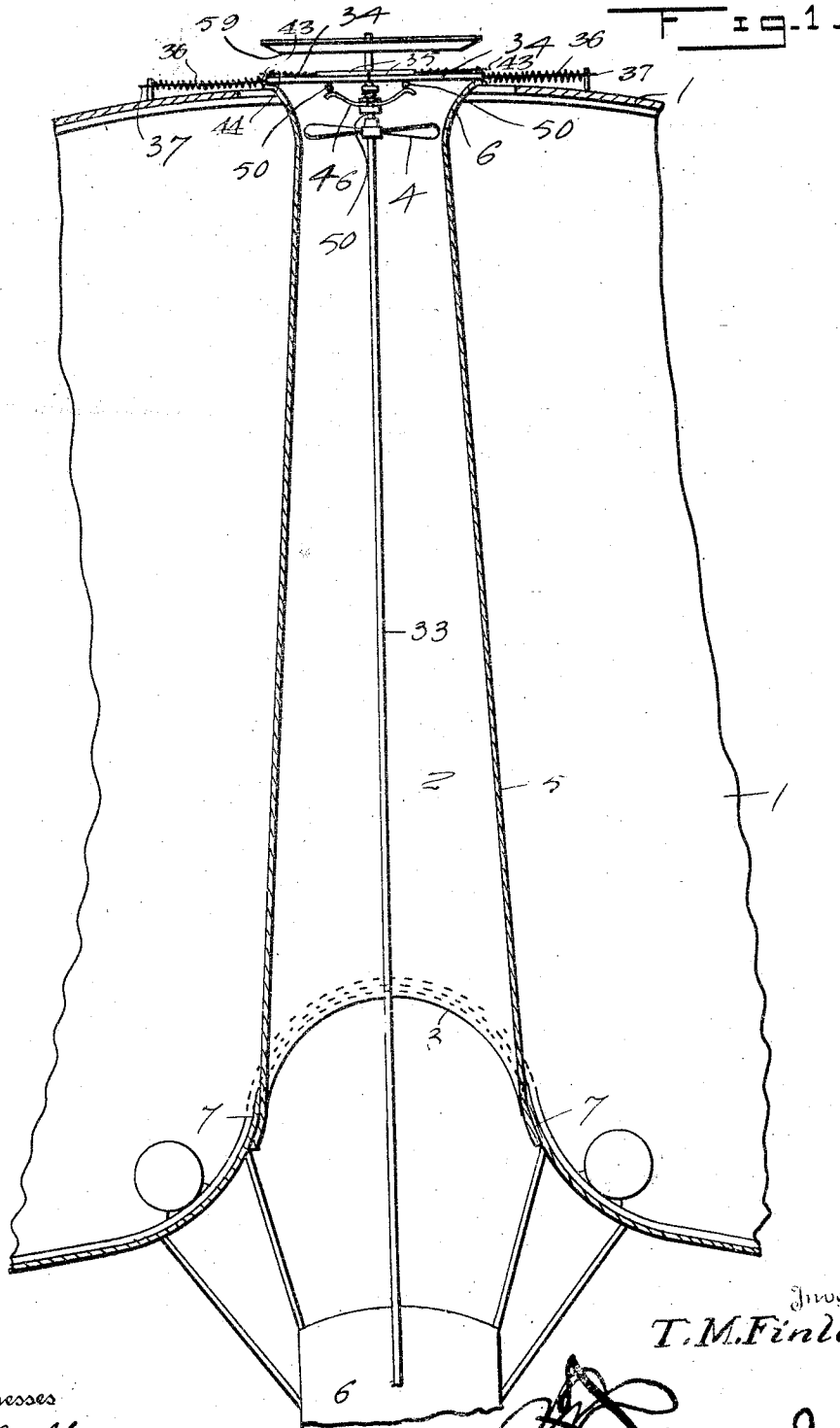


T. M. FINLEY.
LIFTING AND BALANCING MEANS FOR AIRSHIPS.
APPLICATION FILED JUNE 29, 1917.

Patented Dec. 17, 1918.
3 SHEETS—SHEET 1.

1,287,938.



