March 10, 1970 B. A. CHURCH 3,500,423

AERIALS

Filed April 17, 1967

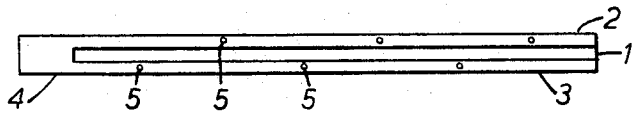


FIG. 1a

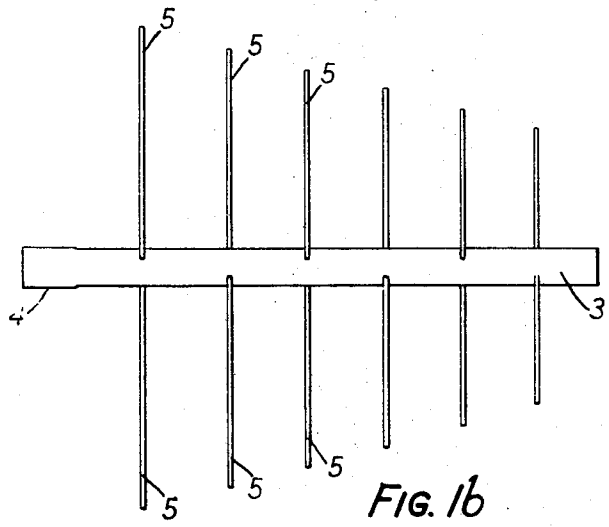


FIG. 1b

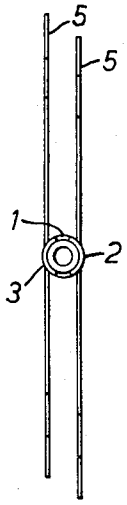


FIG. 1d

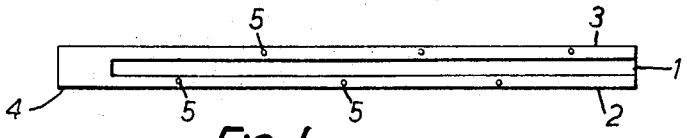


FIG. 1c

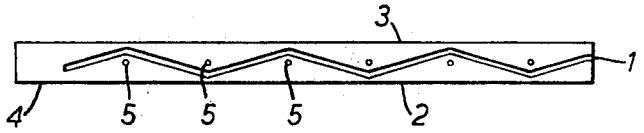


FIG. 2.

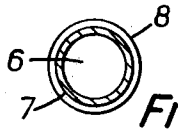


FIG. 3.

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3,500,423

AERIALS

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Int. Cl. H01q 13/00, 11/10, 1/40
U.S. Cl. 343—785 7 Claims

ABSTRACT OF THE DISCLOSURE

An aerial in which at least part of the aerial conductor comprises electrically conducting material deposited on an electrically insulating material of elongate form, and which may comprise one or more aerial elements secured to the insulating material to form an aerial array.

This invention relates to aerials and more particularly to transmitting and receiving aerials for use with communication equipment.

Hitherto it has commonly been the practice for such aerials to include a metallic tubular structure as for example of aluminum or copper, to which in the case of so-called log-periodic aerials a plurality of aerial elements are secured by means of clamping brackets or other clamping means. More specifically, the log periodic aerial comprises a pair of such metallic tubular structures defining parallel booms which are secured together at one end and each of which has clamped to it a number of linear aerial elements. As will be appreciated the metallic tubular structures are themselves relatively heavy parts of the aerial and the clamping brackets or other clamping means add very materially to the overall weight of the aerial as well as increasing its mechanical vulnerability. These two factors can present serious disadvantages in certain applications.

The present invention has in view an aerial construction which lends itself admirably to the log-periodic form of aerial, enabling very significant reductions in weight and vulnerability to be achieved, but which has application to many other forms of aerial (e.g. whip aerials).

According to the present invention there is provided an aerial in which at least part of the aerial conductor comprises electrically conducting material deposited on an electrically insulating material of elongate form.

According to one feature of the invention, the electrically insulating material may take the form of a support member which has electrically conducting material deposited thereon, and which includes at least one aerial element which is secured to the support member such that the aerial element engages with the deposited conducting material.

In carrying out the invention the aerial element or elements, as the case may be, are preferably secured to the support structure by arranging that the ends of the elements are received in holes provided in the support member where they are secured preferably by bonding means.

The aerial according to the invention may be of the log-periodic dipole type in which case it may comprise a main insulating body member, onto which is deposited two areas of electrically conducting material defining a transmission line and a plurality of aerial elements arranged in two groups, each element preferably extending perpendicular to said main body member and connected to one of said two areas of conducting material, with each of said groups of elements extending in mutually opposite directions. The aerial elements may each comprise a metal rod or tube, or, alternatively, they may comprise a rod of electrically insulating material onto which is deposited a layer of electrically conducting material.

