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LOOP CONSTRUCTION

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Fig. 1

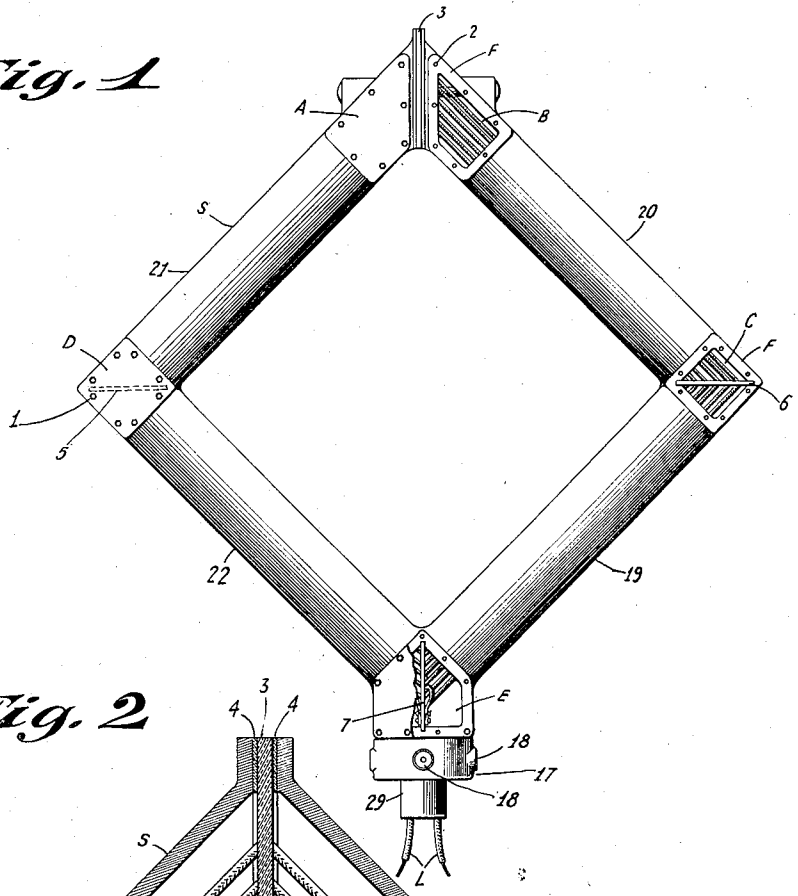
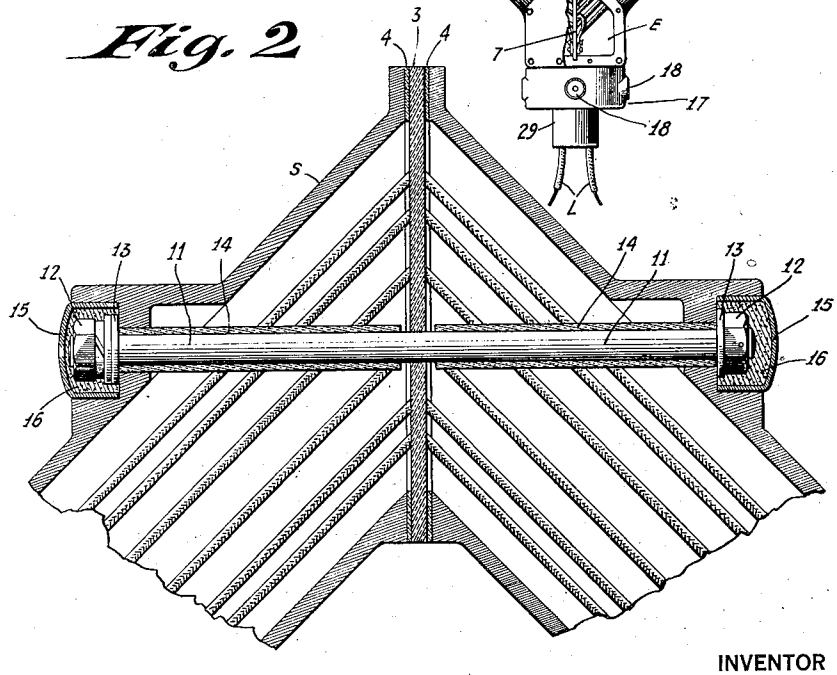


