No. 859,765. PATENTED JULY 9, 1907.

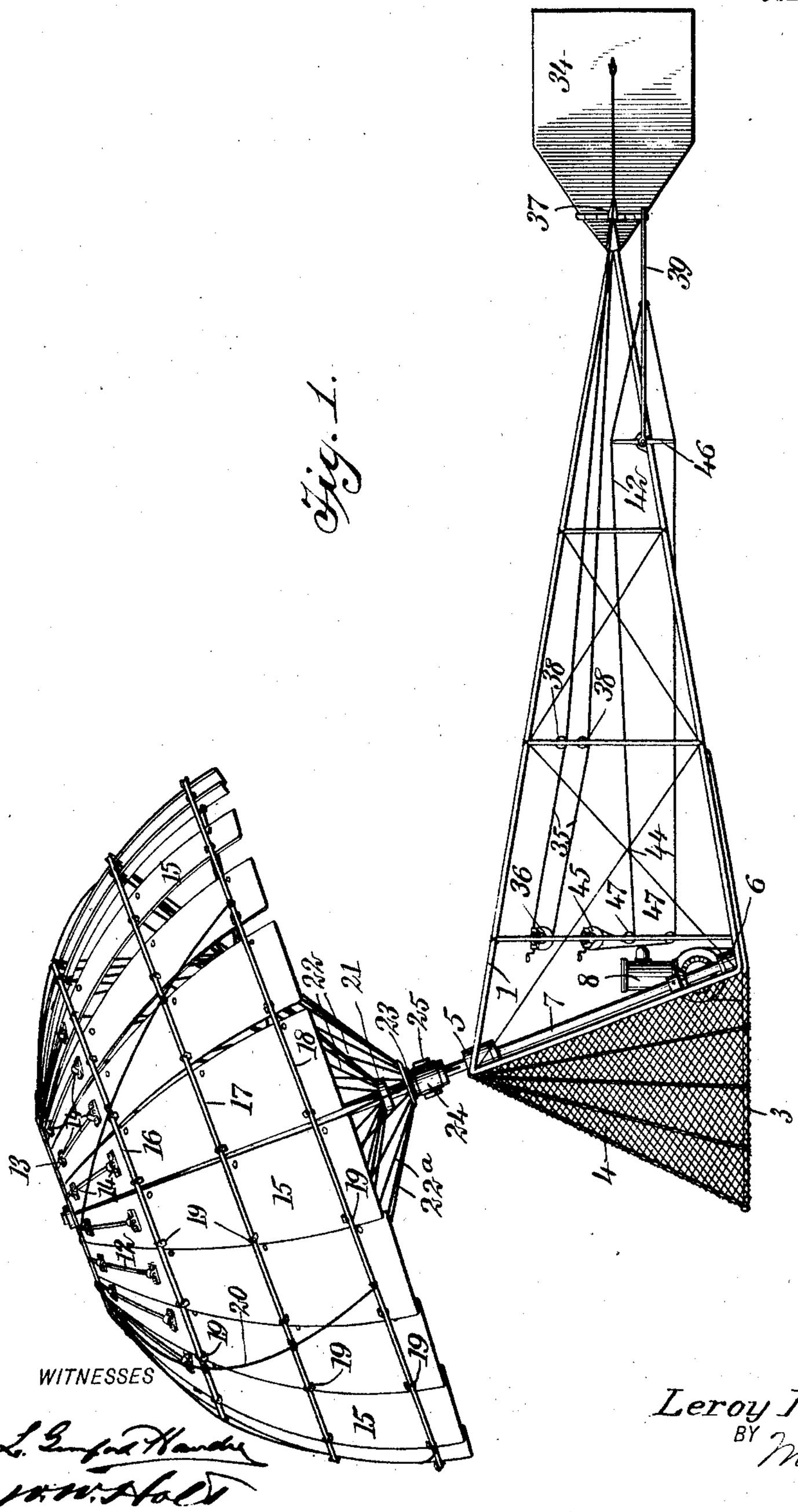
L. HAINES.

AIR SHIP.

APPLICATION FILED SEPT. 19, 1906.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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3 SHEETS—SHEET 2.

