Jan. 21, 1930. I. HERSHEY 1,744,548

RADIOANTENNA

Filed May 31, 1927

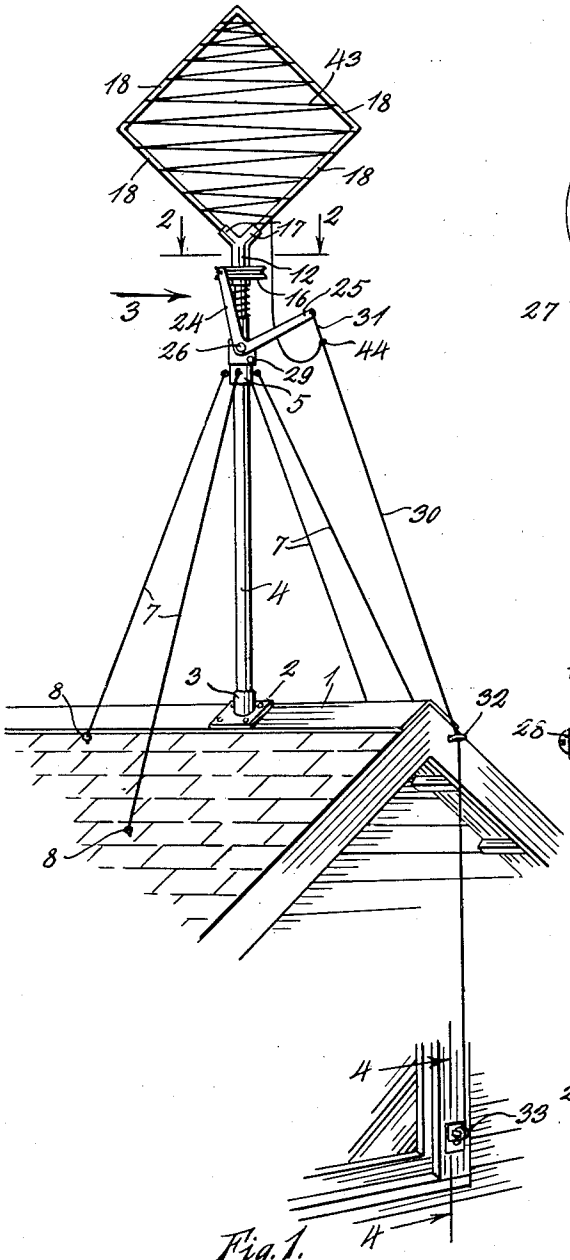

Fig. 1.

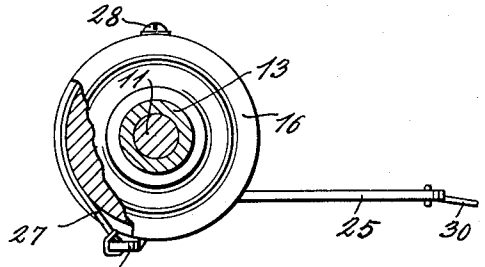

Fig. 2.

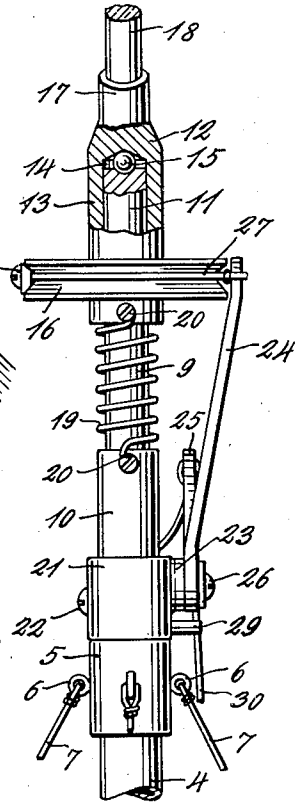

Fig. 3.

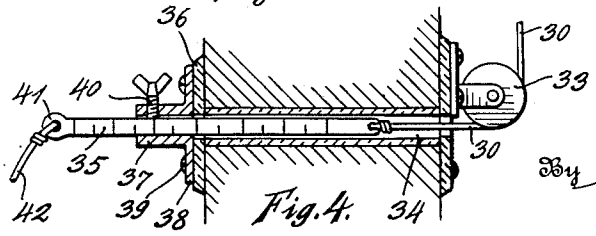

Fig. 4.

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UNITED STATES PATENT OFFICE

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RADIOANTENNA

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This invention relates to improvements in a radio reception antenna and has reference more particularly to an outside antenna that can be placed in an elevated position and which shall be so constructed that it can be oscillated about a vertical axis for the purpose of obtaining the greatest efficiency.

