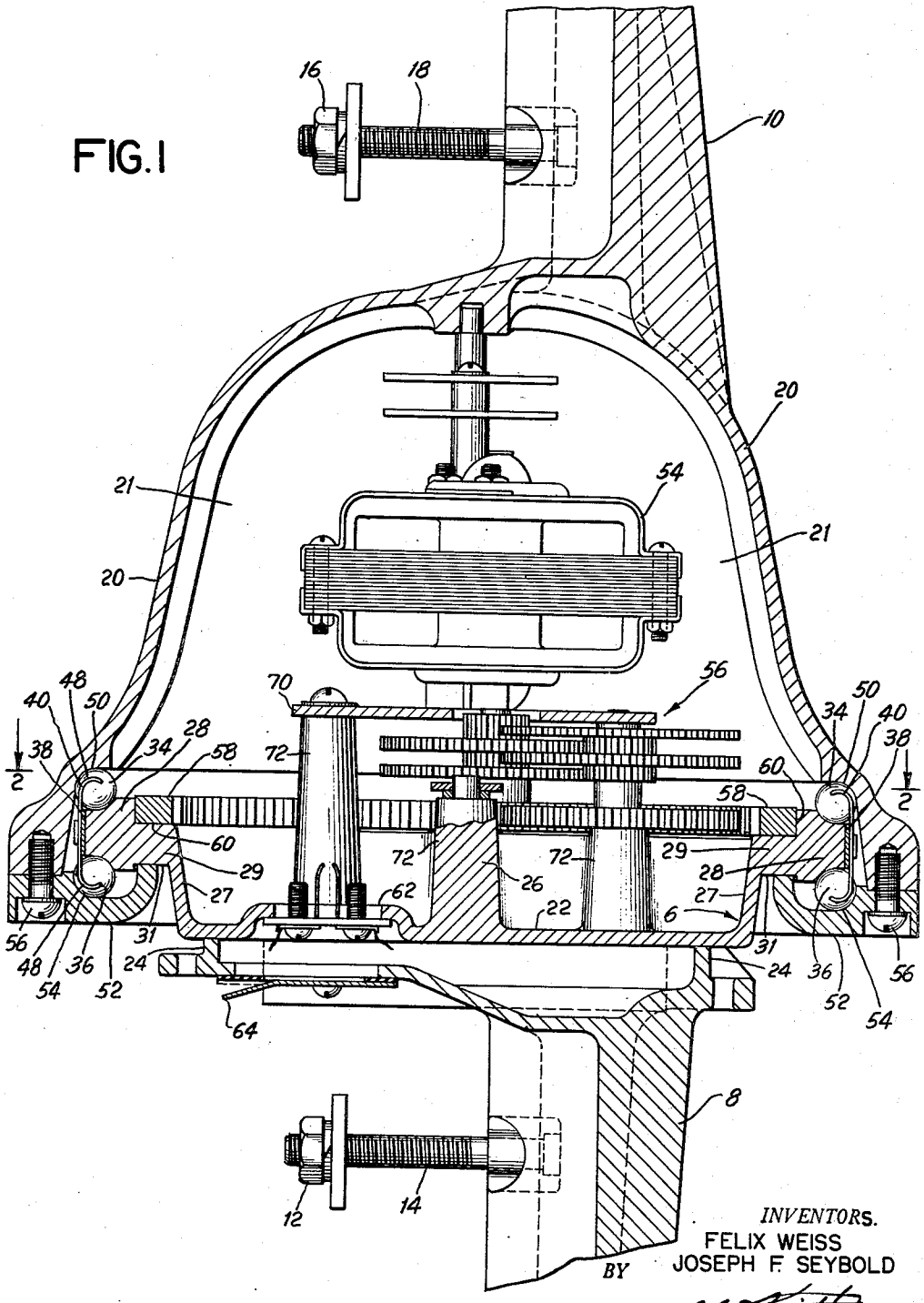
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ROTATOR

