

S. B. MACFARLANE AND L. J. BARRY.

GYROSCOPE.

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1,382,372.

Patented June 21, 1921.

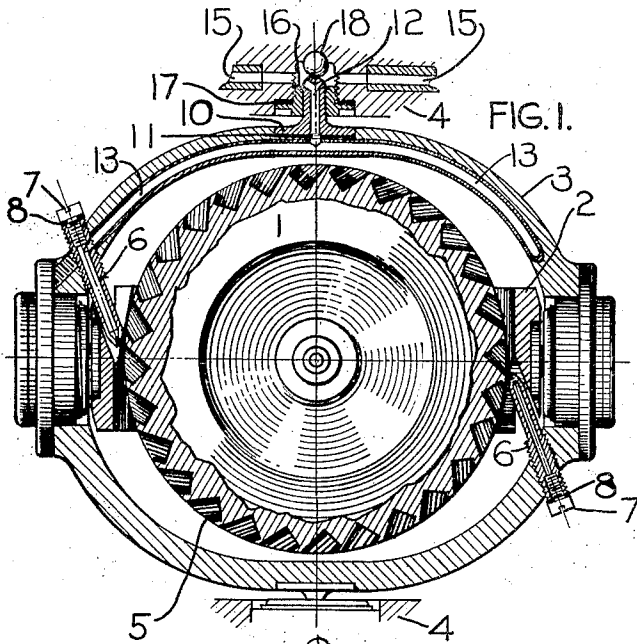
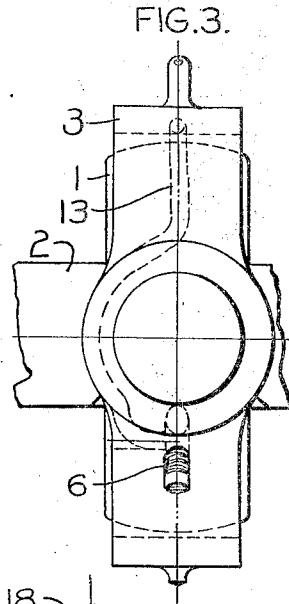
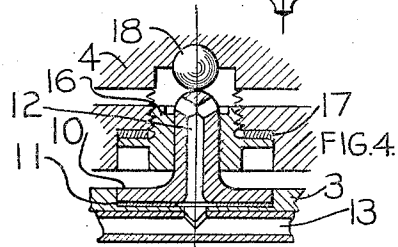
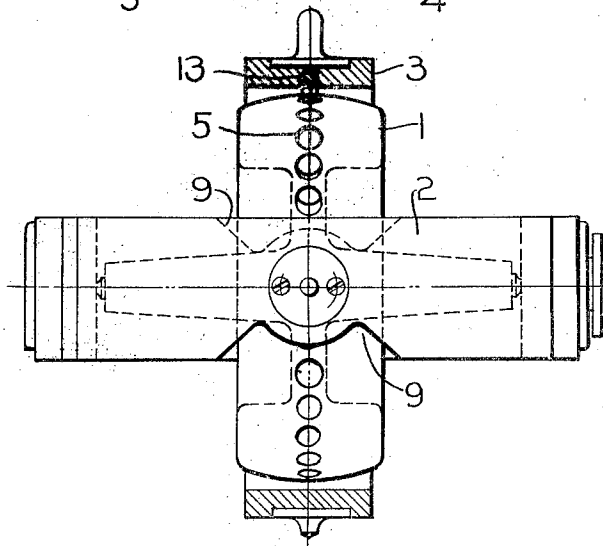
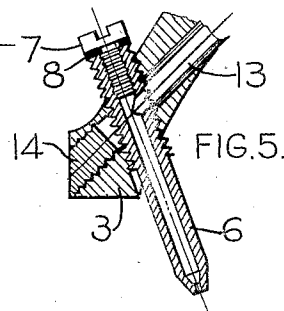


FIG. 2.

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Witnesses

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UNITED STATES PATENT OFFICE.

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GYROSCOPE.

1,382,372.

