March 22, 1932. A. LEIB 1,850,112

FRAME AERIAL

Filed Nov. 5, 1929 2 Sheets-Sheet 1

Fig. 1

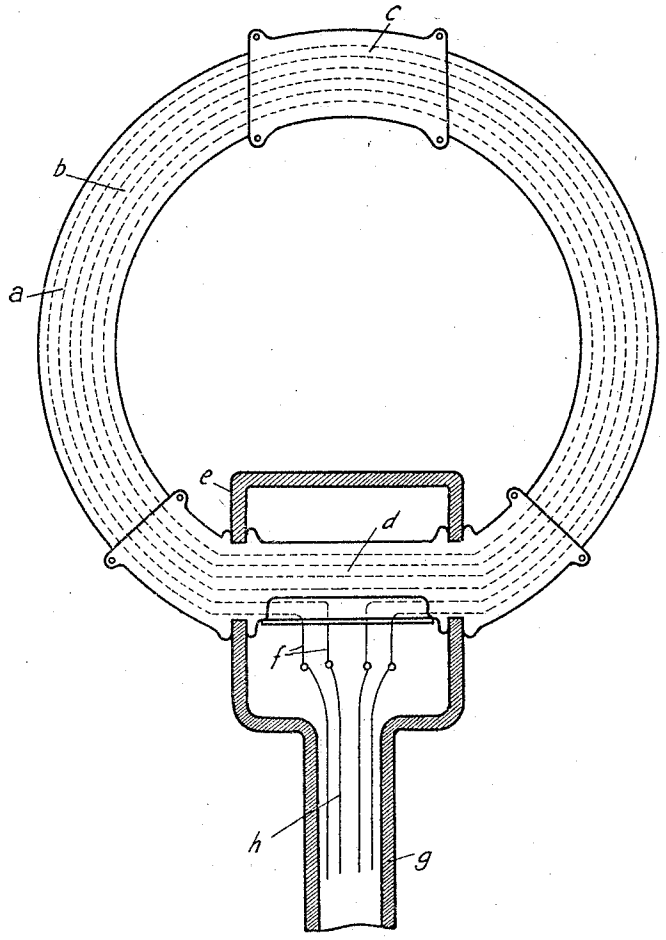

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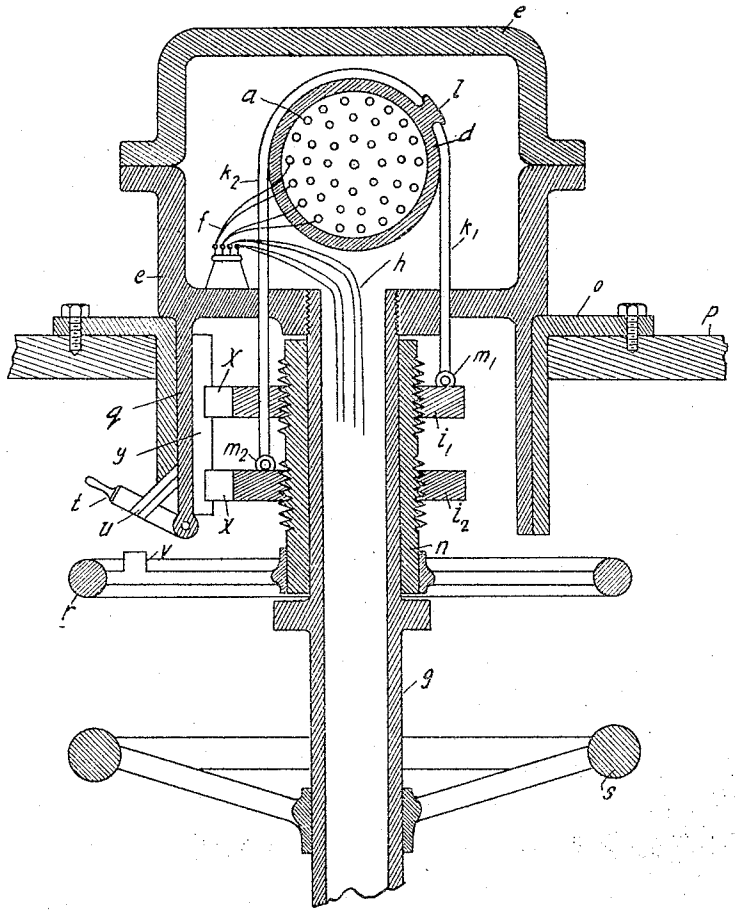
Fig. 2



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UNITED STATES PATENT OFFICE

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FRAME AERIAL

Application filed November 5, 1929, Serial No. 404.980, and in Germany January 16, 1929.

A direction finder aerial consists, as known, of a number of windings in a vertical plane attached to a frame in such a way that they may be rotated together with the frame about a vertical axis.

The invention proposes to improve this frame aerial by providing a possibility of tilting it about a horizontal axis. This arrangement has the advantage that the aerial may be laid down, if desired, during the non-reception period, thus reducing to a minimum the air resistance (which is particularly important in airplanes) and offering a very small target.

A particularly favorable and compact construction is secured in applying this principle to the well known frame aerial, located inside of a protective tube, when the lower part of the latter is made to function as the tilting shaft. With this scheme a very favorable arrangement of the parts of the aerial's tilting mechanism is made possible, requiring but a restricted space.

