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VERTICAL ANTENNA WITH REMOTELY CONTROLLED LOADING COIL AND TUNING INDICATOR

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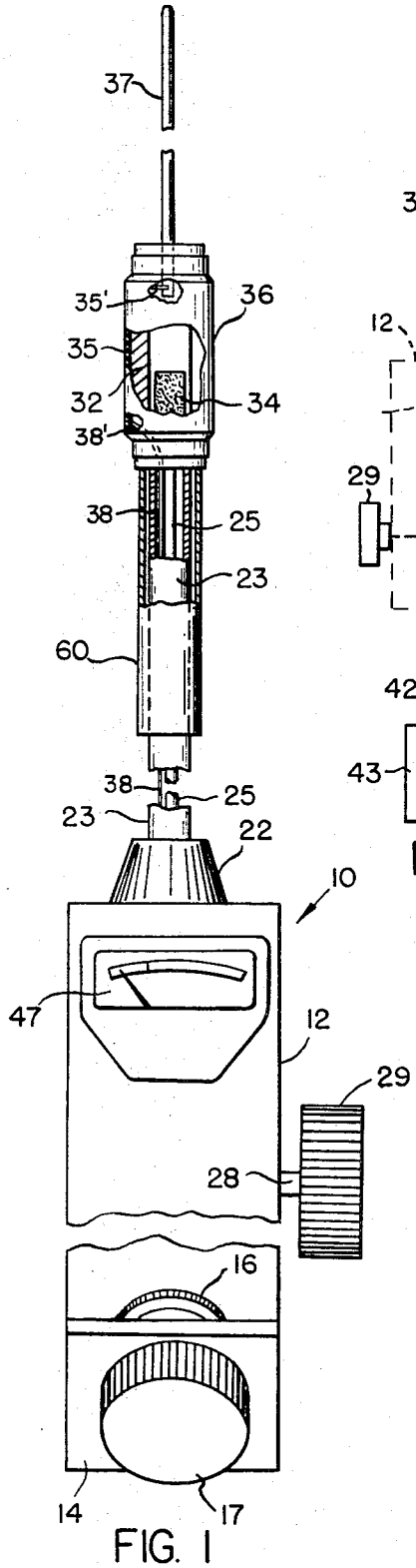


