Feb. 14, 1939. G. M. CHARRIER 2,147,148

LOOP ANTENNA

Filed March 17, 1936

Fig. I.

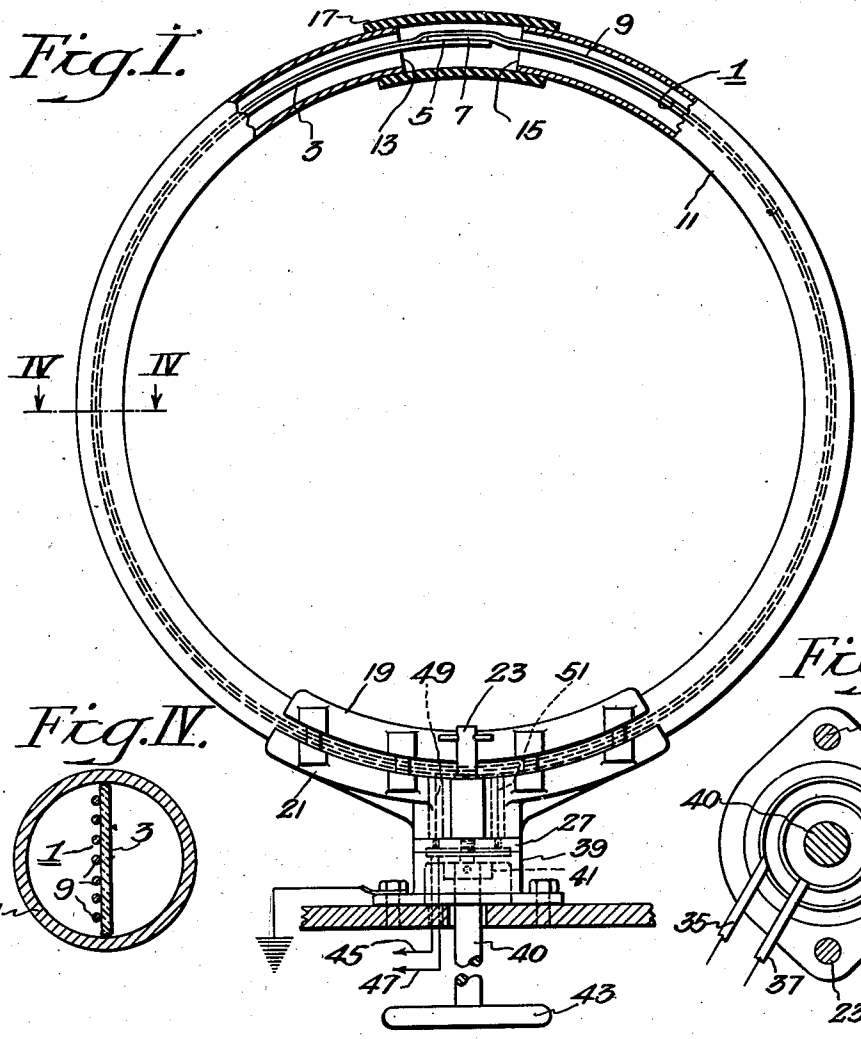
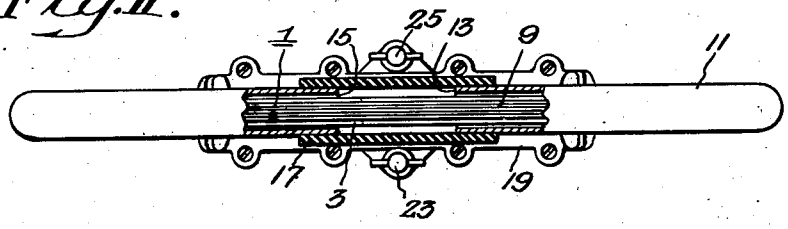


Fig. III.

Fig. IV.

Fig. II.



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LOOP ANTENNA

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2 Claims. (Cl. 250—33)

My invention relates to loop antennas. More particularly my invention is directed to a shielded loop antenna of low capacity and to a method of winding same.

Loop antennas have been primarily used in direction finding. It has been found desirable to shield such antennas to avoid capacity pickup. While shielding reduces the undesired capacity pickup, it has the very undesirable effect of increasing the capacity of the loop winding to the grounded shield.

One of the objects of my invention is to shield a loop antenna without deleteriously increasing the capacity of the loop winding. Another object is to provide means for winding a loop within an annular channel in a shield. A further object is found in the novel method of winding the loop inductor. An additional object is to form a mid-tapped loop antenna inductor whose halves will be balanced capacitively with respect to ground.

