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RADIO APPARATUS AND METHOD OF MANUFACTURE

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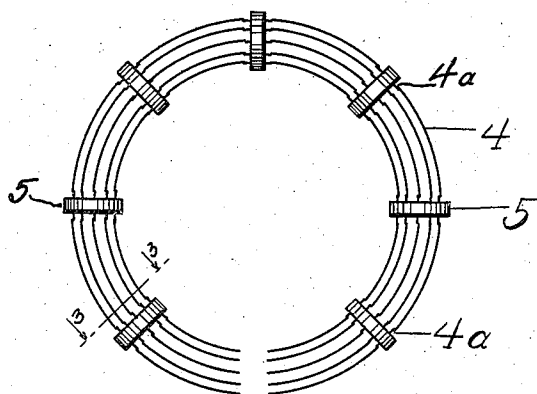


Fig. 2

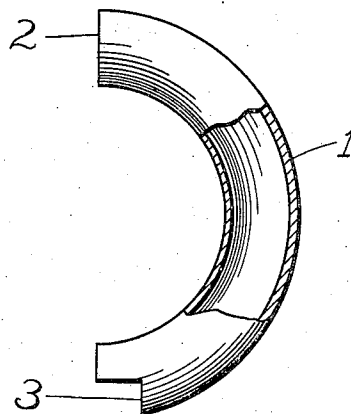


Fig. 1

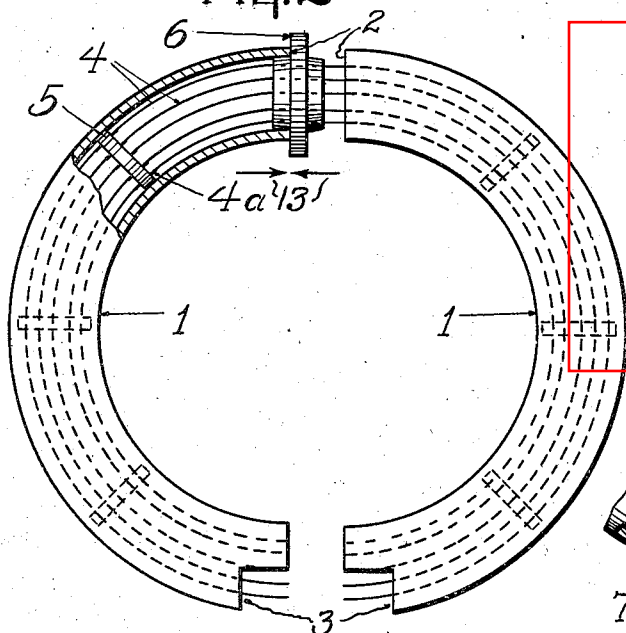


Fig. 4

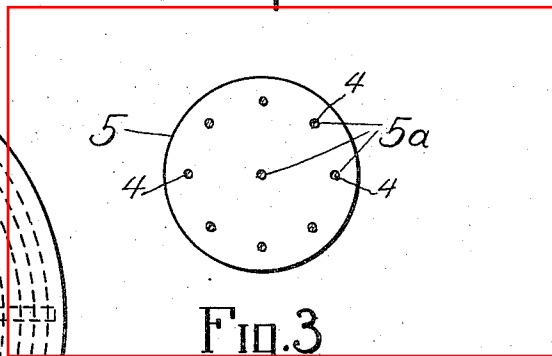


Fig. 3

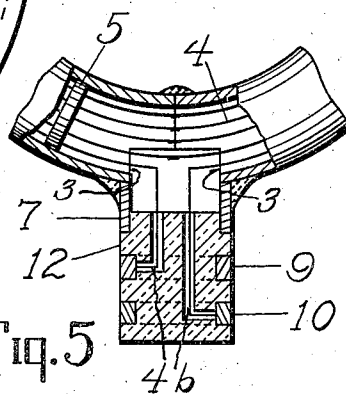


Fig. 5

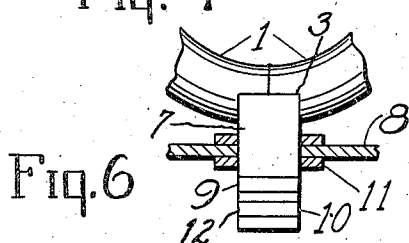


Fig. 6

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UNITED STATES PATENT OFFICE

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RADIO APPARATUS AND METHOD OF
MANUFACTURE

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by mesne assignments, to Bendix Radio Cor-
poration, New York, N. Y., a corporation of
Delaware

Application July 12, 1935, Serial No. 31,083

5 Claims. (Cl. 250—33)

This invention relates to radio apparatus. More particularly this invention relates to radio antennas of the electrostatically shielded loop type and the method of producing such antennas.