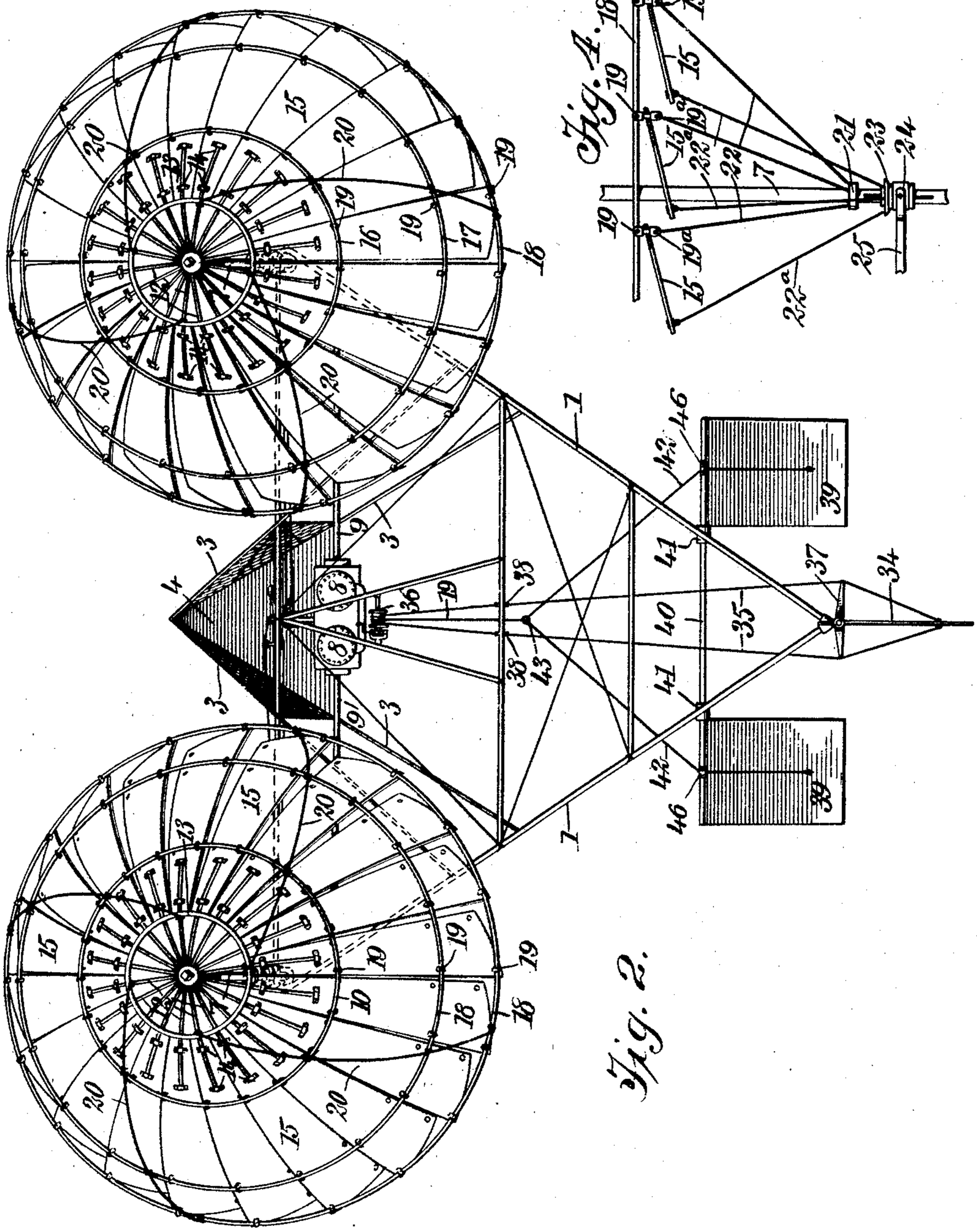

Fig. 2.

Fig. 4.

