Dec. 20, 1955 D. E. GRAY 2,727,404

ANTENNA ROTATOR

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Fig. 1.

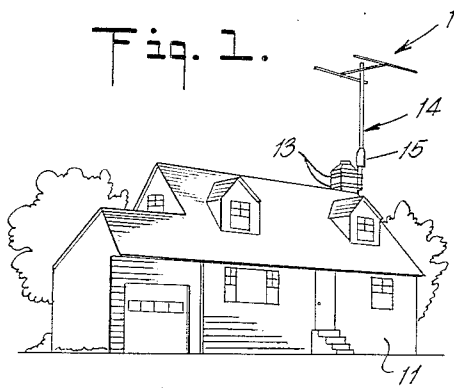


Fig. 2.

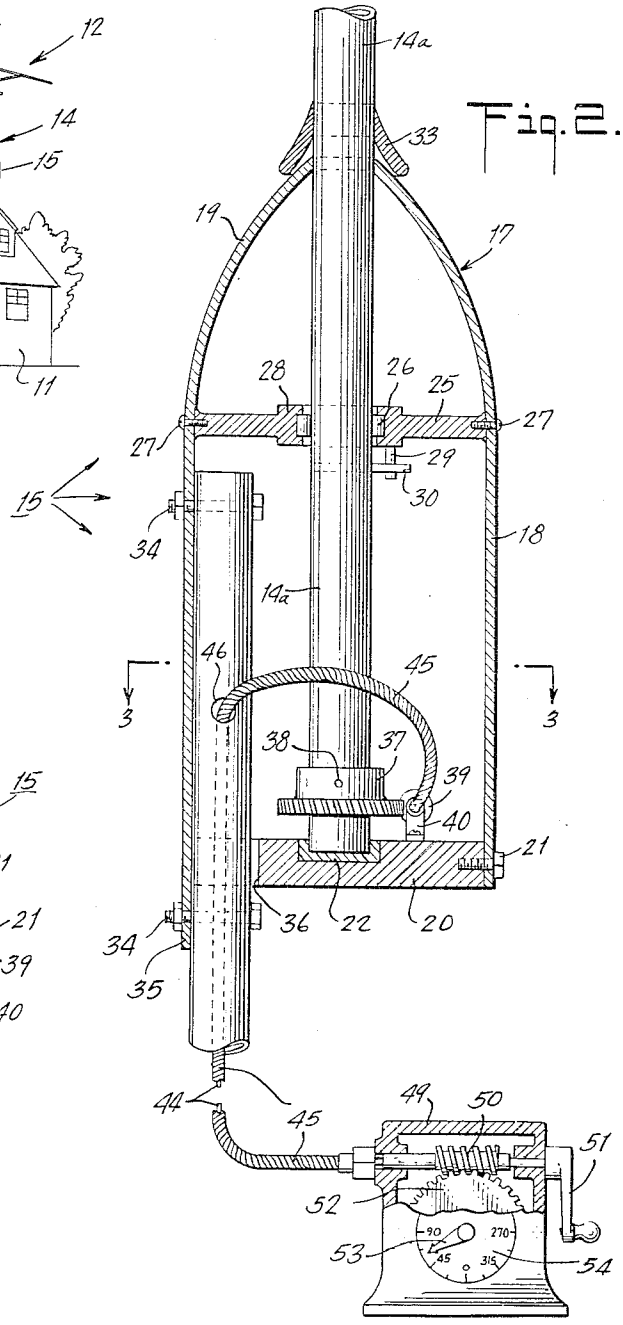
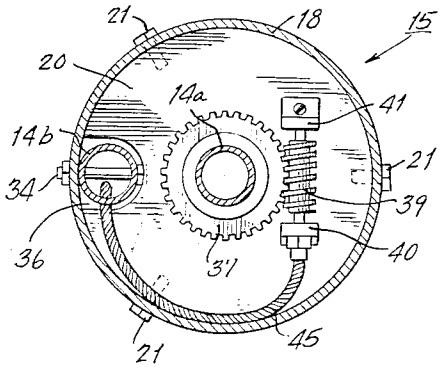


Fig. 3.



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ANTENNA ROTATOR

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4 Claims. (Cl. 74—507)

This invention is concerned with a directional antenna rotator. More specifically, the invention deals with an antenna rotator that is particularly adapted for use with the usual directional antenna that is employed widely for TV reception.

Heretofore various schemes for adjustably rotating the directional antenna and obtaining an indication of the position thereof have been attempted. However, various drawbacks are involved which often concern the complication and expense involved in the necessary equipment.

Consequently it is an object of this invention to provide a directional antenna rotator that is compact and simple, while being extremely reliable in its operation.

Another object of this invention is to provide a simple mechanical rotator for positioning a directional antenna that involves a minimum of mechanical elements, and in addition, one that is adaptable for being mounted on an already existing non-rotatable directional antenna.

Briefly, the invention involves an antenna rotator for a directional type antenna that has an upright shaft for supporting said antenna. Such rotator comprises a housing having bearings therein for supporting said shaft, an additional shaft for supporting said housing, a gear mounted on said first named antenna shaft, and a worm meshing with said gear. Also, a flexible coupling means connecting to said worm, and means for turning said flexible coupling means to drive said worm and position said antenna shaft.

