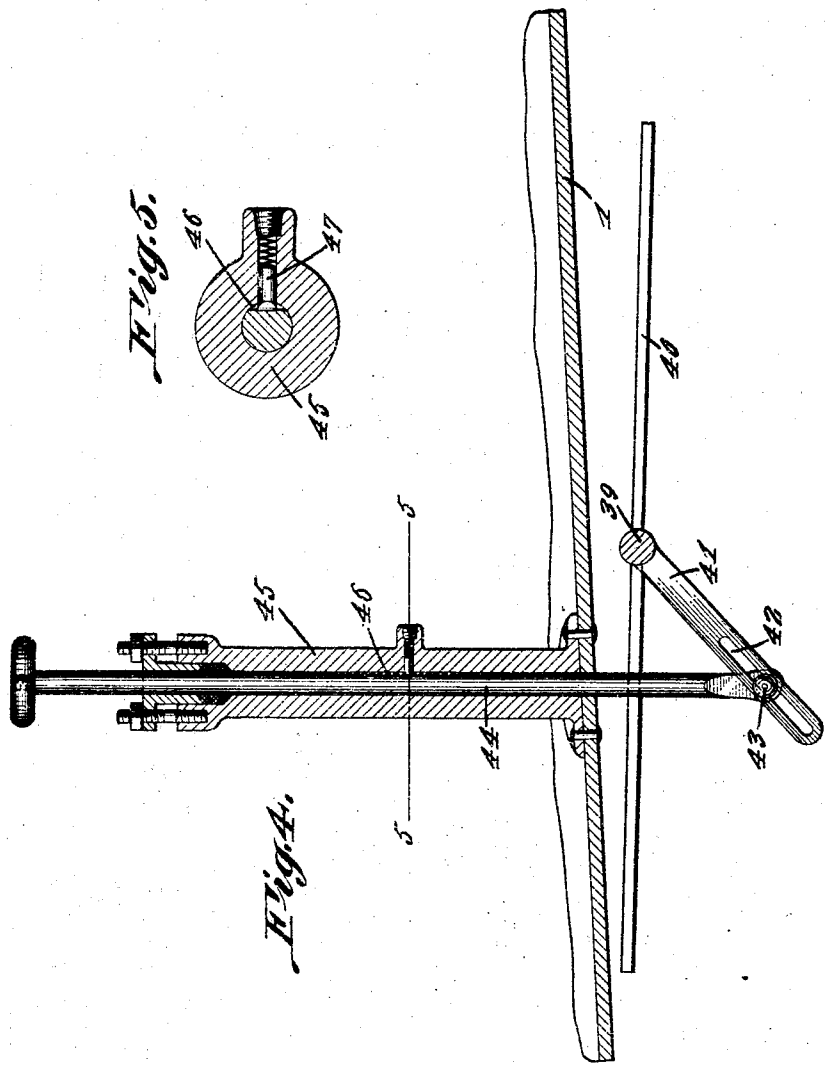
6 SHEETS—SHEET 4.



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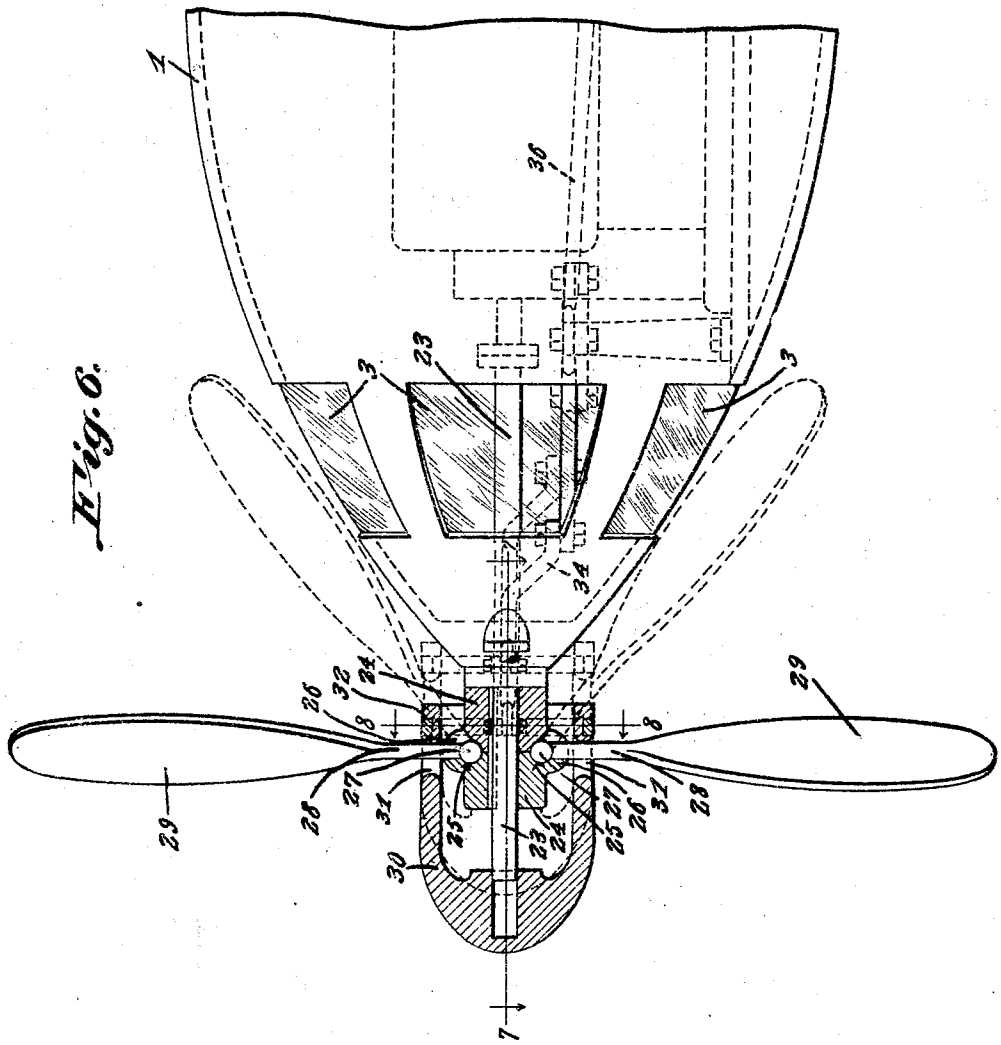
6 SHEETS—SHEET 5.

