March 7, 1933. H. STROBL 1,900,744

AIRSHIP

Filed June 14, 1932 2 Sheets-Sheet 1

Fig. 1.

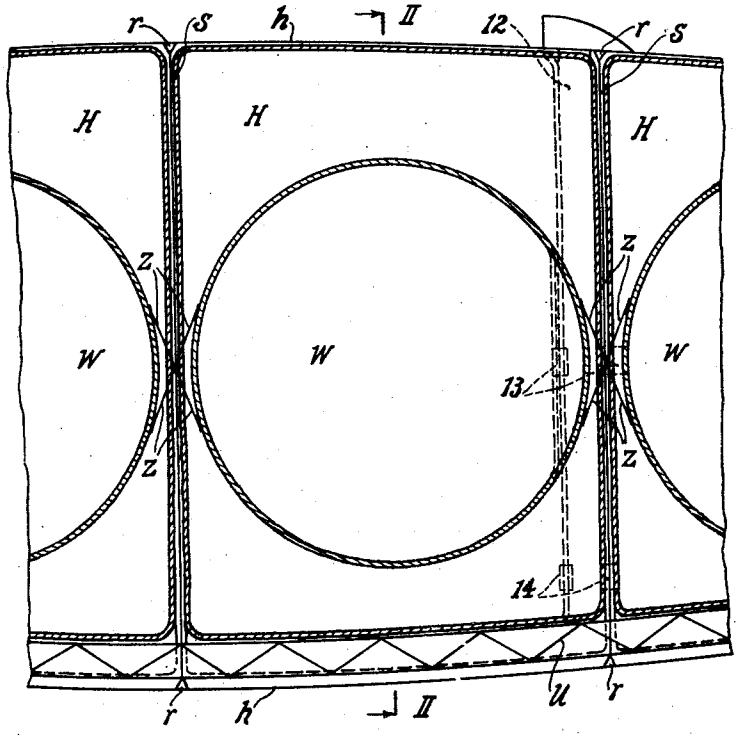
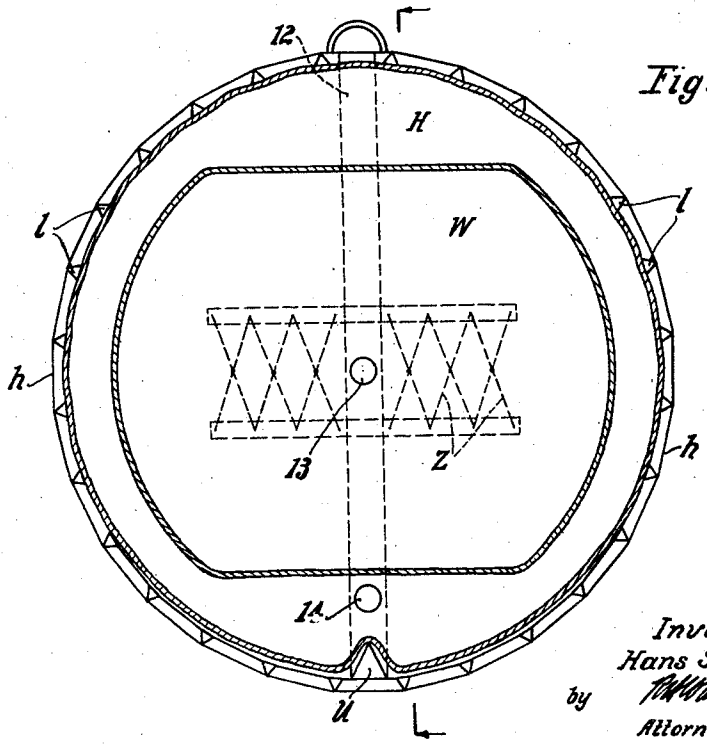


Fig. 2.



