

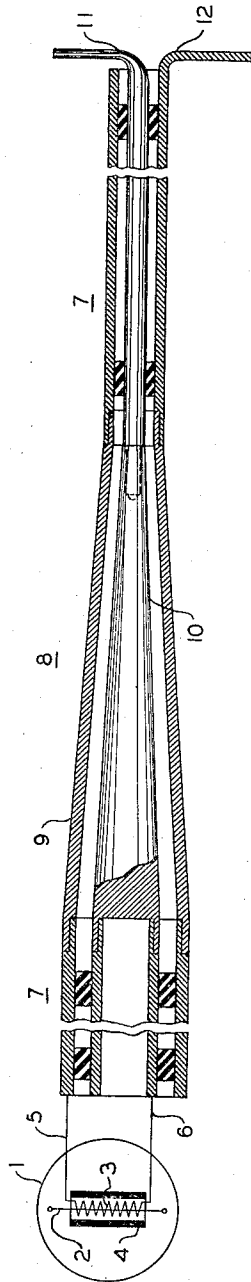
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CONICAL ADAPTER FOR MICRORAY TRANSMISSION LINES

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CONICAL ADAPTER FOR MICRORAY
TRANSMISSION LINES

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3 Claims. (Cl. 178—44)

This invention relates to a conical adapter for micro-ray transmission lines.

In my U. S. Letters Patent No. 1,928,408, a signaling system for micro-rays is disclosed. By micro-rays is meant electro-magnetic waves the length of which lies in the range between 100 centimeters and 1 centimeter, although these limits may be exceeded in either direction.

In that patent it is disclosed that an improved result is obtained by separating the radiating or receiving antenna from the generating or detecting micro-ray tube, and connecting the tube to the antenna by a transmission line composed of concentric conductors. In order to connect the high frequency output to the radiating system, which may be, for example, an antenna at the focus of a paraboloidal mirror or reflector, it is desirable that the concentric transmission line be of small diameter. In order to connect the concentric transmission line to the micro-ray tube without undue loss or distortion, it is necessary that the transmission line at this end be of larger diameter. It is also essential that there shall be as little variation as possible in the characteristic impedance of the line from point to point, in order that the line shall have a low loss. This, of course, does not exclude the use of special portions of line having a different characteristic impedance in order to perform special functions, as, for instance, in the case of a quarter of wavelength line for transformer action.

An object of this invention is to provide means for connecting an antenna with a micro-ray tube by a concentric transmission line having substantially no undesirable characteristics.

In the drawing, the figure shows a view, partly diagrammatical and partly in section, of a micro-ray tube, an antenna, a concentric transmission line between the two, and the conical adapter of this invention in the transmission line.

A tube 1 for the generation or detection of micro-rays has a cathode 2, an oscillating electrode 3, and a reflecting electrode 4. In the tube 1 of the type employed by applicant, it has been found that the plate or reflecting electrode 4 repels the electrons projected toward it from the cathode 2, and these repelled electrons set up differences of potential along the length of the grid or oscillating electrode 3. These differences of potential, in turn, cause a variation in the electronic discharge taking place between the cathode 2 and the plate 4 and thus produce oscillations in the tube 1. As the action of the plate 4 is analogous to the phenomena of reflection, it has seemed desirable to term the plate the re-

fecting electrode, and in view of the differences of potential set up along the length of the grid 3, it has seemed desirable to term this element the oscillating electrode. The oscillating electrode is connected by leads 5, 6, which are parallel to one another, to the concentric transmission line 7. A conical adapter 8 is connected in this transmission line. It consists of a conical tube 9 which is the outer conductor, and a conical tube or solid 10 which is the inner conductor. The conical adapter 8 is connected at its ends in any suitable manner to the sections of transmission line of different diameters. The section of transmission line 7 of smaller diameter is connected to an antenna 11, 12.

The two sections of the line 7 connected to the conical adapter have the same characteristic impedance. That is, they have the same ratio of inside diameter of the outer conductor to outside diameter of the inner conductor. The conical adapter transfers the high frequency current between the two sections with very little loss, because the characteristic impedance of the transmission line does not undergo any noticeable variation from point to point. That is, at any section along the conical adapter the ratio of the internal diameter of the outer conductor to the external diameter of the inner conductor is the same as this ratio in the sections of the line adjoining the conical adapter; and the characteristic impedance of any small portion of the conical adapter remains very nearly equal to the characteristic impedance of the terminal lines, provided the slope of the conical adapter is not too great.

It is desirable to make the length of the conical adapter equal to a half wavelength, or an integral number of half wavelengths, so that the high frequency currents are conducted along this portion of the line without interfering with the general adjustment of the line. The conical adapter may, however, have a length which is not a multiple of a half wavelength.

Such a conical adapter may also, if desired, be connected between two sections of the transmission line having different characteristic impedances without encountering any considerable reflection loss, provided the terminal lines are not too widely different in characteristic impedances.

What is claimed is:

1. A high frequency transmission line having a pair of sections of equal characteristic impedance, comprising outer conductors of different diameters and inner conductors of different diameters, and a conical adapter, comprising an outer and

	an inner conductor, connected between said sections, the ratio of the internal diameter of the outer conductor of said adapter to the external diameter of the inner conductor thereof being	diameter of the outer conductor of either section to the external diameter of the inner conductor of said section.	
5	equal at any point to the ratio of the internal diameter of the outer conductor of either section to the external diameter of the inner conductor of said section.	3. A high frequency transmission line having a pair of sections of equal characteristic impedance, comprising outer conductors of different diameters and inner conductors of different diameters, and an adapter, comprising an outer and an inner conductor, connected between said sections, the internal diameter of the outer conductor of said adapter varying with respect to the external diameter of the inner thereof that the ratio of said variation is substantially equal to the ratio of the internal diameter of the outer conductor of either section to the external diameter of the inner conductor of said section.	80
10	2. A high frequency transmission line having a pair of sections of equal characteristic impedance, comprising outer conductors of different diameters and inner conductors of different diameters, and an adapter, comprising an outer and an inner conductor, connected between said		85
15	sections, the ratio of the internal diameter of the outer conductor of said adapter to the external diameter of the inner conductor thereof being equal at any point to the ratio of the internal		90
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