Fig. 6.



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6 SHEETS—SHEET 6.

Fig. 9.

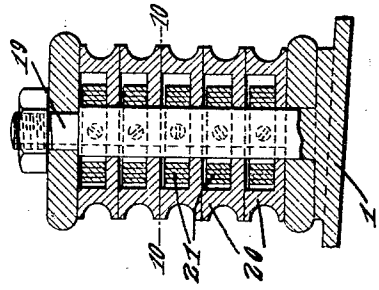


Fig. 10.

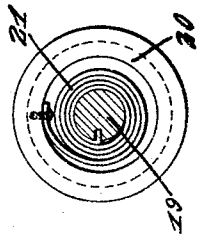


Fig. 7.

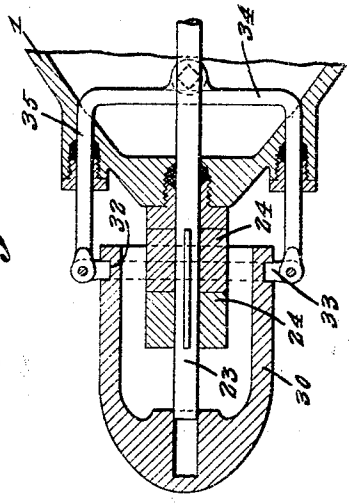
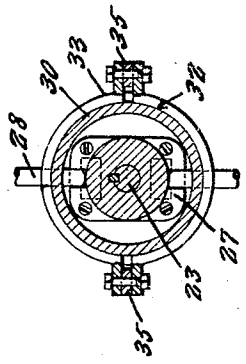


Fig. 8.



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UNITED STATES PATENT OFFICE.

JENKIN W. BOWEN, STANLEY M. HART, AND JOHN E. BOWEN, OF PUEBLO, COLORADO.

HYDROAEROPLANE.

1,427,257. Specification of Letters Patent. Patented Aug. 29, 1922.

Application filed January 3, 1922. Serial No. 526,627.

To all whom it may concern:

Be it known that we, JENKIN W. BOWEN, STANLEY M. HART, and JOHN E. BOWEN, citizens of the United States, residing at Pueblo, in the county of Pueblo, State of Colorado, have invented a new and useful Hydroaeroplane, of which the following is a specification.

This invention relates to hydroaeroplanes and more particularly to an aeroplane which can be used to travel both on the surface of a body of water as well as beneath the surface.

One of the objects of the invention is to provide a structure of this character having sustaining planes capable of being folded against the sides of the body whereby the entire structure can travel upon the surface of the water or, by the use of a proper control, can be caused to submerge and travel under water.

Another object is to provide a structure of this character having a propeller for driving the same while in flight but which propeller can be collapsed against the body when the structure is in use as a surface or submarine boat, a supplemental propeller being provided for driving the structure on or in the water.

Another object is to provide a novel construction of sustaining plane or wing whereby the same can be collapsed into the smallest space possible when not in use for soaring.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that, within the scope of what is claimed, changes in the precise embodiment of the invention shown can be made without departing from the spirit of the invention.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings—

Figure 1 is a plan view of the device, the wings being shown by dotted lines in folded or collapsed positions.

