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AIRSHIP OF THE RIGID TYPE.

APPLICATION FILED FEB. 1, 1910.

**979,979.** Patented Dec. 27, 1910.

Fig. 1.

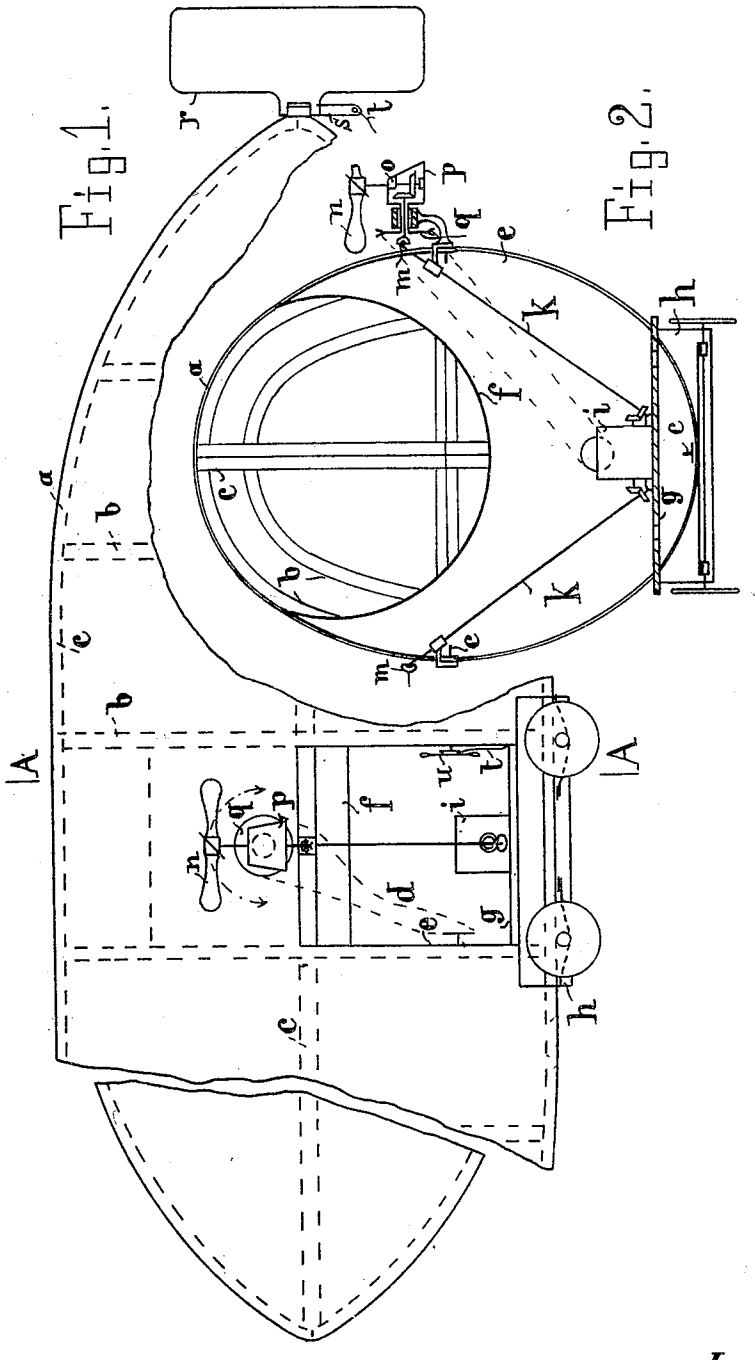

Fig. 2.



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# UNITED STATES PATENT OFFICE.

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## AIRSHIP OF THE RIGID TYPE.

979,979. Specification of Letters Patent. Patented Dec. 27, 1910.

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*To all whom it may concern:*

Be it known that I, JOHANNES MASSOHN, a subject of the Emperor of Germany, residing at Paulinenplatz 2, Hamburg, German Empire, have invented certain new and useful Improvements in Airships of the Rigid Type, of which the following is a specification.

This invention relates to steerable airships of the rigid type, in which a space to serve as the engine-room is reserved in the interior of its gas envelop.

The engine-room is arranged in such a way around the vertical axis of the airship's body that it extends through it from side to side and also upwardly to about its center, while the fore and rear parts of the envelop reach below the level of the floor of the engine-room. This arrangement enables the driving power to be transmitted to the propeller-screws, which are mounted in bearings at or above the horizontal central plane of the envelop, by means of a short transmission mechanism, and further enables the airship by means of its envelop to float on water. This new arrangement provides that the engine- and passenger-rooms are completely embraced within the general shape of the airship and secures thereby not only reduced air-resistance but also improved facility of locomotion and steering. The absolutely sheltered position of the room is of particular value for arctic exploration.

An example of the adaptation of this invention to an airship is shown diagrammatically in the accompanying drawings, of which—

Figure 1 represents a side view of the airship, and Fig. 2 a section on line A—A of the former.

