Jan. 23, 1951

J. W. DAWSON

2,539,363

GYROSCOPIC DEVICE

Filed Sept. 12, 1945

FIG. 1.

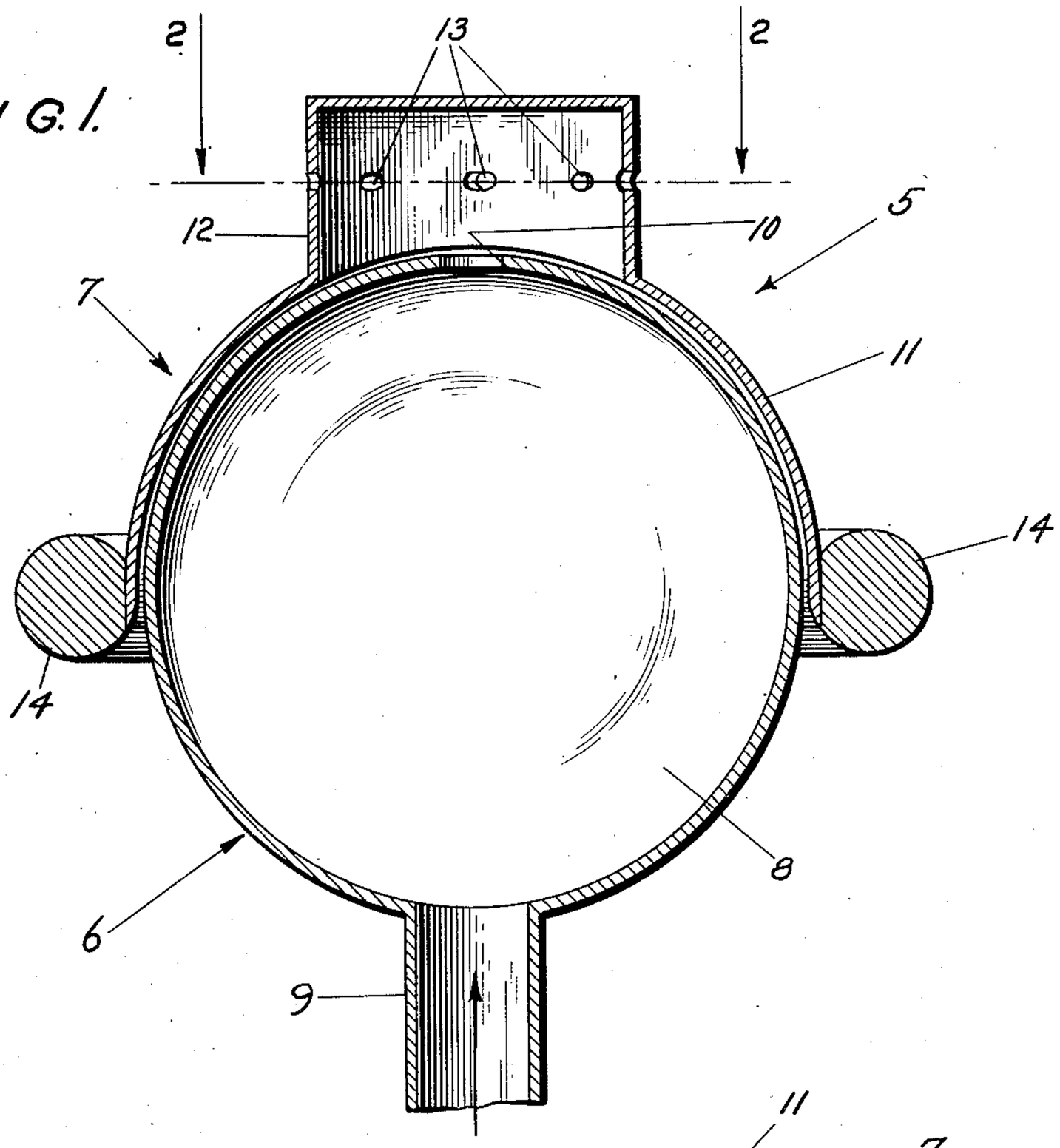
