May 19, 1931. E. F. POTTER 1,805,846

LOOP ANTENNA

Filed Feb. 9, 1923 2 Sheets-Sheet 1

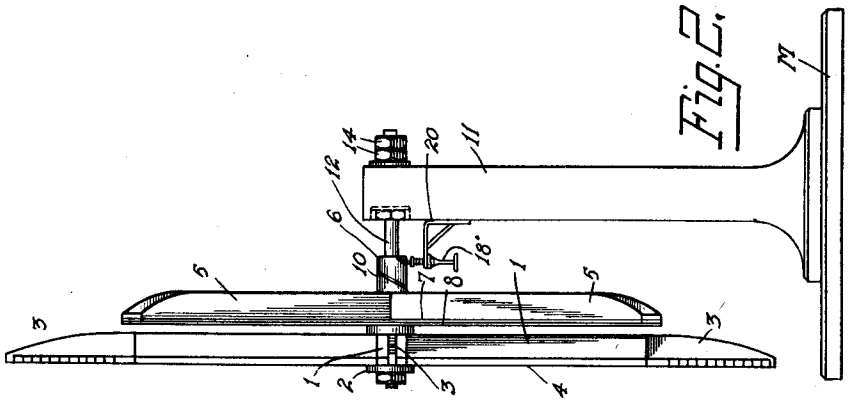

Fig. 2.

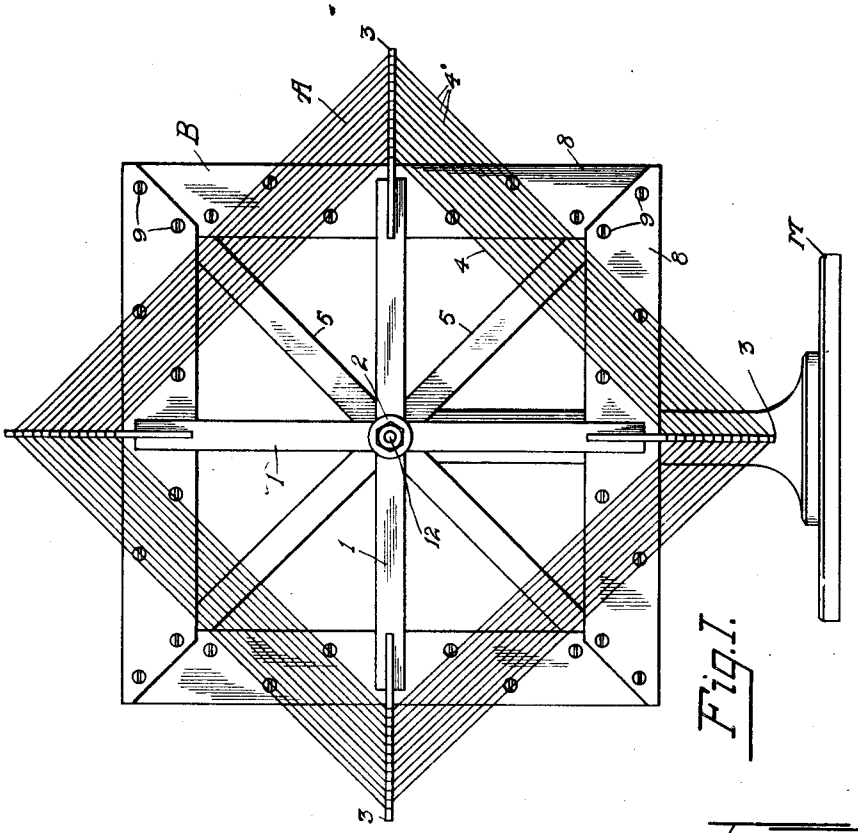

Fig. 1.