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FIG. 1



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FIG. 2

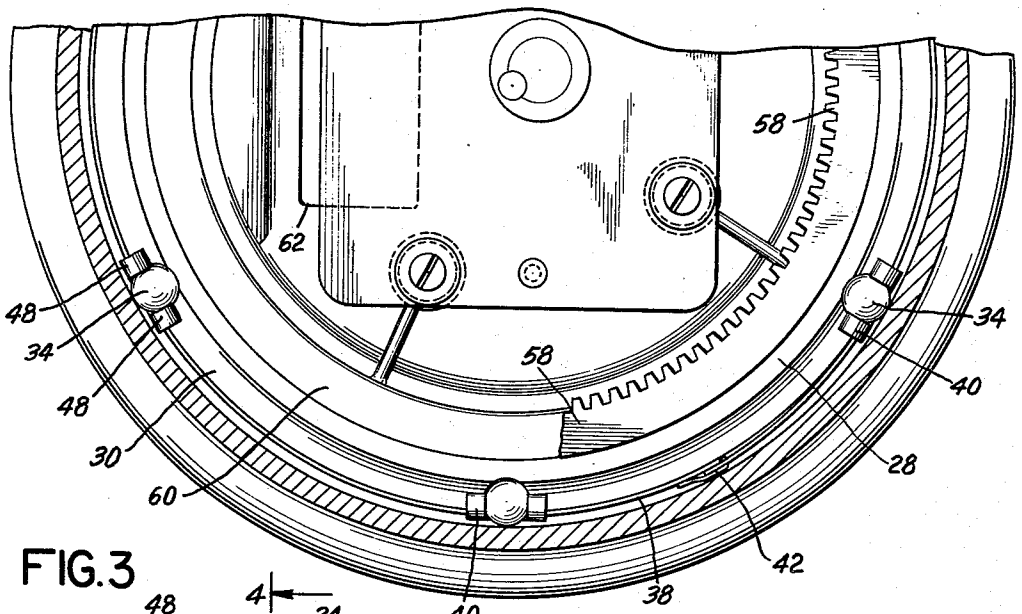


FIG. 3

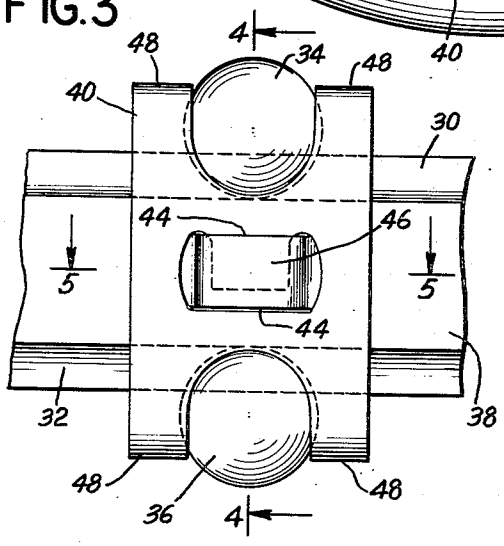


FIG. 4

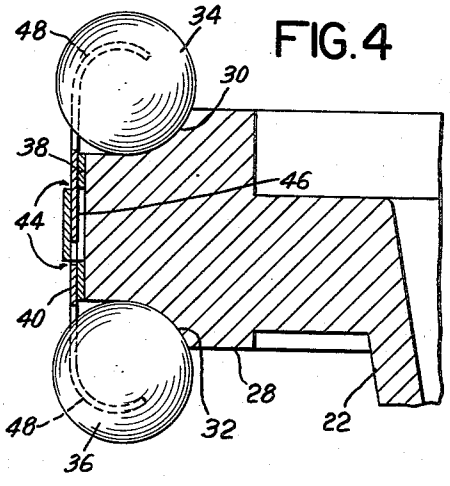
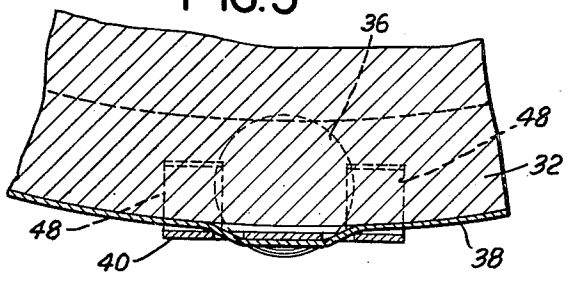


FIG. 5



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2,687,334

UNITED STATES PATENT OFFICE

2,687,334

ROTATOR

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Application November 9, 1950, Serial No. 194,896

