

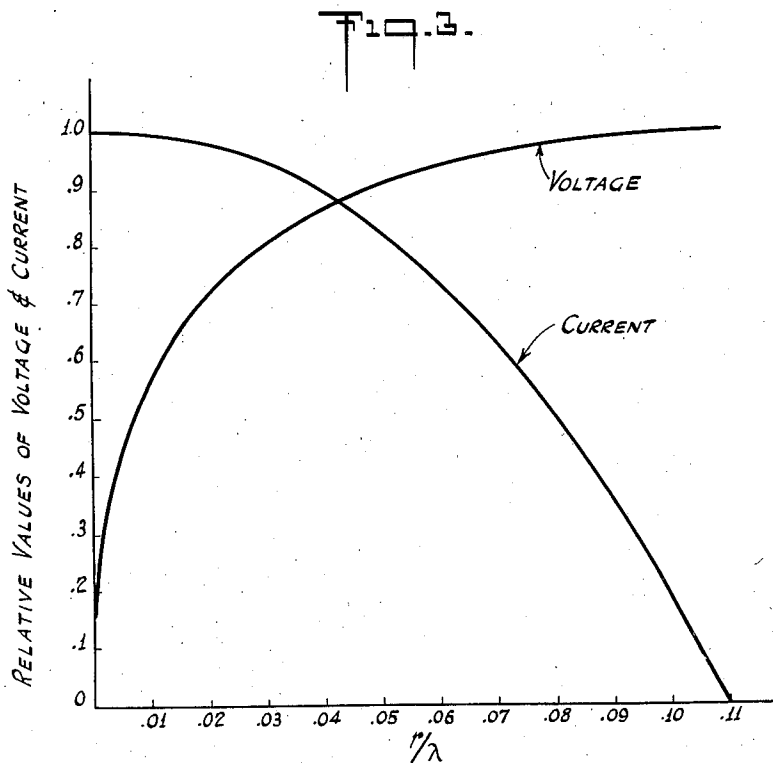
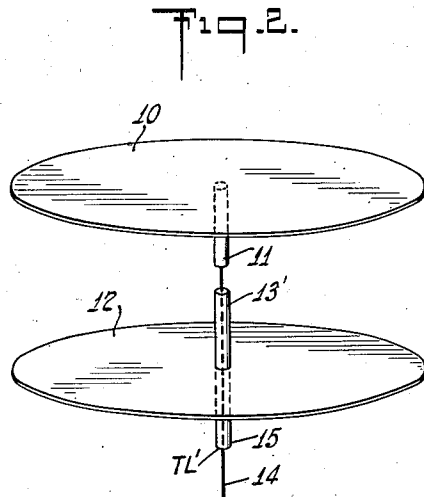
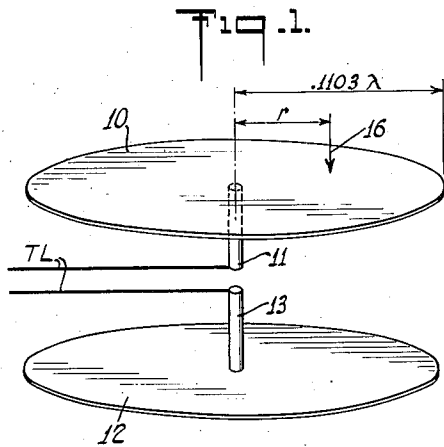
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SHORT WAVE ANTENNA

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SHORT WAVE ANTENNA

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The present invention relates to short wave antennas and has for its primary object the provision of a short wave antenna which presents a negligible reactance at its terminals over a wide range frequency such as may be required in television transmission or reception. When a wide band of frequencies is used, as in the transmission of television programs, it is desirable that the antenna act as a substantially pure resistance of substantially constant magnitude over a wide range of frequencies in order to prevent the occurrence of standing waves along the feeder. The standing waves are an indication of reflection of energy back into the transmission line from the antenna. Such reflections cause variations in the input impedance of the transmission line and increased losses in the transmission line.

