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DIRECTIVE ANTENNA

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This invention has reference to directive aerial systems in which the uniformity in phase of the radiant parts is endeavoured to be ensured.

These systems may be efficiently composed with the aid of symmetrically arranged feeders having connected to them doublets spaced at one wave length or a half wave length apart, the feeders being in the latter case alternately crossed.

It can be established theoretically:

1. That in this manner all the doublets are in the same phase;

2. That this is not detrimentally influenced by reflections in the tapping points.

3. That all the doublets receive an equal quantity of current, the last one consequently as much as the first one, when the feeder has no damping. The latter has therefore to be constructed so as to have a large surface.

A uniphasal straight radiating aerial wire is a directive antenna adapted for transmission as well as for reception. The more wave lengths it is long, the greater is the directive effect.

According to the invention such radiating aerial can be composed in a particularly efficient and simple manner by building it up from doublets which are branched off a feeder. If a directive aerial system is wanted which has a greater directional effect, because of a beam being also formed in another plane, an aerial system according to the invention can be constructed which comprises two or more similar aerials spaced at a half wave length apart, the conductors which are branched off the feeders, having doublets, alternately crossed, connected to them.

The invention will be more clearly understood by reference to the accompanying drawing in which

Figure 1 shows a feeder, having connected to it doublets, alternately crossed, which are spaced at a half wave length apart.

Figure 2 shows a symmetrical feeder to which branch conductors *b* are connected so as to be spaced at a wave length apart.

These branch conductors have the doublets *c* connected to them in the manner shown in the figure by arrows.

In this manner a uniphasal aerial I, according to the invention, is formed.

If the branch conductors *b* are lengthened as shown in Figure 2 and if doublets *d* are connected to the said branch conductors so as to be crossed, a second uniphasal aerial II is produced which is at a half wave length spaced apart from the first one.

The said crossing can be effected either by arranging the doublets *d* so as to be crossed or by crossing the branch conductors.

If the branch conductors are still further lengthened, it is possible to provide still more uniphasal aerials which are alternately crossed and a still greater number of aerials which are parallel to each other is obtained.

The arrangement shown in Figure 2 may be provided in any desired direction. As a rule the aerials will be arranged so as to be either horizontal or vertical.

In the foregoing, uniphasal aerials are referred to and they are illustrated to be situated in a straight line. However it is evident that slight differences do not cause the arrangement to depart from the scope of the invention. These differences may be of different nature, for example the successive doublets may not be situated in a straight line or spacings may be provided by leaving out a doublet now and then or by making the doublets slightly shorter.

Referring to Figure 2, a uniphasal aerial according to the invention is formed by branching conductors which are spaced at a wave length apart of a feeder and connecting to them doublets of twice a half wave length.

The same result may be obtained by conductors branched off the feeder spaced at a half wave length apart and alternately crossed, and by connecting to these branching conductors doublets of twice a quarter wave length.

The invention is adapted for transmission as well as for the reception antennas.

What I claim is:

1. In a communication system for transmitting or conveying intelligence from one geographically situated point to another by means of propagated electromagnetic wave energy derived from the flow of high frequency undulatory electrical currents operated upon in accordance with the intelligence to be transmitted, a directive antenna system comprising a two wire conducting transmission line the wires of which are relatively close together and being crossed at points one-half wave length apart, and linear radiators connected to the two wire line and arranged normally thereto at points intermediate the crossing points of the two wire line.

2. In a communication system for transmitting or conveying intelligence from one geographically situated point to another by means of propagated electromagnetic wave energy derived from the flow of high frequency undulatory electrical currents operated upon in accordance with the

intelligence to be transmitted, a directive antenna system comprising a relatively closely spaced two conductor transmission line, each conductor thereof being continuously conductive throughout its length, and linear conductors arranged normally to the line and spaced apart a whole multiple of a half wave length on said line and connected to the line whereby, by virtue of their spacing, each of said linear conductors is excited in predetermined phase relationship and whereby the radiant action of all of the linear conductors is highly directional.

