March 16, 1954 E. J. EHRBAR 2,672,555

ANTENNA

Filed Dec. 12, 1950 2 Sheets-Sheet 1

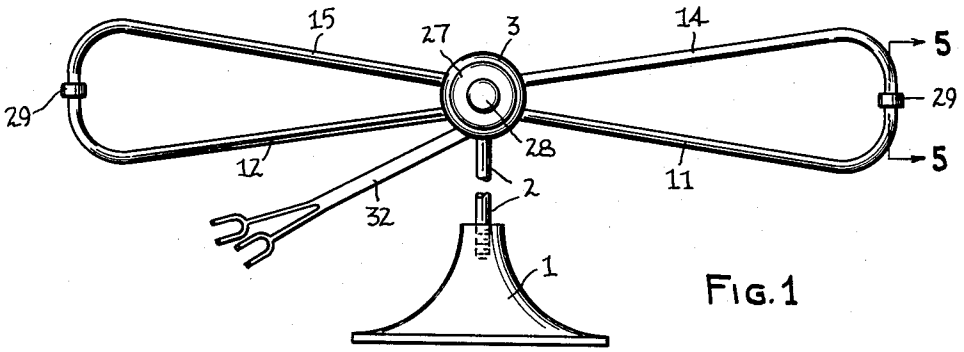


FIG. 1

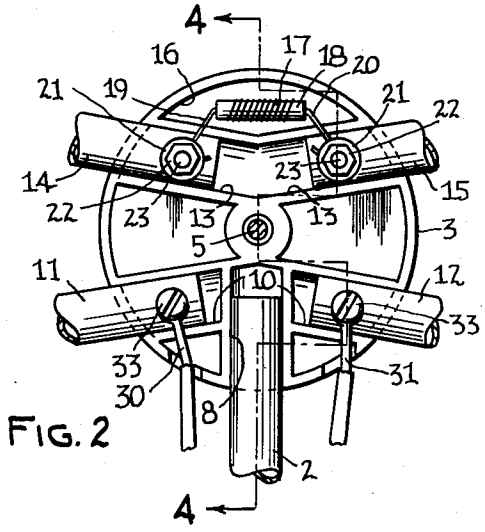


FIG. 2

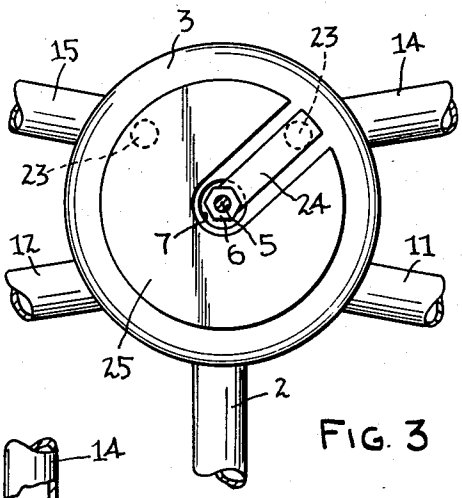


FIG. 3

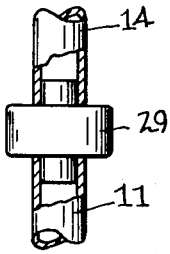


FIG. 5

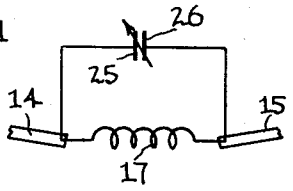


FIG. 6

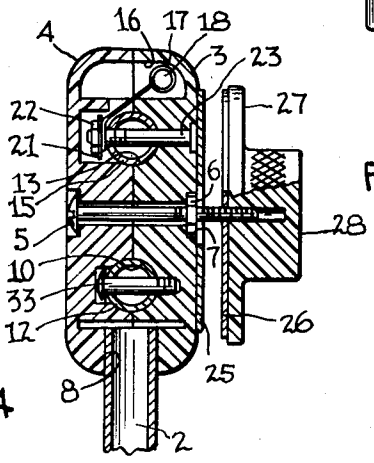


FIG. 4

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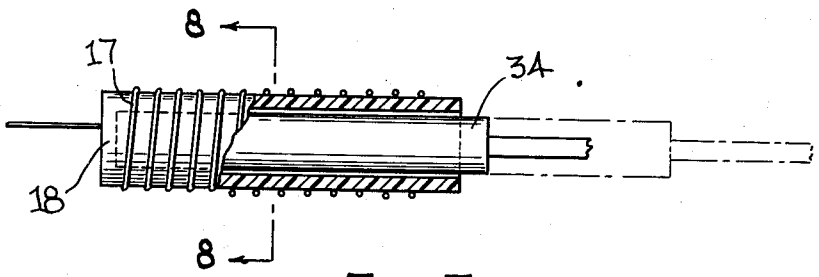


