

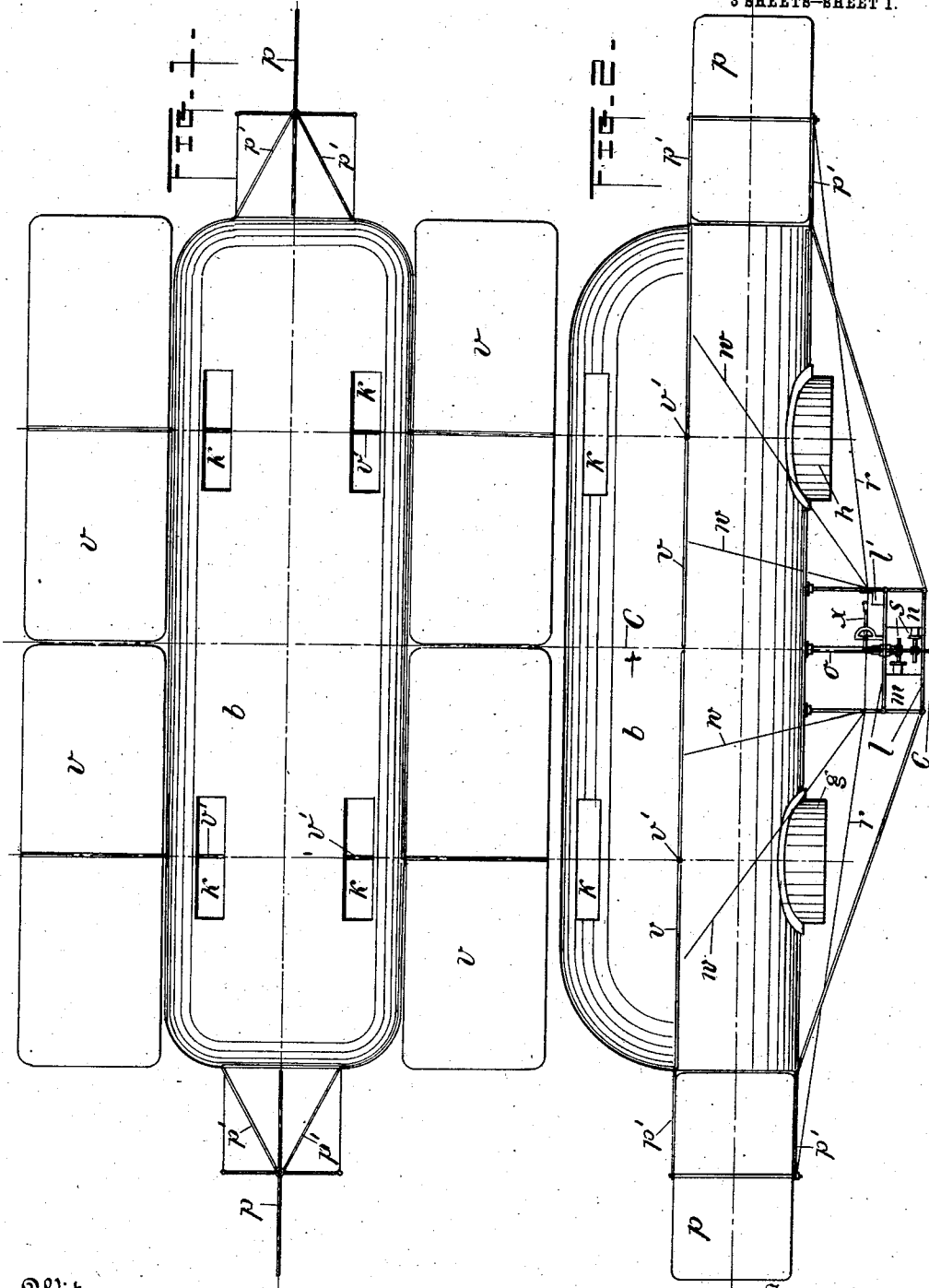
L. C. BADEAU.
AIRSHIP.

APPLICATION FILED JAN. 28, 1908. RENEWED APR. 19, 1911.

1,010,718.

Patented Dec. 5, 1911.