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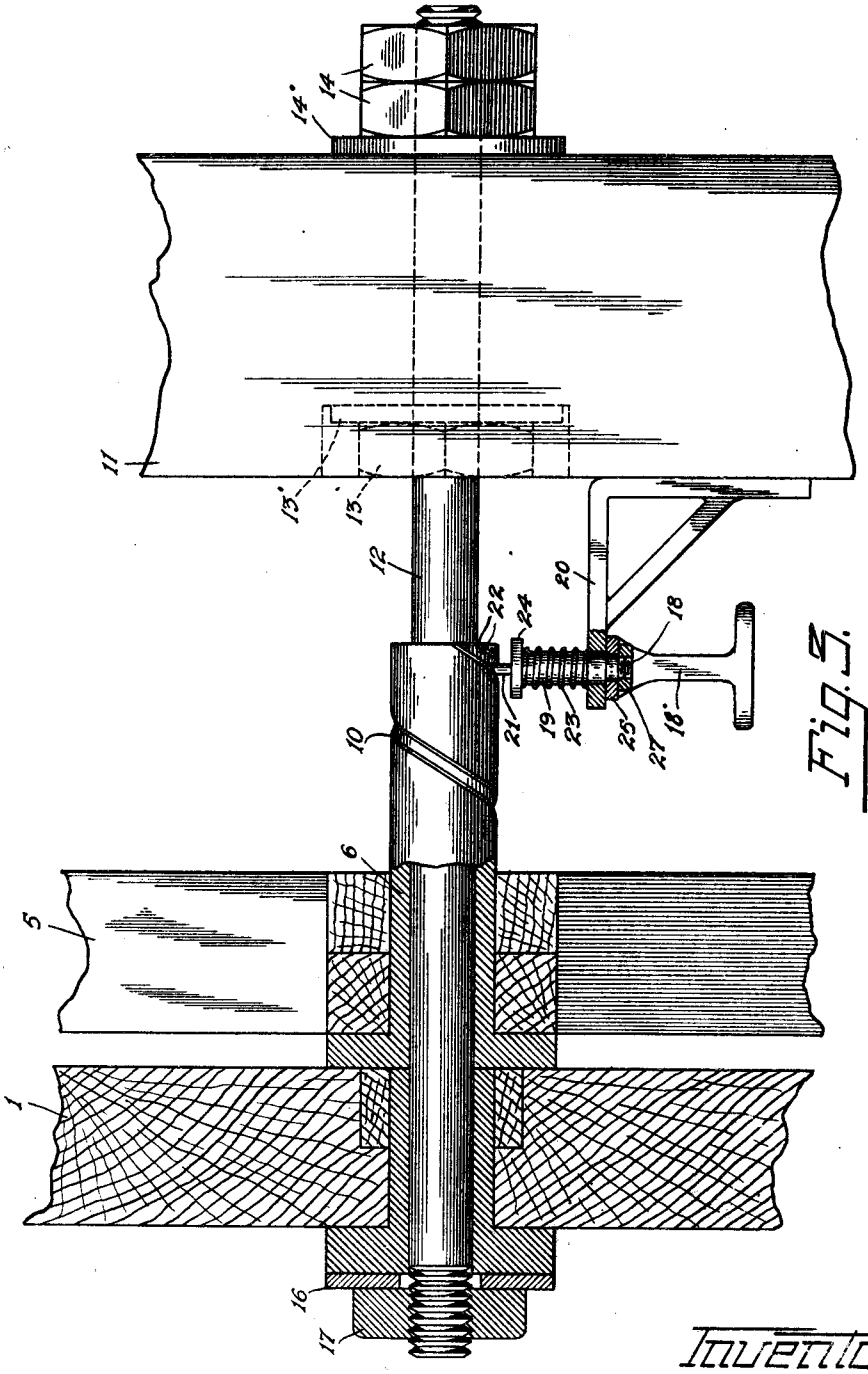

Fig. 3.

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Patented May 19, 1931

1,805,846

UNITED STATES PATENT OFFICE

EARL F. POTTER, OF GLENCOE, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

LOOP ANTENNA

Application filed February 9, 1923. Serial No. 617,929.

