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ANTENNA SYSTEM

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Fig. 1

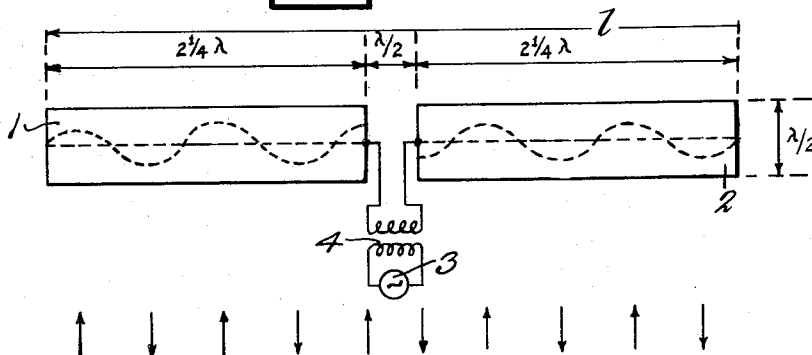
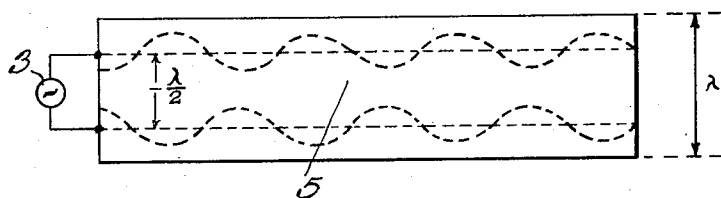


Fig. 2



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ANTENNA SYSTEM

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4 Claims. (Cl. 250—33)

The present invention is concerned with a sheet antenna arrangement adapted for the transmission and the reception of short electromagnetic waves.

In the transmission of short waves it has heretofore been customary to use symmetrically disposed dipole radiators excited at a definite phase sequence or rotation.

According to the present invention, for the purpose of sending and receiving short waves, especially waves of a length of only a few centimeters, recourse is had to aeri-als presenting substantially homogeneous capacity distribution and having linear dimensions, of an order of magnitude of at least one-half wave length or over. In this scheme the length of one side of the plate or net shaped antenna is so chosen that it bears an integral relationship to a half wave length. The excitation of the surface or sheet antenna then occurs in the form of standing waves of the kind known from acoustics as Chladni's sound figures.

A number of embodiments of the invention are illustrated in Figures 1 and 2 of the drawing. In one embodiment, as illustrated in Figure 1, two plate antennæ 1 and 2 having substantially rectangular form are shown separated from each other by a length equal to one half the communication wave and extending in the general direction of their lengths. Each of the antennæ 1 and 2 have a width of about a half wave length and a length of two and one-quarter wave lengths, their total overall length being a multiple of a half wave length. These antennæ are excited in phase opposition with respect to each other. A suitable source of alternating electrical energy 3 energizes the antennæ through a transformer 4 and sets up progressive waves in the individual antennæ in the longitudinal direction thereof, as indicated by dotted lines on the antennæ. The arrows in the drawing indicate current distribution lines (force lines) which are set up in two directions. The arrangement, so far as its effect is concerned, is comparable with an arrangement of dipole antennæ which are excited in phase opposition and are spaced apart by a half wave length. The radiation obtainable thereby is in the direction of the longitudinal axis of the plate antennæ 1 and 2.

Another embodiment is shown in Figure 2 in which, by the use of a flat or sheet antenna 5 a radiation characteristic is obtained which is comparable with the radiation pattern of a Beverage antenna furnished with transversal radiators. Progressive waves are set up in the longitudinal direction of the antenna, as indicated by the dotted lines. The width of the antenna 5 in this case amounts to one wave length, and, at points symmetrically disposed with reference to the mid-

dle of the plate 5 and one-half wave length apart, the radio frequency energy is fed in or taken off, as the case may be. The length of the antenna must be so chosen that at the end the current by radiation has dropped almost to zero. Regulation of the damping may be obtained by a slight detuning of the antenna so that the antenna, let us say, in its width, is either enlarged or reduced somewhat towards the end in such manner that the width of the plate antenna at its beginning is not exactly equal to one wave length. The feeding and the construction of the antenna should be so chosen that current nodes will be set up at the edges of the plate antennæ.

I claim:

1. In an ultrashort wave radio communication system, an antenna arrangement comprising a sheet of substantially rectangular form having substantially uniform capacity distribution whose surface has an area at least equal to

$$\frac{\lambda^2}{4},$$

where λ is the length of the communication wave, one side of said sheet bearing substantially an integral relationship to one half the communication wave and means for producing standing waves on said antenna arrangement.

2. A radio communication system having, in combination, an antenna arrangement comprising two rectangular metallic plates in a single plane separated from each other by a half wave length, each of said plates having a width of half a wave length and a length equal to an odd multiple of a quarter wave length, and a source of alternating electrical energy connected to said plates.

3. A radio communication system having, in combination, an antenna arrangement comprising two rectangular metallic plates in a single plane separated from each other by half a wave length, each of said plates having a width of half a wave length and a length equal to two and one-quarter wave lengths, and a source of alternating electrical energy connected to said plates for producing thereon standing waves in phase opposition to each other.

4. In an ultra short wave radio communication system, an antenna arrangement comprising a metallic plate of substantially rectangular form having substantially uniform capacity distribution whose width over at least a portion of said plate is equal to one wave length and whose length is an odd multiple of a quarter wave length, and a source of alternating electrical energy connected to said plate at points separated by a half wave length for producing thereon standing waves in opposition to each other.

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