June 11, 1935. H. F. KRUG 2,004,411

AIRCRAFT

Filed March 31, 1934

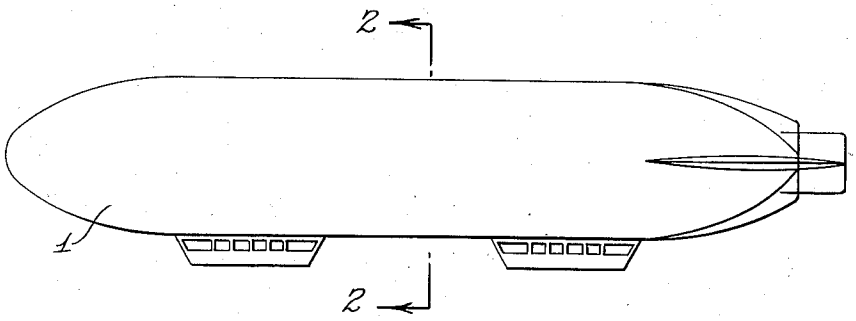


Fig. 1.

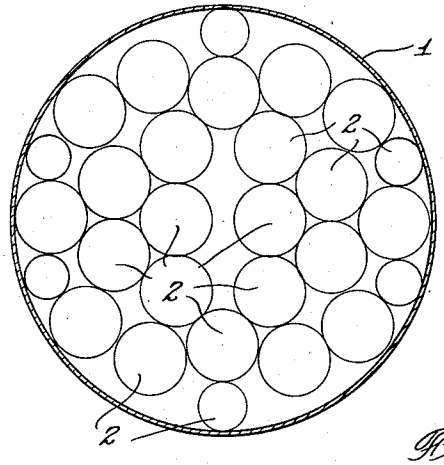


Fig. 2.

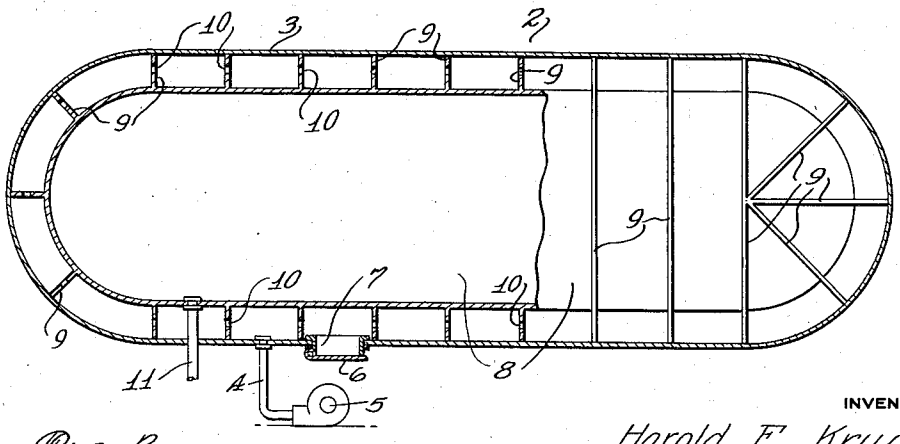


Fig. 3.

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AIRCRAFT

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2 Claims. (Cl. 244—3)

The present invention pertains to buoyant airships and is applicable to both the passive or motorless type of aircraft and the power craft wherein propelling means is provided for setting the craft in motion.

The primary object of the present invention is to provide means for controlling the buoyancy of a lighter than air craft or a balloon so that the same may be caused to ascend or descend as desired. The means includes a flexible bag for containing a quantity of a gas which is lighter than air, such as helium or hydrogen. The bag is assembled within a non-flexible casing which has a valve for opening the interior of the same to the atmosphere, which valve may be closed so that air may be pumped into the casing to compress the bag and the gas therein to so reduce the volume of the gas that it becomes less buoyant relative to the surrounding air. In this manner the buoyancy of the gas in the bag may be regulated so that it may cause the receptacle to ascend or descend by opening the receptacle to the atmosphere or by closing it off from the receptacle and pumping air into the same.

