

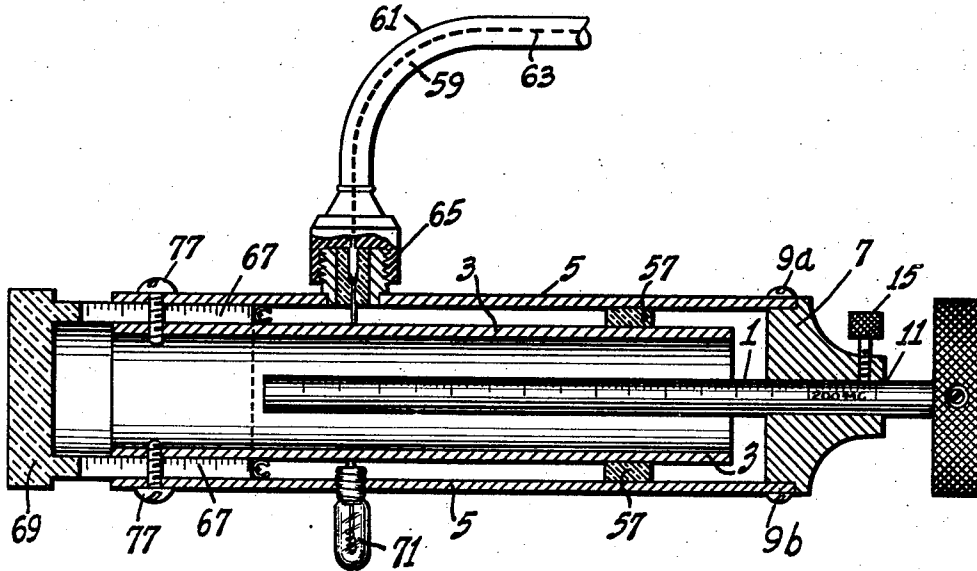
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J. B. DEARING

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IMPEDANCE MATCHING DEVICE

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Inventor

JOHN B. DEARING

C. D. Tucker

Attorney

UNITED STATES PATENT OFFICE

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IMPEDANCE MATCHING DEVICE

John B. Dearing, Haddonfield, N. J., assignor to
Radio Corporation of America, a corporation of
Delaware

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1 Claim. (Cl. 178—44)

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This invention relates to artificial load devices. Artificial loads for sources of high frequency electrical energy, constructed according to the prior art, consist generally of resistors which at high frequencies exhibit substantial reactive characteristics. Such resistors are not only highly cumbersome, but it is also difficult to tune them to a point of minimum reactance. The device of the present invention may be used as an artificial load.

An object of this invention is to provide an improved high frequency device which is more accurate, compact, and adjustable over a very substantially greater range of frequencies than devices of the prior art.

A further object of the invention is to provide an improved and compact artificial load for a source of high frequency electrical energy.

The invention may be better understood from a reading of the following description of an embodiment thereof, and from a consideration of the accompanying drawing, in which the figure is a sectional view in elevation of an artificial load constructed according to the invention.

A device constructed in accordance with the invention will operate satisfactorily as an artificial load for a source of high frequency energy. It is desirable to use for artificial loads materials which have a high resistance to such currents. Magnetic materials generally exhibit this property of high resistance and, in particular, iron and cold-rolled steel, which are cheap and readily available. The figure is a sectional view in elevation of an artificial load constructed in accordance with the invention. The inner conductor 1 and intermediate conductor 3 are contained within the outer conductor 5, and the length of the inner conductor 1 within the other conductors is made variable. A conductive end piece 7 is secured at one end of the outer conductor, as by the screws 9a, 9b. The end piece has an aperture 11 of the same diameter as the inner conductor 1, so that the inner conductor may slide in the aperture and at the same time make good contact with the end piece, and so that the length of the inner conductor within the outer and intermediate conductors may be varied. A locking screw 15 secures the inner conductor in any desired position. Insulating spacers 57 separate the intermediate and outer conductors. A transmission line 59, having an outer member 61 and an inner member 63, connects the source of high frequency energy to the load; it is desirable to couple into or tap the concentric line at a point whose impedance matches that of the trans-

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mission line. The inner member 63 is connected to the intermediate conductor 3 and the outer member 61 to the outer conductor 5, connection being made by any standard transmission line coupling 65. A short-circuiting cylinder 67, having an insulated handle 69, is inserted at the open end of the concentric line and serves to connect the outer and intermediate conductors at that end at points which may be varied by moving the cylinder. Such movement varies the impedance which the load presents to the transmission line, and provides a means for matching the impedance of the load to that of the line. Hence, both the cylinder 67 and inner conductor 1 are calibrated in terms of the frequency at which the load presents the desired impedance to the transmission line.

The cylinder may be maintained in any desired position, as by set screws 77. A lamp 71 may be connected across the circuit.

In operation, inner conductor 1 and cylinder 67 are each set at the known frequency of the source of high frequency energy, and the load is then coupled to the source. While the lamp 71 may be used to indicate resonance, this is not strictly necessary, because if inner conductor 1 and cylinder 67 are properly calibrated, the load will be matched to the line at the frequency of the source. The light intensity of lamp 71 is proportional to the power dissipated in the load, and the light may therefore, if desired, be transmitted to a photometer, and used as a measure of such power. If power in excess of 50 watts is dissipated in the load, it will be desirable to cool the latter, as by means of air-cooling fins, a water jacket or the like.

Thus a high frequency device has been described in which a folded concentric line has been employed as the resonant circuit. The device is, by means of the folding, substantially more compact than prior art devices which include concentric lines. A device constructed in accordance with the invention may be used as an artificial load for a source of high frequency energy.

I claim as my invention:

Apparatus of the character described, comprising in combination a source of high frequency electrical energy, a concentric resonant line constituted by an outer hollow cylindrical conductor, a calibrated inner conductor contained within and concentric with said outer conductor and an intermediate hollow cylindrical conductor nested between and concentric with and radially spaced from said inner and outer conductors, said conductors being composed of material having a high

resistance to high frequency currents, said line having an open end and a closed end, a conductive end member at said closed end having an aperture therein, said inner conductor being of equal diameter with and slidable within said aperture whereby to form an adjustable connection at said closed end between said inner and outer conductors, said intermediate conductor extending from said open end towards, but spaced from, said end member, a connection from said source to said line, and a slidable calibrated short-circuiting cylinder adapted to be inserted between said outer and intermediate conductors at said open end to form an adjustable connection between said outer and intermediate conductors.

JOHN B. DEARING.

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