RADIATING TERMINATION FOR A RHOMBIC ANTENNA

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This invention relates to an aerial system in which for example for the directional transmission of oscillations to be transferred use is made of a rhombic aerial in which only travelling waves must occur. The occurrence of stationary waves is avoided in such an aerial or in other aerial systems in which solely travelling waves must occur by terminating the end of the aerial system that is remote from the supply end by means of an impedance whose value corresponds with the surge resistance of the aerial system.

It has been suggested before to increase the efficiency of such an aerial system by constituting the terminating resistance by a second aerial system formed by a dipole antenna which by means of a transmission line is connected to the terminating end of the former aerial system and is so arranged that the radiations of the two aerial systems are backed up by one another.

The last-mentioned system, however, exhibits an undue intensity variation with the frequency of the oscillations to be transferred or received.

The invention has for its object to avoid this intensity variation with frequency.

According to the invention, for this purpose the second aerial system is arranged in the immediate proximity of the terminating end of the former aerial system and the ends of the former aerial system are connected direct to the input terminals of the second aerial system.

Thus, a suitable relative arrangement of the two aerial systems avoids the use of the transmission line which otherwise would be required for the interconnection of the systems and thus the undue intensity variation of the entire system with frequency is avoided.

If the invention is used with a rhombic aerial terminated by a dipole it is favourable to cross the sides of the rhombic aerial connected to the dipole aerial and constitute a dipole aerial by a single conductor extending between the terminating ends of the rhombic aerial. This does away with the need for earthing the free ends of the dipole halves.

In order to get in the latter case to a symmetric figure of the rhombic aerial, desired in view of the radiation diagram, the sides of the rhombic aerial that are connected to the feeder are, preferably crossed similarly to the other sides and the feeding ends of these sides are respectively connected with the feeder by two conductors jointly constituting a dipole antenna.

In order that the invention may be clearly understood and readily carried into effect it will now be described more fully with reference to the accompanying drawing, in which Figures 1 to 3 show aerial systems according to the invention, the former aerial system being formed by an ordinary rhombic aerial, an asymmetric rhombic aerial or a symmetrically crossed rhombic aerial respectively.

In the form of construction shown in Figure 1 the former aerial system comprises a rhombic aerial 1 which is situated for example in a horizontal plane and which is constituted by two conductors 2, 2' having a length of, say, 4λ, if λ is the wavelength of the oscillations transmitted. The connecting terminals of the rhombic aerial 1 situated on the right hand side are connected to a transmitter 4, whereas the conductors 2, 2' are connected as the left hand ends 5 and 5' respectively (terminating ends) with conductors 6, 6' each having a length of \(\frac{1}{4}\lambda\), which are earthed at the free end and jointly constitute a dipole antenna having an input resistance corresponding to the surge resistance of the rhombic aerial.

By a proper choice of the angle formed by the conductors 2, 6 or 2', 6' respectively this dipole is so arranged that the main directions of radiation coincide for both aerial systems in accordance with the direction denoted by an arrow 7.

As shown in the figure, the second aerial 8, 8' is arranged in the immediate proximity of the terminating ends 5, 5' of the rhombic aerial and the two aerial systems are interconnected direct i.e. without the use of a transmission line serving for the connection.

In the form of construction of the aerial system shown in Figure 1 earthing the free ends of the dipole halves often entails difficulty.

These difficulties may be obviated by the use of the form of construction shown in Figure 2. In this case, the sides of the rhombic aerial 1 that are connected to the dipole aerial are crossed and this permits of the dipole halves being so arranged that the free ends are adjacent each other and thus can be connected direct. This does away with the necessity of earthing the free ends.

In order to ensure a symmetric structure of the rhombic aerial as before the form of construction shown in Figure 3 may be used. In this case, the sides of the rhombic aerial that are connected to the feeder are crossed similarly to the other sides and are connected to the feeder by two conductors 8, 8' respectively which jointly form a dipole aerial, as before, each having a length of \(\frac{1}{4}\lambda\). The radiation diagram of the rhombic aerial thus obtained corresponds with
that of a normal rhombic aerial of similar form and dimensions without crossed sides.

In the forms of conical aerials may be used to constitute the second aerial system, the latter being eminently suitable for the present object in view of their frequency-impedance characteristic curve which has a substantially flat course for a wide frequency band.

What I claim is:

1. An aerial system comprising a rhombic antenna constituted by a pair of conductors, means for energizing said system connected to the terminals of said conductors disposed at one end thereof and a dipole radiator operatively connected directly to the terminals of said conductors disposed at the other end thereof, all elements of said system being connected directly to the terminals of said conductors being radiating elements.

2. An aerial system comprising a rhombic antenna constituted by a pair of conductors, means for energizing said system connected to the terminals of said conductors disposed at one end thereof, and a dipole radiator having its inner terminals connected directly to the terminals of said conductors disposed at the other end thereof and its outer terminals grounded, all elements of said system following the terminals at said one end of said conductors being radiating elements.

3. An aerial system comprising a rhombic antenna constituted by a pair of V-shaped conductors, said conductors at one end thereof being crossed, a dipole radiator having its outer terminals directly connected to the terminals of said conductors disposed at said one end thereof and its inner terminals interconnected, and means for energizing said aerial system connected to the terminals of said conductors disposed at the other end thereof, all elements of said system following the terminals of said conductors disposed at said other end thereof being radiating elements.

4. An aerial system comprising a rhombic antenna constituted by a pair of V-shaped conductors, said conductors at one end thereof being crossed, a radiating member whose length is substantially equal to a half-wavelength of the operating frequency of said system, said member being directly connected between the terminals of said conductors at said one end thereof, and means for energizing said system connected to the terminals of said conductors disposed at the other end thereof, said member acting as a dipole, all elements of said system following the terminals at said other end of said conductors being radiating elements.

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