FIG. 7

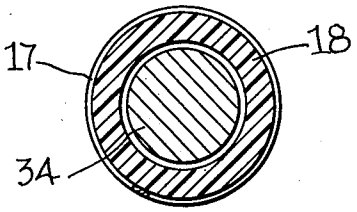


FIG. 8

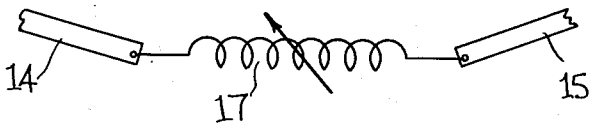


FIG. 9

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Application December 12, 1950, Serial No. 200,336

7 Claims. (Cl. 250—33)

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This invention relates, as indicated, to an antenna, but has reference more particularly to an improved indoor antenna, which is adapted especially for use in connection with television sets.

In copending application, Serial No. 164,101, there is disclosed an antenna having a dipole adapted for low wave band reception, and comprising spaced rod-like elements connected to each other by means of an inductance coil.

A primary object of the present invention is to provide a variable tuning means, either capacitive or inductive, for such an antenna for continuously tuning through television channel assignments of 54 to 88 mc., as well as for covering frequency modulation and other high frequency channels.

Another object of the invention is to provide a variable tuning means, either capacitive or inductive, which resonates the inductively loaded dipole to the desired frequency, and provides a means for electrically changing the length of the loaded dipole, without altering its mechanical structure.

A further object of the invention is to provide a variable tuning means, either capacitive or inductive, which is conveniently located for ready accessibility, is easily operated, and which is simple in construction and inexpensive to manufacture.

Other objects and advantages of my invention will be apparent during the course of the following description. In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a front elevational view of an antenna embodying one form of the invention;

Fig. 2 is a fragmentary elevational view of the central portion of the antenna, in full size scale, and with the rear disk removed to more clearly show the construction;

Fig. 3 is a fragmentary front elevational view of the central portion of the antenna, in full size scale, with the tuning knob removed;

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

Fig. 5 is a fragmentary view, showing the end connection between the dipoles of the antenna;

Fig. 6 is a view illustrating diagrammatically the electrical nature of the invention when the tuning is capacitive;

Fig. 7 is a view similar to Fig. 2, but showing a modified form of the invention, utilizing an inductive tuning means or permeability tuning, and

Fig. 8 is a transverse cross-sectional view taken on the line 8—8 of Fig. 7, and

Fig. 9 is a view illustrating diagrammatically the nature of the invention, when inductive tuning means, as shown in Figs. 7 and 8, is used.

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Referring more particularly to Figs. 1 to 6 inclusive of the drawings, the antenna will be seen to comprise a base 1, molded from a plastic material, as for example, Bakelite, and having threadedly secured thereto a mast 2 formed of metallic tubing, preferably aluminum tubing.

Mounted on the upper end of the mast 2 is a circular antenna support consisting of a front disk 3 and a rear disk 4, which are molded from a plastic insulating material, such as Bakelite, and are removably secured to each other, as by means of a screw 5, passing through aligned central apertures in the disks, and a nut 6 threadedly secured to the screw 5 and disposed in a countersunk recess 7 in the front of the disk 3. The disks 3 and 4 are molded to provide radial recesses 8, of semi-circular cross-section, which coact to receive and snugly engage the upper end portion of the mast 2.

The disks 3 and 4 are also molded to provide downwardly extending divergent recesses 10 of semi-circular cross-section, which coact to receive and snugly engage the inner ends of aluminum tubes 11 and 12 which form elements of a dipole, which are so dimensioned as to be in resonance electrically with television broadcasting stations in the present high band television allocation or spectrum, such, for example, as channels 7 to 13, inclusive.

Disks 3 and 4 are likewise molded to provide upwardly extending divergent recesses 13 of semi-circular cross-section, which coact to receive and snugly engage the inner ends of aluminum tubes 14 and 15, which form elements of a second dipole, the inner ends of which are spaced from each other.

Disposed within a recess or cavity 16 in the disk 3, directly above the recesses 13, is an inductance coil 17 preferably formed of fine enamelled wire, wound around a core 18, of Bakelite or other suitable material, the ends of the coil being electrically connected to the tubes 14 and 15 respectively by means of wire connections 19 and 20, which are clamped to the tubes 14 and 15 by means of washers 21. The washers 21 are secured in position by means of nuts 22, which are threaded into studs 23 which extend diametrically through the tubes 14 and 15 and to the rear face of the disk 3.

The coil 17 has an inductance which permits the combination of the dipole elements 14 and 15 and the coil 17 to be in resonance electrically with television broadcasting stations in the present low band television allocation or spectrum, such, for example, as channels 2 to 6, inclusive. The dipole 14—15 is thus electrically loaded at the center by means of the coil 17.