Inventor
T. M. Finley.

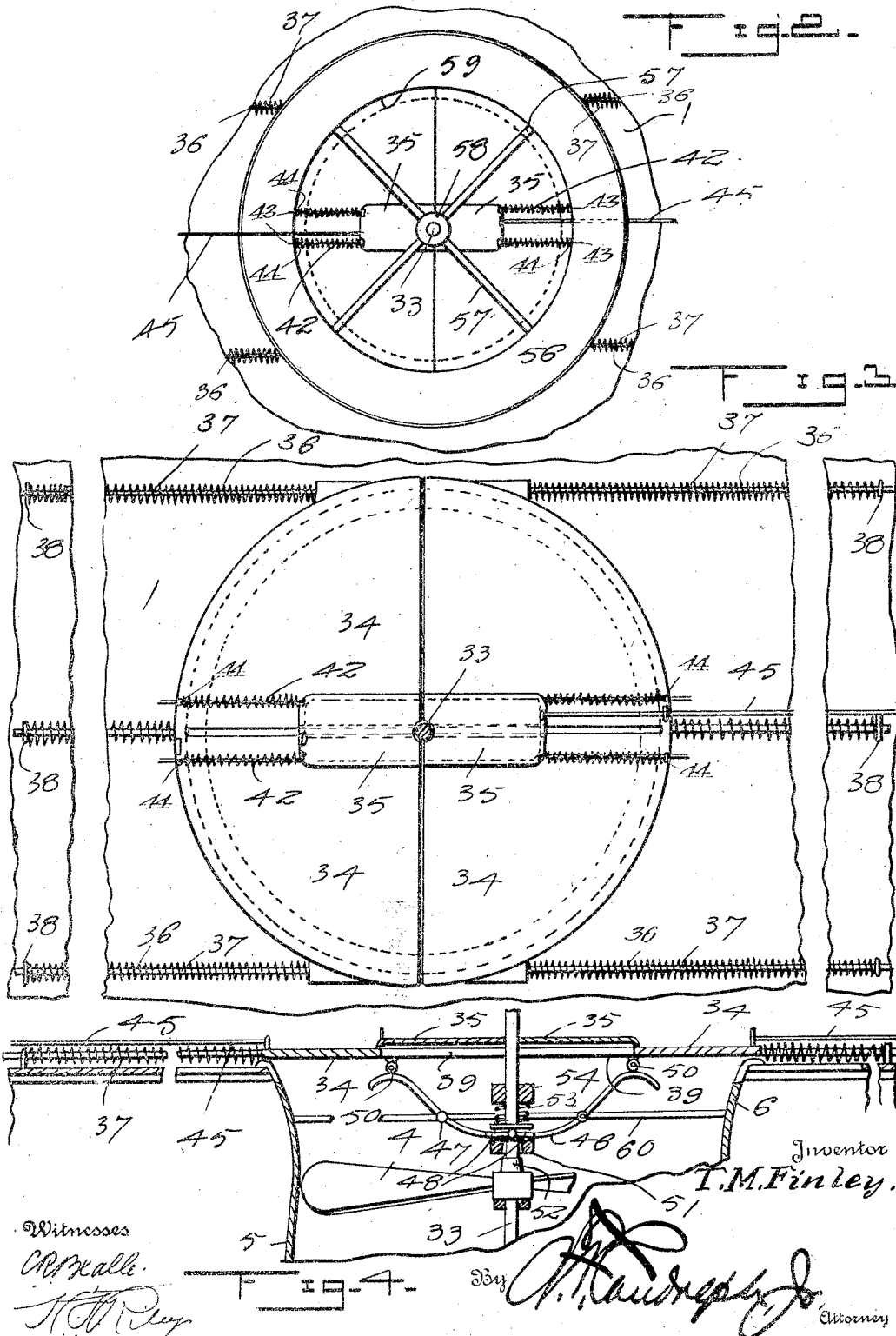
Witnesses
C. M. Bealle
J. H. Riley

By *A. H. Randolph, Jr.*
Attorney

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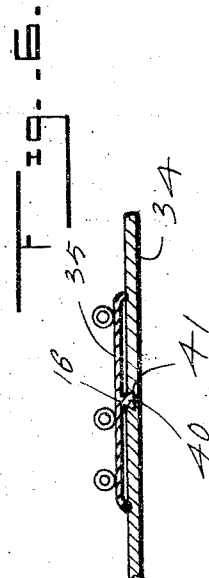
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C. Beale

J. H. Ruz

Inventor

T.M. Finley.