Fig. 2



INVENTOR
JOHN ALBERT PROCTOR
BY H. S. Grover
ATTORNEY

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LOOP CONSTRUCTION

John Albert Proctor, Lexington, Mass., assignor to Radio Corporation of America, a corporation of Delaware

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6 Claims. (Cl. 250—33)

This invention relates to directional receiving systems, and in particular to a new and improved shield for the signal absorption member, and to the novel method of producing the shield and placing the absorption conductor therein.

More in detail, this invention relates to directional aerials comprising one or more turns of conductors which are enclosed in a metallic shield to protect them from the elements, etc., and, more in particular, to the method of producing the metallic shield, and to winding the conductors in the shield in proper spaced relation.

Directional absorption members, as described above, have been used heretofore in the art. Directional absorption members enclosed in metallic shielding to protect them from the elements have been known heretofore in the art. Examples of known directional absorption members enclosed in shielding are shown on pages 102 to 106 of Wireless Direction Finding published by R. Keen in 1927. Kolster, United States Patent No. 1,673,249, also shows a directional absorption member which at first might appear somewhat similar to applicant's absorption member and shield as briefly described above.

In these heretofore known arrangements the shield as constructed comprised several pieces and as assembled had several openings or joints therein which permitted the elements to enter and deteriorate the conductors enclosed in the shield. This often resulted in short-circuiting the conductors. Especially are the above defects present in case the shielded loop is to be used on shipboard where the action of salt water is such as to weaken the structure both electrically and mechanically after some service.

Another defect in structures known heretofore in the art is due to the fact that the shield can not be economically produced since it is made up of several pieces which, after being constructed, had to be assembled or bolted together.

Moreover, in the loop shields known heretofore in the art, no provision is made whereby the conductors may be readily placed in the shield. In many cases it is necessary to place single turn conductors in the shielding structure and solder the end of each conductor to the start of another conductor, in that manner producing a continuous winding.

Furthermore, in arrangements known heretofore in the art, no provision is made for spacing the individual turns from each other and from the enclosing metallic shield. This often times resulted in an unsymmetrical structure and in all cases in an absorption member, the capacitive effect of which is high as compared with the electromagnetic or inductive effect. This predomination of capacity in the absorption member results from the close spacing between the turns, which in shielded loops known heretofore were not retained in spaced relationship with respect to each other.

Briefly, and in its broadest aspect, the object of applicant's invention is to produce a directional absorption member and a shield for the same in which none of the defects enumerated above are present.

Another object of applicant's invention is to produce a directional aerial shield which is constructed of a single piece of metal and in which no joint is necessary and in which the metallic shield is entirely closed except for the openings through which the conductors are placed in the shield.

An added object of applicant's invention is to provide a directional aerial including shielding means therefor, as described above, in which provision has been made whereby the absorption member may be made of a single continuous conductor which can be readily placed in the loop.

A further object of applicant's invention is to provide a novel shielding means including means for supporting the absorption conductor in the shield and for properly spacing the several turns of the conductor with respect to each other and with respect to the walls of the shield.

The present invention, in addition to the objects briefly outlined above, includes a novel method of easily and economically producing the shield for the loop in quantities and for winding the absorption member which comprises a single continuous conductor in the shield.

Briefly and broadly, the above objects are attained, in accordance with applicant's invention, by producing a mold in the desired form and casting in said mold a closed tubular member of the desired shape in which the absorption member may be placed. Openings are left at appropriate points in the closed member so that the conductor may be readily wound or placed therein. The metal surrounding these openings is smoothed down by milling or in any other known manner and metal plates are bolted thereto so that the conductor is completely enclosed and the shield is weatherproof. In order that the closed member does not provide a complete magnetic circuit it is broken at one point and then bolted together with a piece of insulating material between the adjacent ends. The closure

member is cast integral with means whereby it may be removably mounted on a pedestal or other supporting member.