My invention may be best understood by reference to the accompanying drawing in which Figure I represents an elevational view of one embodiment of my invention,

Figure II is a plan view of the loop antenna of Figure I,

Figure III is an enlarged view of a slip ring assembly which is connected to the loop, and

Figure IV is an enlarged sectional view taken along the lines IV—IV of Figure I.

The loop inductor 1 is composed of a strip of flexible insulating material 3 which has been secured in circular form by cementing, riveting or otherwise fastening the ends 5, 7. A plurality of turns of suitably insulated wire 9 are wound on the circular form. The method of winding and securing the wire will be hereinafter described.

A metallic shield 11 surrounds the loop inductor 1. The shield is preferably of hollow circular cross section; it may be streamlined for aircraft or the like. The internal diameter of the hollow section of the shield is preferably just slightly larger than the width of the insulating form 3. The shield is of the form of an annulus excepting that the ends 13, 15 do not meet. The gap between these ends may be covered by a piece of insulating material such as a rubber tube 17.

The base of the shield member 11 is clamped between a pair of elements 19, 21. A pair of screws 23, 25 clamp the slip ring assembly 27 of Figure III to the lower element 21. The slip ring assembly 27 is made by suitably embedding a pair of slip rings 29—31 within an insulated member 33. This insulated member, including the slip rings, is inserted within the slip ring assembly as shown. A pair of brush members 35, 37, bearing on the slip rings, are supported in the lower base member 39. The entire loop assembly is rotatively mounted on the lower base by a shaft 40 which is secured to the loop assembly. A collar 41 prevents upward movement of the loop assembly.

The loop may be rotated by a handle 43, or other suitable means. The lower base 39 is mounted on any convenient support. The inductor leads 45, 47 are connected to the brushes 35, 37. It should be understood that a connection intermediate the ends of the loop may be brought out through a third slip ring conductor. Since the terminal apparatus is not part of the present invention, it is not necessary to describe such apparatus which is well known to those skilled in the art.

I prefer to first form the annular shaped shield 11 from a non-ferrous pipe of aluminum, brass, copper, or the like. The insulated tubing 17 is fitted over the pipe but in a position exposing the pipe ends 13, 15. A strip 3 of flexible insulation material such as Bakelite, or fibre is cut to a width slightly less than the diameter of the annular channel within the shield. This strip is threaded through the annular channel as shown. The ends of the strip are secured by small rivets or cement. The strip is self-supporting because it just fits the channel as shown in Figure IV. The slight clearance permits rotation of the strip within the channel.

The inductor is formed by cementing or otherwise securing one end of an appropriate length of insulated wire to the insulated strip. The strip is then manually rotated within and with respect to the annular channel. Since the wire has been attached to the strip each rotation of the strip will cause one turn to be wound on the strip. It is preferable to secure each quarter turn of wire to the strip by a quick drying cement. It should be apparent that each turn of the strip with respect to the shield applies a turn of wire to the inductor. The required number of turns may be wound in a single layer with each turn spaced from the adjoining turn, or the inductor may be bank wound. The terminals 49, 51 of the inductor winding are brought through appropriate apertures to the slip rings 29, 31.

After the winding has been completed and the terminals have been anchored and connected, no further supports or fittings are required to locate the inductor within the shield. The capacity between the turns and the shield is a minimum

because of the natural and maximum spacing of the elements. The rubber tubing 17 is slipped around the shield until it covers the space between the ends 13, 15. The tubing may then be cemented in position. It is customary to ground the shield. The ends 13, 15 should not be conductively joined to avoid the short circuiting effect which a closed shielding ring would have on the loop inductor.

A shielded low capacity loop antenna has been described. The inductor supporting strip is located within an annular channel in the shield and is supported thereby. In this position the capacity from the inductor windings to the shield is a minimum. The symmetrical arrangement of the inductor with respect to the shield provides a capacity balance between the halves of the loop if a mid tapped inductor is desired. The method of winding the inductor within the annular channel has been described. I do not limit my invention to the precise showing as numerous modifications within its scope are possible; for example, the insulated support may be an edgewise formed circular strip of Bakelite.

I claim as my invention:

1. A loop antenna including a formed metallic tube of annular shape having an open section between the ends of said tube, a flexible insulated form, said form being of hollow cylindrical shape and supported within said tube at approximately the maximum cross-sectional diameter, an inductor comprising a plurality of turns of conductor mounted on said form so that each turn of said inductor has an inductance substantially equal to that of every other turn and so that the corresponding turns on either side of the center form substantially equal capacities to ground and to every other turn, means for securing said turns to said form, insulated means for covering said open section, a member for clamping and supporting said tube, a second member forming a face for said first member and slip rings for connecting said inductor to electrical members in said second member.

2. In a loop antenna of the character of claim 1 means operatively connected to said loop for rotating said loop and first member on said second member.

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