வினா

A. Randolph Jr.

Attorney:

UNITED STATES PATENT OFFICE.

THOMAS M. FINLEY, OF ORAN, MISSOURI.

LIFTING AND BALANCING MEANS FOR AIRSHIPS.

1,287,938.

Specification of Letters Patent.

Patented Dec. 17, 1918.

Original application filed June 29, 1917, Serial No. 177,816. Divided and this application filed June 29, 1917, Serial No. 177,817.

To all whom it may concern:

Be it known that I, THOMAS MILTON FINLEY, a citizen of the United States, residing at Oran, in the county of Scott and State of Missouri, have invented certain new and useful Improvements in Lifting and Balancing Means for Airships; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to a gyratory stabilizer and lifting propeller and is a division of an application filed June 29, 1917, Serial No. 177,816.

The object of the present invention is to improve the construction of lifting propellers and gyratory stabilizers, more especially that shown and described in an application filed by me April 10, 1917, Serial Number 160,980, and to provide a simple, practical and comparatively inexpensive construction in which the lifting effect will be increased and the head resistance eliminated.

A further object of the invention is to provide a structure of this character adapted to afford an efficient air pocket to assist the machine in hovering and capable also of forcing the air downwardly beneath the machine to assist in providing a strong or condensed body of air to support the machine in flight and to increase the effect of the driving propeller and render the aerocruiser more buoyant and easily propelled, and at the same time counteract the evil effects of air pockets and similar unfavorable atmospheric conditions.

A further object of the invention is to provide lifting mechanism adapted to take air from the top of the body of the machine and force such air through the body to the bottom thereof to rarefy the air above the machine and increase the density of the air beneath the machine both to facilitate the ascent of the machine and to cushion the machine in descending and enable the machine to land gently without jar or vibration.

With these and other objects in view, the invention consists in the construction and novel combination of parts hereinafter fully described, illustrated in the accompanying drawings and pointed out in the claims hereinafter appended; it being understood that vari-

ous changes in the form, proportion, size and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:

Figure 1 is a vertical sectional view of a portion of the body of an aerocruiser provided with a gyratory stabilizer and lifting propeller constructed in accordance with this invention.

Fig. 2 is a plan view of the same.

Fig. 3 is a horizontal sectional view, the main and auxiliary doors being closed.

Fig. 4 is a vertical sectional view through the lifting mechanism, the gyratory member being omitted.

Fig. 5 is a plan view similar to Fig. 3, the main and auxiliary doors being open.

Fig. 6 is a detail sectional view illustrating the manner of slidably mounting the auxiliary door.

Like numerals of reference designate corresponding parts in the several figures of the drawings.

In the accompanying drawings, in which is illustrated the preferred embodiment of the invention, 1 designates the body of the aerocruiser, said body being constructed as shown and described in the said application of which the present application is a division. The body is provided with a vertical opening 2 designed to be located at suitable intervals as set forth in the said application and arranged midway between the side of the body and extending upwardly from the trough. The opening is tapered upwardly so as to constrict the compressed air or packed air of the trough in order that the air operated on by a horizontally disposed rotary lifting propeller 4 will be of relatively great density. The walls 5 of the opening are tubular and may be constructed of any suitable material, and the upper and lower terminals of the tubular walls are flared, as shown at 6 and 7. The tendency of the body, as explained in the aforesaid application, to compress or condense the air causes the same to rush into the trough and the vertical opening so that the rotary horizontally disposed lifting propeller 4 will obtain a maximum lifting effect, and the said horizontally disposed propeller operates on such air to force the same downwardly

through the vertical opening 2 into the trough 3 to maintain the air in the trough at a uniform maximum density and to counteract the effect of air pockets and similar unfavorable atmospheric conditions.