FIG. 1

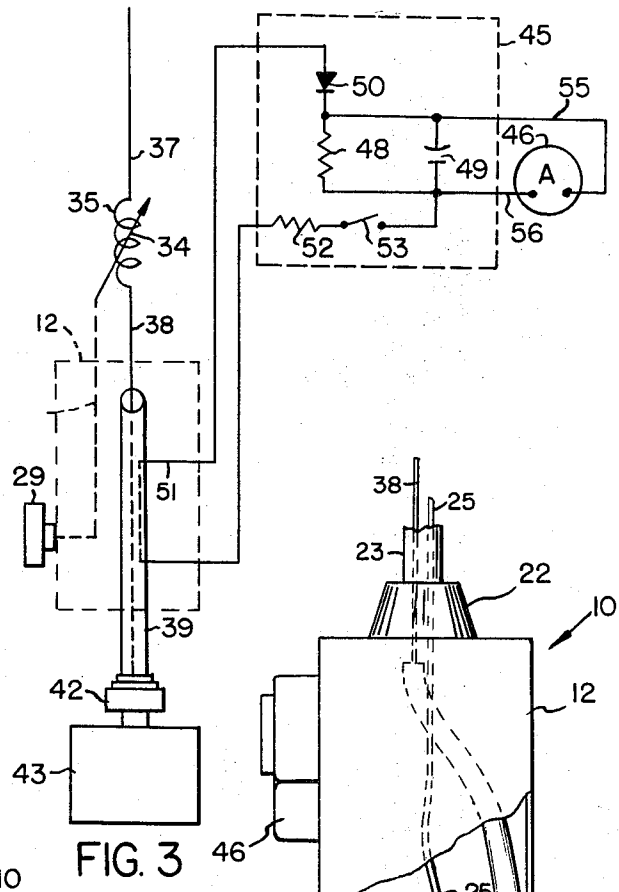


FIG. 3

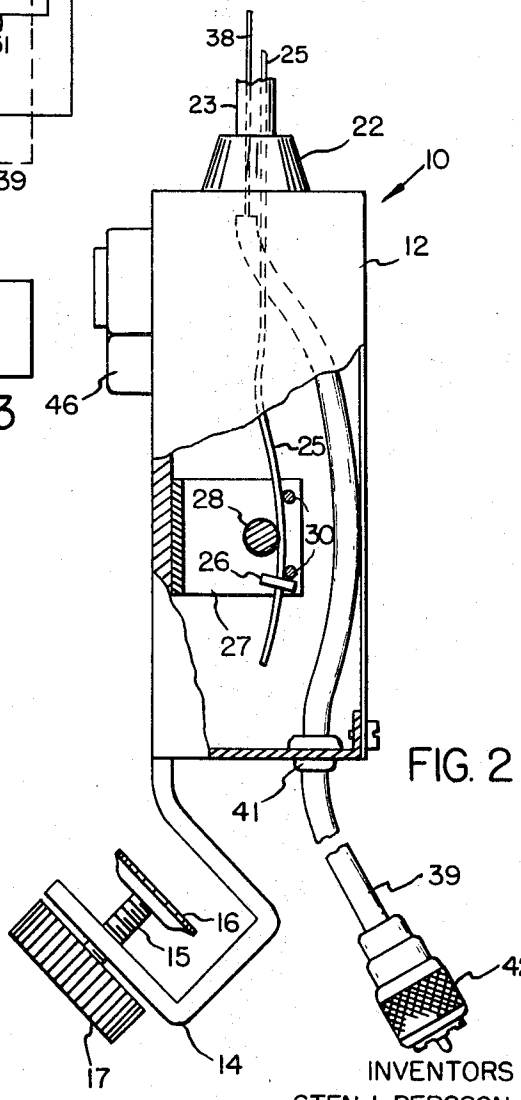


FIG. 2

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VERTICAL ANTENNA WITH REMOTELY CONTROLLED LOADING COIL AND TUNING INDICATOR

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Int. Cl. H01q 9/00, 9/16

U.S. Cl. 343—703 6 Claims

ABSTRACT OF THE DISCLOSURE

A dielectric sleeve, which is secured on a tubular support, is surrounded by a helical wire inductance coil that is connected at one end to a metal whip rod and at its opposite end to a transmitter. A ferrite tuning core is supported for adjustment in the bore of the sleeve by a plastic rod which extends through the tubular support to a housing having manually operable means for adjusting the rod axially. A metal sleeve projects from the lower end of the dielectric sleeve coaxially around the tubular support to form a ground plane for the antenna. A directional coupler and an ammeter are mounted in the housing to indicate optimum adjustment of the core.

This application is a continuation-in-part of our U.S. patent application Ser. No. 590,248, filed Oct. 28, 1966, now abandoned.

This invention relates to radio antennas, and more particularly to an adjustable radio antenna which is particularly adapted for use with citizen band radios.

Normal citizen band radios operate at very high frequencies, and on relatively low power inputs—e.g., in the area of five watts. With such a low power input, it is desirable, if not necessary, that compensation be made in the antenna for changing weather conditions, varying inductance conditions in the antenna itself, the height of the building or other object on which the antenna is mounted, etc. Although efforts have been made heretofore to provide such adjustment or compensation in an antenna of the type described, such proposals as have been made previously for this purpose have not proved to be entirely satisfactory or practical.

It is an object of this invention to provide an improved radio antenna, the inductance of which can be readily and precisely adjusted for optimum operation.

Another object of this invention is to provide an improved adjustable radio antenna having visual means for indicating when the antenna has been adjusted to receive maximum energy from the transmitter connected thereto.

A further object of this invention is to provide an improved radio antenna having a supporting housing which can be releasably secured to any stationary object nearby the associated transmitter, and which contains manually operable means for adjusting the inductance etc. to compensate for ambient conditions and to receive maximum energy from the transmitter.

It is also an object of this invention to provide an improved, adjustable radio antenna, which is operable as a half-wave, tunable dipole antenna.

Another object of this invention is to provide an improved radio antenna which is substantially more effective than prior, like antennas.

Other objects of the invention will be apparent hereinafter from the specification and from the recital of the appended claims, particularly when read in conjunction with the accompanying drawing.

In the drawing:

FIG. 1 is a fragmentary front elevational view of an antenna made in accordance with one embodiment of this invention, parts thereof being cut away and shown in section;

FIG. 2 is a fragmentary side elevational view of this antenna, parts thereof again being cut away and shown in section; and

FIG. 3 is a combined wiring diagram and schematic view showing the antenna and the electrical connections thereto.

Referring now to the drawing by numerals of reference, the antenna **10** comprises a housing **12**, which is adapted to be secured to a stationary support, such as a window sill, by an integral C-clamp **14**, which projects from the underside of the housing. A screw **15**, which is threaded into one leg of the clamp **14**, carries on one end thereof a conventional clamping disc **16**, and at its opposite end a knurled knob **17** for moving the disc **16**, in known manner, to and from clamping position.