In the case of a balloon a single bag and enclosing casing may be used, but in the case of a large airship it is contemplated that a plurality of units will be provided within the hull of the ship. The advantage of duplication of the units is twofold inasmuch as it provides for safety by placing the buoyant gas in a plurality of compartments and it also facilitates regulation of ballast because the several units may be independently regulated.

With the above and other ends in view the invention consists in matters hereinafter set forth and more particularly pointed out in the appended claims, reference being had to the accompanying drawing, in which

Figure 1 is a side elevation of a dirigible;

Fig. 2 is a cross section taken on the line 2—2 of Fig. 1, and

Fig. 3 is a longitudinal cross section of one of the units.

Like characters of reference are employed throughout to designate corresponding parts.

The numeral 1 indicates the hull of an airship having mounted therein in symmetrical arrangement a plurality of units 2. Each of the units 2 is composed of a rigid or semi-rigid casing 3 having a pipe line 4 entering the same and connected to an air compressor 5. A valve 6 is mounted to cover a relatively large outlet port 7, the valve being of any suitable structure available on the market. Inasmuch as such valves are well known in the art the same has not been shown in detail.

Received in the casing 3 is a flexible bag 8 having a series of ribs 9 formed integral therewith. The bag and ribs are formed integral of rubber or like stretchable and flexible material and the ribs serve to position the bag 8 relative to the casing 3 in a non-positive fashion. Each rib 9 has a plurality of apertures 10 extending through the same so as to permit circulation of air around the bag 8.

In operation helium gas or hydrogen, or any other gas which is lighter than air is pumped into the bag 8 through a suitable supply pipe 11. When the bag is inflated to such an extent that the weight of the volume of air displaced by the gas is greater than the weight of the gas plus the weight of the structural elements the unit will be buoyant and will ascend through air. At this time the valve 7 will be open so that air at atmospheric pressure may enter the casing 3.

During ascension the gas in the bag 8 will expand and such expansion is permitted by the flexible nature of the bag 8 and ribs 9. When the bag 8 expands as a result of ascension to higher altitudes air will be forced from the casing 3 and when the desired altitude has been reached the valve 6 is closed so that further escape of air from the casing 3 is prevented. By pumping air from the compressor 5 into the casing 3 the bag 8 may be compressed and the volume of the gas may be so reduced that the device may be caused to remain at a given altitude because of a balanced condition between the gas and the surrounding air, or it may be caused to descend by compressing the gas to such an extent that its displacement is not sufficient to render the device buoyant.

A single unit, as above described, may be used in the nature of a balloon, or a series of units may be used within the hull of a large airship. In the latter case the buoyancy of the airship is controlled by individually controlling the buoyancy of the units. However, in the case of a plurality of units it is obvious that the same may be controlled in groups by connecting all the units of a group to a single compressor 5.

Although a specific embodiment of the present invention has been illustrated and described it is to be understood that various changes may be made within the scope of the appended claims without departing from the spirit of the invention.

What I claim is:—

1. In a device of the character described, a non-expansible casing, an elastic bag within said cas-

ing, integral circumferentially extending ribs on said bag and engaging said casing to maintain the wall of the bag in spaced relation thereto, said ribs being adapted to maintain said bag in a distended position in the absence of abnormal fluid pressure in said bag, and said ribs being collapsible whereby to permit the wall of said bag to be moved nearer to said casing by abnormal fluid pressure in said bag.

2. In a device of the character described, a non-expansible casing, an elastic bag within said casing, integral circumferentially extending ribs on said bag and engaging said casing to maintain the wall of the bag in spaced relation thereto, said ribs being adapted to maintain said bag in a distended position in the absence of abnormal fluid pressure in said bag, said ribs being collapsible whereby to permit the wall of said bag to be moved nearer to said casing by abnormal fluid pressure in said bag, said ribs being adapted to divide the space between the casing and bag into a plurality of chambers, and means in said ribs for providing communication between adjacent chambers.

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