An example of such an arrangement in accordance with the invention is illustrated on the drawings.

Figure 1 shows a well known weatherproof direction finder aerial the windings a of which (represented in dotted lines) are placed inside of a frame tube. The latter consists of the metal parts b and d and of a connecting piece c made of some insulating material. The ends f of the windings are connected to the receiver by way of the leads h running inside of the shaft g.

With the usual construction of the weatherproof direction finder aerial the shaft g is rigidly attached to the lower part of the protective tube. According to the invention this construction is replaced by one in which the upper end of shaft g serves as a bearing e on which the lower part d of the frame ring is pivoted. This arrangement affords the possibility of tilting the frame aerial at will about the axis d.

An example of an operating mechanism for tilting the frame aerial is depicted in Figure 2. Only the lower part d of the frame ring appears on the drawings which represents a vertical section of the tilting mechanism taken in a plane at right angles to the plane of Figure 1.

The tilting or re-erecting of the frame ring is effected in this case by means of the ropes or chains k_1, k_2 whose upper ends are made to engage one or two suitable points on the shaft d, for instance, a projection l, and which are attached with their lower ends to points m_1 and m_2 of two nuts i_1 and i_2 equipped with opposite hand threads. The nuts i_1 and i_2 are prevented from turning relative to shaft g by their teeth xx which are guided in a vertical slot between two strips y provided on the neck q which forms a part of bearing e. Thus it is possible to change the vertical distance between the nuts i_1 and i_2 by turning the wheel r and the screw n attached to the wheel and equipped with two kinds of threads, one left-hand and one right-hand.

The neck q may be rotated in a guide o fastened to a base p which is stationary relative to the direction finder frame. It is, however, possible to prevent the shaft g from turning by operating a handle t attached to the neck q so that it will engage a corresponding stop u on the bearing o.

In addition, there is another stop v attached to the wheel r which controls the tilting and re-erecting of the aerial. This stop v is so located that in a certain position of the wheel, corresponding to the fully erected position of the aerial, it will come to lie directly under the handle t. Turning the latter down releases the shaft g, making it free to turn, whereas the tilting mechanism of the aerial is now fixed in regard to the shaft.

During the non-reception period the frame aerial is normally down and the shaft g, controlled by the bearing wheel s is fixed by the handle t being in its upper position. In order to start reception the aerial frame is erected by operating the wheel r. In turning the wheel r in a certain direction one nut, for instance i_2, is moved downward, while the other nut, i_1, moves up, the rope (or chain) k_2 turns the shaft d in a counterclockwise direction and the frame rises. Now the handle t is turned down until it engages the stop v which is directly under it. Thereby shaft g is re-

leased while the tilting mechanism is locked and the whole aerial may be turned as one solid unit around its vertical axis by operating the bearing wheel *s*.

To lower the aerial upon termination of the reception the bearing wheel *s* is turned until the handle *t* comes to lie directly under *u*. Thereupon the handle is turned up so that it engages *u*. Shaft *g* is now locked and the tilting mechanism released. Turning the wheel *r* backward causes the nut i_2 to move up and i_1 to move down. The rope k_1 engaging the projection *l* turns the shaft *d* in a clockwise direction and the aerial frame is turned down.

I claim:

1. An aerial system to be mounted on a structure and adapted to be moved into an exposed position with reference to said structure when in use and to an unexposed position when not in use including, a bearing rotatably mounted on said structure, a shaft carried by said bearing, a closure member rotatably mounted in said bearing, said closure member being adapted to enclose the conductors of said aerial system, and coaxial means for rotating said closure member and said shaft.

2. An aerial system to be mounted on a structure and moved into an exposed position with reference to said structure when in use and to an unexposed position when not in use, a rotatable bearing member mounted in said structure and supported thereby, a shaft fixed to said bearing member and adapted to be rotated therewith, a weatherproof closure member mounted for rotation about its periphery in said bearing member, said closure member being adapted to enclose the conductors of said aerial system, means for rotating said closure member including differential gearing means, and means for rotating said shaft.

3. An arrangement, as claimed in claim 2, in which said rotating means are co-axial.

4. An aerial system to be mounted on a structure and adapted to be moved into an exposed position with reference to said structure when in use and to an unexposed position when not in use including, a bearing rotatably mounted on said structure, a shaft carried by said bearing, a closure member rotatably mounted in said bearing, said closure member being adapted to enclose the conductors of said aerial system, a hand wheel for rotating said shaft, a hand wheel for rotating said closure member, said hand wheels being coaxially mounted adjacent each other.

5. An aerial system to be mounted on a structure and moved into an exposed position with reference to said structure when in use and to an unexposed position when not in use, a rotatable waterproof bearing member mounted in said structure and supported thereby, a hollow shaft fixed to said bearing member and adapted to be rotated therewith, a weatherproof closed cylindrical member mounted for rotation about its periphery in said bearing member, said closed member being adapted to enclose the conductors of said aerial system, means for rotating said closure member including a tensioned member fastened at a point intermediate its length to said closed member, a sleeve having opposed pitch threads, a pair of threaded members on said sleeve, said threaded members being fastened to opposite ends of said tensioned member, and means for rotating said sleeve.

6. An arrangement, as claimed in claim 2, in which said rotating means is coaxial with said shaft.

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