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AERIAL SYSTEM COMPRISING A CONCENTRIC TRANSMISSION LINE

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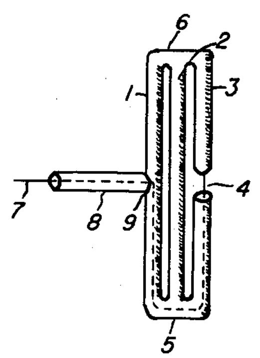

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AERIAL SYSTEM COMPRISING A CONCENTRIC TRANSMISSION LINE

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5 Claims. (Cl. 250—33)

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This invention relates to aerial systems comprising at least two parallel radiators of substantially equal length, the spacing of which is small with respect to the wavelength and of which the adjacent extremities are electrically connected, the aerial systems being fed at the area of a midway interruption of one radiator through a concentric transmission line. Such an aerial system is frequently referred to as a folded dipole.

When the concentric transmission line is connected directly to the aerial system at the area of the interruption, in which event the envelope of the transmission line is connected to one part of the interrupted radiator and the inner conductor to the other part thereof, a troublesome current flows along the outside of the envelope as a result of the different capacities of the two parts of the interrupted radiator with respect to the envelope. As a rule, this current acts upon the radiation diagram in an undesirable manner.

It is known to interrupt such superficial currents by a ¼λ section connected in series with the outer surface of the envelope. However, this section exhibits properties which are dependent on frequency so that the superficial current is completely suppressed for one frequency only. This is an inconvenience more particularly in the case of aerials having broad-band properties and with tunable aerials.

The present invention provides a construction in which the said inconvenience is obviated.

The invention exhibits the characteristic that the inner conductor of the transmission line is connected to that extremity of one part of the interrupted radiator which is adjacent the interior, the inner conductor being led in an insulated manner through the interior of the other part of the interrupted radiator as far as the external extremity thereof and thence led through the interior of a non-interrupted radiator and through an aperture provided midway of the last-mentioned radiator to the exterior, extending from this point through a distance equal to at least a quarter wavelength in a direction at right angles to the longitudinal axis of the radiator, the envelope of the transmission line being connected to the centre of the last-mentioned radiator.

As will appear hereinafter, the aerial system is thus rendered symmetrical with respect to the envelope, the symmetry obtained not being dependent on frequency.

It is noted that an aerial system connected to

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a concentric transmission line exhibiting frequency-independent symmetry is known per se. However, such an aerial system is a frame aerial.

Furthermore it may be mentioned that a dipole aerial is known in which the coupling with a concentric transmission line is established by means of a coupling section which is somewhat similar to the aerial system according to the invention. However, in this known system, separate dipole radiators are secured to the coupling system.

The invention will now be explained more fully by reference to the accompanying drawing, showing, by way of example, one form of construction of the system according thereto.

The aerial system shown comprises three tubular radiators 1, 2 and 3, each having a length of approximately ½λ, in which λ represents the wavelength at the centre of the wavelength range that may be covered by the aerial. The radiator 3 is interrupted midway at 4. At the extremities, the radiators 1, 2 and 3 are interconnected by connections 5 and 6, which are likewise tubular. The spacing of the radiators is small with respect to λ. The radiators here extend in a plane, but this is not essential. Here use is made of three radiators, but in aerial systems according to the invention it is also possible to utilise two or more than three radiators connected in parallel. A core 7 of a transmission line 7, 8 is connected to the upper part of the radiator 3 and, in the manner shown, led in an insulated manner through the lower part of the radiator 3, through the connecting piece 5 and through the lower half of the radiator 1.

The last-mentioned radiator exhibits midway at 9 an aperture through which the core 7 is led to the exterior. The envelope 8 of the transmission line 7, 8 is connected along the edge of the said aperture to the radiator 1, the aerial system thus being geometrically symmetric with respect to the envelope 8. Voltages set up in phase opposition between the adjacent extremities of the interrupted radiator 3 now do not result in currents being produced along the outside of the envelope 8.

It has been found that the symmetry is not disturbed to any appreciable extent if the transmission line 7, 8 is not exactly at right angles to the longitudinal axes of the parallel radiators in so far that part of the transmission line is concerned which is farther than ¼λ remote from the aerial system.

What I claim is:

1. A folded dipole aerial structure adapted to

operate within a predetermined wavelength range comprising first and second parallel radiating elements of substantially equal length, the spacing between said elements being less than a quarter of a wavelength of the central wavelength in said range, first and second conductors having a length relatively small with respect to said elements and interconnecting the respective extremities of said first and second elements, said second element being divided at the midpoint thereof to form a first section and a second section, said first section of said second element, the corresponding portion of said first element and said first conductor being hollow, and a concentric line for feeding said radiators, said line having an outer conductor connected to the midpoint of said first element, and an inner conductor extending through said hollow portion of said first element, said hollow first conductor and said hollow first section and being connected to the free end of said second section.

2. A folded dipole aerial structure, as set forth in claim 1, further including a third parallel radiating element interposed between said first and second elements, the extremities of said third element being connected to said first and second conductors.

3. A folded dipole aerial system adapted to operate within a predetermined wavelength range comprising first and second parallel radiating elements having a length substantially equal to one half the wavelength of the central wavelength in said range, the spacing between said elements being less than a quarter of a wavelength of said central wavelength, first and second conductors interconnecting the respective extremities of said elements, said second element being divided at the midpoint thereof to form a first section and a second section, and first section of said second element, the corresponding portion of said first element and said first conductor being hollow, and a concentric transmission line feeding said elements, said line having an outer conductor connected to the midpoint of said first element and disposed at right angles thereto and having an inner conductor extending through the hollow portion of said first element, the hollow first conductor and the hollow first section and being connected to the free end of said second section.

4. A folded dipole aerial system adapted to operate within a predetermined wavelength range comprising first and second parallel hollow radiating elements having a length substantially equal to one half the wavelength of the central frequency in said range, a third parallel radiating element of like length interposed between said first and second elements, hollow first and second conductors interconnecting the respective extremities of said first, second and third elements and communicating therewith, the spacing between said elements being less than a quarter of a wavelength of the central wavelength in said range, said second element being divided at the midpoint thereof to form a first section and a second section, and a concentric transmission line for feeding said element and having a tubular outer conductor connected to and communicating with said first element at the midpoint thereof and an inner conductor extending through one half of said first element and through said first conductor and said first section of said second element and being connected to the free end of said second section.

5. An arrangement, as set forth in claim 4, wherein said outer conductor of said concentric line is disposed at right angles to said first element.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,167,709	Cork	Aug. 1, 1939
2,243,677	Lindenblad	May 27, 1941
2,283,914	Carter	May 26, 1942
2,465,379	Kandoian	Mar. 29, 1949