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2,777,094

## PROTECTIVE GROUNDING DEVICE FOR A HIGH FREQUENCY ANTENNA

Filed Feb. 9, 1954

2 Sheets-Sheet 1

FIG. I

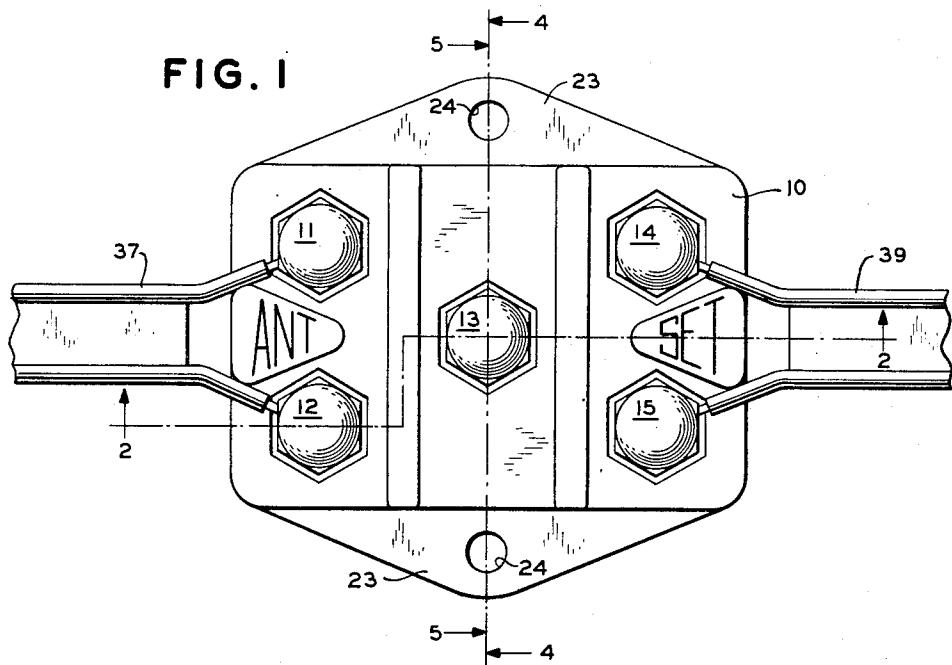


FIG. 2

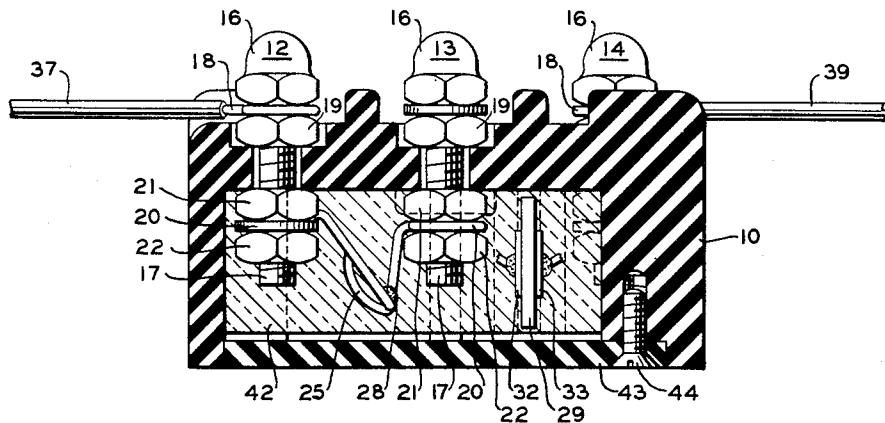
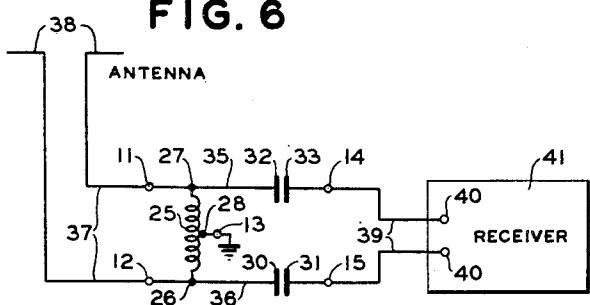