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To all whom it may concern:

Be it known that we, SCOTT B. MACFARLANE and LOUIS J. BARRY, citizens of the United States, residing at Newport, in the county of Newport and State of Rhode Island, have invented new and useful Improvements in Gyroscopes, of which the following is a specification.

Our invention relates to improvements in gyroscopes. One of the objects of this invention is the provision of means for either continuing the spin of a gyro wheel, after it has been given a start by other means or for starting it and continuing its spin.

A further object is to provide a gyro of simple and practical construction having greater efficiency and reliability than those now in use. A further object is to provide a gyro of the last above mentioned character which will permit ready assembling and replacement of parts as well as convenient adjustment to avoid disturbing influences.

Our invention is particularly applicable to that class of mathematically correct gyros, such as are used for steering torpedoes, for stabilizing devices in aeroplanes and for gyroscopic compasses, where the power applied to produce and maintain the spin, must be so perfectly balanced, maintained and regulated as not to cause creeping, tumbling or any other derangement of the gyroscope.

Other objects will be in part obvious from the annexed drawings and in part indicated in connection therewith by the following analysis of this invention.

This invention accordingly consists in the features of construction, combination of parts and in the unique relations of the members and in the relative proportioning and disposition thereof; all as more completely outlined herein.

To enable others skilled in the art so fully to comprehend the underlying features thereof that they may embody the same by the numerous modifications in structure and relation contemplated by this invention, drawings depicting a preferred form have been annexed as a part of this disclosure, and in such drawings, like characters of reference

denote corresponding parts throughout all the views, of which:—

Figure 1 is a vertical sectional view through all the principal parts.

Fig. 2 is a side view of the gyroscope with the outer gimbal ring shown in section.

Fig. 3 is a part of the same side view with the outer gimbal ring shown unbroken.

Fig. 4 is an enlarged sectional view of the upper outer gimbal bearing showing the arrangement of air ports.

Fig. 5 is an enlarged section of one of the air nozzles.

Referring now in detail to these drawings, 1 is a gyro wheel, which is free to revolve upon its axis in suitable bearings in an inner gimbal ring 2, which in turn is centered and pivoted in bearings in an outer gimbal ring 3, having in its turn bearings to center and support it in any type of holder or support 4. The bearings of the gyro wheel 1, and inner gimbal 2, are in the same horizontal plane but at right angles to each other. The bearings of the outer gimbal ring 3 are in a vertical plane.

The general construction so far described is of the usual type of this class of gyroscopes and presents no novel features.

Around the entire circumference of the rim of gyro wheel 1, there is cut or formed, a set of buckets 5, of suitable shape, arranged at an angle to a radial line of the wheel and to each other, as shown.

In the outer gimbal ring 3, there are two nozzles 6, adjustably screwed into place, diametrically opposite to each other, one just below and the other just above the gimbal bearings and at the proper angle to direct a jet of fluid or air substantially tangential to the buckets of the gyro wheel. Each nozzle piece has a screw 7, seated on a washer 8, for the purpose of giving access to the interior of the nozzles in order that the nozzles may be cleaned when necessary.

The inner gimbal ring 2, is cut away or notched along one side or edge adjacent to the nozzles at 9, in order to permit the necessary pivoting of the ring, without interference with the nozzles, as shown in Fig. 2.

While, as stated, vertical bearings and

pivots for the outer gimbal ring 3, provided in frame 4, are usually found in gyroscopes of this class, it is desirable in carrying out our invention, to construct one of these
 5 pivots and bearings, preferably the upper one, as shown in Fig. 4, in which 10 is a pivot member for outer gimbal ring 3, and seated therein on a packing washer 11. There is an air passage 12, through the
 10 pivot 10, and washer 11, which is connected with the nozzles 6, by means of countersunk passages 13, located in outer gimbal ring 3. These passages are preferably pipes, sunk in the walls of the gimbal ring in such a man-
 15 ner as not to interfere with the free movement of either the gyro wheel 1 or inner gimbal ring 2. A screw plug 14, closes the end of the passage and also affords access to the passage for cleaning purposes.

20 Leading from any source of controlled supply, are one or more pipes 15, which connect with the bearing in support 4. This bearing consists of a bearing cup 16, seated on a packing washer 17, in the support 4,
 25 and a ball 18, which takes the end thrust of pivot 10.

