Dec. 28, 1948. E. H. KARLEEN 2,457,562

ANTENNA DRIVE MECHANISM

Filed July 9, 1945

2 Sheets-Sheet 1

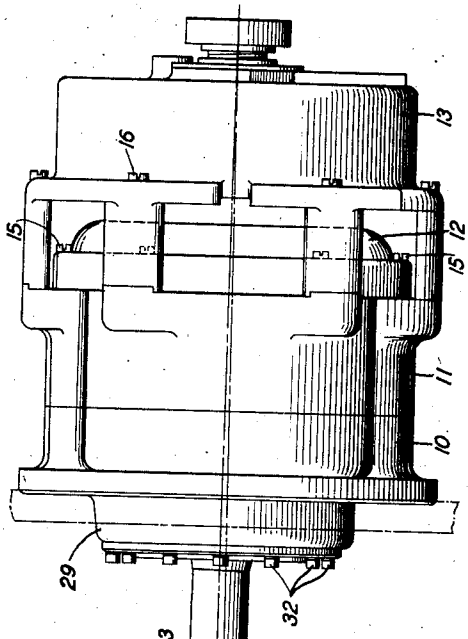

FIG. 1

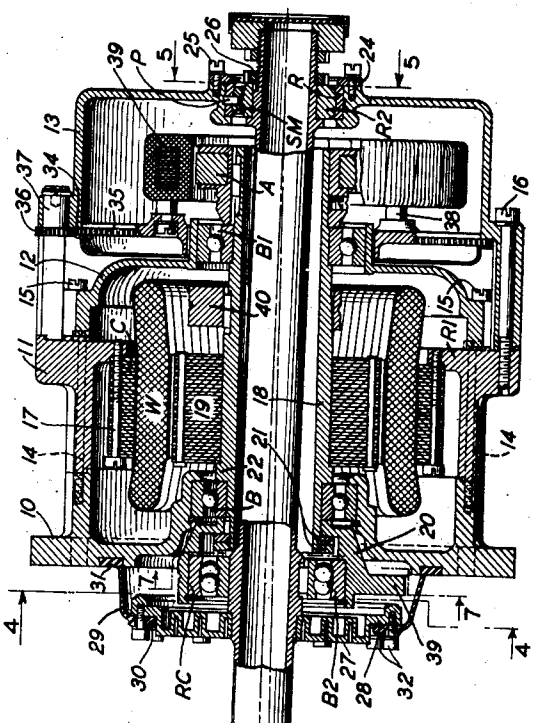

FIG. 2

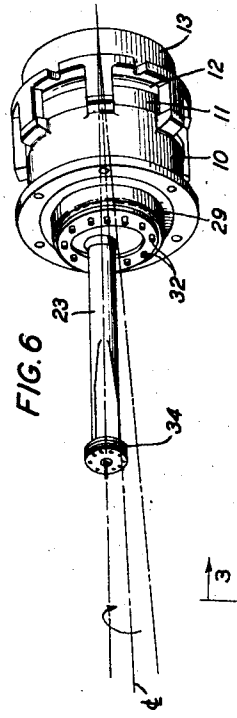

FIG. 6

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2 Sheets-Sheet 2

FIG. 3

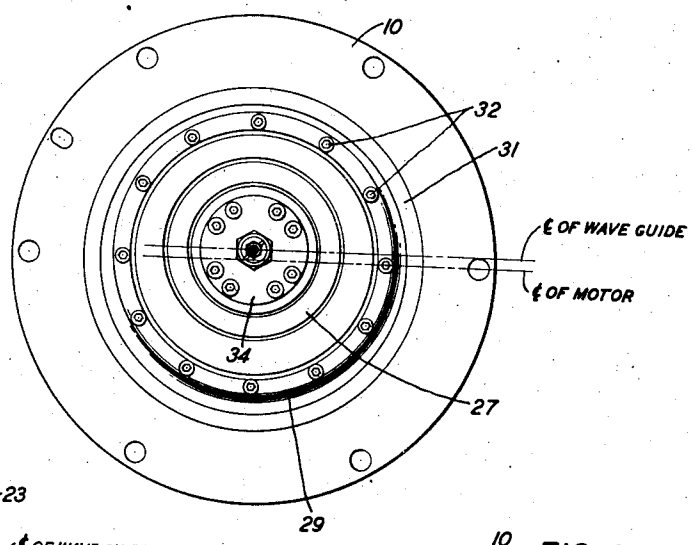


FIG. 7

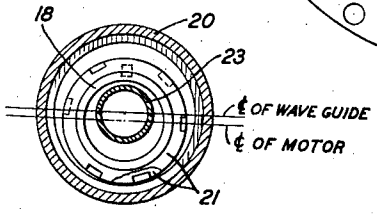


FIG. 4

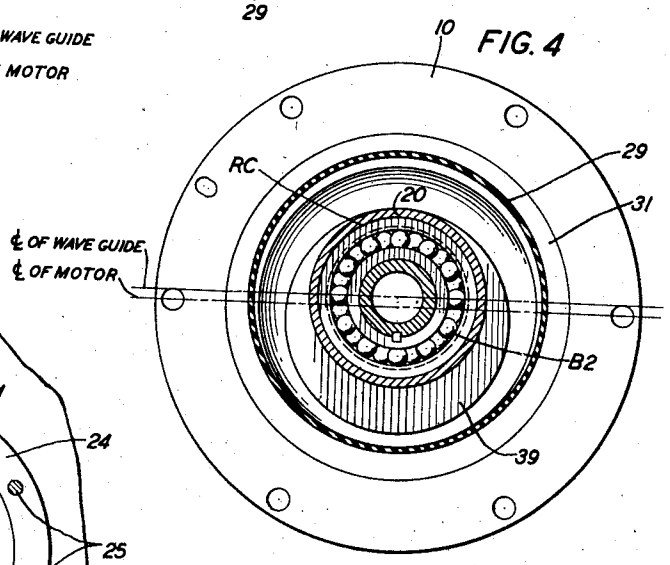
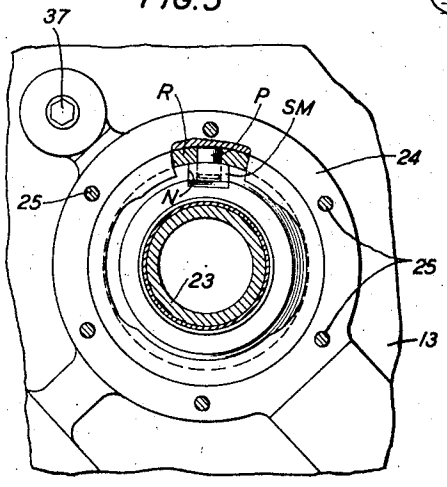


FIG. 5



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ANTENNA DRIVE MECHANISM

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3 Claims. (Cl. 250—33.63)

1

This invention relates to radio signaling mechanisms and more particularly to a driving mechanism for imparting a scanning movement to a radio antenna relative to the longitudinal axis of a driving shaft to cause the antenna to generate a conical scanning field upon the operation of a motor actuating the driving mechanism.

In the drawing,

Fig. 1 is an assembly view of the mechanism;

Fig. 2 is a longitudinal cross-sectional view showing the wave guide partly in section;

Fig. 3 is a front view;

Fig. 4 is a cross-sectional view taken on line 4—4 of Fig. 2;

Fig. 5 is a cross-sectional view taken on line 5—5 of Fig. 2 enlarged shown with a number of operating parts with portions cut away;

Fig. 6 is an assembly view shown in perspective; and

Fig. 7 is a cross-sectional view taken on line 7—7 of Fig. 2.

The driving mechanism of this invention is operated by a motor having a casing constructed of a plurality of detachable sections 10, 11, 12 and 13, sections 10, 11 and 12 being held in assembled relation to each other by a plurality of similar screws 15 and sections 11 and 13 by a number of screws 16.

The casing section 11 as shown in Fig. 2 is formed with an interiorly disposed rim portion R to which is secured by a number of screws 17 the core C and the field winding W of the motor while the casing sections 10 and 12 are provided with portions for receiving ball bearings B and B1 serving to support a hollow shaft 18 on which the armature 19 of the motor is secured.

On one end of the hollow armature shaft 18 adjacent the ball bearing B is keyed a cup-shaped member 20 which is held against longitudinal movement by a pair of locking nuts 21 threadedly engaging this end of the shaft while securing the inner race ring of ball bearing B against a ridge 22 formed at the periphery of the armature shaft.

