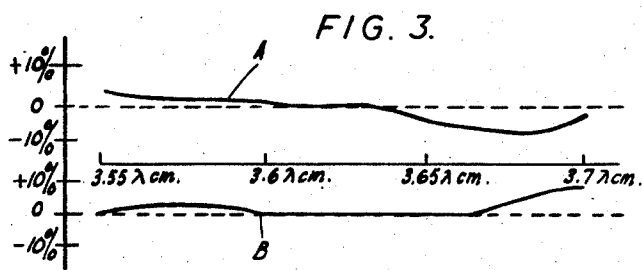
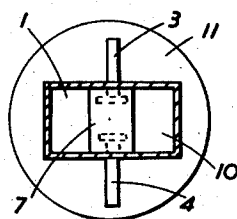
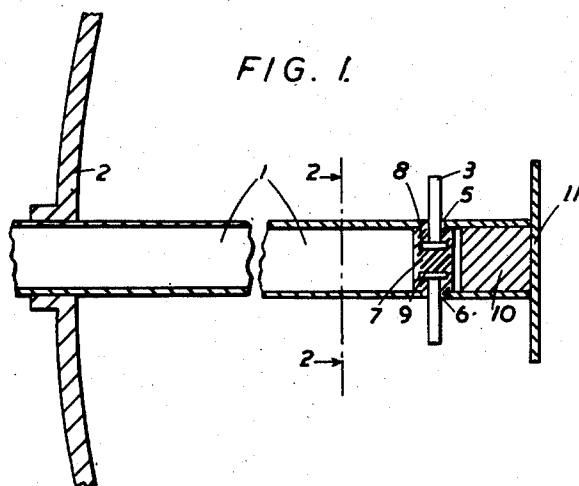


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J. COLLARD
TRANSMITTING OR RECEIVING AERIAL
FOR CENTIMETER WAVE LENGTHS
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TRANSMITTING OR RECEIVING AERIAL
FOR CENTIMETER WAVE LENGTHSJohn Collard, Hammersmith, London, England,
assignor to Electric & Musical Industries Limited,
Hayes, England, a British companyApplication March 1, 1950, Serial No. 147,098
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7 Claims. (Cl. 250—33.65)

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This invention relates to transmitting or receiving aerials for centimetre wavelengths.

Usually aerials for use at centimetre wavelengths have heretofore comprised a length of waveguide an open end of which was bent so as to lie at the focus of a parabolic reflector. Such an aerial is capable of transmitting or receiving waves over a very narrow cone, but the bending of a waveguide in this manner causes disturbance of the directive diagram of the aerial. It has also, however, been proposed to close the end of the waveguide and to construct the transmitting or receiving element in the form of a dipole coupled to the waveguide. It is found, however, that with such an arrangement the resistive and reactive components of the aerial impedance vary considerably over a frequency band.

It is the object of the present invention to provide an improved aerial with a view to overcoming or reducing these difficulties.

According to the present invention an aerial is provided comprising a length of waveguide having a dipole aerial associated therewith which comprises a pair of radiating or receiving elements insulated from each other and from said waveguide and projecting through opposite walls of the latter. The use of two separate elements spaced apart as aforesaid is found to provide an improvement in that the variation of the resistance and reactive components of the aerial over a band of frequencies is reduced whilst a further reduction in such variation can be obtained by providing capacity loading between the adjacent ends of said elements which capacity loading may take the form of conductive discs secured to said adjacent ends of said elements.

In order that the said invention may be clearly understood and readily carried into effect, it will now be more fully described with reference to the accompanying drawings, in which:

Figure 1 is a longitudinal cross-sectional view of an aerial in accordance with the invention,

Figure 2 is a cross-sectional view taken along the line 2—2 of Figure 1, and

Figure 3 illustrates curves showing the variation of the resistive and reactive components of the aerial impedance in accordance with the invention.