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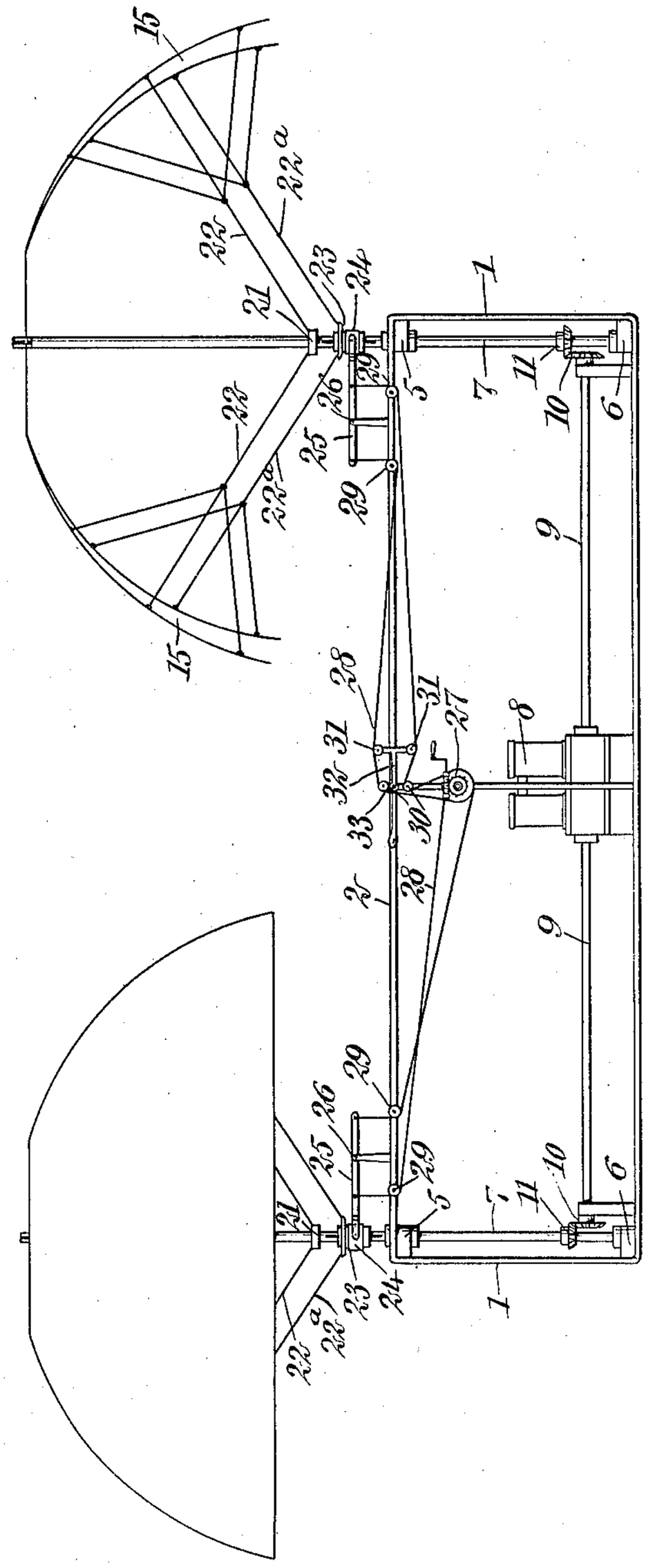
3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

LEROY HAINES, OF COLCHESTER, ILLINOIS.

AIR-SHIP.

No. 859,765. Specification of Letters Patent. Patented July 9, 1907.

Application filed September 19, 1906. Serial No. 335,215.

To all whom it may concern:

Be it known that I, LEROY HAINES, a citizen of the United States, and a resident of Colchester, in the county of McDonough and State of Illinois, have invented a new and Improved Air-Ship, of which the following is a full, clear, and exact description.

This invention is an improved air-ship of strong and light construction embodying a novel form of propelling means which when driven, act to overcome the force of gravity and simultaneously drive the ship forward.