Figure 2 is a side elevation.

Figure 3 is an enlarged section on line 3—3, Figure 2.

Figure 4 is an enlarged section on line 4—4, Figure 3.

Figure 5 is an enlarged section on line 5—5, Figure 4.

Figure 6 is a view partly in section and partly in elevation of the front or nose portion of the device, the positions of the propeller blades when collapsed being shown by dotted lines.

Figure 7 is a section on line 7—7, Figure 6.

Figure 8 is a section on line 8—8, Figure 6.

Figure 9 is a section through one of the series of spring controlled spools used for stiffening the sections on the sustaining wings.

Figure 10 is a section on line 10—10, Figuse 9.

Referring to the figures by characters of reference 1 designates the body or hull of the structure, the same being preferably tapered rearwardly as shown in figure 1 and having a front nose 2 in which may be provided windows 3. It is to be understood of course that suitable means may be provided whereby persons can easily enter and leave the structure, said means, however, serving to tightly seal the body when it is used on or below the surface of a body of water. One of the closures or hatches to be used on the body has been indicated at 4.

There is provided at the rear end of the body a vertical rudder or tail plane 5 and a horizontal rudder or tail plane 6, it being understood that any suitable mechanism, not shown, may be provided for actuating these parts so as to control the direction of movement of the structure either while in flight or while traveling over or under the surface of a body of water.

Formed longitudinally within the sides of the body 1 are channels 7 and journaled within the front end portions of these channels are vertical shafts 8 each having a crank 9. Gears 10 are secured to the shaft and mesh with gears 11 secured to the ends of the transverse shaft 12. This shaft is adapted to be rotated by a hand lever 13 or the like which can be secured in any position to which it may be adjusted, a dog 14 and toothed segment 14′ being preferably provided for this purpose.

Pivotally mounted within each channel 7 at regular intervals are arms or ribs 18, their points of connection with the upper and lower walls of the channel being indicated at 15′. Secured to each of these ribs

18 is a plane or wing section 15 which extends over the next adjoining section 15 as shown in Figure 1. Each section 15 is connected to the next adjoining section by links 16 and the front section of each sustaining plane or wing is connected by links 17 to a rib 18 carried by the crank 9 of shaft 8. Obviously when the cranks on the two shafts 8 are extended inwardly toward each other as shown in Figure 3 the ribs 18 are drawn inwardly at their inner ends and pull, through the links 17 upon the series of links 16, thus to hold the sections 15 extended laterally and in lapped relation as shown by full lines in Figure 1. As the ribs 18 are fixedly connected to the cranks 9 and cannot swing relative thereto, it will be apparent that by rotating shaft 12, the two cranks 9 will be swung forwardly and outwardly and will impart an outward and rearward swinging movement to the ribs 18. Thus links 17 will thrust against a series of links 16 and cause the ribs 13 to swing backwardly on their fulcrums 15′ with the several wing sections 15 superposed in lapped relation as shown by dotted lines in Figure 1.

Extending upwardly and downwardly from the body 1 are studs 19 on each of which is mounted a series of spools 20 arranged one upon the other. Each spool has a spring 21 therein, one end of the spring being attached to the stud 19 while the other end is attached to the spool 20. Secured to each spool are oppositely extending cables 22, one of these cables being attached to the outer end of one of the ribs of one sustaining plane while the other cable is attached to the outer end of one of the ribs of the other sustaining plane. The cables on each spool are connected to corresponding ribs on the respective planes. The springs 21 are normally under tension so as to hold the cables taut. Thus when the sections of the wings are swung backwardly as shown by dotted lines in Figure 1 the springs will maintain the cables taut and, when the wings are swung outwardly to active position the cables will remain taut and serve to keep the wings sufficiently rigid. As a set of spools is provided underneath as well as above the body it will be obvious that cables extending upwardly and downwardly from the wings will pull against each other and thus cooperate to hold the wings sufficiently rigid to resist upward or downward strains exerted thereagainst.