3 SHEETS—SHEET 1.



Witnesses:
Mary Thomas Badeau
Emily Antoinette Davis

Inventor:
Louis Constant Badeau
By Attorney: Alfred P. Egan

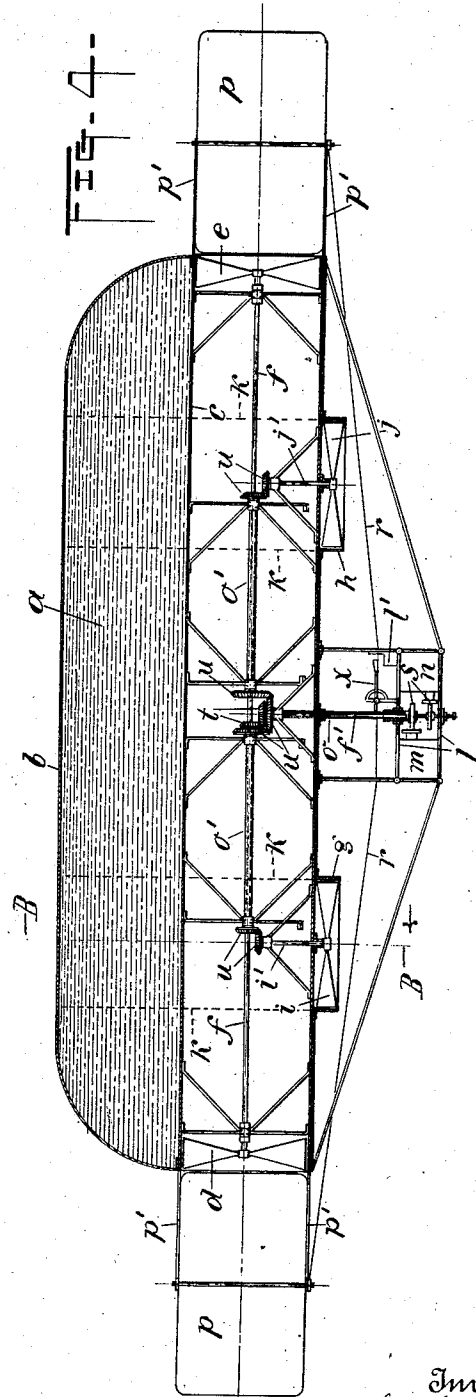
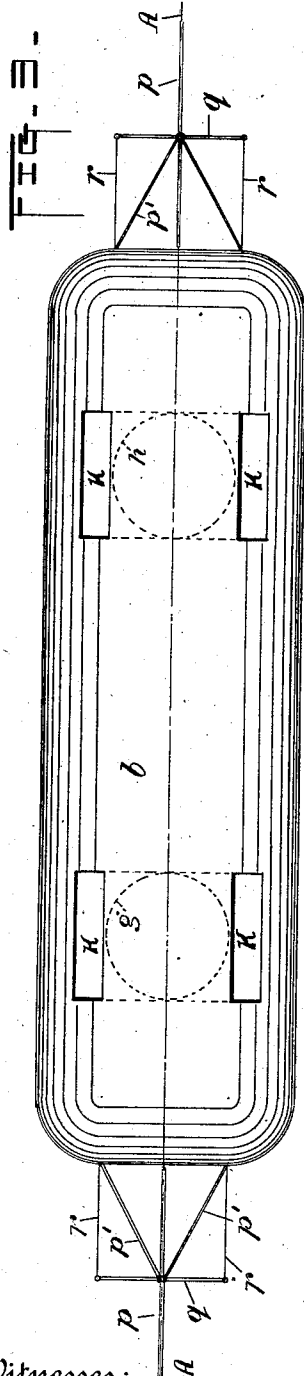
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3 SHEETS—SHEET 2.



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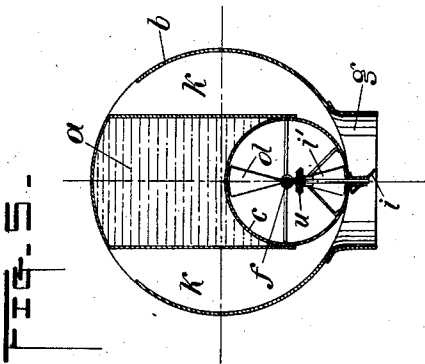
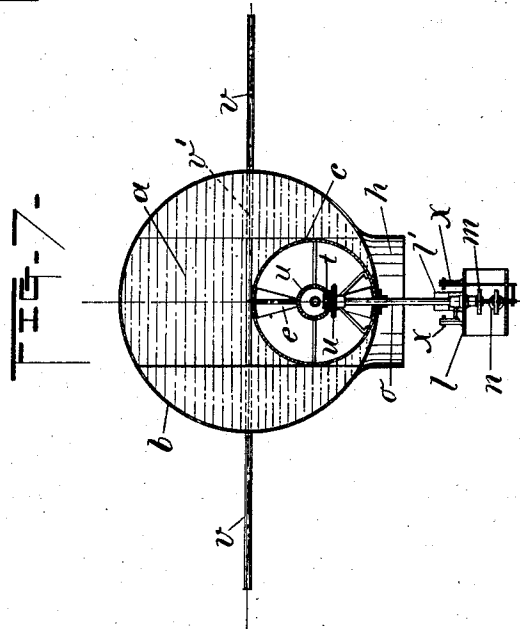
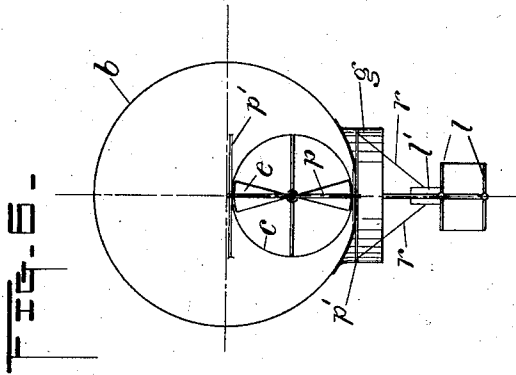
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3 SHEETS—SHEET 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