One form of the invention consists of a frame-work tapering to a point at each end and carrying forwardly at each side a parachute-shaped propeller journaled at an inclination and driven from a suitable motor arranged between them. The blades of the propellers are simultaneously movable to vary their inclination, and means are provided to vary the inclination of the blade of one propeller with respect to the other when desired, to cause the ship to be elevated or depressed at one side. The direction of travel of the ship is controlled by a rudder at the extreme rear or stern end, and the relative vertical position of the stern is controlled by rudders arranged at each side thereof, suitable means being provided for readily controlling the position of the rudders at a convenient part of the ship.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the ship as it appears in flight; Fig. 2 is a plan view of the same; Fig. 3 is a rear, end elevation of the ship with the stern end thereof removed and one of the parachute-shaped propellers uncovered at one side to show the construction therein, and Fig. 4 is a fragmentary view illustrating the manner in which the inclination of the blades of the propellers are controlled.

The invention comprises a frame-work principally composed of two triangular frames 1 connected together and diverging from each other at the stern end of the ship, said frames being connected together at their forward ends by a cross-frame 2 and at a point intermediate their length by triangular frames 3, terminating in a point at the forward end of the ship, all of said frames being suitably braced and reinforced by the stanchions, crossbars and diagonal wiring as shown. The forward part of the frame-work at the junction of the frames 3 is covered over with wire netting 4, giving this part of the ship an appearance resembling an engine pilot.

Journaled in bearings 5 and 6 at the junction of the frames 1 and 2, are shafts 7 conforming to the inclined direction of these frames, and are rotatably driven by a motor 8 stationed on the frame-work between them, said motor being provided with a long, transverse, driving shaft 9 having a beveled gear 10 at each end meshing with a similar gear 11 fixed to the shafts 7. Each of the shafts 7 carry at their upper ends a parachute-shaped propeller of the following construction: At the extremity of a shaft 7 extend a series of radiating spokes 12, which are connected to and pass beyond a small hoop 13, the projecting ends of said spokes being journaled in keepers 14 fixed to a series of sector-shaped blades 15. The blades 15 droop about the shaft 7 as a center and are each further supported by hoops 16, 17 and 18, successively increasing in diameter, extending ears 19 arranged at one edge of the blades and pivotally connected to the hoops, being provided for this purpose. The hoops are connected together by any desired number of equally-spaced and non-radial extending wires 20 arranged at such an angle that the strain due to the revolving of the propellers will be in the direction of their length.

The ears 19 are each connected to a similar set of ears 19^a by an intermediate stem which passes through the blades 15, as shown best in Fig. 4. These ears 19^a are connected to a stationary collar 21 on the shaft 7 by stationary ribs 22, said ribs being provided with three branches as illustrated in Fig. 3, each branch leading to an ear 19^a extending inwardly from each hoop.

Just below the collar 21 is slidably mounted on the shaft 7 a splined sleeve 23 which carries a series of ribs 22^a corresponding to the ribs 22 but pivotally connected to the opposite or free edges of the blades 15. These ribs like the ribs 22, are formed with diverging branches at a point intermediate their length, each branch being pivotally connected to a blade directly under a hoop. A collar 24 is journaled on the sleeve 23 and has pivotally connected thereto a forked lever 25, the latter being also pivoted to a lug on the frame at 26.

Journaled on the frame 2 directly over the motor 8 is a drum 27 operable by the worm-wheel, worm and crank shown, and having wound thereabout two lines 28, the ends of each line passing about rollers 29 journaled near the ends of frame 2 and are connected to the levers 25 at the opposite sides of their pivots 26, one of said lines, however, before passing to the rollers 29, passes over rollers 30 journaled on the frame directly above the drum 27, and also over rollers 31 journaled at the ends of a T-shaped lever 32, pivoted at 33 between the rollers 30. As shown, one of the lines 28 is crossed so that on revolving the drum 27, the sleeves 23 are reciprocated in the same direction through the intermediate mechanism, operating to simultaneously change the inclination of the blades of the propellers at the same angle. It is apparent that on turning the lever 32, one member of the line 28 with which it engages, is shortened, whereas the other is lengthened, operating to change the inclination of the propeller blades at this side of the ship to a greater or less angle than those at the

opposite sides. This is of importance for the reason that should the ship fail to maintain a horizontal position sidewise, the inclination of the blades of the propellers may be varied with respect to each other to increase the pull on the propeller at the lowest side of the ship.