7 Claims. (Cl. 308—227)

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This invention relates to a rotator for carrying a variable-direction antenna or the like, and more particularly to such a rotator for outdoor use and which includes a bottom plate and a cover, one being rotatable, the other being stationary. The bottom plate carries a ring which has external races for upper and lower layers of balls. A strap holds clips around the circumference of the rings, and the clips hold the balls against the races and separated from each other. The cover has an internal race which engages the upper layer of balls, and fastened to the underside of the cover is a retaining ring which has an internal race which engages the lower layer of balls. The inner edge of the retaining ring is in close-fitting, sliding relationship with the bottom plate, providing an effective seal against entry of water, dirt, etc., into the space between the bottom plate and the cover, which space may contain an electric motor and gears for rotating the cover.

The rotator of the invention is freely rotatable, simple of construction and requires little or no servicing.

Furthermore, it is almost impossible for water, dirt or the like to enter the space between the bottom plate and the cover, since an effective seal against such an occurrence is provided.

It is therefore an important object of the invention to provide a rotator whose moving parts and electrical connections are effectively isolated from water, dirt or the like.

It is another object to provide a rotator which requires little or no servicing.

It is a further object to provide a rotator of simple, inexpensive construction.

Further objects and advantages will appear in connection with the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a sectional elevation of a rotator embodying the invention;

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1;

Fig. 3 is a side view showing details of the mounting of one pair of balls;

Fig. 4 is a sectional view taken along line 4—4 of Fig. 3; and

Fig. 5 is a sectional view taken along line 5—5 of Fig. 3.

Like reference numerals designate like parts in the various views.

The rotator illustrated in Figs. 1 and 2 is a mounting for a variable-direction television antenna (not shown), and comprises a ball-bearing

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assembly, indicated generally at 6, mounted between a lower, vertical antenna mast support 8 and an upper, vertical mast support 10, the bottom of which flares out to form a bell-shaped casing 20, which is the cover referred to above. A retaining ring 52 is rigidly attached to the underside of the casing 20.

The cover 20, the lower portion of which terminates in a horizontal circular surface, defines a bell-shaped chamber 21, in which are the moving parts of the ball-bearing assembly 6.

The upper mast support 10 is adapted to carry the antenna by means of nuts 16, bolts 18 and clamps (not shown).

The ball-bearing assembly 6 comprises generally a base portion 22, which is the bottom plate referred to above, a ring 28, upper and lower external ball races 30 and 32, respectively, balls 34 and 36, a strap 38 and a plurality of clips 40.

The base portion 22 is mounted in fixed, non-rotatable position upon a platform 24 atop the mast support 8 which is adapted to be rigidly affixed to a base (not shown) by means of a nut 12 and a bolt 14. The bottom plate 22 is a saucer-like disc with a vertical axis 26 and upwardly-bent sides 27. A rim 29 having a horizontal lower surface 31 is integral with the tops of the sides 27. A ring 28 having the axis 26 is integral with the outer circumference of the rim 29.

The ring 28 has upper and lower external ball races 30 and 32 (see Figs. 3 and 4), respectively, in its upper and lower outer corners.

The balls 34 are evenly distributed around the upper race 30, and the balls 36 are evenly distributed around the lower race 32. The balls 36 in the illustrated rotator are in a one-to-one relationship with the balls 34, one ball 36 being directly beneath each of the balls 34. In the illustrated bearing assembly 6 there are six balls 34 and six balls 36. Obviously, there may be any number, and it is contemplated that there may be more or less balls 34 than balls 36.

The strap 38 encircles the ring 28 circumferentially and is in loose, sliding relationship therewith. The ends of the strap 38 are joined together by any suitable means, an example of which is illustrated in Fig. 2 at 42.

The clips 40 are mounted upon the strap 38 as is best illustrated in Figs. 3 and 4, being equally spaced around its circumference. The illustrated clip mounting may be described as follows: Two parallel circumferential slits 44 are cut in the strap 38, and the portions of the strap 38 between the slits 44 are formed bridgelike outward.

The central portion of the clip is cut away, except for a tab 46, which is inserted into one of the slits 44.