In one example of an aerial according to the present invention the aerial comprises a length of rectangular waveguide 1 adapted to be excited in the H_{10} mode, said waveguide projecting from the centre of a parabolic reflector 2 (a portion only of which is shown) and at the focus of the reflector a pair of elements 3 and 4 forming a

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dipole aerial project from said waveguide. The elements 3 and 4 comprise rods projecting in opposite directions through apertures 5 and 6 respectively in opposite walls of the waveguide, said opposite walls being the longer walls of the waveguide cross-section, as shown in Figure 2. Said elements 3 and 4 are mounted in a cylindrical block 7 of insulating material, such as polythene, the ends of said cylinder being reduced in diameter so as to fit said apertures 5 and 6. The adjacent ends of the elements 3 and 4 which project into the waveguide are provided with conductive discs 8 and 9 respectively so as to afford capacitive loading for the elements. The end of the waveguide 1 is closed by a conductive plug 10 which is provided at its end with a circular plate 11 forming a reflector for the dipole aerial.

The dimensions of the various parts of an aerial which have given good results in terms of decimals of the mean operating wavelength are as follows: the overall length of the elements 3 and 4 including the discs 8 and 9 at their adjacent ends is 0.373; the distance between adjacent surfaces of said discs 8 and 9 is 0.185; the thickness of each disc 8 and 9 is 0.0138; the diameter of the rods forming said elements 3 and 4 is 0.0552; the diameter of the discs 3 and 4 is 0.1685; the diameter of the circular plate 11 is 1.105; the distance of the centre of the elements 3 and 4 from the adjacent end of the plug 10 is 0.1658; the distance from the centre of the elements 3 and 4 to the reflector 11 is 0.497; the diameter of the insulating block 7 is 0.1935; the diameter of the apertures 5 and 6 is 0.138 and the focal length of the parabolic reflector is 4.21. The dimensions of the waveguide are of course chosen according to the wavelength of the energy to be received or transmitted.

Figure 3 illustrates curves showing the variations in the resistive and reactive components of the impedance of an aerial in accordance with the abovementioned dimension over a frequency range corresponding to an operating wavelength of 3.55 to 3.7 centimetres. The curves shown were obtained with a waveguide of 1" by $\frac{1}{2}$ ". In Figure 3 the curve A shows the variation in the resistive component of the aerial impedance over the wavelength range indicated and from which it will be observed that the variation is only plus or minus 5 per cent whilst the curve B shows that the reactive component does not appreciably vary over a wavelength range of 3.55 to 3.66 centimetres but varies up to 10 per cent from 3.66 to 3.7 centimetres.

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What I claim is:

1. An aerial comprising a length of waveguide having a dipole aerial associated therewith which comprises a pair of radiating or receiving elements insulated from each other and from said waveguide and projecting through opposite walls of the latter.

2. An aerial according to claim 1, wherein the adjacent ends of said elements are provided with enlarged portions to provide capacity loading.

3. An aerial according to claim 1, wherein said elements are mounted in a block of insulating material which is mounted within said waveguide.

4. An aerial according to claim 1, wherein a parabolic reflector is provided so arranged with respect to said dipole aerial that the latter is disposed substantially at the focus of said reflector and wherein the end of said waveguide adjacent to said elements is closed by a conductive plug and provided with a conductive plate forming a reflector.

5. An aerial comprising a length of waveguide having a dipole aerial associated therewith which comprises a pair of radiating or receiving elements, and a block of insulating material mounted within said waveguide and in which said elements are mounted insulated from each other

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and from said waveguide and projecting through opposite walls of said waveguide, adjacent ends of said elements having enlarged portions to provide capacity loading.

6. An aerial according to claim 2, including a parabolic reflector arranged with the dipole aerial disposed substantially at the focus of said reflector, the end of said waveguide adjacent to said elements being closed by a conductive plug and being provided with a conductive plate forming a reflector.

7. An aerial according to claim 5, including a parabolic reflector arranged with the dipole aerial disposed substantially at the focus of said reflector, the end of said waveguide adjacent to said elements being closed by a conductive plug and being provided with a conductive plate forming a reflector.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,429,640	Mieher et al.	Oct. 28, 1947
2,491,493	Goldberg	Dec. 20, 1949