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ANTENNA

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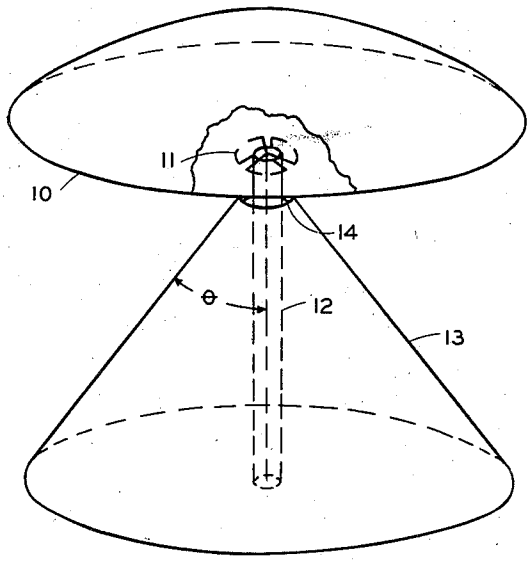

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2,440,210

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ANTENNA

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1 Claim. (Cl. 250—33.65)

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This invention relates to antennas for high frequency communication systems and more particularly to antennas suitable for use as beacons.

One of the objects of the invention is to provide an antenna system adapted to produce a pancake type beam, that is, a beam which is approximately circular in one plane, for example, a horizontal plane, passing through the antenna and that has a small range in the plane perpendicular to the first-mentioned plane.

Another object of the invention is to provide an antenna adapted to produce a radiation pattern that is uniform throughout 360° in azimuth (in a horizontal plane) and that has a small range in elevation.

Still another object of the invention is to provide an antenna system, including an omni-directional radiation element, and a paraboloidal reflector, with means for flattening the beam in elevation.

For a better understanding of the invention together with other and further objects thereof, reference is had to the following description of the invention, taken in connection with the accompanying drawing, in which:

The single figure is a perspective view, partly broken away, of one embodiment of the antenna according to the present invention.

In the drawing, there is shown a paraboloidal reflector 10 preferably having its aperture plane disposed in a horizontal manner. A radiating element 11 is located at the approximate focal point of reflector 10, energy being fed to radiating element 11 by means of an enclosed transmission line 12 which may be a hollow pipe waveguide or preferably a coaxial conductor type transmission line. Transmission line 12 is disposed substantially perpendicularly to the aperture plane of reflector 11 and may, if desired, extend through the vertex region of the reflector 10. However, for a beacon antenna it is preferred that the transmission line 12 extend vertically toward the reflector 10 with its termination in the radiating element 11 being at the approximate focal point thereof as hereinbefore mentioned.

Radiation element 11 may be of any desired type suitable for radiating energy in an omni-directional manner in azimuth. It is preferred, however, that a triple dipole radiating element, as shown, be utilized which is mounted with the common plane of the three dipoles parallel to the aperture plane of reflector 10 and perpendicular to the axis of transmission line 12. The dipoles may be of the kind described in the co-

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pending applications of George A. Jarvis entitled Antenna, Serial No. 613,602, filed August 30, 1945, of Henry J. Riblet entitled Antenna, Serial No. 532,793, filed April 26, 1944, and of Milton G. White entitled Control of wavelengths in waveguides, Serial No. 504,777, filed October 2, 1943. Each of the dipoles of element 11 preferably have their dipole arms curved so that the dipoles have a circular appearance in a horizontal plane.

In accordance with the invention, a cone shaped member 13 is mounted with its axis substantially coinciding or collinear with the axis of transmission line 12, the apex 14 of cone 13 being disposed adjacent but slightly spaced from radiating element 11 in the direction away from reflector 12. The angle θ of the cone 13 is preferably 45°. As shown, the cone member 13 flares away from the reflector 10 for any suitable distance, preferably such that the base of cone 13 has a diameter substantially the same or less than the diameter of reflector 10.

As described, the antenna presents the form of a mushroom the cone member 13 forming the base and when the transmission line 12 is in the preferred position, the cone shaped member may be supported from the transmission line 12 at the apex 14 through which the transmission line 12 may extend. Alternatively, cone member 13 may serve as a support for the antenna, any suitable means being provided for supporting paraboloidal reflector 10, such as by extending transmission line 12 to connect with the vertex region of reflector 10, the extension being suitably insulated from radiating element 11 and transmission line 12.

While the invention has been described as having the planes of reflector 10, radiating element 11 and of the base of the cone member 13 disposed horizontally, it will be understood that the invention is not limited to such a position. For example, the antenna may be disposed with these planes in a vertical manner or at any suitable angle depending upon the particular use which the antenna may be utilized.

The antenna as hereinbefore described is capable of radiating waves of electromagnetic energy when properly fed by energy from a source (not shown) through transmission line 12. The radiation pattern of such an antenna when the axis of transmission line 12 is in a vertical position will be approximately circular in a horizontal plane, that is, omni-directional through 360° in azimuth. The effect of the cone shaped member 13 is to modify the shape of the radiation pattern in elevation by reflecting or deflecting the

radiant energy directed thereon either directly from the radiating element 11 or by reflection from reflector 10 or both. Thus conical member 13 has a flattening effect on the main radiation pattern to produce what is known as a pancake type beam. Hence, the antenna according to this invention, is particularly suitable for use as a beacon in connection with remote communication sets including radio object-locating sets.

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:

An antenna for use in high frequency communication systems comprising a paraboloidal reflector, a radiating element located at the approximate focal point of said reflector and adapted to illuminate said reflector when properly energized, said radiating element comprising three coplanar, circumferentially arranged dipoles to provide a circularly polarized radiation pattern, an enclosed transmission line for feeding energy to said radiating element, said transmission line being disposed forwardly of said reflector with its axis perpendicular to the aperture plane of said reflector, said radiating element being mounted at the end of said transmission line, a cone shaped member disposed about said transmission line with its axis collinear with the axis of said transmission line and its apex close to said radiating element and located at a greater distance from the vertex of said reflector than said radiating element, said cone shaped member flaring away from said reflector at an angle of 45° and having a base not greater than the diameter of said paraboloidal reflector, said cone shaped element being effective to modify the radiation pattern produced by said radiating element and said reflector so that a radiation pattern is produced that is omnidirectional in azimuth and narrow in elevation.

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