This manner of mounting the loop shield permits absorption members of different size to be readily mounted in the deck supporting means or pedestal, thereby permitting the receiver associated with the loop to cover a large range of frequencies. Insulating members in which openings for the conductors are provided are placed at appropriate joints within the cast metal shield member so that the conductors therein are retained in spaced relation with respect to each other and with respect to the shield. The conductor is threaded in from one of the openings and passed through the holes in the insulating members, the operation being repeated until the desired length of continuous conductor is inserted in the shield.

Obviously, since the only joint in the shield is that whereby it is mounted on the support which, in the preferred form, is at the lowermost point of the shield, no rain, spray, or mist can enter the shield and render the absorption member inoperative.

The novel features of my loop shield and the novel method of producing the same will be pointed out with particularity in the claims appended to the end of the specification.

The shield and the manner in which it is produced will be described in detail hereinafter. Such description will be made with reference to the drawing, in the several views of which like reference characters indicate like parts and in which;

Figure 1 shows the shield and is used to illustrate the manner in which the conductor is placed in the shield and is retained spaced therein; while,

Figure 2 is an enlarged view of a detail of the shield of Figure 1.

In producing the shielding member a mold of the desired form is produced in a well known manner. For purposes of illustration, applicant has shown the shield S of Figure 1 as being rectangular in shape. The mold therefor is so formed that a hollow tubular closed rectangular casting, as shown in Figure 1, will be produced by pouring the molten metal, alloy comprising 10% silicon and 90% aluminum, in the mold. The mold is so made that openings A, B, C, D, E are produced in the casting. These openings, as will appear more in detail hereinafter, permit insertion of the insulating members by means of which the turns of the conductor are spaced, and also permit the conductor to be placed within the shield in an easy manner. The faces F of these openings are next smoothed down, as, for example, by milling or by any known manner, so that the metallic covers spaced thereover will form a weatherproof joint with the shielding member. The metallic covers are fastened over the openings, as shown, by bolts 1 cooperating with threaded openings 2 in the metallic shield S. In order to break the continuity of the closed shield, the shield is cut entirely across at some point. In the preferred arrangement the continuity of the shield member S has been broken as shown at the upper corner by sawing. A portion of the metal shield is removed and bakelite, or other insulating material 3, is placed therein. A layer of waterproof material 4 may be placed on each side of 3 to insure a weather-tight joint. These members 3 and 4 serve to break the circuit formed by the shield and the member 3 serves as a spacing means and supporting means for the conductor, as will appear later. Nonconducting, supporting and spacing members 5, 6, and 7 are placed in the other openings in the shield, as shown, to support and space the conductor to be wound therein. The members 5, 6, and 7 fit into guideways cast in the shield S as shown.

In order to prevent any moisture from entering the loop at the opening wherein the member 3 is inserted, the loop is bolted together, as shown more in detail in Figure 2, by means of a stainless steel bolt 11 threaded at each end to receive nuts 12, by means of which pressure may be applied to the interrupted ends of the shield to force it securely against the sides of the insulating member 3. In order that the shield will not be short-circuited by the bolt 11 an insulating washer 13 is placed under one of the nuts 12, while the bolt 11 is inserted within two insulating tubes 14. These insulating tubes 14 also prevent the conductors of the loop from being short-circuited. If perfect symmetry of the shield is required an insulating washer, similar to the one shown at 13, may be placed between each of the nuts 12 and the shield S. In order that moisture be kept out of the openings provided for the washer and nuts described above, the holes are covered by a thin metal cap 15, insulated by insulating packing 16 from the nuts 12. The lower arms of the shield terminate in an enlarged ring 17 having enlargements 18 thereon. The shield S is mounted by inserting the ring 17 in an opening provided therefor in the pedestal or other support. The enlargements 18 cooperate in a well known manner with spring pressed members in the support to retain the loop rigid therein for rotation therewith.