Each clip 40 is provided with four bent prongs 48, two extending beyond one side of the strap 38 and two extending beyond the other side. Space is provided between said first two prongs 48 for one of the balls 34; likewise, space is provided between said second two prongs 48 for the corresponding ball 36.

Thus it will be seen that the clips 40 provide cages for holding the balls 34 and 36 loosely against, and evenly spaced around, their respective races 30 and 32.

The bell-shaped casing 20 is provided near its bottom with an internal circular track or race 50 of the same diameter as the race 30, so that the mast support 10 is supported by the balls 34, and can easily turn thereon.

The retaining ring 52 is rigidly attached by screws 56 to the horizontal circular surface of the cover 20, to form a joint through which water, dirt, etc., cannot pass. The ring 52 is provided with an internal, circular track or race 54 of the same diameter as the race 32, the internal race 54 engaging the balls 36.

The inward portion of the retaining ring 52 is bent upwardly so as to provide a close-fitting, horizontal, sliding contact between itself and the lower surface 31 of the annulus 29. A felt gasket (not shown) may be interposed between the ring 52 and the lower surface 31.

Thus the design is such that it is almost impossible for water, dirt, etc., to gain access to the races 30, 32, 50 and 54, to the balls 34 and 36, to the gears (to be described), and to any electrical connections (to be described) which may be present. This is because of the tortuous path that such foreign matter would have to follow to get into the space between the base plate 22 and the cover 20.

The remainder of the construction provides the following means for automatically rotating the upper mast support 10 in either direction about the axis 26 of the assembly 6.

A reversible electric motor 54 within the bell-shaped chamber 21 has its shaft parallel to the axis 26 of the ball-bearing assembly 6, and is connected to drive a gear train, indicated generally at 56. An internal gear 58 is mounted in a circular recess 60 in the base portion of the assembly 6, and is engaged by the gear train 56. Only a part of the internal gear 58 is shown in Fig. 2.

The motor 54 is fixedly mounted by screws and bolts to a motor mount plate 70. The plate 70 is mounted upon motor mount studs 72 which are cast into the base 22 of the rotator. It will thus be seen that the motor 54 is fixedly mounted to the base 22 of the rotator.

Three bosses (not shown) are equally spaced around the top of the gear ring 58 and engage recesses (not shown) molded into the cover 20 of the rotator.

Electrical connections (not shown) are inserted through an opening 62 in the base portion 22 of the assembly 6. A cover plate 64 keeps water, etc., away from the electrical connections.

In operation, when it is desired to rotate the antenna, a switch (not shown) which is connected via the above mentioned connections is closed to start the motor 54 in the desired direction. Thus the motor 54, firmly attached to the base 22, rotates the internal gear 58 through the gear train 56. The internal gear 58 being secured to the upper part of the antenna carrying mounting by the three bosses engaging the corresponding recesses thus rotates the antenna carrying mounting including the upper mast support 10 until the antenna is in the desired position. At this time the switch is opened to stop the motor 54.

Many modifications, substitutions and equivalents will be apparent to those skilled in the art, and we do not limit ourselves to the details hereinabove set forth except as defined by the following claims.

Having thus described our invention, we claim:

1. A rotator for carrying a variable-direction antenna and the like, comprising: a bottom plate having an axis and including a base portion with upturned sides, a rim having a bottom surface and mounted atop said sides, a circular ring encircling said rim and having upper and lower surfaces, external ball races formed in the ring at the juncture of said upper and lower surfaces with the periphery of the ring, a layer of balls in said upper external race, a layer of balls in said lower external race in a one-to-one relationship with the balls in said upper race; a ball retainer and spacer including a strap encircling said ring and a plurality of clips secured in their central portions to said strap and spaced around the circumference thereof, said clips overlapping said external races for holding said balls against, and evenly spaced around, said races; a cover having an internal race which is supported by the balls in said upper external race, said cover having a lower surface; a retaining ring including an upper outer surface, an inner surface and an internal race which engages the balls in said lower external race, the inner portion of said retaining ring being turned upward so that said inner surface is in close-fitting, sliding contact with the bottom surface of said rim, forming therewith an effective seal against the passage therethrough of water, dirt and the like; means rigidly joining the upper outer surface of said retaining ring to the lower surface of said cover; and means for rotating said cover about said axis to any selected position.