It is well understood that a radio antenna can be so constructed that it will be directional in its action, that is to say that it will receive better from stations located in one direction than from stations located in another direction. Antennæ that are unsymmetrical, or which have greater length than width, are of this type. It has of course been long recognized that in order to obtain the best results from a directional antenna, it is necessary to rotate the same about a vertical axis until its position is such that the maximum efficiency is obtained. Indoor antennæ such as are employed in connection with high power sets are usually placed on a table or on top of a cabinet so that they can be rotated in order to get the best adjustment. It has however been found from experience that much better results will be obtained from an outside aerial or antenna than from an inside one and in order to overcome the objection of directionality of the outside antenna, I am aware that there has been suggested that the same be made of a sphere or other symmetrical geographical shape. Such antennae, however, as a rule present a very small surface and therefore are not efficient in their reception.

It is the object of this invention to produce an outside antenna that shall have considerable area and which shall have a large amount of conductive wire exposed so as to intercept as many of the radio waves as possible. In order to make this antenna light and at the same time obtain the results desired, it is my intention to so construct it that it will have directional properites. The antenna which has been illustrated in connection with this application and which merely serves as an example, is constructed from a rectangular frame made from insulating material and to which or about which an electric conductor is secured. This forms a flat antenna of considerable area and in order that it shall give the greatest efficiency, it is necessary that the plane of the aerial shall be as nearly as possible perpendicular to the direction or to the way the waves are moving. In order to make the necessary adjustment so as to obtain the best results for any desired station, I have so mounted my antenna so that it can be rotated about a vertical axis through an angle of 90 degrees. The angle through which it rotates may be greater or less than 90 degrees but it is apparent that any advantage that can be obtained through such a rotation will be obtained within the arc of 90 degrees.

Having now briefly described my invention and the objects to be attained, I will proceed to describe the preferred embodiment in detail and for this purpose reference will be had to the accompanying drawings in which the preferred embodiment has been illustrated and in which:

Fig. 1 is a perspective view showing my improved antenna secured to a roof.

Fig. 2 is a section taken on line 2—2 of Fig. 1 with a portion of the pulley broken away so as to more closely disclose the construction.

Fig. 3 is a side elevation of a part of the structure taken in the direction of arrow 3, Fig. 1, parts being broken away to better disclose the construction.

And Fig. 4 is a section on line 4—4 Fig. 1 and shows the means for adjusting the position of the antenna and for latching it in adjusted position.

Numeral 1 represents a ridge board of a roof and to this a suitable supporting plate 2 is secured. This plate has an upwardly extending socket 3 for the reception of the lower end of a tubular support 4. This latter member may be a galvanized or nickle plated iron pipe as its function is merely to support. The upper end of the support 4 is threadedly or otherwise secured to the sleeve 5. Sleeve 5 is provided with four eyelets 6 to which the upper ends of the guy wires 7 are secured. The lower ends of these guy wires are secured to the roof by some suitable means such as the screw eyes 8. Secured to the support is my

improved antenna which consists of a vertically extending rod 9 whose lower end is preferably secured to the interior of a tubular pipe section 10 whose lower end is connected with the upper end of the sleeve 5. The upper end of rod 9 is preferably machined so as to have a smooth cylindrical surface which has been indicated by numeral 11. A metallic body member 12 is provided with a downwardly projecting cylindrical portion 13 whose interior is bored out so as to form a socket 14 of the proper diameter to receive the end 11. A steel ball 15 may be placed between the bottom of socket 14 and the top of rod 9 so that the body member 12 can rotate as freely as possible about the cylindrical body 11. The lower end of the cylindrical member 13 has formed integral with it or has secured to it a grooved pulley 16. Projecting upwardly from the body member 12 are two cylindrical members 17 which are provided with screws for the reception of the end of the insulating bar 18 of which the antenna frame is formed. A coiled spring 19 surrounds the rod 9 between the top of the tubular section 10 and the lower end of the cylindrical member 13 and has its end secured to parts 10 and 13 by means of screws 20. This spring has the tendency to maintain the parts in a predetermined position but permits them to be rotated through a small arc which must be at least as great as 90 degrees. If the member 12 is rotated from the neutral position, spring 19 will immediately be put under stress and will exert a force tending to return member 12 to the neutral position.

I will now proceed to describe the means by which the member 12 and the antenna of which it forms a part, can be rotated by the operator from a room within the building. For this purpose I have secured to the pipe section 10 a sleeve 21 which is clamped in position by means of a screw 22. Extending outwardly from one side of this sleeve is a lug 23 to which a bell crank lever having a vertical arm 24 and a horizontal arm 25 is pivotally connected by means of a screw 26. The upper end of arm 24 has secured to it a flexible cable 27 which may be formed from a large number of fine copper wires so as to prevent breakage. The other end of this cable is connected to the periphery of pulley 16 by means of a screw 28. The parts are so adjusted that when the bell crank lever is free to assume a position of rest, the spring 19 will still be under a slight tension and will hold the parts in position as shown in Fig. 2. It is evident that if a force is applied to the outer end of the lever arm 25 which is sufficient to overcome the force of the spring 19, that this lever arm can be rotated and as it is thus rotated it will rotate member 12 and the antenna about the axis of rod 9. As it is unnecessary that this rotation shall exceed 90 degrees, I have provided a stop 29 that will be engaged by the lever 25 when the maximum amount of required rotation has been effected. This stop, although desirable, is not entirely necessary as no harm can be done if the antenna is rotated through more than 90 degrees and as the extent of its rotation is determined by the quality of the reception received and as the receptive efficiency will pass through a maximum somewhere within the arc of 90 degrees, there is no occasion for the operator to subject it to a force which will tend to move it through a greater angle.

