ELLPTICALLY POLARIZED ANTENNA

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This invention relates to antennas, and more particularly it relates to an antenna with special polarization characteristics.

A principal object of the invention is to provide an improved antenna with an elliptically polarized field pattern.

Another object is to provide a novel form of slotted antenna.

Another object is to provide an antenna of the coaxially-fed type, and with an elliptical slot to impart elliptically polarized field characteristics to the antenna.

A feature of the invention relates to an improved coaxially-fed antenna which is of simplified and rugged construction, and which has an elliptically polarized field characteristic.

The above-mentioned and other features and objects of this invention and the manner of attaining them will become more apparent and the invention itself will be best understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a front elevation view of an antenna according to the invention.

Fig. 2 is a right-hand elevation view of Fig. 1.

Fig. 3 is a sectional view of Fig. 1 taken along the line 3–3 thereof and viewed in the direction of the arrows.

Figs. 4 and 5 are respective field pattern diagrams of an antenna according to the invention.

The antenna comprises two tubular metal sections 1, 2, preferably of cylindrical metal tubing. These two sections have their adjacent ends cut at an angle to the longitudinal axis so that when they are assembled in coaxial spaced relation as shown in Figs. 1 and 2, they define an elliptical slot 3 of uniform width. This slot is symmetrical around the common vertical axis of both sections, and the plane of the slot is, for example, at an angle of approximately 25° with respect to the vertical axis. It will be understood, of course, that the ends of members 1 and 2 may be cut at any other angle and assembled in coaxial relation to provide the desired angle a. The two sections can be held in the proper spaced relation by a pair of insulator spacer elements 4, 5, which can be fastened in any suitable manner to the cooperating adjacent edges of the two sections. Preferably the members 4, 5, should be of small width compared with the diameter of the section 1, 2, so as to have negligible effect on the radiation or field pattern of the finished antenna.

Welded or otherwise conductively fastened to the inner surface of section 1 is an inverted conical metal member 6 which is positioned so that its apex is midway between the ends 7 and 8 of the antenna, and is located on the central axis of the antenna. A similar conical metal member 9 is welded or otherwise fastened to the inner periphery of the section 2, and with its apex closely adjacent the apex of member 6, and in conical alignment therewith. The apex of section 9 is slightly truncated to leave a circular opening 10 to which is fastened the end of a small but rigid metal pipe 11 which can form the outer conductor of a coaxial feed line. The central inner conductor 12 of this line passes upwardly through the opening 10 and is fastened to the apex of member 6. By this arrangement, therefore, the coaxial feed line can also serve as the mounting mast for the antenna. If desired one or both ends 7, 8, of the sections 1, 2, can be closed off either by a suitable insulator or by metal cover plates 13.

The antenna, as described, can be used either for transmission or reception of radio waves, and in either case it will have the desired elliptical polarization field characteristics. Thus Fig. 4 (curve 14) shows the field characteristics of the antenna as a receiving antenna for horizontally polarized waves at a frequency of 1300 megacycles per second, and curve 15 shows the field characteristics as a receiving antenna for vertically polarized waves. The particular antenna used at those frequencies had the following dimensions. The over-all length L was 0.23 meter, the sections 1, 2, had a diameter of 0.04 meter, and the slot 3 had a width of 15 millimeters and was at an angle of 65 degrees with respect to the central longitudinal axis of the antenna. The conical sections 6 and 9 each had an altitude of 0.065 meter. It will be understood, of course, that these dimensions are given merely by way of example, and in no way as a limitation on the scope of the appended claims. When the polarization of the waves to be received was varied continuously from 0° to 180°, it was found that a maximum axial ratio of 2 to 1 was obtained. The curves 14a and 15a (Fig. 5) show the field patterns for the reception respectively of horizontally polarized and vertically polarized waves at a slightly different frequency of 1275 megacycles per second.

While I have described the principles of my invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of my invention.
What I claim is:

1. An antenna comprising a pair of electrically conductive, cylindrical hollow sections arranged in spaced, end-on coaxial relation, the adjacent ends of said sections terminating in parallel planes at an acute angle to the axes of said sections to define an elliptical slot, one of said sections being fastened to an inner conductor of a coaxial feed line and the other section being connected to the outer conductor of said feed line.

2. An antenna according to claim 1, in which a rigid pipe passes centrally through one antenna section, said pipe constituting the outer conductor of said feed line and having a peripheral flange fastened to the inner periphery of said outer section, the center conductor of said feed line passing out through said pipe, and means connecting the end of said center conductor to the inner periphery of the other antenna section.

3. An antenna according to claim 2, in which said flange comprises an inverted conical member having its apex fastened to said pipe and its base fastened to the inner periphery of said outer antenna section.

4. An antenna according to claim 2, in which the last-mentioned means includes a conical member having its apex fastened to said center conductor and its base fastened to the inner periphery of said outer antenna section.

5. An antenna for elliptically polarised field patterns, comprising cylindrical tubular means having an elliptical slot extending substantially entirely around the antenna periphery, and a coaxial feed line having the outer pipe conductor connected to the tubular means on one side of said slot and the center conductor connected to the tubular means on the opposite side of said slot.

6. An antenna according to claim 5, in which said feed line has a rigid outer pipe conductor which acts as a support for the antenna.

7. An antenna according to claim 5, in which said feed line has a rigid outer pipe conductor which is connected to the corresponding section of the antenna by means of a conical member, and said feed line has a center conductor which is connected to its corresponding section of the antenna by means of a conical member.

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