Aug. 31, 1954 L. C. VAN ATTA 2,688,080

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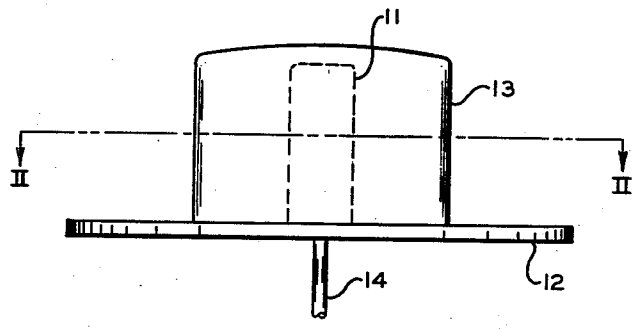


FIG. 1

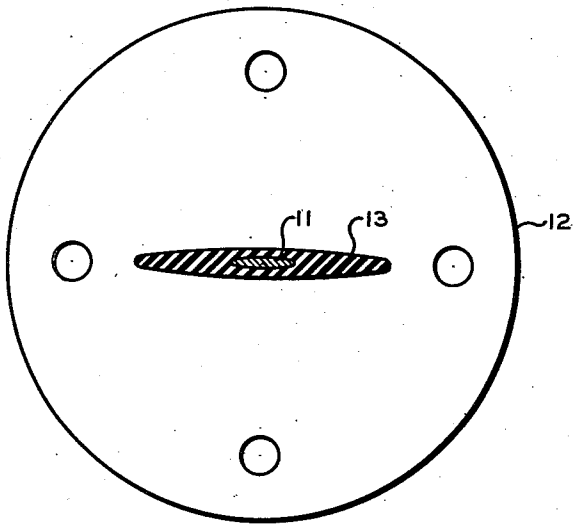


FIG. 2

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5 Claims. (Cl. 250—33)

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This invention relates to radio antennas and more particularly to streamlined stub antennas for mounting on high-speed aircraft.

To obtain a stub antenna satisfactory for use on high speed aircraft, it is necessary to streamline the cross-section of the stub to reduce drag due to wind resistance. For proper streamlining an elliptical cross-section about 10:1 axis ratio is required. A metal stub of such a shape produces a non-uniform radiation pattern with maximum intensities normal to the flat directions. It is desirable to have a streamlined stub antenna which will produce a uniform radiation pattern in azimuth.

The primary object of the present invention is to provide a satisfactory stub antenna for use on high speed aircraft.

Another object of the present invention is to provide a streamlined quarter wave stub antenna that will produce a uniform radiation pattern in azimuth.

A further object of the present invention is to provide a streamlined quarter wave stub antenna in which the radiating element is protected from the weather.

The foregoing and other objects will become apparent from the detailed description when taken with the accompanying drawings in which:

Fig. 1 is a side elevation of the quarter wave stub antenna; and

Fig. 2 is a cross-section view of Fig. 1 taken on section line II—II of Fig. 1.

Referring to the drawings, vertical metal stub 11, elongated fore and aft, is approximately a quarter wave length long for the frequency for which the antenna is designed and together with ground plane 12 serves as the radiating element. The combination of flattened stub 11 and ground plane 12 produces an azimuth radiation pattern which has maximum intensity normal to the flat sides of the stub. An ellipitically streamlined plastic housing 13 surrounds the quarter wave stub antenna. A cylindrical stub antenna in plastic housing 13 would give an azimuth radiation pattern with maxima in the line of the major axis due to the lens effect of the plastic housing. Plastic housing 13, however, together with flattened radiating element 11, provides a radiation pattern effectively uniform in azimuth. Such a pattern is realized by choosing the degree of fore and aft elongation of the radiating stub so as to accurately compensate for the lens action of the plastic housing. Radio frequency energy is fed to the antenna through coaxial cable 14.

The above description of the application of the principles of the invention to a quarter wave length stub antenna is illustrative only. The scope of the invention is defined by the appended claims.

What is claimed is:

1. A quarter wave stub antenna for producing a uniform azimuth radiation pattern comprising,

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a vertical metallic stub, the cross-section of said stub being elliptical in shape, a horizontal metallic ground plane, said metallic stub being mounted on said ground plane, and an elliptically streamlined plastic enclosure, said metallic stub being enclosed by said streamlined plastic enclosure, the major and minor axes of said stub and said plastic enclosure being coincident.

2. A radio antenna comprising, in combination, a horizontal metallic ground plate, an elliptically streamined metallic radiating stub vertically mounted on said ground plate, said stub in cooperation with said ground plate normally producing an azimuth radiation pattern having maximum intensity in directions normal to the flattened sides of said stub, and an elliptically streamlined plastic enclosure surrounding said stub for altering said radiation pattern to provide an azimuth radiation pattern of uniform intensity.

3. An antenna for radio frequencies comprising, a horizontal metallic ground plate, an elliptically streamlined radiating stub of a length substantially equal to a quarter wave length of said radio frequencies vertically mounted on said ground plate, said stub in cooperation with said ground plate normally producing a non-uniform azimuth radiation pattern, and an elliptically streamlined plastic enclosure surrounding said stub, the major and minor axes of said stub and said enclosure being coincident, said enclosure altering said radiation pattern to provide an azimuth radiation pattern of uniform intensity.

4. An aircraft antenna for radio frequencies comprising, in combination, a metallic ground plate adapted for attachment to an aircraft, an elliptically streamlined radiating stub of a length substantially equal to a quarter wave length of said radio frequencies perpendicularly and centrally mounted on said ground plate, the major axis of the cross-section of said stub being substantially greater than the minor axis thereof, said stub in cooperation with said ground plate normally producing a non-uniform azimuth radiation pattern, and an elliptically streamlined plastic sheath enclosing said stub, the lens effect of said plastic sheath altering said radiation pattern to provide an azimuth radiation pattern of uniform intensity.

5. Apparatus in accordance with claim 4 wherein the major and minor axes of said stub and said sheath are coincident.

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