As the antenna is located on the roof and as the operator is usually within the building, it is necessary that some means shall be provided which will enable the operator within the building to rotate the antenna. For this purpose I have provided an electrical conductor 30 whose upper end is connected to the outer end of lever 25 by an insulating member 31 and which is supported out of contact with the building by means of an insulated eyelet 32. The lower end of wire 30 passes around a pully 33 which is secured to the outside wall at the outer end of an insulating bushing 34 which extends entirely through the wall of the house. If wire 30 should project into the interior of the building, it is evident that the operator might by exerting a pull on this wire overcome the action of spring 19 and rotate the aerial frame about the vertical axis. In order to facilitate the adjustment and to clamp or latch the parts in adjusted position, the lower end of the wire 30 has been secured to one end of a cylindrical rod 35 which slides within the interior of bushing 34. The outer surface of this rod may be provided with graduations by means of which its position can be accurately determined. Secured to the inside of the building is an insulating plate 36 to which the metal bushing 37 is attached. This bushing has a round flange 38 that rests against the outer surface of the insulating plate 36 and is secured to the latter by screws 39. The bushing 37 is also provided with a threaded opening for the reception of a clamping screw 40 whose end is provided with wings; the inner end of rod 35 is provided with an eyelet 41 to which the conductor 42 is connected. Conductor 42 extends to the antenna binding posts on the reception device. Referring more particularly to Fig. 1 it will be observed that a wire 43 has been wrapped about or secured to the frame members 18 so as to form a wire grid that constitutes the aerial. This wire is connected to wire 30 at 44.

From the above description it will be apparent that an operator located within a building can by merely loosening screw 40 and moving the bar 35 inwardly or outwardly, rotate the aerial frame 18 into such a position that the greatest amount of radio energy will be intercepted by it. After the parts have been properly adjusted, the position of

any important station can be logged by means of the graduations on the rod 35 so that when the operator desires to tune in on any given station, he can first adjust his antenna and will thereby be in position to more quickly tune his set so as to receive this particular station.

In the above description and on the drawings I have described and shown only a single embodiment of my invention. It is, of course, evident that the same results may be obtained by specifically different means and I therefore want it distinctly understood that the device described is illustrative only and that I do not intend to limit myself to the exact construction shown more than is necessary by the prior art.

The broad idea underlying this invention, as it now appears to me, is the use of a directional antenna which can be operated in an elevated position in such a way that it can be rotated about a vertical axis. This is combined with means whereby it is possible for an operator located within the building to adjust the position of the antenna so as to obtain the best reception.

Having described my invention what I claim as new is:

1. A radio reception antenna comprising, in combination, a support, a directional antenna, means for connecting the antenna to the support so that it can be oscillated, means comprising a spring for producing a force tending to move the antenna in one direction, means comprising a flexible tension for moving it against the force of the spring and means for holding the parts in adjusted position.

2. A radio reception antenna comprising, in combination, a rod-like member forming a support, a directional antenna, means for securing the antenna to the support so that it can be oscillated, means comprising a spring for producing a force tending to move the antenna in one direction, a lead in conductor extending from the antenna to a point within a building, said conductor forming a portion of a means for moving the antenna against the force of the spring, and means for holding the antenna in adjusted position.

3. A radio reception antenna comprising, a support, an antenna frame, means for securing the frame to the support so that it can be oscillated about a vertical axis, means comprising a spring for producing a force tending to rotate the frame in one direction, means for limiting the rotation due to the action of the spring, a lead in conductor connected with the frame, said conductor comprising a means for rotating the frame against the tension of the spring and means for latching the frame in adjusted position.

4. A radio antenna comprising, in combination, a vertical bar, an antenna frame provided with a socket adapted to receive the upper end of the bar so as to be rotatably supported thereon, a spring having one end secured to the bar and the other to the frame, a bell crank lever pivoted to the bar and at a point below the socket and means for connecting one end of one of the arms of said lever to the socket in such a manner that the frame will be rotated when the lever is rotated about its pivot.

5. An adjustable radio antenna adapted to be placed on the outside of a building and operated from the inside of the building comprising, in combination, a vertical supporting member, means for holding the support in place, an antenna frame, means for securing the frame to the support so that it may be oscillated about a vertical axis, a stop for limiting the rotation of the frame in one direction, yieldable means for normally holding the frame against the stop, a lead-in wire having one end connected with the frame and the other end terminating within the building, said wire comprising part of a means for rotating the frame about its pivot, and means for holding the frame in adjusted position.

In testimony whereof I affix my signature.

IRVING HERSHEY.