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FOLDED DIPOLE ANTENNA FABRICATED FROM A SINGLE METALLIC SHEET

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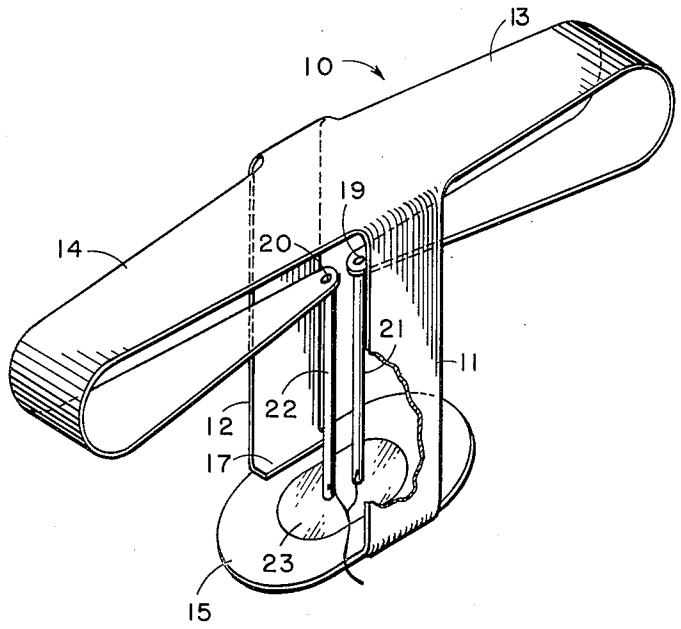


Fig 1

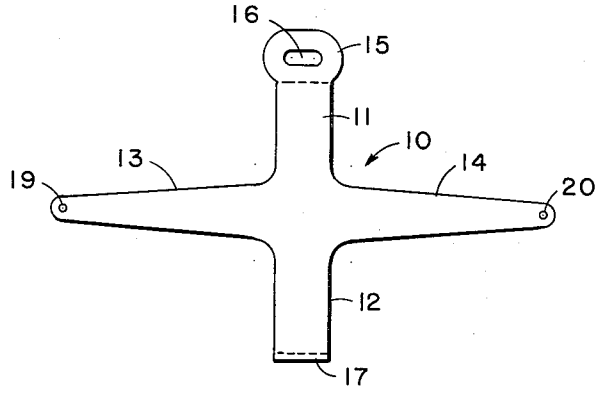


Fig 2

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FOLDED DIPOLE ANTENNA FABRICATED FROM A SINGLE METALLIC SHEET

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3 Claims. (Cl. 343—803)

The present invention relates to antennas and specifically to center-fed folded dipole antennas. The electrical characteristics of antennas of this general type are described in the literature, as for example, in Electronic and Radio Engineering, Terman, page 900, Fourth Edition, McGraw-Hill, New York, 1955; Antennas, Kraus, pages 415–418, McGraw-Hill, New York, 1950; Principles of Radar, M.I.T. Radar School Staff, pages 9–76 and 9–77, McGraw-Hill, 1946.

An object of the invention is to provide an extremely simple folded dipole antenna which is characterized by a manufacturing cost of a radically low order of magnitude.

Another object of the invention is to provide a folded dipole antenna having a radiator which may be shaped with facility to optimize the impedance characteristics of the antenna for maximum band width.

Another object of the invention is to provide a dipole antenna which may be manufactured in quantity by high speed sheet metal fabrication techniques.

For a better understanding of the present invention, together with other and further objects, advantages and capabilities thereof, reference is made to the appended description of the following drawings, in which:

Fig. 1 is a perspective view of a ground plane reflecting folded dipole in accordance with the invention; and

Fig. 2 is a plan view of a development of the radiator member of Fig. 1.

The radiator comprises a single piece of normally flat sheet metal **10**, fabricated as by stamping techniques, in a cruciform configuration, comprising legs **11** and **12**, and arms **13** and **14**. Leg **11** terminates in an integral ground plane member **15** of elliptical form and elliptically apertured at **16** as shown. Leg **12** terminates in a portion **17**.

The first step in the manufacture of this antenna is to stamp out a flat sheet metal conductive radiator member in accordance with Fig. 2, shaped and dimensioned to satisfy the electrical requirements of the particular application for which the antenna is to be employed. Then the legs **11** and **12** are bent downwardly into positions where those legs are in parallel but are perpendicular to arms **13** and **14**. Then portions **15** and **17** of the legs are bent inwardly toward each other and into horizontal planes so that flange **17** overlaps ground plane portion **15**. Flange **17** is then secured to ground plane **15**. Arms **13** and **14** are bent at their mid portions through 180-degree loops and their extremities are secured at **19** and **20** respectively to the conductive members **21** and **22** of a transmission line. These conductive members are secured in position by an insulator **23** through which they project and to which they are secured. This insulator is press-fitted into elliptical aperture **16**.

It will be seen that, upon final assembly, this antenna consists of two closely spaced half wave length elements connected together at the outer ends and the antenna is directly connected to a two-wire line **21**, **22** having a characteristic impedance on the order of the antenna impedance, approximating 300 ohms.

Since the radiator is a stamped element any desired radiation properties within the capabilities of a folded dipole antenna are predetermined by design of the forming elements at the factory. By the use of a simple flat metal development, suitably shaped, the invention accomplishes broad band performance, mechanical stability, radical economy, and the protective advantages of the grounded construction. A folded dipole in conjunction with the reflecting ground plane **15** affords a range of desired radiation pattern (Terman, Electronic and Radio Engineering, pages 886–888, Fourth Edition, McGraw-Hill, New York, 1955). The fabrication of this antenna involves only punching, forming and welding operations. In the particular example, the arms **13** and **14** are conical in general outline but they may be formed in any manner appropriate to the application required.

While the invention is not limited to specific parameters, I have found the following dimensions to be suitable for operation in the 425 megacycle region:

Span of members **13**, **14** after folding	12.3″
Mean distance of the two dipole members from ground	6.15″

While there has been shown and described what is at present considered to be the preferred embodiment of the invention, it will be understood by those skilled in the art that various changes and modifications may be made therein without departing from the proper scope of the invention as defined in the following claims.

Having described my invention, I claim:

1. A folded dipole antenna comprising a sheet metal cruciform body member having integral vertically extending legs and integral radiating arms of ribbon-like section extending transversely of said legs, said arms comprising two closely spaced half-wave length elements looped together at the outer ends.

2. A folded dipole antenna in accordance with claim 1 in which the extremity of one leg includes a horizontally extending ground plane portion, and in which the other leg is secured to said ground plane portion.

3. A folded dipole antenna construction in accordance with claim 2, in which the ground plane portion is provided with an aperture, an insulator mounted in said aperture and secured to said ground plane portion, and a transmission line comprising two conductors projecting through said insulator and secured to the extremities of said arms.

References Cited in the file of this patent

UNITED STATES PATENTS

2,563,243 Hills ---------- Aug. 7, 1951