The propeller 4, which is located within the upper portion of the opening 2 at the flared portion 6 of the upper end of the tubular walls 5, is protected by the body and as there is no head resistance resulting from the use of the lifting propeller and the flaring of the top of the tubular walls enables the air to enter the upper end of the vertical opening from the top and sides so that the horizontal lifting propeller will have the same effect as operating in the open air and at the same time be arranged in the body so as to prevent it from offering any resistance to the forward movement of the machine.

The propeller, which is of the ordinary construction, is mounted on a vertical shaft 33 and it is adapted to force the air downwardly through the vertical opening for the purpose of lifting the aerocruiser and also for the purpose of increasing the density of the air in the trough beneath the body. By the arrangement of the vertical opening at the central portion of the body midway between the sides the air will be taken from directly above the body and packed below the same, thereby reducing the density of the air at the body and lessening the resistance of the air to the upward movement of the body and at the same time causing the air to pack beneath the body and tend to lift and support the same.

The effect of the lifting propeller is controlled by main and auxiliary slidable doors or closures 34 and 35 located at the top of the body and adapted to expose the upper end of the vertical opening to a greater or less degree as required. The main doors or closures 34, which are substantially semi-circular, are slidably mounted and are movable inwardly and outwardly in a direction longitudinally of the body and they are urged inwardly by coiled springs 36 disposed on rods 37 and interposed between the slidable doors or closures 34 and guides 38. The main doors 34 are provided with central openings 39, and the auxiliary doors are slidable to cover and uncover the openings 39 which are adapted to admit air to the central portion of the vertical opening 2 prior to the opening of the main doors 34 so that the air will not be delivered to the propellers in a thin streak. The auxiliary door 35 is slidably mounted on the main door 34 by any suitable means, a dove-tailed rib 40 being shown and arranged to operate in a dove-tailed groove or way 41. Any suitable anti-friction devices may be employed to assist the movements of the slidable doors or closures and the auxiliary door or closure

35 is urged in closed position by springs 42, disposed preferably on rods 43 operating in guides 44 of the main door, but any other suitable means may be employed for mounting the springs 42 which are of less strength than the springs 36, so that the operating connections 45, connected with the auxiliary doors, will open the same to the full extent of the movement of the said auxiliary doors independently of the main doors before the main doors are moved outwardly. This operation is due to the superior strength of the springs 36, which will maintain the main doors in their closed position until the auxiliary doors have reached the limit of their outward movement. Also in the closing movement of the doors, the main doors will completely close prior to the closing of the auxiliary doors, and the operating devices for controlling the doors or closures 34 and 35 are designed to be located in the cars of the aforesaid application and may be of any preferred form.

When the main doors close, the propeller is automatically stopped to prevent it from churning the air in the opening 2, and this operation is effected by means of opposite levers 46, fulcrumed intermediate of their ends at 47 and having inner forked portions 48 and outer curved portions 49, presenting upper convex faces in the path of rollers 50. The rollers 50, which are carried by the main doors, form projections and are adapted to engage the curved arms or portions 49 of the levers to depress the said arms 49 and thereby lift the inner forked arms to raise a slidable or movable clutch section or member 51 out of engagement with a coacting clutch section or member 52 carried by the propeller and held against longitudinal movement. The slidable clutch section 51 is interlocked with the vertical shafts 33 by any suitable means, and the propeller, which is loose on the shaft, is clutched to the same when the section 51 is moved into engagement with the section 52 of the clutch. The slidable clutch member 51, which is adapted to move downwardly by gravity, is positively urged into engagement with the clutch section 52 by means of a coiled spring 53 disposed on the shaft 33 and interposed between the slidable clutch section 52 and a stop 54, which may consist of a collar or other suitable device. The main doors have meeting edges straight at opposite sides of the vertical shaft 33 and the openings 39, and the auxiliary doors 35 are provided with recesses 55 forming an opening through which the shaft passes when the doors are closed. The vertical propeller shaft is extended above the top of the body and carries a rotary gyratory member or plane 56, which is illustrated in the drawings as consisting of an annulus or rim supported by spokes 57 extending from a hub 58 and suit-

