April 6, 1926. 1,580,004

A. BRADFORD

AIRSHIP

Filed May 29, 1925 2 Sheets-Sheet 1

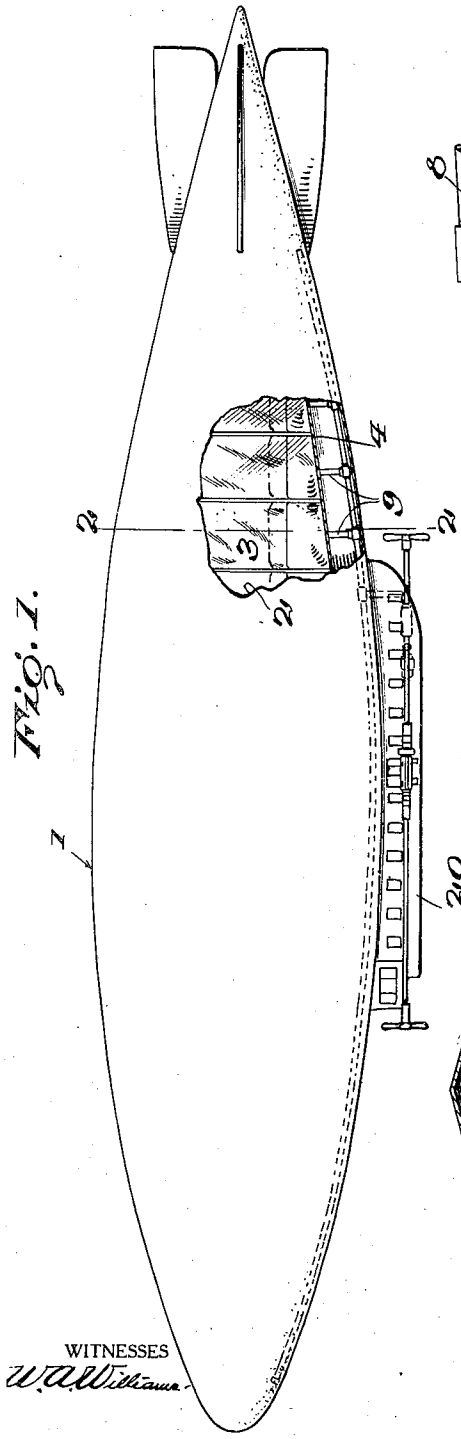


Fig. 1.

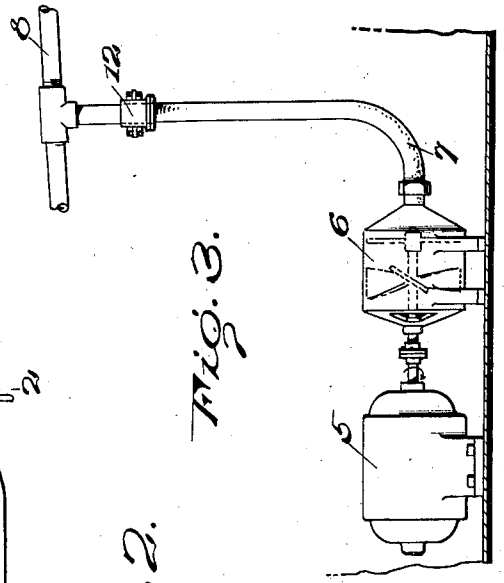


Fig. 3.

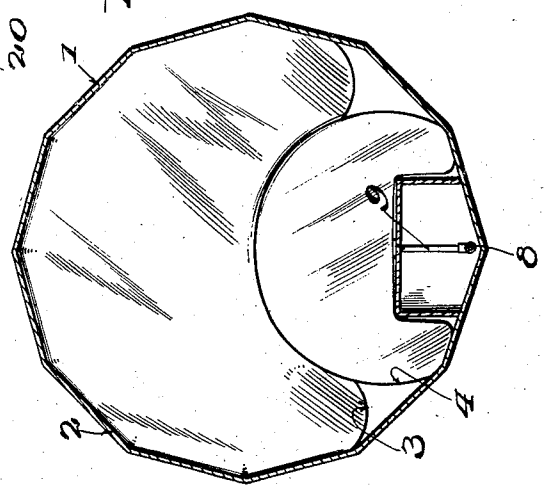


Fig. 2.

WITNESSES

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Fig. 4.