Secured at its lower end in a molded base **22**, which is fixed to the upper end of the housing **12**, and extending above the housing is a metal tube **23**. Mounted for axial adjustment in the tube **23** is a flexible phenolic tuning rod **25**. This rod extends slidably down through the upper end of the housing **12**, and is guided at its lower end for axial sliding movement in the eye of a metal loop or ring **26**, which projects from one of the legs of a bracket **27** that is fixed in the lower end of housing **12**.

Rotatably journaled in the bracket **27** for rotation about an axis that extends transverse to the rod **25** is a shaft **28**. This shaft is rotatable by means of a knurled knob **29**, which is secured at the outer end of shaft **28** at the exterior of the housing **12**. A pair of spaced pins **30**, which are mounted in the bracket **27** parallel to shaft **28**, slidably engage the rod **25** to hold it in frictional engagement with the peripheral surface of the shaft **28**, so that when the latter is rotated, the rod **25** is shifted axially in one direction or the other depending upon the direction of rotation of the shaft.

Secured to the upper end of the rod **25** for axial adjustment thereby in the bore of a "Plexiglas" or like insulating sleeve **32**, which is secured to the upper end of the tube **23**, is a ferrite core **34**. Sleeve **32** is surrounded by a wire coil **35**, which in turn is enclosed or embedded in an insulating sleeve **36**. At its upper end **35'**, coil **35** is connected by soldering or in any conventional manner to the lower end of a conventional, metallic, antenna whip rod **37**, which projects from the upper end of the insulating sleeve **32**. At its lower end coil **35** is connected by soldering or in any conventional manner to the upper end **38'** of a wire **38** (FIGS. 1 and 3), which extends downwardly through the tube **23** and then through a conventional, insulated cable or tube **39**.

Cable **39** is fastened in conventional manner in the housing **12** adjacent the top of the latter, and extends downwardly through a grommet **41** in the bottom of housing **12** to the exterior thereof, and has on its lower end a conventional plug or jack **42** for releasably connecting the antenna to a conventional transmitter **43**, which is illustrated schematically in block form in FIG. 3.

Mounted in the housing **12** above the bracket **27** is a directional coupler **45** (FIG. 3) and an ammeter **46**, which has a meter face **47** that is viewable through a glass covered opening in the face of the housing **12**. (In FIG. 3 the coupler **45** and ammeter **46** are shown at the exterior of the housing **12** merely for convenience in illustration.) Coupler **45** comprises a resistor **48** connected in parallel with a capacitor **49**, and in series with a diode **50** through a line **51**, a second resistor **52**, and a normally-open switch **53**. The ammeter **46** is connected to the coupler by

lines 55 and 56; and for a portion of its length the line 51 extends through the cable 39, parallel to the line 38 inductively to couple line 51 with the antenna wire 38.

Referring now to FIG. 1, it will be noted that the metal sleeve 23 is surrounded at its upper end by a further metal sleeve or shield 60, which is secured at its upper end to the lower end of the "Plexiglas" sleeve 32 coaxially thereof. The lower end of the sleeve 60 is disposed above the top of housing 12 and the base 22; and it has an axial length equal to approximately one quarter (¼) the wave length of the signal that is to be transmitted. It has been found that the addition of this second shield 60 around the shield or tube 23, serves as a ground plane, allowing the antenna to operate as a half wave, center-fed, coaxial, tunable dipole antenna, which produces a maximum of radiation in the plane normal to the axis of the antenna.

In use, the antenna 10 is connected to a transmitter 43 as shown in FIG. 3; and by conventional means not illustrated, the switch 53 is closed when the transmitter is turned on. When switch 53 is closed it completes an inductive pick-up loop responsive to the alternating current flow in the antenna wire 38. The current flow in line 38 attempts to induce corresponding alternating current flow in the line 51. However, due to the presence of the diode 50, line 51 conducts only on alternate half cycles, when its anode is positive, and stops conducting when its anode goes negative. This produces, in effect, a D.C. current flow in the line 51, through the resistor 52 and the switch 53, and part through the resistor 48 and part through the ammeter 46 to the diode 50. The condenser 49 minimizes the fluxuations of the pointer in the ammeter 46. This rectified current flow through the line 51 approaches zero, or minimum value, when the antenna approaches its resonant frequency. The operator then adjusts the knob 29 to shift the core 34 axially in the sleeve 32 until the pointer on the ammeter face 47 reads zero, or practically zero. This indicates that the maximum energy is now being transmitted to the antenna 10. The purpose of this adjustment is to vary the inductance of the coil 35 to compensate for changes in weather conditions, varying inductance conditions in the antenna itself, and the height of the building or other structure upon which the antenna is mounted.

