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FIG. 2

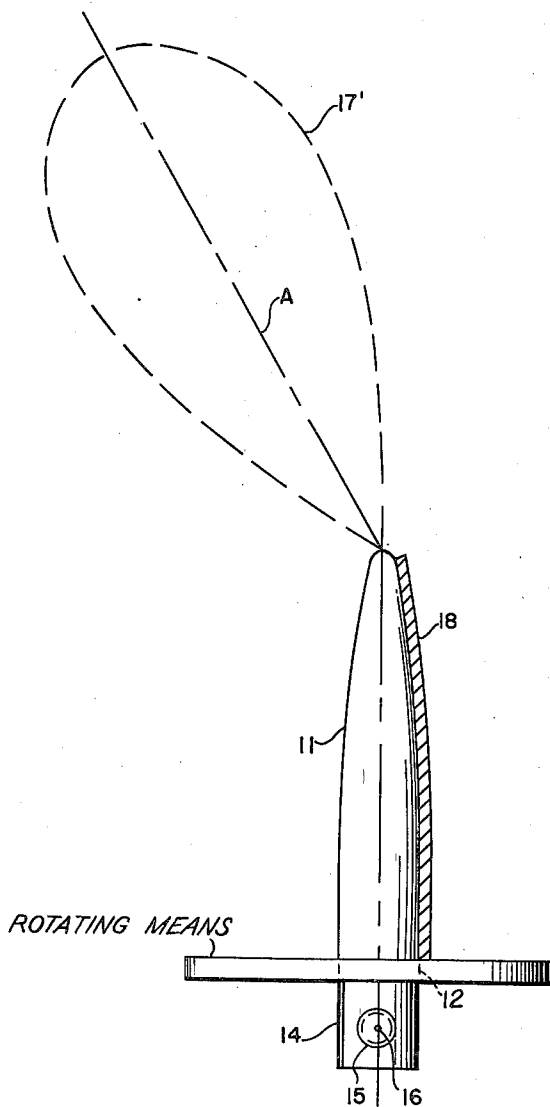
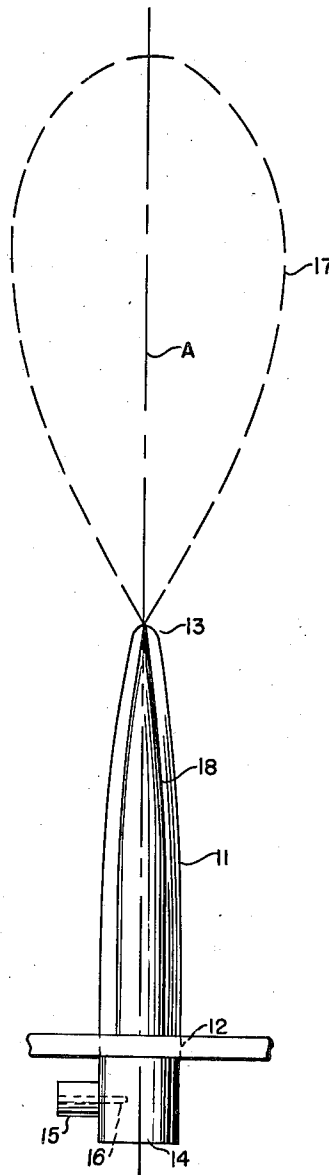


FIG. 1



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5 Claims. (Cl. 250—33.63)

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This invention relates to antennas for communication systems and more particularly to antennas for radiating waves of electromagnetic energy.

In certain radio object locating systems, it is desirable to have a compact and light-weight antenna and a particularly useful antenna is of the probe type comprising generally an elongated cone-shaped member made of a dielectric material such as polystyrene, sometimes referred to as a "polyrod antenna." The base of the dielectric member is usually a short section of circular wave guide excited by a probe in such a manner to propagate energy toward the apex of the cone. Such "polyrod antennas" always have their radiation patterns describing a figure of revolution with their peak signal in the direction of the axis of the antenna, that is, their axis of directivity substantially coincides with the axis of the dielectric cone-shaped member.

In order to obtain a conical scan in space, it has heretofore been necessary to incline the antenna relative, for example, to a horizontal support, and then to rotate the member about an axis perpendicular to the horizontal support so that the member itself describes a cone. To achieve such conical scanning, special supporting and rotating joints have heretofore been necessary. It has now been found that conical scanning may be achieved without the aforesaid disadvantages simply by rotating the dielectric member about its axis and by providing means to produce a radiation pattern whose peak signal is angularly displaced about the axis of the antenna.

Accordingly, it is an object of the invention to provide an antenna of the kind described with means for angularly displacing the axis of directivity of the radiation pattern produced thereby without angularly displacing the antenna itself.