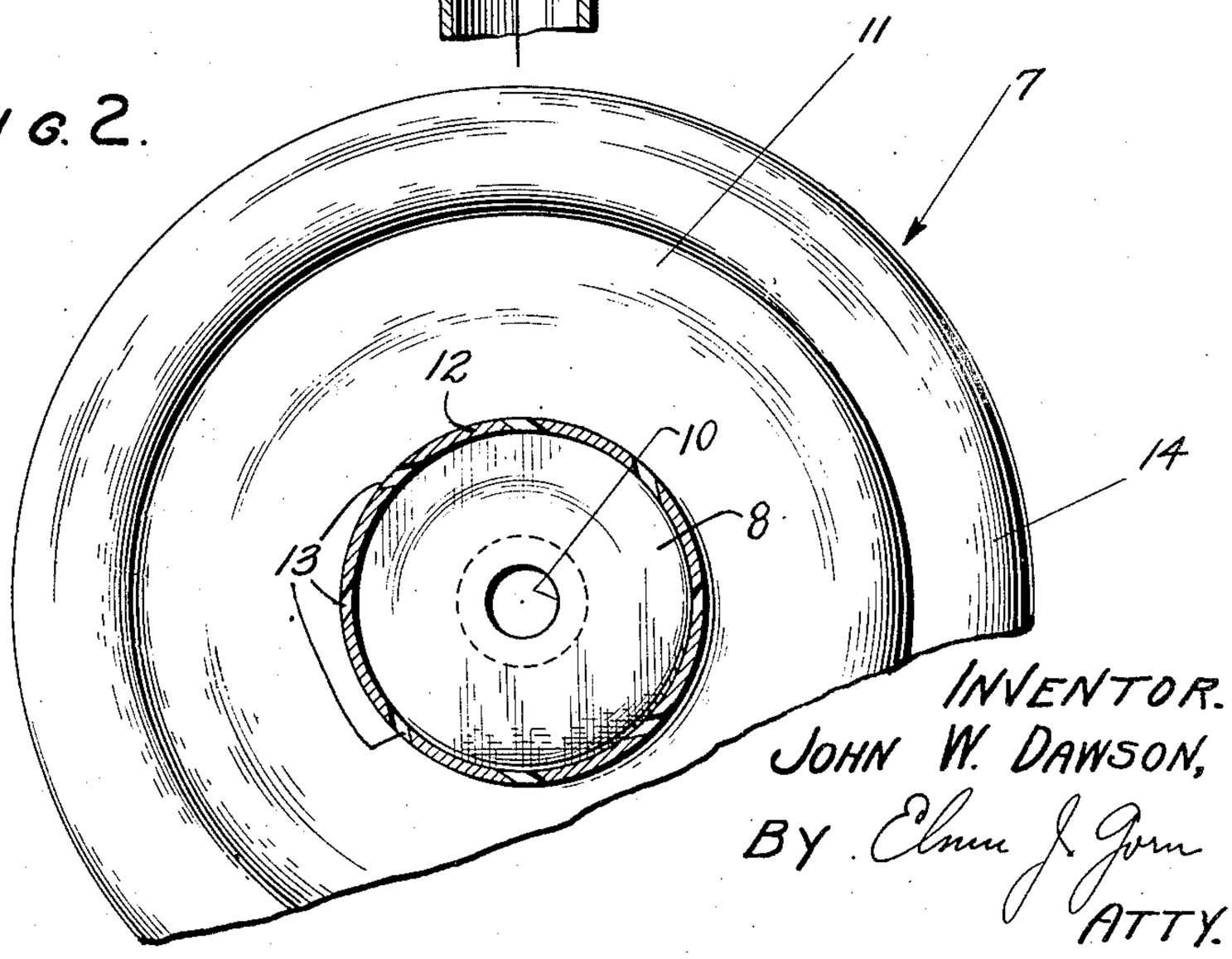


FIG. 2.



INVENTOR.
JOHN W. DAWSON,
BY Elmer J. Gorn
ATTY.