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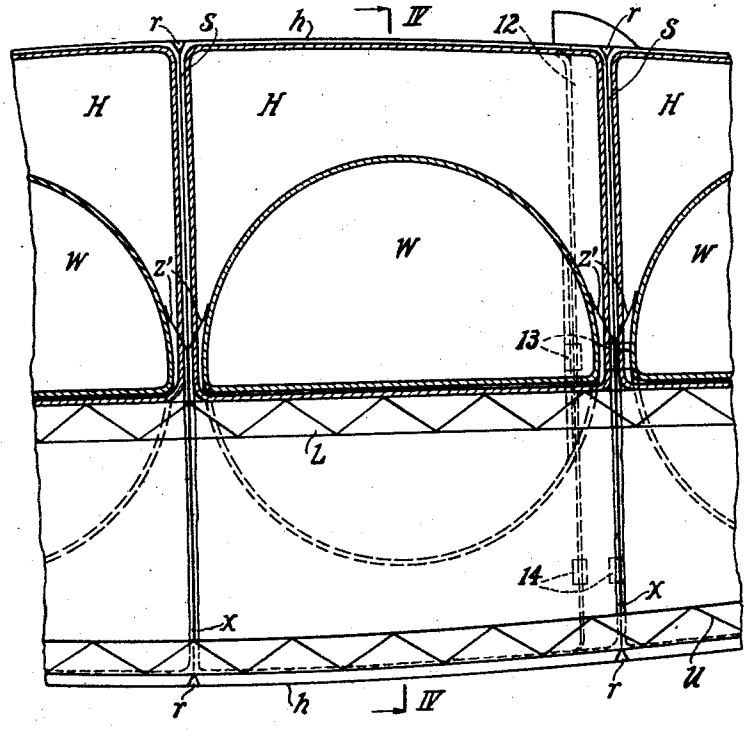


Fig. 3.

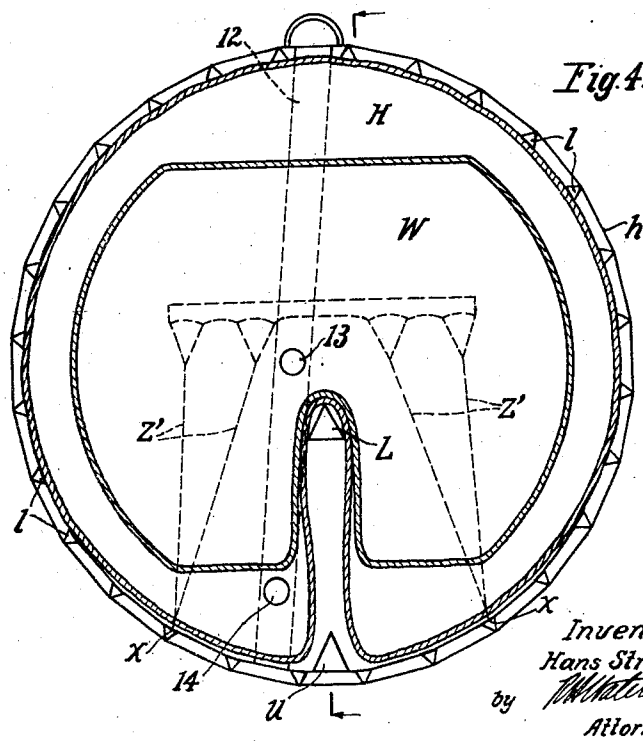


Fig. 4.

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UNITED STATES PATENT OFFICE

HANS STROBL, OF BERLIN-TEMPELHOF, GERMANY, ASSIGNOR TO LUFTSCHIFFBAU ZEPPELIN GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, OF FRIEDRICHSHAFEN, BODENSEE, GERMANY

AIRSHIP

Application filed June 14, 1932. Serial No. 617,142, and in Germany June 15, 1931.

My invention relates to airships, especially gas inflated aircraft, and has special reference to the gas cells or gas bags therein, which are inflated with gas.

This gas generally is intended to give buoyancy to the airship because of its light weight. The common gas used for this purpose is hydrogen. But as this is inflammable helium gas was introduced for the same purpose, because helium is non-inflammable. Unfortunately there is one economical disadvantage connected with the use of helium, that is its high price as compared with hydrogen. That is why it has been suggested to make use of both gases simultaneously and to make the construction and gas cell arrangement so that the dangerous hydrogen gas is surrounded and enclosed by helium gas. In case of a rupture or the like only the non-inflammable helium will escape.

For this purpose it has been suggested to arrange two gas cells, one within the other, the inner one being inflated with the inflammable gas, whereas the outer gas cell contains the non-inflammable gas. But there are difficulties connected with this arrangement especially with regard to the valves on the inner gas cell and the ducts or hose for leading the gas escaping from such valves through the outer cell. Furthermore, there is always danger of the inner gas cell getting ruptures after it has been deflated partially or totally during flight.

