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ANTENNA SYSTEM

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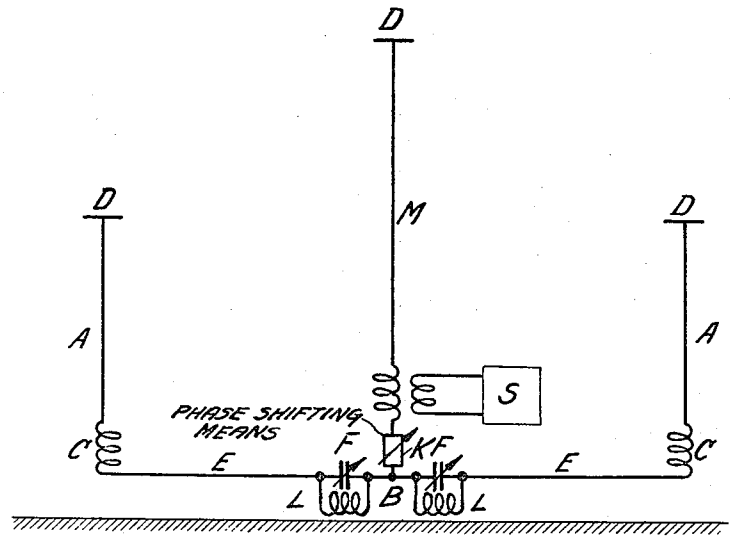


Fig. 1

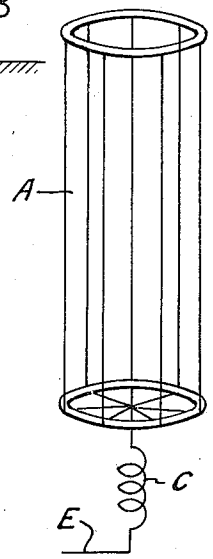


Fig. 3.

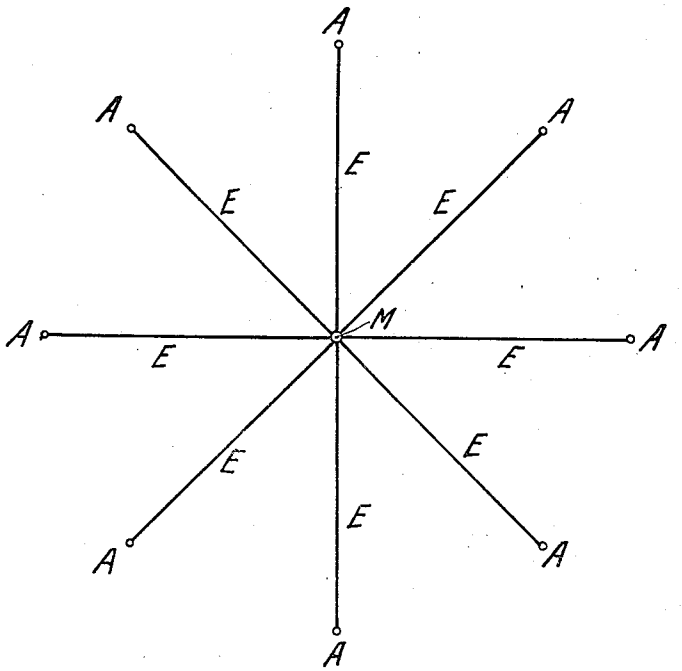


Fig. 2

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ANTENNA SYSTEM

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6 Claims. (Cl. 250—11)

The invention relates to antenna arrangements of the kind wherein a plurality of radiators are disposed around a central radiator and in which the height of these outer radiators is not more than $\lambda/4$ while they are spaced from the central radiator by a distance which is between $\lambda/4$ and $\lambda/2$, where λ is the wave length. It is peculiar to these arrangements that the space radiation, that is, the radiation reflected downward by the Heaviside layer, is suppressed.