For guiding the ship, a vertical rudder 34 is pivotally connected at the extreme stern end, and is operated by a line 35 connected to each side thereof and wound about a drum 36 journaled in bearings carried by the frame-work near the motor 8. The members of the line 35, as shown in Fig. 2, pass over the ends of a cross-bar 37 projecting at each side from the pivotal connection of the rudder, and thereafter pass over rollers 38 journaled to the frame-work near the drum 36. The drum 36 is operable by the worm-wheel, worm and crank illustrated, or other convenient mechanism whereby the rudder may be readily shifted from side to side.

For controlling the relative elevation of the stern of the ship there is provided at each side thereof a horizontal rudder 39 connected to a transverse shaft 40 said shaft being journaled in bearings 41 supported by the frames 1. These rudders are simultaneously operable to change their inclination, by means of lines 42 connected to each side of each of them, the upper and lower members of said lines being joined together at 43 to the ends of a common line 44 wound about a drum 45, the lines 42 passing over the extremities of cross-bars 46 extending perpendicular to and at each side of the shaft 40, and the members of the line 44 passing over rollers 47 journaled to the frame in vertical alinement near the drum 45. This drum 45 is of the same construction and operable by like mechanism as the drum 36.

It is obvious from this construction that on revolving the drum 45, the rudders 39 are caused to swing upward or downward, according to the direction of the rotation, thereby acting to respectively depress or elevate the stern end of the ship as the propellers drive it in its flight.

The precise embodiment of the invention is not material provided the essential characteristics are employed as pointed out in the annexed claims.

Having thus described my invention I claim as new and desire to secure by Letters Patent:

1. In an air-ship, a parachute-shaped propeller having movable blades drooping about a common center, and means for varying the inclination of said blades.

2. In an air-ship, a parachute-shaped propeller journaled at an inclination to the frame of the ship and having movable blades drooping about a common center, and means for varying the inclination of said blades.

3. In an air-ship, a frame-work, parachute-shaped propellers journaled in bearings carried by the frame-work, said propellers having movable blades drooping about a common center, and means operable to simultaneously vary the inclination of said blades.

4. In an air-ship, a frame-work, a parachute-shaped propeller journaled at an inclination thereon, comprising a series of pivotally mounted blades drooping about a common center, and means operable to vary the inclination of said blades.

5. In an air-ship, a frame-work, a parachute-shaped propeller journaled at an inclination thereon, comprising a series of pivotally mounted blades drooping about a common center, reciprocating means for varying the inclination of said blades, and means operable to reciprocate said means.

6. In an air-ship, a frame-work, a propeller journaled at an inclination at each side of the frame-work, each propeller comprising a series of pivotally mounted blades, reciprocating means for varying the inclination of the blades of each propeller, and means operable to simultaneously reciprocate said means.

7. In an air-ship, a frame-work, a shaft journaled at an inclination at each side of the frame-work, a propeller carried by each shaft comprising a series of pivotally mounted blades, a sleeve slidably mounted on each shaft carrying means connecting the blades of their respective propellers, and means operable to simultaneously reciprocate said sleeves whereby the inclination of the blades of the propellers are varied.

8. In an air-ship, a frame-work, a shaft journaled at an inclination thereon, a propeller carried by the shaft comprising a series of hoops successively increasing in diameter, a series of sector-shaped blades, each blade being pivoted at one edge to the hoops, ribs fixed to the shaft and to the pivoted edges of the blades, and a sleeve slidable on the shaft carrying ribs pivoted to the opposite edges of the blades, whereby as said sleeve is reciprocated the inclination of the blades is varied as described.

9. In an air-ship, a frame-work, a shaft journaled at an inclination thereon, a parachute-shaped propeller carried at the upper end of the shaft comprising a series of hoops successively increasing in diameter, a series of sector-shaped blades pivoted at one edge to the hoops, radial spokes connecting the upper hoop with the extremity of the shaft and projecting therebeyond and journaled to the blades, a series of ribs fixed to the shaft and to the blades at their pivotal edges, a splined sleeve slidable on the shaft carrying a series of ribs pivoted to the opposite edge of the blades, and means for reciprocating said sleeve whereby the inclination of said blades is varied.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEROY HAINES.

Witnesses:
CALVIN CANOTE,
GEO. P. HOTTEN.