For the purpose of propelling the structure while in flight, an engine driven shaft 23 is journaled in the nose of the body 1 and has keyed thereon collars 24 forming sockets 25 therebetween, there being slots 26 in the rear collar 24 which open into the respective sockets. Within the sockets 25 are journaled cylindrical heads 27 provided at the inner ends of stems 28 extending from the inner ends of propeller blades 29. These stems 28 are designed to swing within the slots 26 so that the blades 29 will lie close to the nose of the body 1 as shown by dotted lines in Figure 6. A cap 30 is slidable on the projecting forward end of the shaft 23 and has openings 31 through which the stems 28 project. This cap obviously rotates with the shaft and with the propeller blades. An annular groove 32 is formed in the cap and has a ring 33 therein connected to the ends of a yoke 34. The arms of this yoke are slidable within openings 35 in the nose of the body 1 and the inner end of the yoke is connected by a slidable rod 36 to a shifting lever 37. Thus it will be seen that when the blades 29 are to be used for propelling the structure through the air, the cap 30 is shifted forwardly so as to hold the stems 28 radially relative to the shaft 23. When the structure is to travel on or below the surface of a body of water, however, the yoke 34 is shifted so that the cap 30 is drawn backwardly and will swing the stems 28 rearwardly. This will position the blades 29 in the collapsed or inclined positions indicated by dotted lines in Figure 6. Thus they will not interfere seriously with the propulsion of the structure on or within a body of water.

A supplemental propeller 38 similar to the ordinary screw propeller can be provided under the back portion of the body 1 for the purpose of driving the structure on or below the surface of a body of water. This screw propeller is protected by a skid 39 so that it will not be injured when the structure is landing after a flight above the ground or above the surface of the water.

It is to be understood that the body 1 can be provided with a compartment 38 in the bottom thereof for receiving water ballast whereby the submerging of the structure can be effected readily. Furthermore a transverse shaft 39 can be mounted under the body and can have diving planes 40 connected to the ends thereof. This shaft has a crank arm 41 slotted as shown at 42 for engagement with a pin 43 carried by a shifting rod 44. This rod is slidably mounted in a post 45 and is notched, as shown at 46 so as to be engaged by spring pressed holding pin 47 whereby the rod will be held in any position to which it may be shifted by pressing or pulling thereon.

It will be obvious that a structure such as described can be propelled not only through the air and off of the surface of the ground or water but also on the surface of a body of water or below the surface. The necessary adjustment or shifting of the various operative parts can be effected readily by the means that have been described.

What is claimed is:—

1. The combination with a body adapted to be sealed and having longitudinal chan-

nels in the sides thereof, of a series of lapping wing sections at each side of the body, each section of each series being pivotally mounted within the adjacent channel, connections between the sections of each series, means operated from within the body for simultaneously swinging all of said sections backwardly and inwardly thereby to fold them against the sides of the body and within the channels.

2. The combination with a body adapted to be sealed, there being channels along the sides of the body, of a series of wing sections at each side of the body, the sections of each series being pivotally mounted within the adjacent channel, connections between the sections of each series, a crank shaft mounted for rotation within each channel, and means operated by the rotation of the crank shafts for folding the wing sections backwardly and inwardly against the sides of the body and for extending said sections outwardly from the body.

3. In a structure of the class described the combination with a body adapted to be sealed and having channels along the sides thereof, of normally lapping wing sections arranged in series at each side of the body, the sections of each series being pivotally mounted within the adjacent channel, means operated from within the body for folding said sections rearwardly and inwardly against the body and for extending them laterally from the body, and flexible bracing means extending from the outer ends of the sections to the top and bottom portions of the body.

4. In a structure of the class described the combination with a body adapted to be sealed, and tiltable planes connected to the bottom of the body and controllable from within the body, of a sustaining plane at each side of the body, each plane comprising a plurality of lapping sections connected to the body by individual pivots, means operable from within the body for shifting said sections simultaneously to fold them rearwardly against the sides of the body or to extend them laterally from the body, a screw propeller at the rear end of the body, an air propeller at the front end of the body, and means operable from within the body for folding the blades of the air propeller against the body or for shifting them to active positions.

5. In a structure of the class described the combination with a body having channels extending along the sides thereof, of sustaining planes at the side of the body, each plane including a plurality of lapping sections having individual fulcrums within the adjacent channel, link connections between the sections of each plane, a crank shaft journaled within each channel, a rib fixedly connected to each crank shaft and to the adjacent plane section, and means operable from within the body for rotating the crank shaft to fold the plane sections against the sides of the body or to extend said sections laterally to sustaining positions.

6. In a structure of the class described the combination with a body having channels extending along the sides thereof, of sustaining planes at the sides of the body, each plane including a plurality of lapping sections having individual fulcrums within the adjacent channel, link connections between the sections of each plane, a crank shaft journaled within each channel, a rib fixedly connected to each crank shaft and to the adjacent plane section, and means operable from within the body for rotating the crank shaft to fold the plane sections against the sides of the body or to extend said sections laterally to sustaining positions and yieldingly held stay devices extending from the outer ends of the sections to the top and bottom respectively of the body.

In testimony that we claim the foregoing as our own, we have hereto affixed our signatures in the presence of two witnesses.

JENKIN W. BOWEN.
STANLEY M. HART.
JOHN E. BOWEN.

Witnesses:
WILLIAM F. CARWELL,
C. F. W. E.