In actual practice the antenna 10 is particularly adapted for use with a transmitter that operates in the range of 27 to 28 megacycles.

The meter 46 may be a conventional reflected power meter of the type used not only in citizen's band radios, but wherever it is desired to measure reflected power. The meter is, in effect, a passive device, since during the operation of the associated transmitter, maximum energy is transmitted to the antenna, and very little power is absorbed by the meter when it registers zero, or nearly zero.

From the foregoing it will be apparent that applicants have provided a relatively simple and inexpensive device for adjusting the inductance in an antenna of the type described, and also for providing a visual indication of the effect of such adjustment. With the shield 60 the performance of the antenna is considerably improved as compared to prior such antennae. The housing 12 may be readily clamped onto any convenient surface by means of its C-clamp 14; and the knob 29 is readily accessible to adjust the axial position of the flexible rod 25, and hence the position of the iron core 34 thereon.

While the invention has been described in connection with a specific embodiment thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains and as may be applied to the essential features hereinbefore set forth, and as fall within the scope of the invention or the limits of the appended claims.

Having thus described our invention, what we claim is:

1. An antenna, comprising:
a housing having a tubular support projecting therefrom,
a dielectric sleeve mounted on said support coaxially thereof,
an antenna rod projecting coaxially from said sleeve away from said housing,
a wire coil surrounding said sleeve and secured at one end to said rod,
a conductor for connecting the opposite end of said coil to a transmitter to receive signals therefrom,
a ferrite core mounted for reciprocation in said sleeve coaxially thereof to vary the inductance of said coil,
an elongate flexible member connected at one end to said core and extending axially through said tubular support into said housing, and adjustable axially to shift said core axially in said sleeve,
manually adjustable means on said housing connected to said flexible member, and adjustable simultaneously to shift said flexible member and core axially, and
means in said housing including a movable indicator visible from the exterior of said housing to indicate the movement of said core.

2. An antenna as defined in claim 1, wherein:
said support comprises a tubular member secured at one end thereof to one end of said dielectric sleeve coaxially thereof, and
a metal shield is secured to said one end of said sleeve to surround said one end of said tubular support coaxially thereof.

3. An antenna as defined in claim 1, wherein said means for indicating the movement of said core further comprises
a directional coupler device,
a second conductor in said housing extending for a portion of its length adjacent and parallel to the first-named conductor,
a normally-open switch movable to a closed position upon the application of signals to said coil by a transmitter, and operative, when closed, to connect said coupler device in circuit with said second conductor, and
an ammeter connected in circuit with said coupler device,
said movable indicator comprising a pointer on said ammeter operative, upon movement thereof toward a zero reference in response to the adjustment of said core, to indicate the transmission of maximum energy to said coil from the transmitter connected thereto.

4. An antenna as defined in claim 3, wherein:
said first-named conductor is secured at one end to said opposite end of said coil and extends axially through said tubular support to said housing, and including
means for releasably connecting the opposite end of said first-named conductor to a transmitter, and
clamping means on said housing manually operable releasably to clamp said housing manually operable

5. An antenna, comprising:
a support,
a dielectric sleeve mounted on said support,
an antenna rod projecting from said sleeve away from said support,
a wire coil surrounding said sleeve and secured at one end to said rod,
means for connecting the opposite end of said coil to a transmitter to receive signals therefrom,
a ferrite core mounted for reciprocation in said sleeve coaxially thereof to vary the inductance of said coil,

manually-adjustable means on said support connected to said core to shift said core axially in said sleeve, said support comprising a housing, and said manually-adjustable means comprising

a second, flexible, dielectric rod secured at one end to said core, and extending at its opposite end slidably into said housing,

a shaft rotatably mounted in said housing and projecting to the exterior of said housing for manual rotation selectively in opposite directions, and

means connecting said second rod to said shaft for longitudinal reciprocation thereby upon rotation of said shaft in opposite directions.

6. An antenna as defined in claim 5, wherein the last-named connecting means comprises:

a stationary bracket mounted in said housing beneath said shaft to guide the opposite end of said second

rod for movement transverse to said shaft, and

means interposed between said bracket and said shaft to hold said second rod frictionally in engagement with the peripheral surface of said shaft.

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ELI LIEBERMAN, Primary Examiner

U.S. Cl. X.R.

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