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SHORT WAVE ANTENNA

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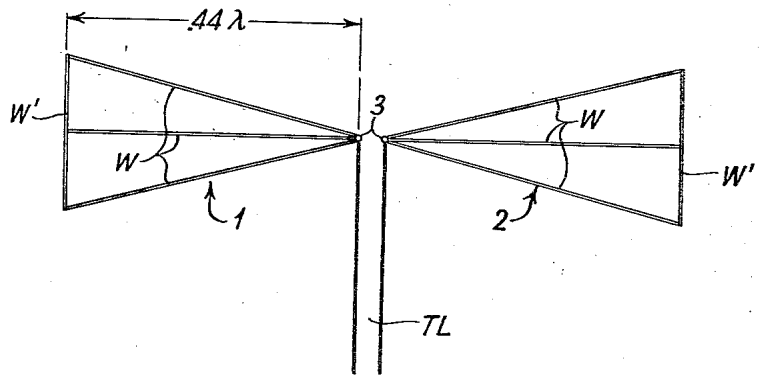


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## SHORT WAVE ANTENNA

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3 Claims. (Cl. 250—33)

The present invention relates to a short wave antenna system, and has for one of its objects to provide a simple form of short wave antenna which has an impedance versus frequency characteristic considerably wider than that of a simple dipole type of antenna.

In brief, the present invention comprises a wide frequency band antenna having two arms each of which is composed of a plurality of wires which are electrically connected in parallel, each of said arms having an overall length in the range between .35 and .5 wavelength at the mid-band frequency.

A more detailed description of the invention follows in connection with a drawing, wherein the single figure illustrates, by way of example only, a side view of one embodiment of the invention.

Referring to the single figure of the drawing, there is shown an antenna comprising two arms 1 and 2, each of which consists of three conductors W, W extending outwards in fan fashion from an apex 3. The conductors W of each arm are electrically connected together in parallel, and are joined together at one end at the apex 3, and at their other ends by a connecting conductor W'. Conductors W and W' may be in the form of wires, rods or pipes.

A suitable transmission line TL is arranged to extend from high frequency translating apparatus (not shown) to the terminals of the antenna, here indicated as being the apices 3, 3. I have found that with an antenna system of the type hereinabove described, each of whose arms has an overall axial length of the order of .4 wavelength at the mid-band frequency, I obtain a flat impedance versus frequency characteristic which is considerably wider than that of a simple dipole type of antenna having a single conductor for each arm.

In the ordinary type of dipole antenna wherein each arm approaches one-half wavelength, the impedance of the antenna at its terminals (located at the center), which connect with the transmission line, is extremely high, of an order greater than 5000 ohms. Such an extremely high terminal impedance does not match the characteristic or surge impedances of any practical transmission line which can be built without the use of auxiliary matching circuits. The antenna of my invention, however, provides a terminal impedance of the same order as the characteristic or surge impedance of the transmission line, and consequently eliminates the necessity of an auxiliary matching circuit, or where an auxiliary matching circuit is desired, the transformation ratio is very small.

In one embodiment successfully tested in practice, using a mid-band frequency of 84.5 megacycles (3.55 meters) and where the axial length of each arm was 155 centimeters, three conductors electrically connected in parallel in the same vertical plane were employed for each arm, the length of each half of the conductor W' at the large end of each arm, as measured between the central conductor W and one of its spaced conductors, being 18 centimeters. The surge or characteristic impedance of the transmission line TL was 387 ohms, while the impedance of the antenna at the apices 3, 3 was 700 ohms. In effect, the length of each arm of the antenna was .44 wavelength at the mid-band frequency. The band width over which I obtained a flat impedance versus frequency characteristic was three megacycles, or 1.5 megacycles above and below the mid-band frequency of 84.5 megacycles.

Although each arm of the antenna of the drawing has been shown having three conductors W in fan-shape in the same plane, it should be distinctly understood that these conductors may be in different planes so as to form a triangular configuration, and that any number of conductors greater than three may be employed in any desired configuration, provided that the axial length of each arm is of the order indicated, and that the wires of each arm are electrically connected together.

Where desired, the connection W' at the widely spaced ends of the arms may be dispensed with, in which case the conductors W should be made slightly longer than the preferred length, but still less than one-half wavelength at the mid-band frequency. In effect, the conductor W' serves to add capacity to each arm. By increasing the number of conductors in each arm, or the spacing, or both, the impedance of the antenna at its terminals (here the apices) can be brought down to a value much less than the 700 ohm value obtained in the experimental model tried out in practice. By means of this regulation of the number of conductors in each arm, or the spacing, or both, I can obtain an antenna having a relatively flat impedance versus frequency characteristic over a considerably wider range than the simple dipole type of antenna, and whose impedance at its terminals matches the impedance of the transmission line to which it is connected.

The terminology "of the order of .4 wavelength", employed in the appended claims, is

meant to include a range of wavelengths from .35 up to .5 wavelength.

What is claimed is:

1. A short wave antenna having a flat impedance versus frequency characteristic, comprising a pair of arms arranged coaxially end-to-end and a transmission line connected to adjacent ends of said arms, each of said arms having a length of the order of .4 wavelength at the mid-band frequency and being composed of at least three conductors electrically connected together in parallel and spreading outwardly from a terminal substantially at the center of said antenna the width of said arms at their extreme ends being so related to the length of said arms that the impedance of said antenna is equal to the impedance of the transmission line connected thereto.

2. A short wave antenna having an impedance versus frequency characteristic considerably wider than a simple dipole comprising a pair of horizontal arms arranged coaxially end-to-end and a transmission line connected to adjacent ends of said arms, each of said arms having a length of the order of .4 wavelength at the mid-band frequency and being composed of three conductors in the same plane, electrically connected together in parallel, and spreading outwardly in fan fashion from a terminal substantially at the center of the antenna the width of said arms at their extreme ends being so related to the length of said arms that the impedance of said antenna is equal to the impedance of the transmission line connected thereto.

3. A short wave antenna having an impedance versus frequency characteristic considerably wider than a simple dipole comprising a pair of horizontal arms arranged coaxially end-to-end and a transmission line connected to adjacent ends of said arms, each of said arms having a length of .44 wavelength at a mid-band frequency of 84.5 megacycles and being composed of three conductors in the same plane, electrically connected together in parallel, and spreading outwardly in fan fashion from a terminal substantially at the center of the antenna the width of said arms at their extreme ends being so related to the length of said arms that the impedance of said antenna is equal to the impedance of the transmission line connected thereto.

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