The two areas of conducting material may take the form of opposed strips deposited say at diametrically opposite positions along a hollow cylindrical body member, the aerial elements of each group defining two rows of elements which extend in a like direction and which appertain to the respective deposited strips so that elements associated with one strip are alternated with elements of the same group associated with the other strip in the longitudinal direction of the opposed strips.

Alternatively each of the areas may be shaped so that the aerial elements in each group define a single row on the main body member whilst alternate elements connect with the same one of the said two layers of conducting material.

According to another feature of the present invention, the electrically conducting material is deposited on to an elongate rod, preferably by spraying, and constitutes the conductor of a whip aerial.

Aerials constructed in accordance with the invention may finally be coated with an insulating layer for weatherproof protection.

Some exemplary embodiments of the invention will now be described with reference to the accompanying drawings in which:

FIGURES 1*a*, 1*b*, 1*c* and 1*d* show top plan, side, underneath and end views of a log-periodic dipole aerial;

FIGURE 2 is an underneath view of an alternative construction of log-periodic dipole aerial; and

FIGURE 3 shows a cross-sectional view of a single whip aerial.

In FIGURES 1*a* to 1*d* of the drawings, the aerial shown comprises a boom **1** in the form of a fibre glass tube, on to which is deposited two strips **2** and **3** of metal (e.g. copper) which are joined at the rear end **4** of the aerial and which together form a transmission line. The aerial is provided with two groups of aerial elements **5** which are positioned above and below the boom **1** and alternate elements in each group are contained in separate rows (see FIGURE 1*d*) of elements which pass through the respective strips **2** and **3** into the boom **1**, it being apparent from FIGURES 1*a* and 1*c* that the two groups of elements are also arranged so that corresponding elements in the groups are displaced on either side of the axis of the boom **1**. The elements **5** may each comprise a fibre glass rod onto which is deposited a metal coating which is arranged to contact one of the metal strips **2** and **3** and they may be secured to the boom by providing holes into which each element may be fixed by bonding means e.g. by gluing. It may be convenient to secure the aerial elements **5** in the boom **1** before either are plated with metal, and then to deposit metal where required on the aerial array. By this method positive electrical connection between each aerial element and its associated strip on the boom is achieved. Connection may be made to the aerial by securing wires to the ends of the metal strips **2** and **3** which form the transmission line.

FIGURE 2 shows a view from below of an alternative arrangement and shows how the strips of metal **2** and **3** may be so shaped to allow the elements **5** in each group to be placed in line.

FIGURE 3 shows a cross-sectional view of a whip type aerial which comprises a fibre-glass rod **6** onto which is deposited a layer of metal **7** and a further layer **8** of fibre glass. With this construction the aerial exhibits greater structural flexibility than conventional whip aerials.

It will be appreciated that some changes may be made in the above embodiments without departing in scope from the present invention. For instance the boom need not be a circular tube but may be of any convenient shape e.g.

square or oval in cross-section and may be solid. The aerial elements could be tubular or alternatively conventional metal tubes or rods could be used in place of the plated fibre glass type. Although fibre-glass has been mentioned any resilient non-conducting material may be used in its place and could include most plastics materials. The metal coating may be sprayed on to the insulator or deposited in some other suitable manner. The metal need not be restricted to copper but could include most metals. Silver-tin alloy, copper plus a gold flash, zinc plus an aluminium flash, aluminium and nickel have been found to be suitable. The aerial construction described is not limited only to log-periodic and whip aerials but may be used for most types of aerials used with present day communication equipment. If required the aerials may be coated with an epoxy or polyurethane paint to give them better weathering characteristics.

What I claim is:

1. An aerial comprising a main body member of electrically insulating material, two areas of electrically conducting material defining a transmission line deposited on said body member and a plurality of conductive aerial elements secured to said body member, the aerial elements being arranged in two groups, each element extending perpendicularly to said main body member and connected to one of said two areas of conducting material, with each of said groups of elements extending in mutually opposite directions.

2. An aerial according to claim **1**, in which each aerial element comprises a metal rod secured to the main body member.

3. An aerial according to claim **1** in which each aerial element comprises a rod of electrically insulated material secured to the main body member and onto which is deposited a layer of electrically conducting material.

4. An aerial according to claim **1**, in which the two areas of electrically conducting material are deposited at diametrically opposite positions along a hollow cylindrical body member, the aerial elements of each group defining two rows of elements which extend in a like direction and which appertain to respective deposited strips so that elements associated with one strip are alternated with elements of the same group associated with the other strip in a longitudinal direction of the opposed strips.

5. An aerial according to claim **1**, in which the two areas of electrically conducting material are deposited at diametrically opposite positions along a hollow cylindrical body member and are so shaped that the aerial elements in each group define a single row on the main body member, alternate elements of each row connecting with the same one of the two areas of electrically conducting material.

6. An aerial according to claim **1**, in which the electrically conducting material is coated with an insulating layer.

7. An aerial according to claim **1**, in which the electrically insulating material is fibre glass.

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U.S. Cl. X.R.

343—792.5, 873