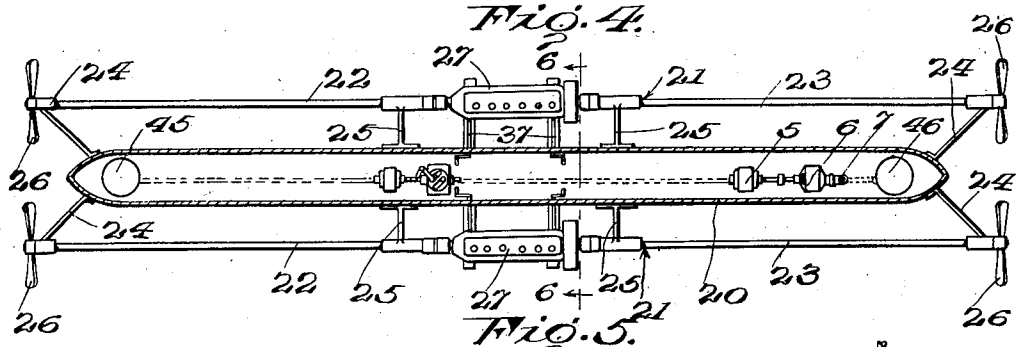


Fig. 5.

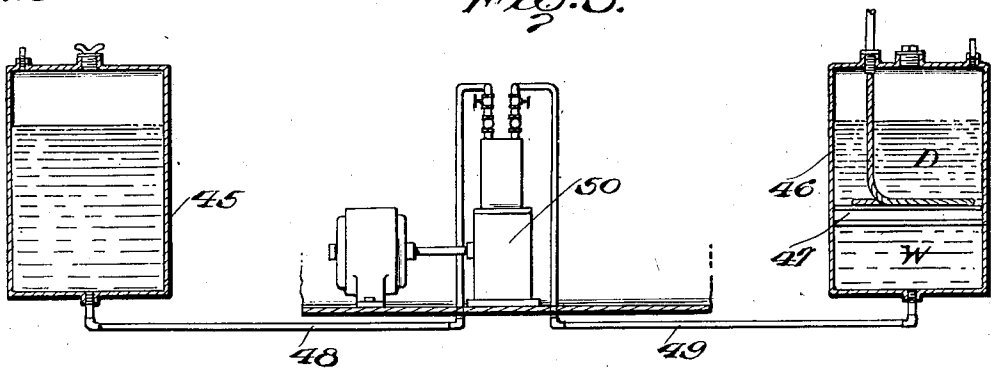


Fig. 6.

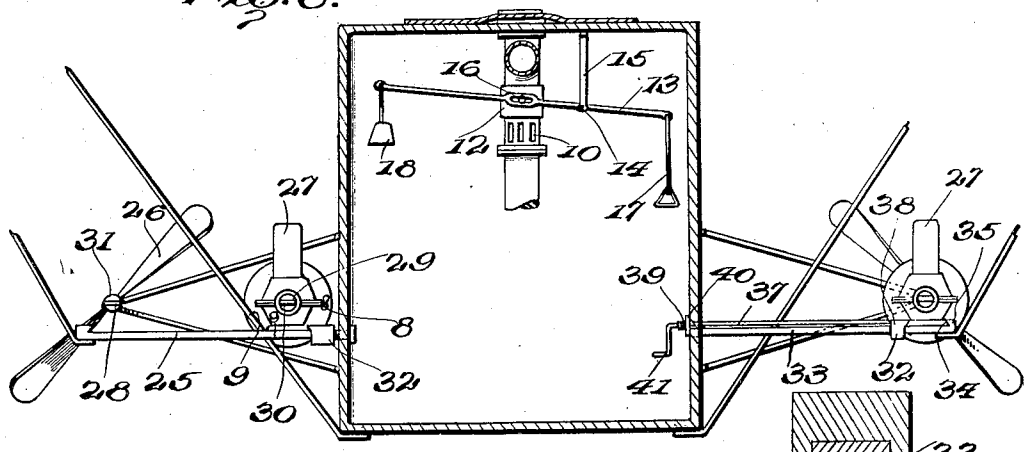


Fig. 7.

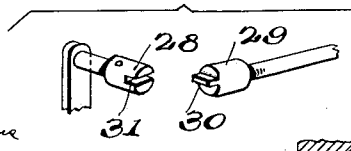


Fig. 8.

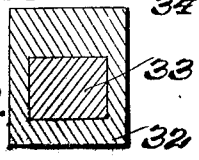


Fig. 9.



WITNESSES

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UNITED STATES PATENT OFFICE.

ALLEN BRADFORD, OF PORTLAND, OREGON.