2. A rotator for carrying a variable-direction antenna and the like, comprising, a bottom plate member having an axis and including a circular ring having external annular ball races, formed in the upper and lower surfaces of the ring, balls in said races, means extending between the races in the upper and lower surfaces for holding said balls against and spaced around said external races, a cover member having an internal race for engaging the balls in said upper external race, for supporting said cover, said cover having a lower portion extending below said internal race and encompassing the ring of the bottom plate, a retaining ring adapted to be removably fixed to said lower portion of the cover member, said retaining ring having an internal race formed to engage the balls in the external race on the lower surface of the ring of the bottom plate, and means for rotating one of said members about said axis.

3. A rotator for carrying a variable-direction antenna and the like, comprising, a bottom plate having an axis and including a circular ring having external ball races formed around its peripheral circumference at the juncture of the upper and lower surfaces of said ring with said peripheral circumference, balls in each of said races, means extending from the race in the upper

surface to the race in the lower surface for holding said balls against and spaced around said external races, a cover having an internal race by which said cover is supported by the balls in the upper external race, a retaining ring having an internal race which engages the balls in said lower external race and means between said bottom plate and said cover for rotating said cover about said axis.

4. A rotator for carrying a variable-direction antenna and the like, comprising, a bottom plate having an axis and including a circular ring having upper and lower surfaces around its circumference, upper and lower external ball races formed in said surfaces, balls in each of said external races, the balls in said lower external race being in a one-to-one relationship with the balls in said upper race, a ball retainer and spacer including a strap encircling said ring and a plurality of clips secured in their central portions to said strap and spaced around the circumference thereof, said clips overlapping said external races for holding said balls against and evenly spaced around said races, a cover having an internal race which is supported by the balls in said upper external race, a retaining ring having an internal race which engages the balls in said lower external race, and means for rotating said cover about said axis.

5. A rotator for carrying a variable-direction antenna and the like, comprising, a bottom plate member having an axis and including a base portion, a circular ring therearound, and a race around said ring, balls in said race, a cover member supported by the balls in said race, said cover extending below said race and freely encompassing said circular ring, a retaining ring having a portion thereof joined to said cover and extending radially inward and upward with respect to said axis, and having an inner portion in close-fitting, sliding contact with the under side of said circular ring, forming therewith an effective seal against the passage therethrough of water, dirt and the like, and means for rotating one of said members about said axis.

6. A rotator for carrying a variable-direction antenna and the like, comprising, a bottom plate having an axis and including a base portion with upturned sides, a rim having a bottom surface and mounted atop said sides, a circular ring encircling said rim, and upper and lower external ball races around said ring, balls in said external

races, a cover member having an internal race for engaging the balls in said upper external race, for supporting said cover, whereby the cover is freely rotatable about said axis, said cover having a lower portion extending below said internal race and terminating in a lower surface, a retaining ring including an outer portion adapted to be removably fixed to said lower surface of the cover, said retaining ring having an internal race formed to engage the balls in the external race on the lower surface, and said retaining ring having an inner portion extending radially inward with respect to the axis, the inner portion of said retaining ring being turned upward so that said inner portion is in close-fitting, sliding contact with the bottom surface of said rim, forming therewith an effective seal against the passage therethrough of water, dirt and the like, and means for rotating said cover about said axis to any selected position.

7. A rotator for carrying a variable-direction antenna and the like, comprising, a bottom plate member having an axis and including a circular ring having external annular ball races, formed in the upper and lower surfaces of the ring, balls in said races, means extending between the races in the upper and lower surfaces for holding said balls against and spaced around said external races, a cover member having an internal race for engaging the balls in said upper external race, for supporting said cover, said cover having a lower portion extending below said internal race and loosely surrounding the ring of the bottom plate, a retaining ring which has an outer portion adapted to be removably fixed to said lower portion of the cover member, said retaining ring having an internal race formed to engage the balls in the external race on the lower surface of the first mentioned ring, said retaining ring extending inward radially and terminating in an inner portion in close-fitting, sliding contact with said base portion, forming therewith an effective seal against the passage therethrough of water, dirt and the like, and means for rotating either of said members about said axis.

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