FIG. 6



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FIG. 3

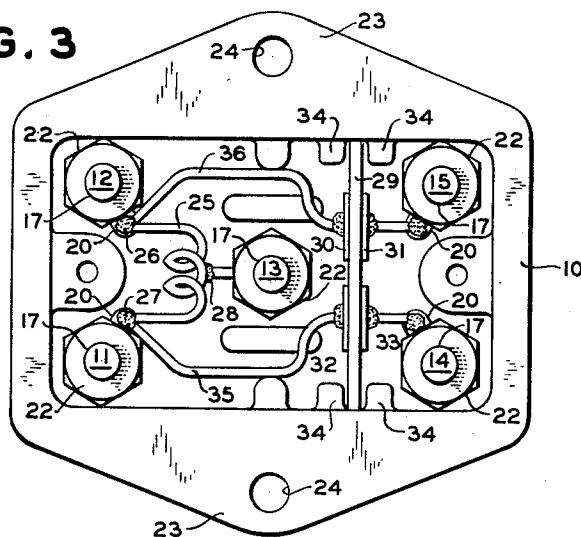


FIG. 4

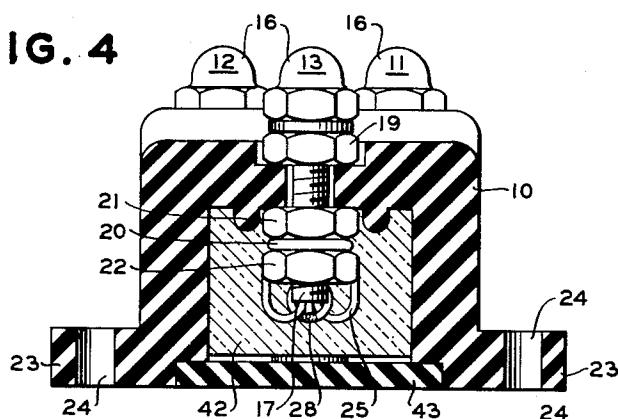
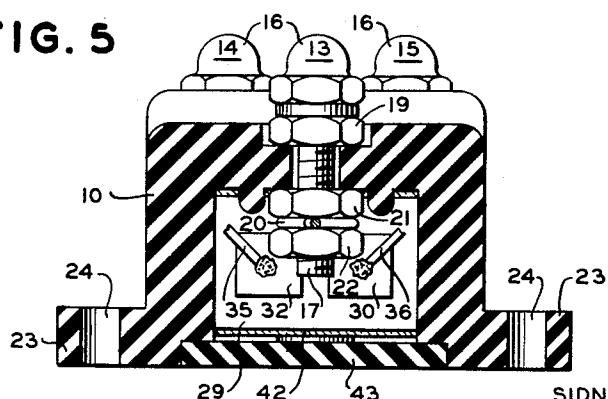


FIG. 5



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## PROTECTIVE GROUNDING DEVICE FOR A HIGH FREQUENCY ANTENNA

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Application February 9, 1954, Serial No. 409,103

1 Claim. (Cl. 317—61)

The present invention relates to a grounding protective device for use with a high frequency antenna, such as a television antenna.

An object of the invention is to provide a grounding device which will effectively maintain the antenna at ground potential without impairing its efficiency for the reception of signals.

A further object of the invention is the provision of a device of this character which will drain off undesired longitudinal currents and simultaneously pass the desired signal currents which are balanced with respect to ground.

Another object of the invention is to provide a protective device of this character for insertion in a transmission line with a minimum of effect upon the normal characteristic impedance of the line.

Other and further objects and advantages of the invention will become apparent upon reading the following specification together with the accompanying drawing forming a part hereof.

Referring to the drawing:

Fig. 1 is a plan view of an embodiment of the invention;

Fig. 2 is a longitudinal sectional view in elevation taken along the line 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is a bottom view of the embodiment of the invention shown in Fig. 1, with the bottom cover removed and with certain insulating compound omitted to illustrate details of construction;

Fig. 4 is a transverse sectional view in elevation taken along the line 4—4 of Fig. 1, looking to the left in the direction of the arrows;

Fig. 5 is a transverse sectional view in elevation taken along the line 5—5 of Fig. 1, looking to the right in the direction of the arrows, with a part of the insulating compound omitted;

Fig. 6 is a schematic electrical circuit diagram showing the device of Figs. 1 to 5 connected in a transmission line between an antenna and the antenna terminals of a television receiver.

Referring to Fig. 1, the device comprises a hollow main body or housing designated generally as 10.

