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ANTENNA SYSTEM

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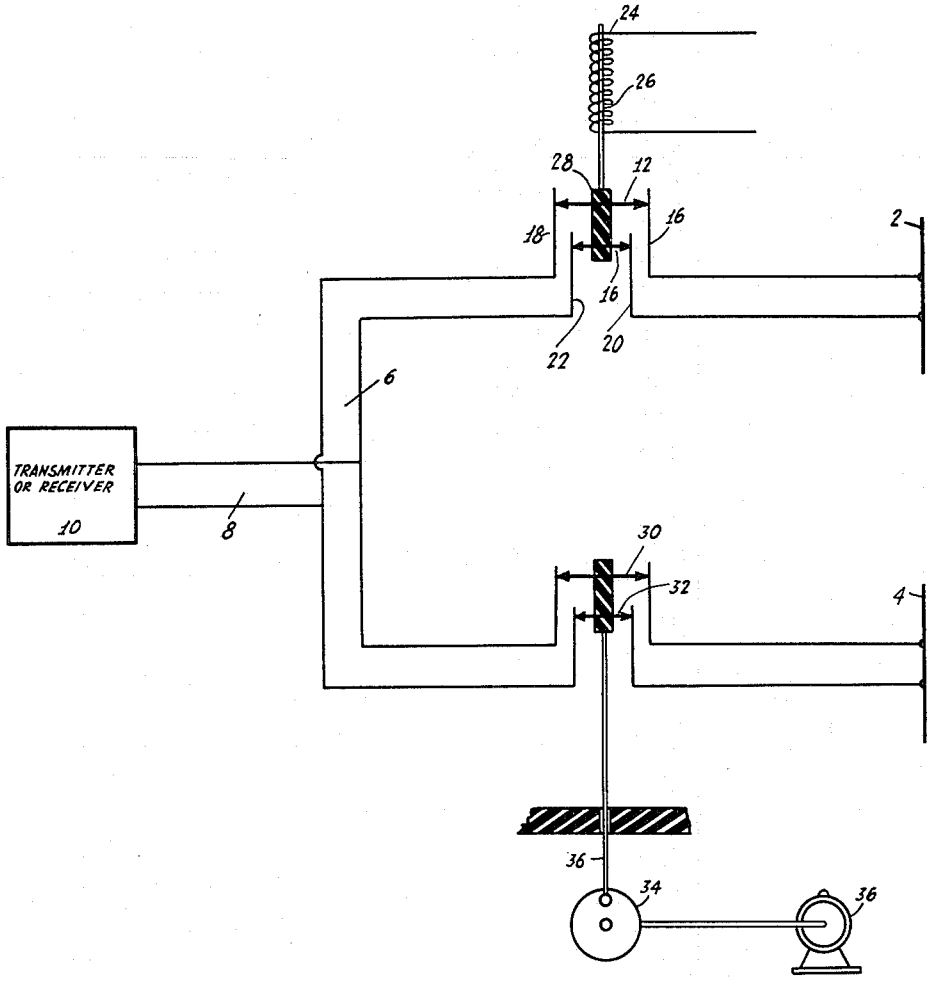

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ANTENNA SYSTEM

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6 Claims. (Cl. 250—33)

In modern short-wave antennæ the energy is increased by causing the radiation to simultaneously assume the shape of beams both in vertical and in horizontal direction in order that the field intensity or the sensitiveness may be raised. However, insofar as the vertical beam effect is concerned, a limitation is set to the increase as stated insofar as in the presence of frequent atmospheric conditions, especially in the Heaviside layer, the bunched radiations do not fall in at the same point; indeed, stray or scattering occurs in forward and rearward direction, with the result that they are received or caused to impinge at points ahead or in the rear of the receiving station. Hence, a limit is here set to maximum concentration of the energy.