AIRSHIP.

Application filed May 29, 1925. Serial No. 33,751.

To all whom it may concern:

Be it known that I, ALLEN BRADFORD, a citizen of the United States, residing at Portland, in the county of Multnomah, State of Oregon, have invented certain new and useful Improvements in Airships, of which the following is a specification.

This invention relates to an airship of the lighter than air type and aims to provide an airship of this character which may be ballasted by means of air pumped into air containers organized with the structure of the airship.

A further object resides in the provision of an airship having these advantages and capacities wherein the motors for driving the propellers are located in the propeller lines and yet are so mounted and controllable as to be adapted to be drawn into or drawn adjacent to the cabin of the airship for purposes of repair or for other purposes.

Another object resides in the provision of an airship having these advantages and wherein means is provided for regulating the fore and aft trim or balance of the airship.

A still further object resides in the provision of a device of this character which is of simple and durable construction, reliable and effective in operation and easy and comparatively inexpensive to manufacture.

Other objects and advantages reside in certain novel features of the construction, arrangement and combination of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming a part of this specification, and in which:—

Figure 1 is a view in side elevation showing an airship constructed in accordance with the present invention, parts being broken away for the sake of illustration,

Figure 2 is a view in transverse section on the line 2—2 of Figure 1,

Figure 3 is a detail view of the means employed for pumping air into the air containers,

Figure 4 is a view in horizontal section showing how the motors and propeller shafts are associated with the cabin,

Figure 5 is a view partly in section and partly in elevation illustrating the balancing means employed for regulating fore and aft trim,

Figure 6 is a view in transverse vertical section on the line 6—6 of Figure 4,

Figure 7 is a fragmentary group view in perspective showing the coupling employed between the engine shaft and the sections of the propeller shaft,

Figures 8 and 9 are detail sectional views on the line 8—8 and 9—9 of Fig. 6.

Referring to the drawings, the numeral 1 designates generally the buoyant body of the airship. This buoyant body may be of the form shown in the drawings or any suitable form and includes an outer casing 2 and inner containers or bags 3 and 4, the containers or bags 3 and 4 being adapted to hold gas lighter than air and air, respectively. The buoyancy of the airship is derived from the gas lighter than air contained in the containers 3 and the air which is supplied to the containers 4 serves as ballast. The containers 3 and 4 are made of gas tight fabric which is, however, flexible so as to be collapsible and expansible.

Means is provided for controlling the supply and exhaust of air from the air bags or containers 4 and this means may comprise any suitable type of motor 5 coupled with and driving an air blower and pump 6, the discharge port of which is connected to the main air supply line 7. The supply line 7 is connected to an air manifold 8 having branches 9 connected to each one of the air bags or containers 4. In the air supply pipe 7 a plurality of air ports 10 are provided, the ports 10 taking the form of slots. A sleeve valve 12 is slidably fitted on the air supply pipe 7 and may be adjusted to leave the ports 10 open, to cover and close the ports entirely, or to cover and close these ports partially. For the sake of facilitating this adjustment of the sleeve valve 12 a rockable control bar 13 is provided and is fulcrumed, as at 14, on hanger bracket 15. The control bar 13 has a pin and slot connection 16 with the sleeve valve 12. One end of the control bar has connected thereto a handle member 17 and the other end of the control bar is counterweighted, as at 18.

When the sleeve valve 12 covers the ports 10 the air forced through the pipe 7 by the blower 6 is forced into the air bags 4. The amount of air forced into these bags may be varied by partially opening the ports 10 to any desirable extent. When the ports 10 are fully opened and the blower 6 is running,

the air bags 4 are inflated to a minimum extent. When it is desirable to cause the airship balloon to descend to the ground, the valve 12 is adjusted to close the ports and the air bags 4 are inflated to the maximum extent. Inflation of the air bags causes them to expand and to compress the bags 3 and the gas therein, whereby to increase the weight of the airship and cause it to slowly descend.