All these disadvantages are overcome by my invention.

The outer gas cells which fit into the different compartments of the hull are more or less of a cylindrical shape or of that of a frustum of a cone. The axis of such a gas cell coincides substantially with the axis of the airship. According to my invention the inner gas cells, which are smaller, are given also a substantially cylindrical shape, but the axis of the inner cell is arranged substantially at right angles to the axis of the surrounding outer cell. As generally the length of the outer gas cell is smaller than its diameter, it is possible by this arrangement to let the inner gas cell touch or nearly touch the end discs of the outer cell. Thus the valves on the inner cell, according to my invention, can be provided at these touching points, needing no long tubes or hose. Also, according to my invention, the inner gas cells are provided at these touching points with fastening means, by which they may be fastened to the outer cell or even to the adjacent ring bracing of the hull structure.

Having given a general description of my invention I now want to point it out more in detail referring to the drawings which represent two examples embodying my invention.

Fig. 1 is a fragmentary diagrammatic longitudinal vertical section through a rigid airship and Fig. 2 is a corresponding cross section taken on line II—II of Fig. 1.

Fig. 3 is also a fragmentary diagrammatic longitudinal section of a rigid airship but representing another modification of the invention. Fig. 4 is the corresponding cross section taken on line IV—IV of Fig. 3.

The cross or ring girders are designated by r, whereas l are the longitudinal girders. The rings r are braced by braces S, which are not shown in Figs. 2 and 4. The outer cover is indicated at h. There is a longitudinal gangway U in the lower portion of the hull.

The gas cells H contain the non-inflammable noble gas, such as helium, whereas the gas cells W are inflated with hydrogen. There are gas ducts 12 provided between the adjacent noble gas cells into which safety valves 14 of these cells open. The valves 13 on the inner gas cells also open into these ducts leading to the back of the airship.

There are tension members Z fastened to the circumferential walls of the inner gas cell which by means of a hose connection or the like, as is well known in the art, penetrate through the disc of the outer gas cell. These members may also be fastened to the ring bracing S. Thus they serve for transmitting lift from the inner gas cell to the hull structure when the inner cell is inflated, and they also serve for supporting the walls of the inner gas cell, when it is empty or nearly empty.

In the example represented in Figs. 3 and 4 there is an additional gangway L in the

middle of the airship which serves for stiffening the ring bracing S. Consequently the shape of the gas cells is somewhat different, as will be seen, especially from Fig. 4. Otherwise the conditions are equal to those of the first example represented in Figs. 1 and 2, except that the tension members Z' extend downward to the ring corners X.

I do not want to be limited to the details described or shown in the drawings as many variations will occur to those skilled in the art.

What I claim is:

1. In an airship of the lighter than air type a gas cell of substantially circular cross section with its axis substantially parallel to the longitudinal axis of the airship hull, and a smaller gas cell of substantially cylindrical shape so inserted in said first gas cell that the axes of both cells are substantially at right angles to each other.

2. An airship of the lighter than air type comprising a hull structure longitudinally subdivided by bulkheads into individual compartments, a gas cell in one of these compartments closely fitting therein, a second gas cell having substantially cylindrical shape inserted in said first gas cell and being so situated that its axis is substantially at right angles to the longitudinal axis of said airship, the circumferential wall of said second gas cell substantially touching the end walls of said first gas cell.

3. An airship according to claim 2, further including tension means connecting said circumferential wall of said inner gas cell to points of said airship hull structure, said tension means penetrating through the end walls of said first gas cell.

4. An airship according to claim 2, further including a gas valve in said inner gas cell, said gas valve being situated substantially at the touching line of the circumferential wall of said inner gas cell with one of the end walls of said outer gas cell.

5. An airship including a rigid frame, a gas cell positioned so that its axis extends substantially parallel to the axis of the airship, a second gas cell contained within the first, and tension means connecting the second cell with the rigid frame, said means passing through the end walls of the first cell.

6. An airship including a substantially cylindrical gas cell with substantially flat ends, and a second substantially cylindrical gas cell so positioned within the first gas cell as to have substantially a line contact with the first gas cell only at the comparatively flat end portions thereof.

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