ably connected at their outer ends to the said annulus or rim. The annular gyratory member or plane has a central opening 59 of substantially the diameter of the upper end of the opening or passage 2 so as not to interfere with the passage of the air to and from the same or interfere with the action of the horizontal lifting propeller. The annular rim is set at an inclination and extends upwardly and outwardly and is adapted to operate as set forth in the aforesaid application. Instead, however, of providing an open gyratory member it may be located a sufficient distance above the upper end of the vertical opening to enable a solid continuous plate or plane to be used without interfering with the action of the lifting propeller. The vertical propeller shaft may be braced from the frame work of the machine in any desired manner and the levers, which operate the clutch, are fulcrumed on suitable braces 60.

The control of the passage of the air through the vertical opening will regulate the lifting effect of the propeller and will enable the machine to hover and also will cause the same to descend gently. When the doors are closed and the propeller stops, the vertical opening is adapted to operate as an air pocket and will increase the buoyancy of the machine. Also the gyratory plane or member at the top of the body and the arrangement of the car 61 below the body, as set forth in the aforesaid application, will operate to maintain the body in an upright position and enable the same to travel on an even keel under changing atmospheric conditions. Any suitable means may be employed for actuating the vertical shaft 33 of the horizontal lifting propeller, preferably the means disclosed in the aforesaid application.

What is claimed is:

1. In an airship of the class described, the combination of a body provided with an opening extending upwardly through the body from the bottom to the top thereof, a lifting propeller operating within the body at the upper portion of the opening, the latter being flared above the propeller, and a superimposed gyratory plane of greater diameter than the flared portion of the opening.

2. In an airship of the class described, the combination of a body provided with a vertical opening extending through the body from the bottom to the top thereof, a lifting propeller operating within the opening, a superimposed gyratory plane of greater diameter than the said opening, and means located between the gyratory plane and the propeller for varying the effect of the propeller on the air in the opening.

3. In an airship of the class described, the combination of a body having a longitudinal

trough at the bottom and provided with an opening flared at the top and extending upwardly from the trough through the body, a superimposed gyratory plane of greater diameter than the flared portion of the opening and a lifting propeller operating in the opening below the flared portion and adapted to force the air downwardly through the opening into the said trough.

4. In an airship of the class described, the combination of a body having a longitudinal trough and provided with a vertical opening extending upwardly from the trough to the top of the body and tapered upwardly, a horizontal lifting propeller operating within the opening at the upper end thereof, the opening being flared at the top, and a gyratory plane of greater diameter than the flared portion of the opening located above the same and connected with the propeller.

5. In an airship of the class described, the combination of a body having a substantially vertical opening extending upwardly through the body from the bottom to the top thereof, a lifting propeller operating within the opening, and a gyratory stabilizing member connected with the propeller and located above the body.

6. In an airship of the class described, the combination of a body having a substantially vertical opening extending upwardly through the body from the bottom to the top thereof, a lifting propeller operating within the opening, and a gyratory stabilizing member connected with the propeller and located above the body, said gyratory member having a central opening of substantially the size of the opening of the body.

7. In an airship of the class described, the combination of a body having a longitudinal trough and provided with a vertical opening extending upwardly from the trough to the top of the body and tapered upwardly, a horizontal lifting propeller operating within the opening at the upper end thereof, and a gyratory stabilizing member connected with the propeller and located above the body and having an opening of substantially the size of the opening of the body.

8. In an airship of the class described, the combination of a body having a vertical opening extending through the body from the bottom to the top, a propeller shaft, mounted within the opening and extending above the body, a lifting propeller mounted on the said shaft, and a rotary gyratory plane or member mounted on the shaft and located above the body and having an opening of substantially the size of the opening of the body.

9. In an airship of the class described, the combination of a body having a vertical

opening extending through the body from the bottom to the top, a propeller shaft mounted within the opening and extending above the body, a lifting propeller mounted on the said shaft, and a rotary gyratory plane or member mounted on the shaft and located above the body and having an opening of substantially the size of the opening of the body, said gyratory plane or member inclining upwardly and outwardly from the said opening.