A cabin 20 is suspended below the buoyant body 1 and the propelling means for the airship is mounted on this cabin. This propelling means includes parallel propeller shafts, designated generally at 21. Each propeller shaft 21 includes a pair of sections 22 and 23 rotatably mounted in bearing brackets 24 and 25 carried on the cabin 20. At their ends the sections 22 and 23 have fixed thereto propellers 26. Motors, such as internal combustion engines 27, are interposed between the sections 22 and 23 of the propeller shafts and these sections are coupled to the engine shaft by means of interfitting coupling members 28 and 29 illustrated in Fig. 7, the coupling members having interfitting tongues and grooves, designated at 30 and 31, respectively. The engines 27 have bearing portions 32 secured thereto and slidably fitted on engine bracket arms 33, the bracket arms 33 being carried by the cabin and the buoyant body. As shown in Figs. 8 and 9 a portion of the bearing 32 completely surrounds the bracket arm 33 and a portion partially surrounds the same. The base of each engine also has an inclined edge 34 which is engageable with undercut lugs 35 provided at the outer ends of the engine supporting brackets. When the inclined edges 34 of the engine bases are forced against the undercut edges of the lugs 35 of the engine bracket arms, the engines are firmly and securely held in position and at such time the coupling members 28 and 29 are interfitted so that the sections of the propeller shaft are driven from the engines. For the purpose of facilitating movement of the engines and for holding them in position, rotatable engine control rods 37 are provided for each engine, each control rod having its outer end swiveled, as at 38, to a bearing block 32 of its engine and having an enlarged and threaded portion 39 adjacent its inner end engageable with a threaded bearing 40 provided in the wall of the cabin. A hand crank 41 is integrally formed with the inner end of each engine control rod 37. A suitable opening may be provided in the cabin opposite each engine. By turning the hand cranks 41 in the proper direction, the engines 27 may be drawn inwardly by the action of the engaged threaded parts 39 and 40, until these parts are disengaged. Then the rods 37 are pulled inwardly to slide the engines 27 over toward the cabin whereby they are positioned for more convenient adjustment and repair. Prior to pulling an engine from the sections of its propeller shaft the ribs and grooves 30 and 31 are horizontally disposed so that the ribs may slide out of the grooves.

Balancing means is provided for regulating the fore and aft trim or balance of the airship and this means consists of a water tank 45 arranged in the bow of the airship and a combined gasolene and water tank 46 arranged in the stern of the airship. A slidable piston 47 is fitted for vertical sliding movement in the tank 46 and serves to separate the gasolene G from the water W. Valved pipe lines 38 and 49 and a motor driven pump 50 complete the balancing means. The balancing means operates by drawing water from the tank 45 and pumping it into the tank 46 below the piston 47, thereby displacing the piston 47 and the gasolene upward or by pumping the water from the tank 46 and discharging it into the tank 45, thereby lowering the piston 47 and the gasolene port G. In other words, after the bow sinks water is drawn from the water tank 45 and pumped into the tank 46, thereby lightening the bag and increasing the weight of the stern and vice versa when the stern sinks water is drawn from the tank 46 and pumped into the tank 45 to lighten the stern and weight the bow.

I claim:

1. In an airship, a buoyant body including an outer casing, a container for gas lighter than air arranged within said casing, a container for air also arranged in the casing and engageable with the container for the gas lighter than air, means for supplying and exhausting air to and from said air container and comprising a motor driven blower, a pipe leading from the blower and communicating with the air container, said pipe having a port therein, and a controllable valve for regulating the exhaust of air from said port.

2. In an airship, a buoyant body, a cabin suspended from the body, propeller shafts mounted on the cabin, engines releasably coupled to the propeller shaft, and means for mounting the engines for movement to and from the cabin.

3. In an airship, a buoyant body, a cabin suspended from the body, propeller shafts mounted on the cabin, engines releasably coupled to the propeller shaft, means for mounting the engines for movement to and from the cabin and consisting of bracket arms having lugs at their outer ends provided with undercut faces, engines having bases slidable on said arms and formed with inclined faces engageable with the undercut faces of the lugs, said engine bases also having bearings slidably embracing the bracket arms, and means for holding the engines in

position and for moving the same when desired.

4. In an airship, a buoyant body, a cabin suspended from the body, propeller shafts mounted on the cabin, engines releasably coupled to the propeller shaft, means for mounting the engines for movement to and from the cabin and consisting of bracket arms having lugs at their outer ends provided with undercut faces, engines having bases slidable on said arms and formed with inclined faces engageable with the undercut faces of the lugs, said engine bases also having bearings slidably embracing the bracket arms. and means for holding the engines in position and for moving the same when desired and comprising rotatable control rods having a swivel connection with the engine and a short threaded connection and the cabins.

5. In an airship, a buoyant body, a cabin suspended therefrom, and means for regulating the fore and aft trim of the airship and including a water tank at the bow, a tank at the stern having a piston therein adapted to separate gasolene in the tank from water therein, and means for pumping water from one tank to the other.

ALLEN BRADFORD.