A specific embodiment of this invention is described in some detail below and illustrated in the drawings, in which—

Fig. 1 is a perspective view illustrating a directional antenna mounted on the chimney of a house and including a rotator according to this invention;

Fig. 2 is an enlarged cross-sectional view illustrating the details of the rotator including manual rotation means to be remotely located; and

Fig. 3 is a cross-sectional view taken along the line 3—3 of Fig. 2.

In Fig. 1 there is illustrated one (probably most widespread) usage for the rotator of this invention. There is illustrated a house 11 having a directional antenna 12 mounted in any convenient manner from a high portion of the house 11. By way of example, there is shown one common method of mounting such an antenna that employs straps 13 which surround the chimney of the house 11 and are clamped on to the lower extremity of a shaft 14 generally indicated by an arrow in Fig. 1. Located on the shaft 14 there is shown an antenna rotator 15 according to this invention.

Turning to Fig. 2, it will be noted that the rotator 15 is adapted to act as a connecting link between two sections 14*a* and 14*b* of the directional antenna supporting shaft 14. The section 14*a* of the shaft 14 is mounted in a generally vertical position and is rotatably supported by a housing 17 which may take various forms. Preferably, the housing 17 has the form illustrated, and includes a shell 18 that is circular in cross-section and that has a

bullet-shaped, progressively reduced diameter top 19 integrally attached to the shell 18. Centrally located in the top 19 there is a hole for admitting the shaft 14*a* therethrough. Located within the shell 18, at the bottom thereof, there is a base 20 that may be constructed of any suitable material, e. g. aluminum or the like. The base 20 is secured in place at the bottom of the shell 18 by means of three bolts 21 that pass through holes in the shell 18 and are threadably received by tapped holes in the sides of the base 20. Centrally located on the top side of the base 20 there is a thrust bearing 22 that receives the lower extremity of the shaft 14*a* and supports the same vertically, as well as horizontally. This bearing 22 is illustrated as being constructed of any convenient relatively soft bearing material, e. g. babbitt, but may, if desired, be constructed in the form of a ball bearing or the like.

Mounted within the shell 18, just below the top 19 thereof, there is a supporting disc 25 that carries at the center thereof a lateral bearing 26 for giving lateral support to the shaft 14*a* while allowing free rotation thereof. It will be appreciated that the disc 25 may be in the form of a spoked wheel or the like to save material and weight. The disc 25 is secured in place within the shell 18 (of the housing 17) by means of a sufficient number of machine screws 27 that pass through holes in the shell 18 and are threadably received by the disc 25. Similarly, as with the thrust bearing 22, lateral support bearing 26 is illustrated as being constructed of any desirable bearing material, e. g. fiber, although here also a ball bearing may be employed if desired. Attached to a central hub portion 28 of the disc 25 there is a pin 29 that extends vertically downward to intercept the path traversed by a similar pin 30 that is secured to the shaft 14*a* in a radial position, so as to rotate therewith. The pin 29 acts as a stop upon being contacted by the pin 30, so as to limit the rotation of shaft 14*a* to somewhat less than one complete revolution.

In order to prevent moisture from entering the housing 17 by running down the sides of shaft 14*a*, there is a resilient material snap-on collar 33 that is positioned on the shaft 14*a* so as to overlap the highest portion of the top 19 of the housing 17.

The housing 17 is supported by the lower section 14*b* of the shaft, which section is fastened on the inside of the shell 18 by means of a pair of bolts 34. It will be observed that the lower bolt 34 passes through a depending skirt portion 35 of the shell 18. There is an opening 36 in the base 20 for the shaft section 14*b* to pass therethrough. As pointed out above, the section 14*b* of the shaft 14 will be mounted by any convenient bracket arrangement, such as that illustrated using straps 13 around the chimney.

In order to rotate the shaft section 14*a* and the antenna 12, there is a gear 37 that is placed over the end of shaft section 14*a* and is secured to the shaft in any convenient manner, as by means of a pin 38 illustrated. Meshing with the gear 37 there is a worm 39 that is journaled in a pair of supports 40 and 41. Attached to the worm 39 for rotation thereof, there is a flexible shaft 44 that is covered by sheathing 45. A convenient manner of leading the flexible shaft 44 and its sheathing 45 out, from within the housing 17, is that illustrated which employs a hole 46 in the shaft 14*b* so that the flexible shaft 44 may be led down within the hollow interior of shaft 14*b*, to then continue to any given remote location where there is situated a means for turning the flexible shaft 44 in rotation.

Such remote turning means includes a housing 49 that has bearings for rotatably supporting a worm 50 which is securely attached to the remote end of flexible shaft 44, and which has also connected thereto a crank handle

51 for manually rotating the worm 50. In order to indicate the geographical or rotative position of the antenna shaft 14*a*, there is a gear 52 that meshes with the worm 50 and that has a pointer 53 connected thereto. The pointer 53 cooperates with a calibrated dial 54 located on the face of the housing 49 of the remote positioning device.