The rear end of one of the studs 23 is fastened to one end of a thin brass strap 24, the other end of the strap being fastened to the nut 6.

The rear end of the other stud 23 is fastened to a C-shaped plate 25 of thin brass stock similar to that from which the strap 24 is made, the point of connection being adjacent the periphery of the plate.

The stem or shank of the screw 5 extends for an appreciable distance beyond the nut 6, and has threadedly secured thereto a relatively thick circular brass plate 26 which is rigidly embedded in a disk 27 of insulating material, such as Bakelite. The disk 27 is provided with a knurled knob 28 formed integrally with the disk, this knob serving as a means for manually rotating the disk, whereby the spacing between the plate 26 and the plate 25 may be varied.

The plates 25 and 26 are thus electrically insulated from each other and form a variable condenser which is in parallel with the inductance coil 17 of the dipole 14—15. The manual control for varying the capacitance of the plates 25 and 26, which is afforded by the readily accessible knob 28, provides a means for continuously tuning through the television channel assignments of 54 to 88 mc. and may be used to cover FM and other high frequency channels.

The capacity of the variable condenser resonates the inductively loaded dipole to the desired frequency, and provides a means for electrically changing the length of the loaded dipole, without altering its mechanical structure. The tuning control is conveniently located and easily operated, and the mechanism is simple in construction and inexpensive to manufacture.

The dipole elements 11 and 12 are bent upwardly at their outer ends, and the dipole elements 14 and 15 are similarly bent downwardly at their outer ends extending downwardly to points spaced from the outer ends of elements 11 and 12. Buttons 29, formed of a plastic insulating material, are employed as means for mechanically joining the dipole elements 11 and 12 to the dipole elements 14 and 15 at their ends. From an electrical standpoint, the buttons 29 form the dielectric material for condensers or capacitors, which consist of these buttons and the portions of the dipole elements which they connect. They serve to couple voltage at the ends of the dipole formed by the elements 14, 15, 17, 25 and 26 to the lower dipole made up of the elements 11 and 12, that is to say, the dipoles are coupled electrically by means of capacitance established through the insulating material of buttons 29.

The terminals or contacts 30 and 31 of a transmission line 32 are secured electrically to the tubes 11 and 12, as by clamping such contacts to the tubes by means of the heads of self-tapping screws 33 which are in threaded engagement with the tubes 11 and 12. The transmission line 32 is a conventional one employed to connect the antenna to the television set or receiver.

In that form of the invention shown in Figs. 7, 8 and 9, the inductance coil 17, which is preferably formed of fine enamel wire, is wound around a core 18 of Bakelite or other suitable material. The core 18 is in the form of a tube containing a powdered iron core 34, which is movable along the axis of the tube, so as to vary the inductance of the coil 17. This movable powdered iron core constitutes an inductive tuning means of the form commonly known as permeability tuning.

It is to be understood that the forms of my invention, herewith shown and described, are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In an antenna for television purposes and the like, a mast, a pair of substantially flat front and rear discs of insulating material mounted on said mast, dipole elements in spaced relation to each other mounted in said discs, an inductance coil disposed within one of said discs, and connected to said dipole elements, a screw passing through aligned central apertures in said discs and connecting said discs to each other, said screw having an extension projecting behind the rear disc, and variable tuning means for said inductance coil, said tuning means comprising a metallic plate secured to the rear surface of the rear disc and electrically connected to said inductance coil, a second metallic plate threadedly secured to said extension and disposed parallel with said first plate, and means for rotating said second plate to vary the spacing between said plates.

2. An antenna, as defined in claim 1, in which said rotating means comprises a knob of insulating material in which the second plate is embedded.

3. An antenna, as defined in claim 2, in which said inductance coil is connected to said dipole elements by means of screws passing diametrically through the dipole elements, the rear end of one of said screws being electrically connected to said first plate and the rear end of the other screw electrically connected to a strip of metal which, in turn, is electrically connected to the screw which extends through the central apertures in the discs.

4. An antenna, as defined in claim 3, in which said metal strip is disposed in a recess in said first plate and is coplanar with said plate.

5. In an antenna for television purposes and the like, a mast, a pair of connected disks of insulating material mounted on said mast, dipole elements in spaced relation to each other mounted in said disks, an inductance coil connecting said elements and in series therewith and disposed in one of said disks, a variable capacitance in parallel with said inductance coil, said capacitance comprising spaced metallic plates, and means for varying the spacing between said plates, one of said plates being mounted on the front of one of said disks, and the other of said plates being mounted on a third disk disposed in a plane parallel with said plates.

6. An antenna, as defined in claim 5, in which said other plate is threadedly secured to the means which connects said pair of disks.

7. An antenna, as defined in claim 6, in which said third disk is provided with a knob for rotating said disk.

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