10. In an airship of the class described, the combination of a body provided with an opening extending upwardly from the bottom of the body through the same to the top thereof, a lifting propeller operating within the opening, means for closing the opening to form an air pocket, and a superimposed gyratory plane having an opening located above the opening of the body and connected with the propeller.

11. In an airship of the class described, the combination of a body provided with an opening extending upwardly from the bottom of the body through the same to the top thereof, a lifting propeller operating within the opening, means for varying the effect of the propeller on the air in the opening and for closing the opening to form an air pocket, and a superimposed gyratory plane having an opening and located above the opening of the body and connected with the propeller.

12. In an airship of the class described, the combination of a body having an opening extending upwardly through the body, a propeller operating within the opening, slidable closures located above the propeller for controlling the admission of air to the opening and its passage therethrough, and a superimposed gyratory plane located above the body and having an opening registering with the opening of the body.

13. In an airship of the class described, the combination of a body having an opening extending upwardly through the body, a propeller operating within the opening, and doors arranged to cover and uncover the said opening and provided with auxiliary doors or closures to effect a preliminary admission of air to the said opening.

14. In an airship of the class described, the combination of a body having an opening extending upwardly through the body, a propeller operating within the opening, main doors arranged to cover and uncover the said opening and having openings, auxiliary doors mounted on the main doors to cover and uncover the openings thereof, and operating mechanism for the said doors.

15. In an airship of the class described, the combination of a body having an opening extending upwardly through the body, a propeller operating within the opening, main doors arranged to cover and uncover

the said opening and having openings, auxiliary doors mounted on the main doors to cover and uncover the openings thereof, and operating mechanism for the said doors, said operating mechanism having means for effecting a preliminary opening and closing of the auxiliary doors.

16. In an airship of the class described, the combination of a body having an opening extending upwardly through the body, a propeller operating within the opening, slidable main doors arranged to cover and uncover the said opening and provided with apertures, auxiliary doors slidably mounted on the main doors to cover and uncover the said apertures, springs for urging the auxiliary doors to their closed position, superior springs for actuating the main doors to move the same to their closed position, and operating mechanism connected with the auxiliary doors and adapted to effect a preliminary opening and closing of the same through the successive action of the said springs.

17. In an airship of the class described, the combination of a body having an opening extending upwardly through the body, a propeller operating within the opening, a clutch for throwing the propeller into and out of operation, and means for closing the upper end of the opening and for simultaneously operating the clutch to stop the propeller when the opening is closed.

18. In an airship of the class described, the combination of a body having an opening extending upwardly through the body from the bottom to the top, a propeller operating within the opening, a clutch connected with the propeller for throwing the same into and out of operation, a lever connected with the clutch, and means for covering and uncovering the upper end of the said opening and for simultaneously operating the clutch to start the propeller when the opening is uncovered and to stop the propeller when the opening is covered.

19. In an airship of the class described, the combination of a body having an opening extending upwardly through the body from the bottom to the top, a propeller operating within the opening, a clutch connected with the propeller for throwing the same into and out of operation, a lever connected with the clutch, and a slidable closure for the said opening provided with means for engaging and operating the lever.

20. In an airship of the class described, the combination of a body having an opening extending through it from the top to the bottom, a propeller operating within the opening, a clutch connected with the propeller and having a movable member, a spring for urging the movable member in one direction, a lever connected with the movable member, and a slidable closure for the opening hav-

ing means for engaging the said lever for moving the member against the action of the spring.

21. In an airship of the class described, the combination of a body provided with an opening extending through it from the bottom to the top, a shaft mounted in the opening, a horizontal lifting propeller arranged on the shaft, a clutch connected with the propeller and having a slidable member movable to clutch the propeller to the shaft and unclutch it from the same, a spring for urging the movable member in one direction,

levers connected with the movable member and having arms presenting curved faces, 15 and slidable closures provided with rollers arranged to engage and disengage the curved faces of the levers in the closing and opening movements of the said closures.

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

THOMAS M. FINLEY.

Witnesses:

M. I. LEWIS,
BENNETT S. JONES.