Operation

It will be noted that the operation of the rotator is quite simple and at the same time extremely reliable. The crank handle 51 is rotated as desired to produce maximum reception at the receiving set, or to turn the antenna shaft 14*a* to a desired geographical position as indicated by the pointer 53 in conjunction with the dial 54. Such turning of the crank handle 51 rotates the indicator gear 52 by means of the worm 50, while at the same time the flexible shaft 44 is directly rotated. In this manner the worm 39 located within the housing 17 of the rotator 15, is turned by the rotation of the other end of flexible shaft 44 and consequently causes rotation of meshing gear 37 that is secured to the antenna shaft 14*a*. In this manner the antenna shaft 14*a* may be rotated as desired from a remote point, such as beside the television, or other receiver which employs the directional antenna 12.

The purpose of having a stop arrangement employing the pins 29 and 30 is to avoid excessive twisting of the antenna leads which extend down from the antenna 12 to the receiver.

It will be noted that the entire rotator according to this invention is extremely compact and yet simple in its design and operation. A meritorious feature is that concerning the adaptability of this rotator to an existing directional antenna supported by a standard sized shaft. It will be appreciated that an existing antenna shaft need merely be cut off at a desired height somewhat above its supporting brackets and then the two sections of the shaft as thus cut off, e. g. sections 14*a* and 14*b*, may be readily assembled in conjunction with the rotator housing 17 and its various elements. The procedure for such assembly will be clear to one skilled in the art. Thus, it will be appreciated that this rotator is extremely well adapted for use with a conventional style outdoor TV antenna having the usual support shaft.

While a specific embodiment of the invention has been described in detail in accordance with the applicable statutes, this description is not to be taken as in any way limiting the invention but merely as being descriptive thereof.

It is claimed:

1. An antenna rotator for a directional type antenna having an upright shaft for supporting said antenna comprising a housing having bearings therein for supporting said shaft, said housing including a relatively elongated smooth exterior shell, said shell being circular in cross-section and having a progressively reduced diameter top with an axially located hole therein to receive said antenna shaft, a removable base at the bottom of said housing having a centrally located thrust bearing thereon for rotatably supporting said antenna shaft, a lateral support bearing spaced vertically from said thrust bearing, an additional shaft for supporting said housing, a gear mounted on said first named antenna shaft, a worm meshing with said gear, flexible coupling means connected to said worm, and means for turning said flexible coupling means to drive said worm and position said antenna shaft.

2. An antenna rotator for a directional type antenna having an upright shaft for supporting said antenna comprising a housing having bearings therein for supporting said shaft, said housing including a relatively elongated smooth exterior shell, said shell being circular in cross-section and having a progressively reduced diameter top with an axially located hole therein to receive said antenna shaft, a removable base at the bottom of said housing having a centrally located thrust bearing thereon for rotatably supporting said antenna shaft, a lateral support bearing spaced vertically from said thrust bearing, an additional shaft extending beneath said housing, means for attaching said additional shaft to one side of said housing parallel to said first named antenna shaft, a gear mounted on said first named antenna shaft, a worm meshing with said gear, a single flexible shaft having one end thereof connected to said worm, and manual rotation means connected to the other end of said flexible shaft including an indicator to indicate the rotative position of the antenna.

3. An antenna rotator for a directional type antenna having an upright shaft for supporting said antenna comprising a housing having bearings therein for supporting said shaft, said housing including a relatively elongated smooth exterior shell, said shell being circular in cross-section and having a progressively reduced diameter top with an axially located hole therein to receive said antenna shaft, a removable base fitting within the bottom of said shell having a centrally located thrust bearing thereon for rotatably supporting said antenna shaft, a lateral support bearing located just below said top, support means for said lateral bearing including a stop to prevent more than one complete revolution of said antenna shaft, an additional shaft extending beneath said housing, means for attaching said additional shaft to the interior of said shell and parallel to said antenna shaft, a gear mounted on said first named antenna shaft, a worm mounted on said base and meshing with said gear, a single flexible shaft having one end thereof connected to said worm, and manual rotation means connected to the other end of said flexible shaft including an indicator to indicate the rotative position of the antenna.

4. An antenna rotator for a directional type antenna having an upright shaft for supporting said antenna comprising a housing having bearings therein for supporting said shaft, said housing including a relatively elongated smooth exterior shell, said shell being circular in cross-section and having a progressively reduced diameter top with an axially located hole therein to receive said antenna shaft, a resilient collar tightly fitted onto said shaft and overlapping said top where the shaft enters, a removable base fitting within the bottom of said shell having a centrally located thrust bearing thereon for rotatably supporting said antenna shaft, a lateral support bearing located just below said top, support means for said lateral bearing including a stop to prevent more than one complete revolution of said antenna shaft, an additional shaft extending beneath said housing, means for attaching said additional shaft to the interior of said shell and parallel to said antenna shaft, a gear mounted on said first named antenna shaft, a worm mounted on said base and meshing with said gear, a single flexible shaft having one end thereof connected to said worm, and manual rotation means connected to the other end of said flexible shaft including an indicator to indicate the rotative position of the antenna.

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