My invention relates to radio, or to the transmission of messages by "wireless", and has to do more particularly with that part of radio or "wireless" known in the art as coil or loop antenna or aerial, or, as is sometimes referred to as a tuned antenna or aerial, for receiving and conducting electromagnetic waves to sound producing mechanism or radio receiving sets.

It is an object of my invention to provide an antenna or aerial of the above mentioned type which may be used with the various types of radio receiving sets present in the art today, and which is provided with an adjustable member having metal plates secured thereto for reflecting or concentrating the radio or electromagnetic waves on the loops or coils of the antenna conductor of my invention from different distances, and also to reflect or concentrate the radio or electromagnetic waves on the entire antenna conductor, or only a portion of the antenna conductor, so that the volume of sound produced through the sound producing apparatus or receiving set with which my antenna or aerial is used, may be increased or decreased to obtain the proper degree of volume, by merely manipulating the adjustable member carrying the metal plates to bring the metal plates into different positions relative to the loops or coils of the antenna conductor.

Another object of my invention is the provision of means for adjusting the metal plate carrying member in a rotary and a longitudinal direction relative to the loops or coils of the antenna or aerial conductor, whereby a tuning effect is produced to the proper wave length of the transmitting station.

The above features, as well as others, will be more fully hereinafter described in the ensuing specification, and for a clearer understanding of my invention, reference may be had to the accompanying drawings, in which like reference characters denote like parts in the several views, and in which:

Fig. 1 is a front plan view of my invention;

Fig. 2 is a side view of Fig. 1; and

Fig. 3 is a view showing the means for adjusting the metal plate carrying member relative to the loops or strands of the antenna or aerial of my invention, and also showing certain parts of my invention in cross-section.

Referring now more in detail to my invention, A is an antenna or aerial element, and B is an adjustable element which is movable in a longitudinal and a rotary direction, for reflecting or concentrating electromagnetic or radio waves on the strands of the antenna or aerial conductor to increase or decrease the volume of sound produced through the radio sound-producing mechanism or receiving set connected to the antenna or aerial of my invention, as will be more fully hereinafter described. The element A comprises a pair of cross arms 1, which are suitably notched and secured together at their center portions by means of a sleeve 2 which has a drive fit with suitably aligned openings extending through the center portions of said cross arms 1. Extension arms 3 of suitable insulating material are provided and are secured in suitable openings in the ends of the cross arms 1. The extension arms 3 are provided with a plurality of suitable grooves or slots for receiving the antenna or aerial conductor 4 to form the turns or loops 4′ out of said antenna or aerial conductor.

The adjustable element B comprises a pair of cross arms 5 which are suitably notched and secured together at their center portions by means of a sleeve 6 which has a drive fit with suitable aligned openings extending through the center portions of said cross arms 5. To the end portions of the cross arms 5 are suitably secured four strips of wood 7 to form a rectangular member and to the front face of these strips 7 are secured plates 8 of suitable metal, by means of screws 9 which extend through openings in the metal plates 8 and then have screw-threaded engagement with the cross arms 5 and strips 7. The end of the sleeve 6 which extends through the openings in the cross arms 5 is provided with a twisted or longitudinally winding slot 10, for purposes which will be pointed out later.

A supporting post 11 is provided which has a cylindrical shaft 12 extending through an opening in its one end and is secured therein by means of nuts 13 and 14 and washers 13′ and 14′, respectively, and which nuts have screw-threaded engagement with the shaft 12. To operatively associate the element B with the element A, element B is slipped over the free end of the shaft 12 via its sleeve 6 which has a central opening for receiving said shaft 12. Element A is now slipped over the free end of the shaft 12 via its sleeve 2, which is provided with a central opening for receiving the end of the shaft 12. A washer 16 is provided, which fits over the end of the shaft 12 and engages the end of the sleeve 2, and a nut 17 is also provided which has screw-threaded engagement with the threaded end portion of shaft 12 for preventing longitudinal movement of the element A on the shaft 12. The flange portion 6′ of the sleeve 6 separates the element A from the element B when the element B is in the position shown in Figures 2 and 3.