The balloon envelop *a* is made of a textile material such as usually employed for aeronautical purposes and substantially oval shape in vertical section; it is fixed over a framework which corresponds with the exterior shape of the airship and is composed of strong frames *b*, preferably made of aluminium, steel, and longitudinal ribs *c*, made of aluminum, steel, bamboo or other light and resisting material. In the lower half and near the center of *a*, a space or room *d* is provided. The side walls *e* as well as the roofing *f*, which separate this room *d* from the interior of the gas compartment of the balloon, are preferably made (either wholly or partly) of aluminium-sheets and are packed gas-tight, while the flooring *g* may be made of a strong openwork or of wood provided with observation holes. The end walls of the compartment substantially conform in contour to the sides of the receptacle and the roof of the compartment is substantially semicircular in contour and forms a continuation of the roof of the receptacle, thereby providing a cylindrical gas passage over the compartment. Underneath the floor *g* a wheeled truck *h* is arranged in such a way that it acts as a buffer in landing or as a carriage for travel on land. For use in arctic regions, or in winter, sledge-runners may also be provided.

The walls *e* of the room *d* take the form of the sectional shape of the balloon, while in order to secure the greatest possible use of available space, that part of the envelop which is above the room *d* is preferably roll-shaped. The other two sides of the room *d* are suitably, and following the general shape of the balloon, covered (partly or wholly) by a suitable envelop, in order to prevent air-resistance. If this envelop is not itself transparent, it may be provided with celluloid windows or small holes for observation. A forward view may be obtained by means of a periscope or equivalent device. The lower part of the envelop is covered in with a light yet strong waterproof material, which is intended to impart to the balloon the resistance necessary to float on water.

The motor *i* (preferably a light benzin engine) is suitably mounted in room *d*. Instead of one engine only several such may be provided if required. The driving power is transmitted from the motor by means of bevel gears, tubular shafts *k*, and universal-joints *m*, to the propeller-screws *n*, which are arranged at the side, and approximately level with the center of the balloon body. The bearings are preferably fixed to the central longitudinal ribs *c*, which stiffened by the walls *e* may, if necessary, be further strengthened through rods connecting them with other longitudinal ribs.

The propeller-screws *n* are mounted in such a way that their axes can be changed into any angles in the same vertical planes. In this manner it is possible to control the position of the screws so that they rotate in a vertical plane for propelling, or in a horizontal plane for lifting. To obtain

this result the bearing $o$ for the screws $n$, together with the last gear-wheels are arranged in a revoluble casing $p$, which, on the other hand, carries the driving shaft in its hollow trunnion. On the end of this trunnion a disk, sector, arms, or other suitable device is fixed, which can be operated by a cord or the like, and by thus turning the casing $p$ will allow the position of the propeller axle to be varied.

The coupling of the shaft $k$ with the motor $i$ may be arranged in such a way as to make the motion of the screws reversible. Thus the steering may be effectively assisted by the propellers. To avoid the necessity of using a heavy reversing gear, however, it is preferable to reverse the position of the propeller axle, or the angle of the blades $n$ may be changed in well known manner.

The rudder $r$ is fixed directly on to the stern end of the framework of the airship. Two oblique side arms $s$ are connected by means of a guiding device $t$, with the controlling handle $u$ situated in room $d$. In a similar way vertical steering with a horizontal rudder (not shown) may be obtained. To obtain the greatest possible lifting power, the balloon is preferably inflated with hydrogen-gas.

It is obvious that all other well known particulars may be applied with this balloon, such as sliding weights below the floor $g$ for controlling the deviation, divided gas-compartments or separate chambers within the envelop, connected by pipes with one another and with the engine room. This latter connection may be advantageous for warming or cooling the gas by means of a pump and suitable apparatus or the engine itself. The warming of the gas is of importance to maintain the airship at a given height, in case the lifting power of the balloon should be reduced through a reduction in the outside temperature. Furthermore one pair of the carriage-wheels may be connected with the motor by suitable means, in order to drive the wheels directly, if necessary.

I am aware that prior to my invention airships have been known with engine- and passenger-rooms below or within the envelop, and with propeller screws at the sides of the airship. I therefore do not claim such a combination broadly.

I claim:

An airship comprising a gas containing receptacle substantially oval-shape in vertical section, a compartment formed in the lower half and near the center of the receptacle, the end walls of said compartment being gas-tight and substantially conforming in contour to the sides of the receptacle, the roof of the compartment being substantially semi-circular in contour and forming a continuation of the top of the receptacle, thereby providing a cylindrical gas passage over said compartment, the floor of said compartment arranged above the plane of the bottom of the receptacle and provided with observation openings, a motor within said compartment, propellers arranged at the sides of said receptacle, and driving shafts connected with said propellers and extending in said compartment and driven by said motor.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHANNES MASSOHN.

Witnesses:

ERNEST H. L. MUMMENHOFF,

IDA CHR. HAFERMANN.