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R. E. BASSETT, JR

2,841,789

LOADING COIL STRUCTURE

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FIG. 2.

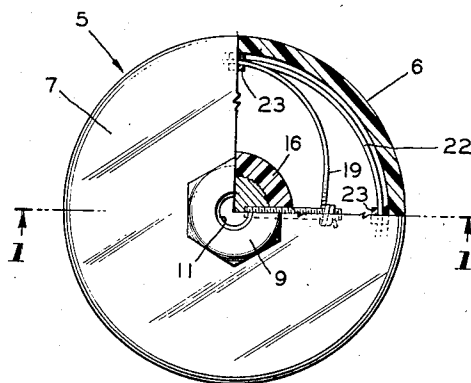


FIG. 3.

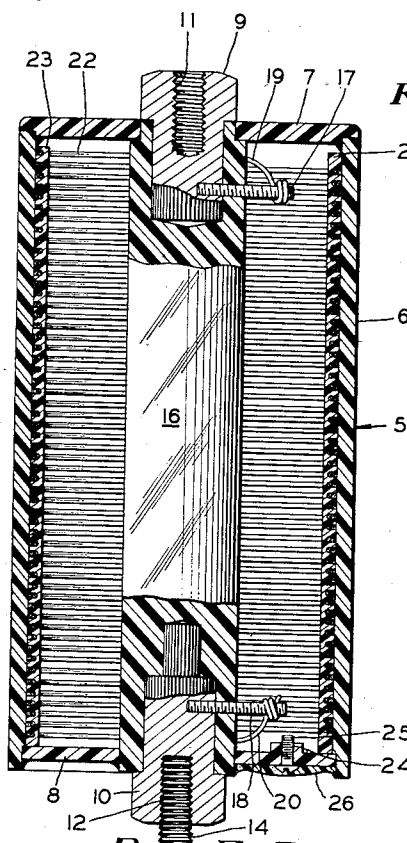
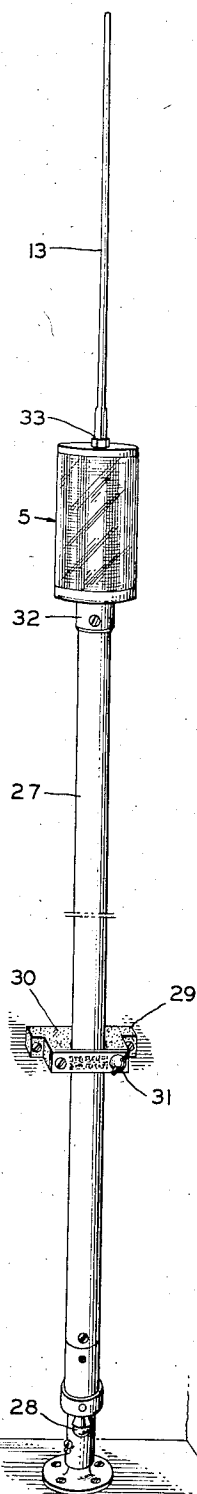


FIG. 1.

INVENTOR

Rex E. Bassett, Jr.

BY Cameron, Kerkam & Sutton
ATTORNEYS

1

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Rex E. Bassett, Jr., Fort Lauderdale, Fla., assignor to Bassett Research Corporation, Detroit, Mich., a corporation of Michigan

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3 Claims. (Cl. 343-749)

This invention relates to an improved antenna system including a novel inductor for resonating the antenna system to desired frequency.

The novel loading coil which is the primary subject of this invention may not only be applied to antenna systems but may also be used to improve the stability and operation of any radio frequency generator, transmitter or receiver.

In the present instance the novel coil structure is incorporated in an antenna system for radio telephones and is positioned between the lower antenna rod and the upper whip rod thereof to artificially load the antenna system to resonance. The incorporation of the novel inductor in the antenna system greatly increases the efficiency of the antenna system and stabilizes the system, making it impervious to humidity changes and inclement conditions and maintaining it at the desired frequency, regardless of adverse weather conditions.

In the past such loading coils have been wound on a suitable form, using the desired wire, and left unprotected to the elements. They then produced one resonant frequency and one degree of efficiency at only one specific condition of humidity. Thus, during a rainstorm or other inclement weather conditions these prior structures became highly inefficient or lost their efficiency altogether.