Patented Jan. 23, 1951 2,539,363

UNITED STATES PATENT OFFICE

2,539,363

GYROSCOPIC DEVICE

John W. Dawson, West Newton, Mass., assignor to Raytheon Manufacturing Company, Newton, Mass., a corporation of Delaware

Application September 12, 1945, Serial No. 615,796

6 Claims. (Cl. 74—5.7)

1

My present invention relates to gyroscopic devices, and aims to provide a device of the general character indicated which is simple, and in which friction is reduced to a minimum, thereby enabling the attainment of high angular momentum and consequent high gyroscopic stability.

These, and other objects of my present invention, which will become more apparent as the detailed description thereof progresses, are attained, briefly, in the following manner:

I provide a stator member, preferably, in the form of a hollow sphere, having a driving-fluid inlet at one end of its normally vertical axis, and a driving-fluid outlet, of somewhat reduced diameter, at the opposite end of said normally vertical axis. Seated over said stator member is a rotor member, preferably, in the form of a hollow, spherical segment, said rotor member including a dome portion communicating with the interior of said stator member through the above-mentioned driving-fluid outlet in the latter, and having a multiplicity of restricted reaction-turbine vents communicating with the exterior region surrounding the same. Carried by said rotor member is a member of appreciable mass, preferably, in the form of an annulus secured to the rim thereof, said mass being uniformly distributed about the axis of said rotor member.

Now, a driving fluid, for example, air, upon being admitted to the interior of the stator member, flows through the outlet port in the latter and into the dome portion of the rotor member. The pressure of the driving fluid lifts the rotor member into spaced relationship with the stator member. Said driving fluid escapes from the dome through the restricted reaction-turbine vents therein, and also through the space between the interior surface of the rotor member and the exterior surface of the stator member. The fluid escaping from the reaction-turbine vents causes the rotor member to spin, and the fluid escaping through the space between the rotor and stator members causes a reduced pressure in said space to balance the lift against the interior of the dome. If the pressure under the dome tends to throw off the rotor member, the increased velocity of the fluid escaping from between the rotor and stator members will further reduce the pressure in the inter-member space, thus compensating for the increased lift. These effects tend to maintain the rotor member located centrally with respect to the stator member. The angular momentum imparted to

2

the mass carried by the rotor gives to said rotor a high gyroscopic stability, and the spin axis of said rotor member becomes fixed in space notwithstanding any shift in the direction of the axis of the stator member.

In the accompanying specification I shall describe, and in the annexed drawing show, an illustrative embodiment of the gyroscopic device of my present invention. It is, however, to be clearly understood that I do not wish to be limited to the details herein shown and described for purposes of illustration only, inasmuch as changes therein may be made without the exercise of invention and within the true spirit and scope of the claims hereto appended.

In said drawing,

Fig. 1 is a vertical sectional view taken substantially through the center of a gyroscopic device made in accordance with the principles of my present invention; and

Fig. 2 is a partial transverse sectional partial top plan view taken along line 2—2 of Fig. 1.

Referring now more in detail to the aforesaid illustrative embodiment of my present invention, with particular reference to the drawing illustrating the same, the numeral 5 generally designates a gyroscopic device including a stator member 6 and a rotor member 7.

The stator member 6 comprises, preferably, a hollow sphere 8 provided with an inlet tube 9 for admitting to the interior thereof a driving fluid, for example, air under pressure. The communication between the tube 9 and the sphere 8 is preferably at the lower end of the normally vertical axis of said sphere, the latter being fixed, for example, to the deck of a boat. At the opposite end of said normally vertical axis, the sphere 8 is provided with a port 10 for permitting the escape of the fluid admitted to the interior thereof, said port, preferably, being of smaller diameter than the inlet tube 9 so that the escaping fluid is under somewhat increased velocity.