LOUIS C. BADEAU, OF NEW YORK, N. Y.

AIRSHIP.

1,010,718.

Specification of Letters Patent.

Patented Dec. 5, 1911.

Application filed January 28, 1908, Serial No. 413,103. Renewed April 19, 1911. Serial No. 622,136.

To all whom it may concern:

Be it known that I, LOUIS C. BADEAU, a citizen of the United States, and resident of Greater New York, State of New York, have invented certain new and useful Improvements in Airships, of which the following is a full, clear, and exact description, such as will enable those skilled in the art to which it appertains to make and use the same.

My invention has two main phases. On the one hand it relates to an improved construction of lighter-than-air vessel including an elongated gas-container, whereby enhanced stability is secured; and on the other hand it relates to improved steering means whereby is attained complete control of the movements of the airship parallel to the surface of the earth. While this improved steering means is particularly adapted to navigable lighter-than-air vessels constructed for superior stability according to the other phase of the invention, it is by no means limited in its applicability to such air-ships, but may be embodied in any type of vessel or machine designed for navigation of the earth's atmosphere.

In the accompanying drawings the improvements constituting the invention are shown as embodied in an illustrative form of lighter-than-air vessel, but it must be understood that these views are primarily illustrative, and not limiting.

In the said drawings, Figure 1 is a top view of the air-ship; Fig. 2 is a side view of the same; Fig. 3 is a top view of the air-ship without side rudders; Fig. 4 is a vertical longitudinal central sectional view on line A A of Fig. 3; Fig. 5 is a vertical cross-sectional view on line B B of Fig. 4; Fig. 6 is an end view; and Fig. 7 is a vertical cross-sectional view on line C C of Fig. 2.

Referring now to these drawings, *a* is the inclosed space to be filled with a suitable gas of less specific gravity than air. This gas space is formed by an elongated tube, as *b*, and a smaller tube of substantially the same length, as *c*, placed eccentrically within the larger tube, the ends of which latter are drawn over and onto the ends of the smaller tube and connected thereto to form a gas-tight joint. The smaller tube is preferably thus fastened to the larger tube with the lowest points of their walls in close proximity, and with their center lines in parallelism, for the purpose of giving rigidity

to and lowering the center of gravity of the balloon, thus counteracting in great degree any tendency toward rolling or rocking in a transverse sense.

The inflatable body or balloon may be constructed of textile fabric, like silk or canvas, or any other suitable material, and may be properly braced and reinforced to withstand external as well as internal pressure.

Tube *c* is open at both ends and forms an airshaft or tunnel, in which one or more vertical propellers *d*, *e* may be mounted for moving the air-ship forward or backward. In addition, if desired, there may be provided horizontal propellers *i* and *j*, mounted, respectively, on short vertical shafts *i'* and *j'* in short vertical tubes *g* and *h*, which are open at their lower ends below the balloon body and communicate with flues, as *k*, leading to and through the top of the tube *b*, without in any way interfering with the propeller tunnel or tube *c*; see Figs. 4 and 5.

Naturally, any suitable motive power and transmission may be employed. According to the illustrative arrangements shown in the drawings, two engines or motors, as *m* and *n*, are mounted on a platform, as *l*, which is suspended below tube *b*; these engines turning and operating vertical shaft *f'* and tubular vertical shaft *o*, by means of suitable reversible friction drive gears, as *s*. Bevel gears, as *t* *t*, transmit power from shaft *f'* to horizontal shaft *f*, thus driving propellers *d* and *e*, while bevel gears, as *u*, transmit power from tubular shaft *o* and through horizontal tubular shafts *o'* *o'* to vertical shafts *i'* and *j'*, thereby driving propellers *i* and *j*.