The manner in which the conductor L is placed within the loop will now be described. The end of the conductor L is inserted through the hollow shaft 19 and through the desired opening in the insulating member 1 and fished through the side 19 of the shield S and then through the appropriate opening in the insulating member 6 where it is again pulled tight and then fished through the side 20 of the shield S. The conductor L is next threaded through an opening in the insulating member 3 and again pulled tight and fished through the side 21 of the shield to the opening D. The conductor is again pulled tight and threaded through the opening in the insulator member 5 and fished through the side 12 of the shield S. The conductor is next threaded through an opening in the insulator 7 and the above operation is repeated until the proper number of turns of the conductor is placed within the shield.

It will be obvious that applicant has invented a novel shield for a loop which shield may, in accordance with applicant's method, be produced readily and economically in quantities. Furthermore, a loop shielded as disclosed by applicant will be completely weatherproof. This is an essential feature since it is important to keep out all moisture from the loop since such moisture will corrode the wires and metal parts, and so form a high resistance path which will impair the electrical operation of the receiver. In applicant's arrangement no moisture can enter the loop at any place.

Having thus described my invention and the operation thereof, what I claim is:

1. A directional loop aerial comprising a tubular closure member having a plurality of arms of continuous metal, said member having its upper arms separated by a vertical slot, openings in each

of said arms for winding the conductor turns, waterproof covering means for closing said openings, a vertical insulating sheet having a central aperture interposed between the two upper arms at the apex of the loop aerial to prevent said metallic closure member forming a closed electrical path, and a clamping bolt passing through the aperture in said insulating sheet, insulating tubes located each side of said insulating sheet for insulatingly covering said clamping bolt.

2. A directional loop aerial comprising a tubular closure member having a pluralty of arms of continuous metal, openings in each of said arms for winding the conductor turns, waterproof covering means for closing said openings, a vertical insulating sheet interposed between the two upper arms at the apex of the loop aerial to prevent said metallic closure-member forming a closed electrical path, and a clamping member for clamping said upper arms together and retaining said insulating sheet.

3. A directional loop aerial comprising a tubular closure member having a plurality of arms of continuous metal, openings in each of said arms for winding the conductor turns, waterproof covering means for closing said openings, a vertical insulating sheet having a central aperture interposed between the two upper arms at the apex of the loop aerial to prevent said metallic closure member forming a closed electrical path, a clamping member for clamping said upper arms together and retaining said vertical insulating sheet, and horizontal and vertical insulating sheets retained within said openings for retaining and spacing the conductor turns.

4. A directional loop aerial comprising a tubular closure member having a plurality of arms of continuous metal, openings in each of said arms for winding the conductor turns, waterproof covering means for closing said openings, a vertical insulating sheet interposed between the two upper arms at the apex of the loop aerial to prevent said metallic closure member forming a closed electrical path, a clamping member comprising an insulated bolt for clamping said upper arms together and retaining said vertical insulating sheet.

5. A directional loop aerial comprising a tubular closure member having a plurality of arms of continuous metal, openings in each of said arms for winding the conductor turns, waterproof covering means for closing said openings, a vertical insulating sheet having a central aperture interposed between the two upper arms at the apex of the loop aerial to prevent said metallic closure member forming a closed electrical path, a central boss located on each side of said apex, a clamping bolt located within said boss, and two insulating tubes covering said bolt, said insulating tubes located each side of said vertical insulating sheet, a housing within said boss, an insulating washer, clamping nuts located within said housing, and a metallic cover closing the ends of said housing.

6. Means for substantially complete and electrostatically enclosing a loop aerial including one or more turns of conducting material, and for permitting said loop to be effected by magnetic fields comprising a continuous metallic shielded member formed with its ends adjacent each other, the ends of said member being at the apex of said shield and said loop, a space between said ends to prevent said metallic shielded member from forming a closed electrical path, a vertical insulating member interposed between the ends of said shields, means for clamping said ends together to retain said vertical member and to increase the mechanical strength of said shield, an opening in said continuous metallic shielded member to permit winding of said loop, and metallic means for closing said last mentioned opening.

JOHN ALBERT PROCTOR.