The invention has for its object to energize such radiators in the simplest possible manner, the energy lines hitherto employed in this connection requiring very costly transformers to be provided.

In arrangements as provided by the invention the central radiator and the outer radiators, or groups of these, are interconnected by unifilar conductors so as to form an oscillatory system.

Some embodiments of the invention are described hereafter by way of example, reference being had to the accompanying drawing in which;

Fig. 1 is a diagrammatic elevation of one form of the novel system represented as a sort of section, as is customary for the sake of simplicity, in the representation of flat antenna structures of this type. Fig. 2 is a diagrammatic plan to Fig. 1. Fig. 3 shows an alternative structural arrangement for certain of the radiators.

The central radiator is denoted by M. The outer radiators are designated A. It has been assumed that the radiators are fitted above with capacity plates D in order to reduce their height, this however being immaterial to the idea of the invention. The system is energized by a high frequency generator S connected to radiator M. The radiators A are at their lower ends connected at B to radiator M by single wire conductors E. In the case represented this is done over condensers F. The radiators A and conductors E are interconnected by self-induction coils C. The conductors E are preferably spaced from the earth's surface by a certain distance. They may be carried on the poles of telegraph lines, for example.

The current distribution along the lines E, A is by means of the coils C made to be such that the currents entering these lines at B shall be supplied to radiators A at an intensity suitable to produce the proper diagram. It is possible in this way readily to obtain sufficiently strong currents at C. If coils C are large enough to tune the lines E, A to $\lambda/2$, then the requisite voltage may be produced at B with the aid of a rejector circuit. If however coils C are smaller, each line E, A is tuned to $\lambda/2$ by means of condenser F or by a detuned oscillatory circuit FL, as is the case in the example shown in the drawing. In this way the current supplied to the radiators A is easy to vary in order to cause the radiation diagrams to undergo desired variations. Also, phase correctness of the currents in the radiators A is provided by this arrangement.

In order to correct influences which the radiation of radiator M may have upon the radiators A as regards phase conditions, phase shifting means K may be included at B in the radiator M. In this way also the phase of radiator M may be displaced with respect to the phase of the radiators A.

The radiators A may each comprise a number of antennae arranged in a well known manner in circular relation to each other. By constructing the radiators A in this manner, the surge impedance or resistance thereof may be made equal to that of the conductors E so as to avoid reflections occurring at C.

If a ground mat is disposed below the conductors E, as is well known per se, it will be convenient, in order to decrease ground losses, to construct it in a manner corresponding to the structure composed of the conductors E, and to make the radial arms of such ground mat so wide that their width is a multiple of that of the conductors E. Such arrangement besides has the advantage that the current of the radiators nowhere reaches earth and that therefore losses caused by a passage through earth are avoided.

It will in general be sufficient to make the radiators A approximately half as high as radiator M, whereby a simple arrangement is created whose masts may be interconnected by braces.

What is claimed is:

1. An antenna arrangement comprising an upright central radiator, upright outer radiators disposed around this central radiator and spaced therefrom by a distance which is between $\lambda/4$ and $\lambda/2$ where λ is the operating wavelength, the height of these outer radiators not exceeding $\lambda/4$, a high frequency generator connected to the central radiator, and unifilar conductors connecting the lower end of each outer radiator with the lower end of the central radiator and arranged parallel to the earth's surface.

2. An arrangement according to claim 1, hav-

ing a condenser between each unifilar conductor and the lower end of the central radiator.

3. An arrangement according to claim 1, having rejector circuits interconnecting the unifilar conductors and to the lower end of the central radiator.

4. An arrangement according to claim 1, having phase shifting means included in the central radiator.

5. An arrangement according to claim 1, wherein the outer radiators are composed of antennae arranged in circular relation to each other.

6. An antenna arrangement as defined in claim 1, having condensers and inductances constituting oscillatory circuits detuned with respect to the operating wavelength and inserted between the lower end of said central radiator and each of said unifilar conductors.

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