Another object of the invention is to provide an antenna having a dielectric probe-like member, which may be in the shape of an elongated cone, with a metal shield partially covering its surface resulting in displacing the axis of symmetry of the radiation pattern produced by the antenna.

For a better understanding of the invention together with other and further objects thereof,

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reference is had to the following description, taken in connection with the accompanying drawing.

In the drawing:

Fig. 1 is a front elevation view of the antenna according to the present invention; and

Fig. 2 is a partial longitudinal side view of the antenna of Fig. 1.

In the drawing, the antenna comprises a probe-like member 11 made of any suitable dielectric material such as polystyrene. Member 11 as shown is preferably in the shape of an elongated cone having a substantially cylindrical base portion 12 and a pointed or rounded apex 13. Mounted on and in substantial alignment with the base portion 12 is a metallic sleeve or sheath 14, preferably of substantially hollow cylindrical shape and of substantially equal diameter to the base portion 12. The sheath 14 thus comprises a substantially circular short section of a wave guide transmission line. Energy from a source (not shown) is carried to wave guide or sheath 14 in any suitable manner such as by a section of coaxial line 15 connected to sheath 14 and including a probe or central conductor 16 for exciting energy within wave guide 14. The energy propagated within wave guide 14 is thereby adapted to excite member 11 and, as thus far described, member 11 is adapted to radiate energy in a radiation pattern 17 whose axis of symmetry or axis of directivity A is substantially coincidental with the longitudinal axis of member 11.

Partially covering the outer surface of member 11 is a metallic shield or sheet 18. Shield 18 preferably extends substantially the length of member 11 and is shaped to conform and lie in close contact with the surface of member 11. As shown, member 18 is broader in width at the base portion 12 and gradually narrows or tapers toward apex 13. Preferably, shield 18 covers not more than half of the surface of member 11 and preferably along one side thereof. Shield 18 is effective to displace the radiation emitted from member 11 in a direction away from member 18. Thus, the axis of directivity or the axis of symmetry of the beam pattern 17 is angularly displaced from the axis of member 11 as indicated as 17' in Fig. 2.

If desired, member 11 may be rotated about its axis whereby the displaced beam pattern 17' or

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more correctly its axis of directivity substantially describes a cone whereby conical scanning may be achieved.

While there has been described what is at present considered the preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention.

What is claimed is:

1. An antenna for communication systems comprising a dielectric solid of revolution substantially in the shape of an elongated cone having a cylindrical base portion, exciting means coupled to said base portion to cause said dielectric solid to radiate energy, said energy forming a pattern which normally has its axis of directivity substantially coinciding with the axis of said solid of revolution, a metallic sheet member mounted on said dielectric member and curved to conform to the shape of said dielectric member, said sheet member being so shaped as to be included between two angularly displaced planes which intersect along the axis of revolution of said dielectric member, said sheet member covering substantially all of the surface of said dielectric member within one of the angles of intersection of said two planes, said sheet member being effective to angularly displace the axis of directivity of said radiation pattern in a direction away from said sheet member.

2. An antenna for communication systems comprising a dielectric solid of revolution substantially in the shape of an elongated cone having a cylindrical base portion, a hollow cylindrical metallic sheath mounted on and in alignment with said base portion, said sheath forming a short circular wave guide, means mounted on said sheath for electrically connecting said waveguide to a source of electromagnetic energy, a probe extending inwardly of said sheath and into said waveguide and coupled to said connecting means, said probe exciting said dielectric member to cause it to radiate energy, said radiated energy forming a pattern normally having its axis of directivity substantially coinciding

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ing with the axis of said solid of revolution, a metallic sheet member curved to conform with the surface of said dielectric member, said sheet member being so shaped and so mounted on the surface of said dielectric member as to be included between two angularly displaced planes which intersect along the axis of revolution of said dielectric member with said sheet member covering substantially all of the area included within one of the angles of intersection of said two planes, said sheet member being effective to angularly displace the axis of directivity of said radiation pattern in a direction away from said sheet member.

3. An antenna as claimed in claim 1 wherein the area covered by said sheet member is generally not more than half the surface area of said dielectric member.

4. An antenna as claimed in claim 1 wherein said antenna is adapted to be rotated about the axis of revolution of said dielectric member whereby the axis of directivity of said displaced radiation pattern substantially describes a cone in space.

5. An antenna as claimed in claim 2 wherein said antenna is adapted to be rotated about the axis of revolution of said dielectric member and wherein the area covered by said sheet member is generally not more than half the surface area of said dielectric member whereby the axis of directivity of said displaced radiation pattern substantially describes a cone in space.

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