5 An object of this invention is to provide a loop antenna housing of a substantially doughnut-shape, formed out of substantially straight mem-
ber bent into shape and cut into two substan-
tially symmetrically shaped units into which the
10 antenna conductors are positioned.

Another object of this invention is to provide a method of making loop antennas of the dough-
nut-shaped-electrostatically shielded type in
15 which the antenna conductors are positioned within the shield which is formed in two sym-
metrical sections having one pair of the abutting
faces or adjacent ends thereof welded while the
other adjacent ends are pressed into a grommet
of insulating material.

20 Another object of this invention is to provide an electrostatically shielded loop antenna having
a shielded housing made of two substantially
symmetrical sections in which a plurality of con-
ductors are symmetrically disposed with relation
25 to the shielding housing.

A further object of this invention is to pro-
vide a shielded loop antenna in which the shield
is made of two sections formed into a predeter-
mined shape, one end of each section being
30 pressed into an insulating and watertight mem-
ber and the other two ends joined to each other
and to an attachment fitting.

In accordance with this invention I provide
a loop antenna of the shielded type which is more
35 rugged, has greater electrical efficiency, and is
capable of more economical manufacture than
loop antennas made in accordance with conven-
tional practice.

My method consists of steps such as the fol-
40 lowing: A tubular member of metallic material,
such as copper, aluminum, brass and the like, is
filled with material such as rosin and then bent
into substantially a semi-circular shape. The
rosin is then removed. A plurality of conductors
45 such as copper wire or similar material and a
plurality of insulating members are assembled
and formed into the loop structure, one of the
insulating members being joined with a rubber
ring or grommet which is to be adjacent to two
50 ends of the tubular housing. The wires and in-
sulators are maintained in spaced position with
respect to one another after assembly by means
of crimping or soldering and by fitting of the
insulators within the housing. Two of the tubu-
55 lar members are then placed over the conductor

insulator assembly so that one end of each of the
tubular members presses into the grommet while
the two other ends coincide roughly with the lo-
cation of the unjoined ends of the conductors.
A fixture is employed then to press the tubular
5 members together which places the rubber ring
or grommet under compression making a water-
tight joint at that point. The conductors are
then joined together in such a manner as to pro-
vide a continuous circuit having the required
10 number of turns in series, shunt or series shunt,
as may be desired. A fitting is then placed in
a suitable space previously formed in the tubular
members. The members are welded to each
other and to the fitting after which the fixture
15 is removed. The completed shielded loop an-
tenna is then ready for installation on any suit-
able mounting mechanism.

Other features of this invention will be appar-
20 ent from the following description and the claims
when read with the drawing in which briefly,
Fig. 1 shows a bent semicircular tubular shield-
ing housing in which the loop conductor-insula-
tor assembly is inserted; Fig. 2 shows a detail
view of the conductors threaded through spacers;
25 Fig. 3 shows an enlarged view of one of the
spacers; Fig. 4 illustrates the manner in which
the conductors are threaded through the shield
members; Fig. 5 shows the conductors threaded
through the shield and the bottom ends of the
30 shield joined and Fig. 6 illustrates the assembled
loop.

Referring to Fig. 1 of the drawing in detail,
reference numeral 1 designates a tubular mem-
35 ber of aluminum, copper or the like, formed into
a semi-circular shaped member by bending from
a straight piece of tubing. Where desired, the
tubing 1 may be coated inside thereof with a re-
latively heavy oxide insulating layer and in cases
where aluminum is employed in fabricating this
40 tube this coating may be applied chemically or
electrically by conventional processes. The outer
surface of the tube may also be oxidized with
a relatively thick coating of aluminum oxide, and
one or both of the two halves of the loop shield 1
45 then dyed with suitable dyes and coloring ma-
terials which are readily absorbed by the aluminum
oxide. The purpose of applying this coloring ma-
terial is to enable the operator, manipulating the
loop to determine the polarity of the loop when
50 it is employed in direction finders of the uni-
lateral type.

The tube 1 is cut out at 3 to accommodate the
mounting fitting. A plurality of conductors 4,
55 of a suitable length are threaded through the

holes 5a of the spacer insulators 5. These conductors are preferably sufficiently resilient to maintain their form and prevent undesired kinks from forming therein. The conductor-insulator assembly is formed to the final shape and the conductors 4 are slightly crimped at points 4a adjacent to the insulators 5.