To adjust the element B relative to the element A, member 18 is provided which has its enlarged body portion 19 extending through a suitable opening in the bracket 20, which bracket is suitably secured to the post 11, so that its reduced end 21 extends into and engages the sides 22 of the twisted or winding slot 10 in the sleeve 6 of element B. A member 18′ for controlling member 18 is provided and has its end 25 turned back and provided with an opening for receiving the threaded end portion of member 18, whereby member 18′ is secured to the member 18 by means of a nut 27, which has screw-threaded engagement with the end of said member 18. The opening in the bracket 20 is of a size to permit longitudinal movement of the member 18 and to maintain the end 21 of said member 18 in engagement with the slot 10 in the sleeve 6; a coil spring 23 is provided which fits over the enlarged portion 19 of the member 18 and has its one end engaging one face of the bracket 20 and its other end engaging the collar 24 which is integrally formed with the member 18. The end 25 of member 18′ secured to member 18 will engage the other face of the bracket 20, which will limit the longitudinal movement of the member 18 against the tension of spring 23, thereby limiting the amount of extension of its end 21 in slot 10 of sleeve 6.

The post 11 supporting elements A and B, as a unit, is pivotally secured in any suitable manner to a suitable mounting member M so that the elements A and B may, through the turning of the post 11 upon the member M, be made to face any direction desired.

Having described the construction and assembly of the various parts of my invention I will now describe its operation. When the element B is in its position as shown in the several views of the drawings, in which position element B will be as close to element A as is possible, and assuming that it is desired to move element B away from element A, to increase the space between the metal plates 8 of element B and the loops or turns 4′ of the antenna or aerial conductor 4 of element A, the same may be accomplished by rotating the element B in a clockwise direction. The element B rotating in a clockwise direction will cause the sleeve 6 to ride along on the end 21 of member 18 in a longitudinal and rotary direction, due to the winding effect of slot 10 in said sleeve 6, and the engagement of said end 21 with said slot 10, whereby element B is moved away from element A, thereby changing the position of the metal plates 8 relative to the loops or turns 4′ of the antenna conductor 4. When the element B has been moved to the position desired, the operator will cease rotating element B, and element B will be held in this desired position by the member 18, due to the frictional engagement of the end 21 of member 18 with the sides 22 of slot 10 in sleeve 6. To bring the element B closer to element A, element B will be rotated in a counter-clockwise direction, whereby sleeve 6 will move along on the end 21 of member 18 in a longitudinal and rotary direction due to the engagement of end 21 of member 18 with the slot 10 in sleeve 6, as pointed out above, thereby bringing the element B closer to element A and changing the position of the plates 8 relative to the loop 4′ of the antenna conductor 4, and when element B is in the position desired it will be held in this position by member 18, as described above. If it is desired to move element B in a longitudinal direction only and not to move said element in a rotary direction, or vice versa, the same may be accomplished by pulling on the member 18′ in a direction against the tension of the spring 23, and since member 18′ is secured to member 18, said members 18 and 18′ will move against the tension of spring 23, whereby the end 21 of the member 18 will disengage the slot 10 in the sleeve 6, which will permit the element B to be moved in a rotary or longitudinal direction, as the case may be, without moving said element B in the other direction, and when moved to the position desired the member 18′ is released whereupon the end 21 of said member 18 will engage the slot 10 in sleeve 6 if the slot 10 is in alignment with the said end 21, and if it is not in alignment the end 21 will engage the outer face of the sleeve 6, and due to the tension of spring 23 element B will be held in position against movement by frictional engagement with the end 21 of sleeve 6.