The rotor member 7 is seated over the stator member 6 and comprises, preferably, a spherical segment 11, for example, a hemisphere, provided with a dome portion 12 presenting a chamber in communication with the interior of the stator member 6 through the port 10 of the latter. Said dome portion 12 is provided with a plurality of restricted openings 13, it being intended that said openings act as reaction-turbine vents, having their longitudinal axes so angularly disposed with respect to the radii of the dome that the fluid

escaping from the interior of said dome to the exterior region surrounding the same exerts a tangential component of force upon said dome. This force causes the rotor member to spin about the stator member at a high angular velocity, the cushion of fluid between the adjacent surfaces of the rotor and stator members constituting a low-friction bearing.

Carried by the rotor member, preferably, in the region of its greatest diameter, for example, at the rim of the hemisphere here shown, in an annular member 14 of appreciable mass, the rotation of said annular member at a high angular velocity imparting thereto a high angular momentum, with the result that the rotor member acquires a high gyroscopic stability.

As a result of this high gyroscopic stability, the axis of spin of the rotor is unaffected by shifts in the direction of the normally vertical axis of the stator member, which shifts may be caused, for example, by the rolling or pitching of the boat carrying the device.

This completes the description of the aforesaid illustrative embodiment of my present invention. It will be noted from all of the foregoing that the device of my present invention is simple, has great stability, and, because of the fluid bearing utilized therein, can be operated with the expenditure of a minimum of energy.

Other objects and advantages of my present invention will readily occur to those skilled in the art to which the same relates.

What is claimed is:

1. A gyroscopic device comprising: a hollow stator member; a hollow rotor member disposed over said stator member; said rotor member including a chamber communicating with the exterior region surrounding the same, and with the interior of said stator member; a member of appreciable mass carried by said rotor; said mass being symmetrically disposed about the axis of said rotor; and means for admitting a driving fluid into the interior of said stator member.

2. A gyroscopic device comprising: a hollow stator member; a hollow rotor member disposed over said stator member, and having a major portion of its interior surface contour substantially following the exterior surface contour of said stator member; said rotor member including a chamber communicating with the exterior region surrounding the same, and with the interior of said stator member; a member of appreciable mass carried by said rotor, said mass being symmetrically disposed about the axis of said rotor; and means for admitting a driving fluid into the interior of said stator member.

3. A gyroscopic device comprising: a hollow, spherical stator member; a hollow, spherical-segmental rotor member disposed over said stator member; said rotor member including a chamber communicating with the exterior region surrounding the same, and with the interior of said stator member; a member of appreciable mass carried by said rotor; said mass being symmetrically disposed about the axis of said rotor; and means for admitting a driving fluid into the interior of said stator member.

4. A gyroscopic device comprising: a hollow stator member; a hollow rotor member disposed over said stator member; said rotor member including a chamber communicating with the exterior region surrounding the same through a plurality of reaction-turbine vents, and with the interior of said stator member through a port in the latter; a member of appreciable mass carried by said rotor; said mass being symmetrically disposed about the axis of said rotor; and means for admitting a driving fluid into the interior of said stator member.

5. A gyroscopic device comprising: a hollow, spherical stator member; a hollow, spherical-segmental rotor member disposed over said stator member; said rotor member including a dome providing a chamber communicating with the exterior region surrounding the same through a plurality of reaction-turbine vents, and with the interior of said stator member through a port in the latter; an annular member of appreciable mass carried by said rotor, said mass being symmetrically disposed about the axis of said rotor; and means for admitting a driving fluid into the interior of said stator member.

6. A gyroscopic device comprising: a hollow stator member; a hollow rotor member seated over said stator member; said rotor member including a chamber communicating with the atmosphere through reaction-turbine vents, and with the interior of said stator member through a port in the latter; a member of appreciable mass carried by said rotor member; said mass being symmetrically disposed about the axis of said rotor member; and means for admitting a driving fluid into the interior of said stator member.

JOHN W. DAWSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
442,461	Sharples	Dec. 9, 1890
464,806	Tower	Dec. 8, 1891
1,932,412	Keen	Oct. 31, 1933
2,133,809	Carter et al.	Oct. 18, 1938
2,158,048	Braddon	May 9, 1939