The passage 12 adjacent its outer end is deflected through the side of the trunnion, so that a bearing surface is provided at the
 30 outer end of the pivot member 10. The inner wall of the cavity of the support 4, and into which the trunnion 10 extends, has a semi-spherical recess which receives the ball 18.

35 The operation of our invention is as follows: Compressed air or other gas or fluid is brought from any source of supply, through the pipes 15, and flows through the air passages 12, pivot 10, passages 13 in the
 40 outer gimbal 3, and is directed by the nozzles 6, in the form of jets, upon the cylindrical buckets 5, of the gyro wheel 1, causing the wheel, either to start and continue to spin, or to continue to spin after it has
 45 been started by any other means.

By taking the driving force, air or other fluid through the pivot as described, the entire gyroscope is capable of being rotated freely about that pivot, without interfering
 50 with the free supply of fluid.

By directing the power to the wheel through the nozzles, located as described and shown, forces due to the application of power which might otherwise tend to cause de-
 55 rangement of the gyroscope, or cause tumbling, are neutralized.

It is thus seen that the present invention provides a device adapted to accomplish all of the objects and advantages herein set
 60 forth.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can by applying current knowledge readily adapt it for various ap-

plications without omitting certain features 65 that, from the standpoint of the prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and therefore such adaptations should and are intended to be comprehended within the meaning and range of equiv- 70 alency of the following claims.

We claim as follows:

1. In gyroscope construction, in combination, inner and outer gimbal rings, a wheel 75 mounted in one of said rings having tangential buckets in its periphery, and tangentially adjustable nozzles mounted in the outer ring adapted to direct the fluid jets into such buckets, said inner gimbal ring being 80 notched on one side to permit free movement of said nozzles during the relative turning movement of said gimbal rings.

2. In gyroscope construction, in combination, a support having a cavity, a bearing 85 cup in said cavity, an inner gimbal ring, an outer gimbal ring having a pivot member trunnioned in the bearing cup of said support, a wheel mounted in the inner ring and having buckets in its periphery, noz- 90 zles carried by the outer ring and adapted to direct fluid jets into said buckets, communicating passages in said support, pivot member and outer gimbal ring for supplying fluid from an external source to said 95 nozzles, and a bearing ball positioned in said cavity and against which the end of said pivot member of the outer gimbal ring engages.

3. In gyroscope construction, in combination, inner and outer gimbal rings, a wheel 100 pivotally mounted in one of said rings having buckets about its periphery; nozzles mounted in one of said gimbal rings tangentially disposed with respect to the periphery of said wheel, said nozzles being 105 adjustable and each having a plug at the outer end to permit easy access to the interior of the nozzle, and means countersunk in the outer gimbal ring communicating 110 with said nozzles and with a suitable source of supply.

4. In gyroscope construction, in combination, inner and outer gimbal rings, a wheel 115 pivotally mounted in one of said rings, having buckets about its periphery, and nozzles mounted in one of said gimbal rings tangentially disposed with respect to the periphery of said wheel, said nozzles each having a plug at the outer end to permit easy access 120 to the interior of the nozzle, means countersunk in the outer gimbal ring communicating with said nozzles and with a suitable source of supply, said communicating means passing axially through one 125 pivot point of the outer gimbal ring.

5. In gyroscope construction, in combination, inner and outer gimbal rings, a wheel

pivotally mounted in one of said rings and provided with peripheral buckets, nozzles mounted in one of said gimbal rings, a passage associated with said gimbal rings
5 and communicating with said nozzles, and removable closure means at one end of said passage to permit cleaning thereof.

6. In gyroscope construction, in combination, inner and outer gimbal rings, a wheel
10 pivotally mounted in one of said rings, provided with peripheral buckets, nozzles mounted in one of said gimbal rings tangen-

tially disposed with respect to the periphery of said wheel, a plug secured to the outer end of said nozzle, a passage leading to said 15 nozzle, and removable closure means at one end of said passage.

Signed at Newport, Rhode Island, this 24th day of April, 1918.

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Witness as to both:

WILLIAM J. COZZENS.