3. In a communication system for transmitting or conveying intelligence from one geographically situated point to another by means of propagated electromagnetic wave energy derived from the flow of high frequency undulatory electrical currents operated upon in accordance with the intelligence to be transmitted, a directive antenna system comprising a relatively closely spaced unbroken two-conductor transmission line, the conductors of which are conductive throughout their length, and linear conductors arranged normally to said line and directly connected thereto for obtaining a predetermined phase relationship spaced successively a half wave length apart in the direction of the line, said linear conductors by virtue of their spacing, having an overall highly directional radiant characteristic.

4. In a communication system for transmitting or conveying intelligence from one geographically situated point to another by means of propagated electromagnetic wave energy derived from the flow of high frequency undulatory electrical currents operated upon in accordance with the intelligence to be transmitted, a directive antenna system comprising a multi-conductor transmission line crossed at point one-half wave length apart, and linear radiators one-half wave length apart, connected to the line at points intermediate the crossing points of the line whereby, by virtue of the spacing of the radiators, the entire system is given a highly directional radiant characteristic.

5. In a communication system for transmitting or conveying intelligence from one geographically situated point to another by means of propagated electromagnetic wave energy derived from the flow of high frequency undulatory electrical currents operated upon in accordance with the intelligence to be transmitted, a directive antenna system comprising a substantially straight two wire transmission line, a plurality of two wire branch lines connected to and arranged normally of said transmission line, and linear radiators directly connected to said two wire branch lines said branched lines being crossed at points one half wave length apart.

6. In a communication system for transmitting or conveying intelligence from one geographically situated point to another by means of propagated electromagnetic wave energy derived from the flow of high frequency undulatory electrical currents operated upon in accordance with the intelligence to be transmitted, a directive antenna system comprising a substantially straight two wire transmission line, a plurality of two wire

branch lines connected to and arranged normally of said transmission line, and linear radiators connected to said two wire branch lines, successive radiators on said branch lines being spaced one-half wave length apart.

7. In a communication system for transmitting or conveying intelligence from one geographically situated point to another by means of propagated electromagnetic wave energy derived from the flow of high frequency undulatory electrical currents operated upon in accordance with the intelligence to be transmitted, a directive antenna system comprising a closely spaced two wire transmission line, closely spaced two wire branch lines spaced apart on said transmission line a multiple of a wave length and arranged normally to said transmission line, and linear radiators arranged normally to said branch transmission lines, and spaced apart thereon one-half wave length, said branch lines being crossed at points one-half wave length apart and intermediate said radiators whereby all of said radiators carry high frequency currents of predetermined phase relationship giving the entire system a highly directional characteristic.

8. A directive antenna system comprising a two wire conducting transmission line the wires of which are relatively close together and crossed at points substantially one half wave length apart, and linear radiators connected to the wire line, said linear radiators being spaced apart a whole multiple of a half wave length.

9. A directive antenna system comprising a two wire conducting transmission line the wires of which are relatively close together and crossed at points substantially one half wave length apart, and linear radiators connected to the wire line and arranged normally thereto at points intermediate the crossing points of the two wire line, said linear radiators being spaced apart a whole multiple of a half wave length.

10. A directive antenna system comprising a substantially straight two wire transmission line, a plurality of two wire branch lines connected to and arranged normally of said transmission line and linear radiators connected to said two wire branch lines, successive radiators of said branch lines being spaced one half wave length apart, and said branch lines being crossed between successive radiators.

11. In a communication system for transmitting or conveying intelligence from one geographically situated point to another by means of propagated electromagnetic energy derived from the flow of high frequency undulatory electrical currents operated upon by the intelligence to be transmitted, a directive antenna system comprising a closely spaced two conductor transmission line, and linear radiators arranged normally to said line and connected thereto in such manner as to obtain a predetermined phase relationship and spaced successively a half wave length apart in the direction of the line, said linear radiators by virtue of their spacing having an overall directive characteristic.

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