

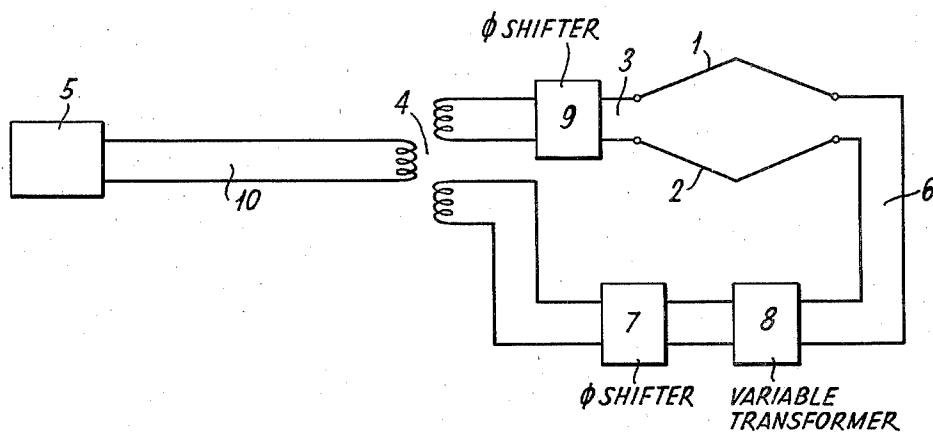
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ANTENNA

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For transmitting and receiving high-frequency waves antennas are known which as compared with the customary short wave antennas operate with travelling waves. These antennas ordinarily consist of one or several conductors connected at one side to the transmitter or receiver and whose free ends are either connected to each other or to the ground across an end resistor, which is equal to the wave resistance of the antennas. The energy coming from the transmitter is then in part radiated along the antenna conductor and the remaining part is consumed in the end resistor. These antennas have the disadvantage that a substantial part of the energy conducted thereto is destroyed in the terminal resistor.

This disadvantage is overcome in accordance with the invention in that the antenna is coupled at both ends to the transmitter or receiver instead of being connected thereto at one end only. In this case no terminal resistor is required since the energy appearing at the ends of the antenna is again passed to the input. The transmitter need then supply only the radiated part of the energy so that the efficiency of the arrangement will thereby be greatly increased.

The present invention will be clearly understood by reference to the following detailed description which is accompanied by a drawing which shows diagrammatically an embodiment of the invention.

The figure shows a rhombic antenna comprising the two bent conductors 1 and 2 connected at one end to the transmitter 5 across a connection line 3 and coupling arrangement 4. Instead of connecting to each other across a terminal resistor in the manner known in the prior art, the other two ends of the antennas have, in accordance with the invention, likewise an energy line 6 connected thereto by means of which the non-radiated part of the energy is again returned to the coupling arrangement 4 and hence, also, to the input of the antenna. The energy must be returned in such a manner that this returned energy and the energy coming from the transmitter have the same phase and the same amplitudes. The phase equality can be provided either by a suitable choice of the length of the line 6, or by a phase shifting device 7 while the amplitude is controlled for instance by transformation in the transformer 8. Additionally, arrangements 9 serving for adjustment of the amplitude and phase may also be placed in the line 3. The proportion between the amplitude

of the returned wave and the amplitude of the primary wave may also be attained by adjustment of the coupling arrangement 4. Care must be taken that matching exists at all places of the entire arrangement.

Aside from the gain in energy the described arrangement has the further advantage that the proportions between the currents on the antenna can be adjusted to in any desired manner and that thereby much more favorable conditions of radiation can be achieved.

The return line 6 need not necessarily be coupled directly as shown but any number of intermediate organs or transformers may be employed. The entire antenna can be matched with the energy line 10 likewise by adjusting the coupling of the transformer 4.

I claim:

1. A rhombic antenna comprising a pair of conductors having their ends adjacent and the midpoints separated, a transmission line, means for coupling said line to said antenna at one pair of adjacent ends whereby travelling waves are set up in said antenna, a second transmission line connected to the other pair of adjacent ends and means for coupling said second line to said first mentioned means.

2. A rhombic antenna comprising a pair of conductors having their ends adjacent and the midpoints separated, a transmission line, means for coupling said line to said antenna at one pair of adjacent ends, a second transmission line connected to the other pair of adjacent ends, means for coupling said second line to said first mentioned means and means for adjusting the phase relationship between the currents in said second transmission line and said first mentioned means.

3. In combination, a travelling wave antenna, means for energizing said antenna connected to one end thereof and means connected to the other end of said antenna for preventing reflection of energy from said end, said means comprising a transmission line connected to said other end and coupled to said first mentioned means whereby energy arriving at said other end is reapplied to said antenna at said one end.

4. A rhombic antenna comprising a pair of conductors having their ends adjacent and the midpoints separated, a transmission line, means for coupling said line to one pair of adjacent ends, a second transmission line connected to the other pair of adjacent ends, means for coupling said second line to said first line and means

for adjusting the phase and amplitude of the currents in said second line.

5. A travelling wave antenna having a length at least as long as the length of the operating wave, said antenna having an axis arranged along the line of a desired direction of communication, a first transmission line, means for coupling said transmission line to said antenna at its remote end with reference to said direction line, a second transmission line coupled to said antenna at its other end and means for coupling said second transmission line to said first mentioned means.

6. A rhombic antenna comprising a pair of conductors having their ends adjacent and the midpoints separated, means for energizing said antenna connected to one pair of adjacent ends, a transmission line connected to the other pair of adjacent ends for feeding energy from said second pair of ends back into said first pair of ends, and means for adjusting the phase and amplitude of currents in said transmission line.

7. In combination, a travelling wave antenna, means for energizing said antenna connected to one end thereof and means connected to the other end of said antenna for preventing reflection of energy from said end, said means comprising a transmission line connected to said other end and coupled to said first mentioned means whereby energy arriving at said other end is reapplied to said antenna at said one end and means for adjusting the phase of said reapplied energy.

8. A travelling wave antenna having a length at least as long as the length of the operating wave, said antenna having an axis arranged along the line of a desired direction of communication, a first transmission line, means for coupling said transmission line to said antenna at its remote end with reference to said direction line, a second transmission line coupled to said antenna at its other end, means for coupling said second transmission line to said first mentioned means and means for adjusting the phase of the currents in said second transmission line.

9. In combination, a travelling wave antenna, means for energizing said antenna connected thereto at one point, means connected to said antenna at another point remote from said one point for receiving energy arriving thereat and means for reapplying said energy to said antenna at said one point in phase with the energy applied thereto from said energizing means.

10. In combination with an antenna characterized in that wave energy is applied thereto at one point and continuously progresses to another point on said antenna of means coupled to said other point for receiving energy arriving thereat and means for reapplying said received energy to said antenna at said one point with a predetermined phase and amplitude.

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