The insulator spacers 5 may be made of any insulating material, such as, synthetic porcelain, hard rubber, phenol or rosin condensation products, wax impregnated wood and the like. A sufficient number of spacers is employed to keep the loop antenna conductors properly spaced after they are threaded through the shield members 1.

A rubber ring or grommet 6 is placed over the centrally disposed spacer. The assembled conductors 4 and spacers 5 are fed into one of the ends of each of the semicircular tubular members 1, as shown in Fig. 4, and the ends of the conductors brought out of the opposite ends of these tubular members.

After the conductors 4 are placed into the tubes 1, ends of these tubes are welded together and to the member 7 which forms the bottom and support of the loop and holds the two semicircular tubes 1 together. Selected ends of the conductors 4 are soldered together at 4a in such a manner that the looped conductors inside of the tubes 1 form a plurality of turns connected in series, shunt or series-shunt. The ends 4b of the loop coil are brought out of the bottom of the member 7.

Pressure is applied to the loop casing in the direction of the arrows 13 to press the ends of the tube ends into the grommet 6 and make a water-tight joint. The loop is thus adapted for use in exposed places, such as, on aeroplanes, ships, automobiles and similar vehicles and vessels.

An insulation member 12 is fitted into the bottom of the member 7 and suitable slip-rings 9 and 10 are mounted on the member. The leads 4b are connected to these slip-rings as shown. Suitable brushes are employed with the slip-rings 9 and 10 for the purpose of connecting the loop to a signal receiver.

It will be readily seen, therefore, that according to the present invention, a novel shielded loop antenna has been provided that requires no auxiliary coupling means in order to maintain a weatherproof joint at the insulated point of the shield. Once the two tubes 1 have been pressed into the grommet or ring 6 and while in this condition welded together and to the mounting member 7, no additional means is needed to keep the joints formed between grommet 6 and tubes 1 tight, since the rigidity of the completed shielding casing will maintain the edges of the tubes snugly against the sides of the ring or grommet 6. This not only facilitates manufacture but makes possible a shielded loop structure having none of the mechanical disadvantages inherent in structures employing bulky coupling members for effecting a weatherproof joint.

What I claim and desire to secure by Letters Patent of the United States is as follows:

1. The method of manufacturing a loop an-

tenna having a metal shield, an insulating grommet and mounting means, which comprises forming two tubular shielding members into substantially semi-circular shape, placing the grommet over cut loop turns at some point intermediate their ends, inserting the cut loop turns into each tubular member with the grommet between two adjacent ends thereof, pressing the two ends into the grommet and holding said tubular members in this relation while uniting the two opposite ends of the tubular members together and to the mounting means.

2. The method of manufacturing loop antennas including the steps of cutting a plurality of turns of wire, spacing said turns from each other by insulation and arranging said turns side by side to form a cut ring-like member, threading said ring-like member through an insulation grommet and through a pair of substantially semi-circular tubular members one on each side of said insulation grommet, pressing adjacent ends of said tubular members into said grommet, maintaining them so pressed, rigidly connecting the opposite ends of said tubular members to each other to form a unitary shield, joining selected ends of said turns to form a desired inductance from said plurality of turns of wire, leading out the ends of said inductance, and uniting suitable mounting means to said shield.

3. The method of manufacturing loop antennas including the steps of threading a plurality of cut turns of substantially circular shape spaced from each other through an insulation grommet and through a pair of substantially semi-circular tubular members one on each side of said insulation grommet, pressing adjacent ends of said tubular members inward to force the ends of said members into said insulation grommet and form a weather-tight joint therebetween, joining the ends of said tubular members remote from said grommet together to form a split ring antenna shield joining selected ends of said turns to form a continuous coil of the antenna and mounting said antenna shield member on an attachment fitting having contact members for said coil.

4. An antenna assembly comprising a tubular metallic shield, a loop antenna disposed therein, said shield being unitary and substantially circular having ends spaced apart to break the electrical continuity of the shield and a resilient insulating ring disposed between said ends and being under compression, said ring being retained under compression solely by the rigidity of said shield.

5. The combination with a loop antenna having spaced turns, of a metallic tubular shield enclosing said antenna and having spaced ends, discs of insulating material carried by said turns for maintaining the same in spaced relation, an insulating grommet of resilient material arranged over one of said discs, the ends of said tubular shield being embedded in said grommet to form a weatherproof union therewith, said union being maintained solely by the rigidity of said shield, independently of auxiliary fastening means.

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