The present invention contemplates the provision of an inductor which is completely encased and protected in a sealed plastic cylinder which is evacuated and then filled with an inert gas, such as helium, the object being to eliminate the deleterious effects on the coil of changing humidity, dirt, dust, salt spray, corrosion and oxidation. The primary advantage of the new protected coil structure lies in the fact that distributed capacity across the coil remains constant, regardless of weather conditions, resonance is stabilized and constant efficiency for the tuned circuit results.

These same advantages follow whether the coil is used in an antenna system or in the transmitter or receiver circuits.

It is therefore a primary object of this invention to evolve an improved inductor coil for radio frequency circuits in which the coil is completely enclosed and protected in an evacuated casing so as to be impervious to the deleterious effects of the elements.

It is a further object of this invention to provide such an improved loading coil which is particularly adapted to antenna systems and which will maintain such systems at the desired frequency, regardless of weather conditions.

A further object of this invention is to provide such a loading coil of improved structure and efficiency.

Other and further objects of this invention will become apparent as this specification proceeds.

Referring to the drawings, Fig. 1 is a cross-sectional view, taken on the vertical axis, of an improved loading coil made in accordance with the present invention;

2

Fig. 2 is a plan view from above, partially broken-away, of the improved coil structure;

Fig. 3 is a perspective view of an antenna system incorporating the improved loading coil.

In the drawings, 5 indicates the improved loading coil structure which comprises an outer casing or plastic tube 6 of heavy construction which is closed at its extremities by plastic end discs 7 and 8 which are appropriately cemented or sealed thereto with ethylene dichloride or an epoxy resin, as shown in Fig. 1 of the drawing. Plastic end discs 7 and 8 are preferably bored at their centers to receive metal end fittings 9 and 10 which are appropriately cemented or otherwise affixed within the centers of end plates 7 and 8, respectively. Metal end fittings 9 and 10 are preferably centrally recessed and screw threaded, respectively, at 11 and 12 to receive the screw threaded extremities of the upper whip rod 13 of the antenna and the screw threaded upper extremity of the lower antenna rod 14. Center support rod 16, which is preferably a heavy plastic rod, is shown suitably bored at its upper and lower extremities to receive and support the knurled inner extremities of metal end fittings 9 and 10, between which it is rigidly affixed and for which it provides insulation and central support.

Extending rectangularly from the inner extremities of metal end fittings 9 and 10, through rod 16, are metal pins 17 and 18 which serve as terminal contacts for the extremities 19 and 20 of the coil structure supported within the casing 6.

Coil 22 is shown supported within plastic casing 6 by means of a series of vertically disposed plastic spacer members 23 which maintain coil 22 in its proper vertical position within casing 6 and which are preferably applied over coil 22 against the inner peripheral wall of casing 6 by means of suitable plastic cement or other bonding material. A series of five of these spacers 23 are preferably provided to maintain coil 22 in its proper vertical position within casing 6. As will be seen from Fig. 1, the upper, free extremity 19 of coil 22 is affixed to contact pin 17 of metal end fitting 9 and its lower, free extremity 20 is affixed to contact pin 18 of lower end fitting 10.

In order more completely to protect coil 22 from humidity and other deteriorating effects casing 6 is preferably evacuated, after the coil and casing structure has been completely assembled, through a small vent 24 tapped in the lower end plate 8. After evacuation of the coil and casing structure through vent 24, helium or other inert gas is fed therethrough to fill the casing 6, after which a small screw 25 is inserted through vent 24 to seal the casing 6 and a layer of plastic or other sealing material 26 is applied over the head of screw 25 to complete the sealing of the casing.

Prior to its insertion into the casing 6 coil 22 is wound to produce the desired resonant frequency for the installation and by virtue of the subsequent evacuation and sealing of the casing 6 coil 22 will remain permanently at this desired resonance to insure the maintenance of the desired resonant frequency, regardless of humidity or other outside conditions.

When this improved sealed coil structure is utilized, as shown, in an antenna system it produces a constant resonant frequency which is unaffected by outside weather conditions or humidity.