The present invention provides a highly desirable type of short wave antenna for use over a wide frequency range, the antenna causing very little reactance variation in the transmission line with a variation in frequency.

In principle, the antenna of the present invention comprises a pair of conducting surfaces in the form of flat discs arranged coaxially and in parallel planes. The discs are preferably energized at the centers of their facing surfaces. The radii of the conducting plates and the diameter of the conductors to which the transmission line conductors are connected are so proportioned with respect to the wavelength to be employed that a broad frequency characteristic is attained.

The present invention will be more fully understood by reference to the following detailed description which is accompanied by a drawing in which Figure 1 illustrates an embodiment of the present invention, Figure 2 illustrates a modification of the form shown in Figure 1, and Figure 3 illustrates by means of curves some of the features of the present invention.

The antenna shown in Figure 1 is composed of a pair of flat circular plates 10 and 12 coaxially disposed in parallel planes. In the particular embodiment disclosed, the radius of the plates 10 and 12, is chosen as $.1103\lambda$ where λ is the operating wavelength of the antennas, in one particular case, 150 centimeters. In the particular embodiment shown the axis of the antenna may be assumed to be vertical for radiating uniformly in a horizontal plane. Of course, if horizontally polarized radiation and some horizontal directivity is desired, the axis may be horizontally arranged. The antenna is coupled to a frequency transducer means (not shown), such as a radio transmitter, by means of trans-

mission line TL having its conductors connected to the centers of plates 10 and 12 through intermediary conductors 11 and 13 of somewhat larger diameter than the diameter of the conductors of the transmission line. In the particular example embodiment mentioned above, the diameter of conductors 11 and 13 was chosen as .25 centimeter.

The modification shown in Figure 2 is similar to that shown in Figure 1, with the exception that the transmission line 'TL' is, in this modification, a concentric line having its central conductor 14 connected to conductor 11 and passing through a hollow conductor 13'. The casing 15 of the transmission line forms an extension of conductor 13' below the plate 12. This embodiment has some advantages over that shown in Figure 1 because the structure is entirely symmetrical, the transmission line leading away from the antenna along its vertical axis of symmetry. Thus, any disturbance of the radiated field pattern by the transmission line is avoided.

The curves shown in Figure 3 illustrate the variations in voltage and current along the surface of plates 10 and 12 with varying distance r from the center, as indicated by the point 16 in Figure 1. The curves in Figure 3 plot voltage and current against varying values of r/λ where r is the radial distance between the center of plate 10 and point 16.

While I have particularly shown and described several modifications of my invention, it is to be distinctly understood that my invention is not limited thereto but that improvements within the scope of the invention may be made.

I claim:

1. A short wave antenna including a pair of flat conductive plates coaxially arranged in parallel planes and a two conductor substantially aperiodic transmission line and means for coupling said transmission line to said plates at substantially the midpoints of their facing surfaces, said means including a pair of coaxially arranged conductors, each connected at one end to the midpoints of one of said plates, the other ends of said conductors being connected to the conductors of said transmission line, the dimensions of said plates and said conductors being so proportioned that over a broad frequency band said antenna appears to said transmission line as a substantially pure resistance of substantially constant magnitude.

2. A short wave antenna including a pair of flat conductive plates coaxially arranged in parallel planes and a coaxial transmission line hav-

ing an inner conductor and an outer shell, said shell being connected to and extending through one of said plates at its center, said inner conductor being connected to the center of the other of said plates through a short section of conductor having a diameter substantially equal to that of said outer shell, the dimensions of said plates and said conductors being so proportioned that a broad frequency band is obtained.

3. A short wave antenna including a pair of flat conductive plates coaxially arranged in parallel planes and a coaxial transmission line having an inner conductor and an outer shell, said

shell being connected to and extending through one of said plates at its center, said inner conductor being connected to the center of the other of said plates through a short section of conductor having a diameter substantially equal to that of said outer shell, the lengths of the portion of said shell between said plates and of said short section of conductor being equal, the dimensions of said plates and said conductors being so proportioned that a broad frequency band is obtained.

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