The object of this invention consists in obviating the said limitation or to suppress the same in part, in a manner such that the approximately horizontal issuing angle of the transmitter radiation and, if desired, also the angle of incidence in the receiver antenna is varied rhythmically or periodically by the aid of special means inside definite limits. This end may be attained, for instance, by that the phase position of the radio frequency currents in the dipoles vertically superposed at the transmitter or better still at the receiver end, is periodically altered a certain amount.

The present invention, although defined with particularity in the appended claims, may best be understood both as to its structural organization and method of operation by referring to the accompanying drawing which, of course, is solely illustrative and in no way limitative of the present invention. The drawing illustrates a transmitting or receiving system having a pair of antennæ, the energy supply by or to which, to or from radio receiving apparatus, is periodically in predetermined fashion altered in phase.

Referring to the drawing, antennæ 2, 4, preferably superposed linear antennæ each a half wave length long, are coupled through transmission lines 6, 8 to transmitting or receiving apparatus 10. In order to vary the electrical length of antenna 2 from high frequency apparatus 10, conductors 12, 14 contacting with a slidable over conductors 16, 18 and 20, 22, are provided. Actuation of the conductors 12, 14 over conductors 16, 18 and 20, 22, is accomplished by supplying energy of predetermined frequency to solenoid 24 which in turn wobbles armature 26 carrying insulating member 28. Insulating member 28, of course, insulatingly supports conductors 12, 14.

Although only the electrical length of the path of one of the antennæ need be varied, both may be varied, and, the electrical length of the path from antenna 4 to apparatus 10 need not be varied in the fashion outlined. Instead, conductors 30, 32 may be actuated by means of cam 34 and connecting rod 36, cam or eccentric 34 being driven by a motor 36 at any predetermined speed. Of course, rather than vary the actual length of the path from each antenna to the high frequency apparatus, variable inductors may be inserted in the lines to each antenna and varied in predetermined fashion, the variation in inductance giving an effective change in length which, of course, produces an effective change in phase of energy supplied to or by the respective antennæ.

Having thus described my invention, what I claim is:

1. In a radio transmitting system employing two directive antennæ, the method of communicating which includes automatically and periodically varying the phase position of the currents in at least one of said antennæ with respect to the other.

2. In apparatus for undulatory electrical currents, two spaced vertical dipole antennæ in superposed fashion, high frequency apparatus, conductive paths for coupling the two antennæ to the apparatus, slidable contacting means serially connected in both of said paths for varying the effective lengths thereof, insulating supports rigidly attached to and movable with each of said contacting means, connecting rods for each of said supports, an electromagnetic relay controlling one of said rods for movement of one set of contacting means, said relay being responsive to energy of a predetermined frequency, and a motor and cam arrangement controlling the other connecting rod for rhythmically varying the other set of contacting means, whereby the phase of energy supplied to or by the antennæ is varied.

3. In apparatus for undulatory electrical currents, a plurality of spaced antennæ, high frequency apparatus, conductive paths for coupling the antennæ to the apparatus, slidable contacting means serially connected in one of said paths for varying the length thereof, an insulating support rigidly attached to and movable with said contacting means, an electromagnetic relay controlling said support and contacting means, said relay being responsive to energy of a predetermined frequency for varying the effective length of said one conductive path, whereby the phase of energy supplied to or by the antennæ is varied.

4. In means for increasing the transmission

range of undulatory oscillations of high frequency by continuously varying the phase of the oscillations, a source of oscillations, radiating means, an electrical path between said source and said radiating means, and means for varying continuously the effective length of the electrical path between said source and said radiating means.

5. In combination, a radiating system, a source of high frequency oscillations, conductive means connecting said source to said radiating means, and means for increasing the effective range of the oscillating energy sent out from said radiating means comprising means for continuously varying the electrical length of said conducting means.

6. In combination, a load circuit, a source of high frequency oscillations, a conducting medium connecting said source of high frequency oscillations to said load circuit and a device for increasing the efficiency of operation of said system comprising means for continuously varying the electrical length of said conducting medium.

GEORG v. ARCO.