In Fig. 3 one embodiment of an improved antenna system including the novel coil structure is illustrated. This antenna comprises broadly an alloy base rod 27 of substantially one and a half inch diameter which is swivelly mounted at its base for installation on a deck, wall or other surface by a base insulator and

swivel mount 28 into which the lower extremity of base rod 27 is fitted. The antenna structure is supported in vertical position by quick disconnect insulator member 29 comprising a recessed insulator base 30 and a pivotal catch member 31 which may be opened to allow the antenna to be swung to horizontal position. At its upper extremity base rod 27 is shouldered at 32 and is reduced into screw threaded extension 14 which screws into screw threaded lower recess 12 of lower metal end fitting 10 of the evacuated coil structure 5. Antenna whip rod 13, which is preferably formed of non-corrosive Fiberglas, is shown disposed above coil 5 and supported thereupon by its lower shouldered extremity 33, its lower extremity being screw threaded about its outer periphery to screw into screw threaded recess 11 in upper metal end fitting 9 of the evacuated coil assembly 5. The preferable over-all length of the antenna system is twenty feet. This length may be varied as desired, depending upon the nature and wattage of the radio telephone with which the antenna is being utilized.

As the inductor coil 22 is connected at its lower extremity 20 to pin 18 of metal end fitting 10 and at its upper extremity 19 to pin 17 of upper metal end fitting 9 and as the upper and lower antenna rods screw-threadedly engage metal end fittings 9 and 10 respectively, the inductor coil becomes an integral part of the antenna system and maintains the antenna system at the desired resonant frequency at all times.

With the antenna system shown here, incorporating the improved high "Q" inductor, any radio telephone installation will give an extremely high performance. For example, with this antenna system a twenty-five watt set will out-perform a fifty watt set with a conventional antenna.

As has been hereinbefore stated, the improved inductor herein described will greatly improve the stability and operation of any radio frequency generator, transmitter or receiver and its adaptability to such systems will be readily apparent to anyone skilled in the art.

The use of the improved coil structure guarantees the production of one resonant frequency, frequency is stabilized and constant efficiency for the tuned circuit results. These advantages result whether the coil is used in antenna, transmitter or receiver circuitry.

By virtue of the provision of the heavy center support rod 16 into the extremities of which metal end fittings 9 and 10 are set, and which supports end plates 7 and 8 and casing 6 of the coil structure, the entire coil structure is of extreme strength and stability and is capable of withstanding heavy shocks. This high physical strength further insures the efficient operation of the

coil structure under any and all conditions of use and weather.

The invention is susceptible of numerous alternative embodiments without departing from the spirit thereof. Changes may be made in the structural design of the casing and elements thereof within wide limits without departing from the spirit of the invention.

Attention is directed to the appended claims for a limitation of the scope of this invention.

What is claimed is:

1. In a resonant evacuated coil structure, a cylindrical casing, end plates affixed to the extremities of said casing, metal end fittings affixed through the centers of said end plates, a heavy dielectric rod extended on the axis of said casing receiving the inner extremities of said metal end fittings, a wire coil disposed about the interior of said casing and in contact with said metal end fittings at its upper and lower extremities, whereby said coil structure may be incorporated in an electrical system by contacting said metal end fittings in said system.

2. In a loading coil for resonating an antenna to desired frequency, a cylindrical plastic casing, plastic end plates affixed over the extremities of said casing, metal end fittings disposed through the centers of said end plates, a heavy dielectric rod extending longitudinally of said casing receiving and supporting the inner extremities of said metal end fittings, a loading coil resonated to a desired frequency disposed about the inner periphery of said casing and contacting said metal end fittings at its extremities, whereby said coil structure may be incorporated in an electrical system by contacting said metal end fittings in said system.

3. In a loading coil for resonating a radio frequency system to desired frequency, a cylindrical casing, plastic end plates fitted to the extremities of said casing, metal end fittings supported in the centers of said end plates, a dielectric rod within said casing supporting and insulating said metal end fittings, a loading coil supported against the inner periphery of said casing and in contact with said end fittings respectively at its upper and lower extremities, an inert gas filling said casing, whereby said loading coil may be utilized for resonating a radio frequency system to desired frequency by contacting said metal end fittings in said system.

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