By having the element B movable in both

a longitudinal and rotary direction, it is at once apparent that the metal plates 8 may be brought into different positions relative to the loops or strands 4′ of the antenna conductor 4, so that the electromagnetic or radio waves may be reflected or concentrated on the entire length of the loops or strands 4′ of the antenna conductor 4, when the plates 8 are brought to coincide with the loops or strands 4′ of the conductor 4, or the radio waves may be reflected and concentrated on only a portion of the strands or loops 4′ of the conductor 4, as is the case when the metal plates 8 are in the position shown in Fig. 1. By having the element B movable longitudinally, the plates 8 may be brought closer or moved away from the loops or strands 4′ of the antenna conductor 4 to vary the effect of the electromagnetic or radio waves reflected or concentrated on the strands of the antenna conductor 4 to increase the volume of sound produced through the sound producing mechanism or radio receiving apparatus which may be operatively associated with my invention, or to decrease the volume of sound produced through the sound producing mechanism or radio receiving set. Thus, it will be obvious that, by regulating or adjusting the element B relative to element A, the electromagnetic or radio waves may be reflected or concentrated on the strands of the antenna conductor in such a way, that the volume of sound produced by the radio apparatus with which my invention is employed, may be varied until the best desired tone or sound is obtained. It will further be seen that I have provided an antenna or aerial which may be operated and adjusted as tuning means for effecting the desired degree of volume of the sound produced through the sound producing mechanism or radio receiving set which may be connected to my antenna or aerial.

While I have described and illustrated a preferred embodiment of my invention, it is to be understood that I do not wish to be limited to the exact structure as described and shown, but intend to cover all changes and modifications which come within the spirit and scope of the appended claims.

Having described my invention, what I claim as new and desire to secure by United States Letters Patent, is:

1. In a device of the character described, a coil of conducting material for receiving electromagnetic waves, means positioned back of and in association with said coil of conducting material, a standard supporting said coil of conducting material and said means and means comprising a spiral slot and a finger engaging said slot to convert rotatable movement of said plate into longitudinal movement thereby adjusting the position of said first means relative to said coil of conducting material to increase or decrease the distance between said coil of conducting material and said first means.

2. A radio antenna or aerial of the character described, including a conductor for receiving and conducting electromagnetic waves to sound producing mechanism associated therewith, means adjustably associated with said conductor for varying the reception of electromagnetic waves by said conductor to increase or decrease the volume of sound produced by said sound producing mechanism, a member supporting said conductor and said first means, and means comprising a sleeve member having a spiral slot, a finger engaging said slot, said slot and finger cooperating to move said first means in a longitudinal direction when said first means is rotated and means for rendering said means inoperative.

3. A device of the character described including a mounting plate, a support rotatably secured thereto, a loop aerial connected to said support, and an adjustable element secured to said support and associated with said loop aerial and adapted to be rotated relative thereto, means comprising a spiral slot and a finger engaging said slot adapted to move said adjustable element in a longitudinal direction when the said element is rotated.

4. A device of the character described including a mounting base, a supporting element, a loop aerial secured to said supporting element, an adjustable element mounted back of said loop aerial and means comprising a sleeve member having a spiral slot therein and a finger engaging said slot, said adjustable element adapted to be rotated and said finger and slot converting said rotatable movement into longitudinal movement whereby said adjustable element is moved longitudinally in respect to said loop aerial.

5. A device of the character described including a mounting base, a supporting element, a loop aerial secured to said supporting element, an adjustable element mounted back of said loop aerial and means comprising a sleeve member having a spiral slot therein and a finger engaging said slot, said adjustable element adapted to be rotated and said finger and slot converting said rotatable movement into longitudinal movement whereby said adjustable element is moved longitudinally in respect to said loop aerial, said loop aerial and adjustable element being adapted to be rotated simultaneously with respect to said mounting base.

6. A device of the character described including a mounting base, a supporting element, a loop aerial secured to said supporting element, an adjustable element mounted back of said loop aerial and means comprising a sleeve member having a spiral slot

therein and a finger engaging said slot, said adjustable element adapted to be rotated and said finger and slot converting said rotatable movement into longitudinal movement whereby said adjustable element is moved longitudinally in respect to said loop aerial, said loop aerial and adjustable element adapted to be rotated simultaneously with respect to said mounting base, and means for maintaining said adjustable element in its adjusted position relative to said loop aerial.

Signed by me at Chicago, in the county of Cook, and State of Illinois, this 7th day of February, 1923.

EARL F. POTTER.