Operating levers, as *x*, suitably mounted on platform *l* and connected to motors *m* and *n* and their driving gear, serve to facilitate the proper manipulation of the propelling means. No details of the motors *m* and *n*, their connection with the propellers on the one hand, and with the operating lever on the other, have been shown, as these details are merely matters of mechanical choice and are not relevant to the invention.

If desired, a number of horizontal rudders, as *v*, may be arranged at the sides of the balloon, all preferably in the same plane and mounted on horizontal spindles, as *v'*, in such manner that these rudders may be placed at any angle to the axis of the balloon, from a horizontal to a vertical posi-

tion, as by means of cords or ropes *w*, secured to these rudders or planes in suitable places and conducted to the pilot-seat *U*. As will be well understood, such planes or
 5 rudders may be operated to deflect the course of the air-ship upward or downward.

We come now to a consideration of the second phase of the invention, namely, the improved steering means for controlling the
 10 horizontal movements of the air-ship. Such means comprises vertical rudders, as *p*, in front of each of the two open ends of tube *c*, that is to say, the propeller-tube, the said rudders being pivoted on central vertical
 15 axes. Preferably, each rudder *p* is supported and pivoted between upper and lower triangular brackets *p'*. Cross-bars, as *q*, may be secured to the lower parts of the rudders, at right angles, at or near the pivots, and
 20 cords or wires *r* may lead from these cross-bars to the pilot-seat *U*; but, obviously, any other devices for controlling these rudders may be employed.

By means of the two vertical, centrally
 25 pivoted rudders, one at each end of the propeller tube, absolute control of the movements of the air-ship parallel to the earth's surface is secured. The vessel may be caused to travel horizontally in a straight line parallel to its own axis and the direction of the
 30 wind, in a straight line parallel to its own axis and at an angle to the direction of the wind, or in a straight line at an angle to its axis and at an angle to the direction of the
 35 wind, its axis being parallel to the direction of the wind. In the first instance, the air-ship is brought head or end on to the wind, by suitable manipulation of one or both of the rudders, and kept there with the rudders
 40 in alinement, one or other of the rudders being slightly turned, from time to time, to counteract any tendency to turn. In the second instance, the vessel is brought into the desired course, and held there by turning
 45 both rudders substantially parallel to each other and at such angle to the axis of the vessel, that the drift due to the wind is exactly neutralized by the counter-drift due to the position of the two rudders. In the
 50 third instance, the vessel is brought head or end on to the wind, and both rudders are then turned substantially parallel to each other and at such angle to the axis of the vessel, that a drift is created. To accomplish
 55 all these results it is necessary that there be two rudders, to control both extremities of

the air-ship. It is also essential that the rudders be pivoted centrally, since otherwise they would not act upon the entire column of air entering and leaving the propeller
 60 tube.

I wish to call attention to the fact that the propellers, for the best results, should be disposed one at each end of the tube and adjacent the inner ends of the rudders, as
 65 clearly shown in Fig. 4. In this way, the rudders and propellers coöperate directly in their action on the column of air, and a hole or rent in the tube will not affect the result to any great extent, as might be the case if
 70 the propellers were otherwise disposed.

What I claim as new is:

1. In a vessel for aerial navigation, a longitudinal propeller-tube or air-tunnel, open at its ends, propellers therein for driving the
 75 vessel forward or backward, and two vertical rudders located, respectively, at the two open ends of said tube or tunnel, said rudders both being supported on central vertical axes, said axes being located in ad-
 80 vance of the ends of the tube.

2. In a vessel for aerial navigation, a straight longitudinal propeller-tube or air-tunnel, open at its ends, two vertical rudders located, respectively, at the two open ends
 85 of said tube or tunnel, said rudders both being supported on central vertical axes, said axes being located in advance of the ends of the tube and the inner ends of said rudders being immediately adjacent the ends of said
 90 tube, and two propellers located, respectively, within the two open ends of said tube or channel and adjacent the inner ends of said rudders.

3. An air-ship comprising outer and inner
 95 elongated tubes secured together at their ends, said tubes being eccentric, with the inner tube at the bottom of the outer, a gas container being afforded between said tubes, and the inner tube constituting an air tun-
 100 nel open at its ends, propellers in said air tunnel and means for driving the same, and two vertically-disposed rudders pivoted centrally on a vertical axis at the two open ends of said air tunnel, and means for controlling
 105 said rudders.

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

LOUIS C. BADEAU.

Witnesses:

EMILY A. DAVIS,
 MARY F. BADEAU.