The cup-shaped member 20 is provided with a recess RC eccentrically disposed relative to the armature shaft 18 and in this recess is mounted a ball bearing B2 having its inner race ring fitted over the periphery of a wave guide in the form of a cylindrically shaped tubing 23, the right end portion of which is supported by a gimbal bearing comprising a ring R fitted into a recess in the casing section 13 and held in position therein by a clamping ring 24 under the tightening action of a plurality of screws 25 while the inner disposed ring R2 of the gimbal bearing is secured to this end of the wave guide tubing 23 by a nut 26, a pin P being fitted in an opening in the outer disposed ring R as shown in Figs. 2 and 5 for engaging a shoe-shaped member SM fitted into a notch N formed at the periphery of ring R2 for preventing rotary relative movement between the rings R and R2.

2

On the wave guide tubing 23 adjacent the ball bearing B2 is mounted a screen in the form of a metallic plate 27 having a flanged portion 28 at its periphery provided for securing as by a number of screws 32, the rim 30 of a hood member 29 of elastic material having a second ring 31 fitted into a dovetailed circular recess at the front end of casing section 10 as shown in Figs. 1, 2, 3, 4 and 6, the metallic plate 27 and hood member 29 being provided for shielding the motor from the high voltage reflected by the antenna 34 mounted at the free end of wave guide tubing 23.

The portion of casing section 13 which serves for mounting the gimbal bearing R supporting one end of the wave guide tubing 23 forms a hub element 34 on which a gear 35 is mounted for free rotation thereon as effected by the manual operation of a pinion 36 formed with a spindle 37, the gear 35 being provided with a plurality of laterally extending studs 38 for mounting the core and winding assembly 39 of a generator having its armature A keyed on the end of the hollow shaft 18, the rotation of gear 35 and the field winding 39 mounted thereon being for the purpose of adjusting the generator voltage in the well-known manner and which forms no part of the present invention.

The cup-shaped member 20 is formed with a weight 39 provided for balancing the eccentric portions thereof in addition to the ball bearing supported thereby relative to the armature shaft 18 while this shaft is provided with a weight 40 to dynamically balance the assembly comprising the wave guide tubing 23, the metallic ring 27, the shield plate 27 and its securing screws 32, the ball bearing B2, the motor armature 19 and generator armature A.

In the operation of the motion translating mechanism of this invention, the rotation of the armature shaft 18 is effective to actuate the wave guide to simulate a nutation movement to cause the antenna to trace a geometrical figure representing a cone having an angle corresponding to the eccentricity of the cup-shaped supporting member 20 relative to the turning center of the armature shaft 18 and the distance between the

ball bearing B2 and the gimbal bearing R, the outer disposed ring of ball bearing B2 having its race formed with a concave radius for permitting the relative movement of the inner ring and the outer ring during the operation of the wave guide and that of the antenna carried thereby as effected by the rotation of the armature shaft.

What is claimed is:

1. A radio signaling device having a wave guide element, a mechanism for actuating said wave guide, said mechanism comprising a motor having a hollow shaft, a cup-shaped member carried by said shaft and eccentrically disposed relative to the longitudinal axis thereof, a casing for said motor, a gimbal bearing mounted in said casing for supporting one end of said wave guide and a bearing mounted in said cup-shaped member supporting said wave guide at another point to cause the latter to generate a conical movement relative to the longitudinal axis of said hollow shaft upon the operation of said motor.

2. A radio signaling device having a wave guide element, a mechanism for actuating said wave guide, said mechanism comprising a motor having a hollow armature shaft, eccentrically disposed means carried by said hollow shaft at one end thereof, a casing, bearings in said casing for supporting said hollow shaft, another bearing in said casing for supporting one end of said wave guide in concentric relation to said armature shaft and another bearing carried by said eccentrically disposed means for supporting said wave guide at a point adjacent its middle length portion whereby the operation of said armature shaft is effective to cause said wave guide to generate a conical movement.

3. A radio signaling device having a wave guide, a mechanism for actuating said wave guide, a motor having a casing, a pair of ball bearings fitted in said casing for supporting the armature shaft of said motor, said shaft being hollow, a cup-shaped element mounted on said hollow shaft for operation therewith, a ball bearing mounted on said casing for supporting one end of said wave guide, a ball bearing mounted in said cup-shaped element for supporting said wave guide at a point adjacent its middle length portion to cause the latter to generate a conical movement upon the operation of the armature shaft of said motor, an electric shield element for said motor mounted on said wave guide and a resilient hood member secured to said element and to said casing for permitting the operation of said wave guide relative to said casing.

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