The hollow body 10 is formed of suitable electrical insulating material, as by molding or other convenient process. Five electrical terminals designated 11 to 15 are mounted on the body 10. These five terminals comprise two antenna terminals 11 and 12, a ground terminal 13, and two set terminals 14 and 15. The connections to these terminals are described in greater detail below. Each of these five terminals 11 to 15 comprises an acorn nut 16 disposed on the upper end of a threaded stud 17. The acorn nut 16 may be tightened or loosened at will to secure a conductor 18 against a fixed nut 19. At the lower or inner end of each terminal, a terminal lug 20 is held between upper and lower lock nuts 21 and 22, respectively, carried by the threaded stud 17.

The body 10 is provided with laterally projecting ears 23 which have mounting holes 24 formed therein.

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An effectively coreless inductor or radio frequency choke coil 25 is disposed within the interior of the body 10. The inductor 25 is shown formed of a relatively few turns of heavy wire, the two ends of which are connected directly by soldering at 26 and 27 to antenna terminals 11 and 12. Coil 25 is center-tapped at 28 and the center tap is connected to ground terminal 13. The inductance of coil 25 is sufficiently high and its distributed capacitance is sufficiently low so that the introduction of appreciable bridging loss in the transmission path from antenna terminals 11, 12 to set terminals 14, 15 is effectively avoided.

A transverse barrier member 29 of suitable high voltage resistant dielectric material traverses the interior of body 10 between ground terminal 13 and set terminals 14 and 15. Four electrodes 30, 31, 32 and 33 are disposed on barrier member 29, and may be formed thereon by electroplating or electrodeposition, or may be secured thereto by suitable adhesive means.

Juxtaposed electrodes 30 and 31 constitute a first coupling capacitor and similarly juxtaposed electrodes 32 and 33 constitute a second coupling capacitor. The barrier member 29 is positioned between inwardly extending lateral projections 34 formed on the inner wall of body 10.

A conductor 35 connects antenna terminal 11 through coupling capacitor 32, 33 to set terminal 14. A similar symmetrically arranged conductor 36 connects antenna terminal 12 through coupling capacitor 30, 31 to set terminal 15.

As shown in Figs. 1 and 6, a two-wire transmission line 37 of conventional construction extends from antenna terminals 11 and 12 to an antenna diagrammatically indicated as a dipole 38. A similar transmission line 39 extends from set terminals 14 and 15 to the antenna terminals 40 of a television or other signal receiver 41.

If desired, the interior of body 10 and inductor 25 may be filled with a suitable insulating compound 42 to secure the various parts against movement relative to each other and to exclude moisture. The inductor 25 is completely surrounded by and imbedded in the insulating compound 42. This stabilizes the geometric configuration of inductor 25 and prevents small dimensional changes which could be produced by mechanical vibration and which could otherwise alter its inductance and distributed capacitance, thereby causing noticeable interference with the reproduced image in the case of a video signal. The compound 42 will be so selected that it will have satisfactory dielectric properties at the frequencies and voltages which are involved. Conveniently, the hollow body 10 may be closed at its bottom by a cover member 43 held by a screw 44.

In operation, the antenna 38 is maintained at ground potential by the drainage connection to ground through ground terminal 13 and center tap 28 of coil 25. The inductance value for coil 25 and the capacitances of coupling capacitors 33 are selected to avoid resonance effects and to provide for the efficient transmission of signals from antenna 38 to the receiver 41, over the entire frequency range which is required to be received. As may be seen in the drawing, the physical configuration of the circuitry is such as to minimize any impedance irregularity which may be introduced into the transmission line 37, 39 by the connection of the protective device therein. Preferably, the protective device is connected in the transmission line 37, 39 at a point relatively close to the receiver 41.

What is claimed is:

A protective device of the class described, comprising a hollow body, a first pair of terminals mounted on said body and adapted for connection to an antenna, a second pair of terminals mounted on said body and

adapted for connection to utilization means for a signal received by said antenna, a fifth terminal adapted to be connected to ground, a barrier of high voltage resistant insulating material extending transversely of the interior of said hollow body, said barrier having a first pair of electrodes disposed on one side thereof and a second pair of electrodes disposed on the opposite side thereof in juxtaposition to said first pair of electrodes, said two pairs of electrodes constituting a pair of direct current blocking coupling capacitors, circuit means connecting said first pair of electrodes to said first pair of terminals and said second pair of electrodes to said second pair of terminals whereby said first pair of terminals is coupled to said second pair of terminals through said capacitors and a center-tapped inductor connected directly across 15

5 said first pair of terminals, said inductor being conductive to direct current and disposed within said body on the same side of said barrier as said first pair of electrodes, said center tap being connected to said fifth terminal for effectively maintaining said first pair of terminals at ground potential with respect to said direct current.

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