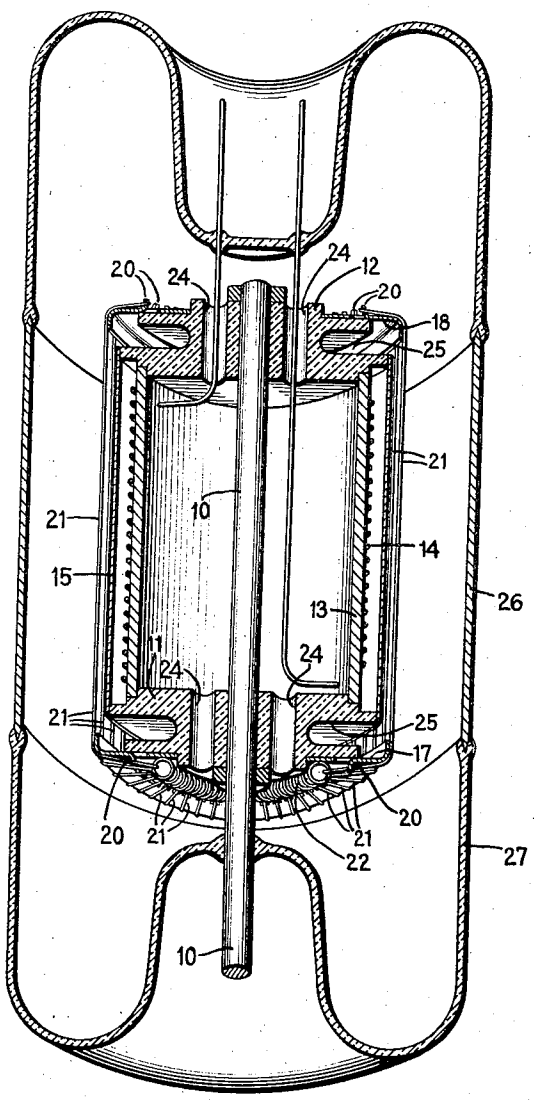
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LOW IMPEDANCE POWER TUBE

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BY

INVENTOR.
CHARLES V. LITTON
R C Hopgood
ATTORNEY.

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LOW IMPEDANCE POWER TUBE

Charles V. Litton, Redwood City, Calif., assignor to International Standard Electric Corporation, New York, N. Y., a corporation of Delaware

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6 Claims. (Cl. 250—27.5)

My invention relates to power vacuum tubes and more particularly to low impedance power tubes.

In tubes designed to produce a large power output it is desirable to have a relatively large structure with closely spaced elements. However, in such tubes it has generally been found difficult to maintain the desired electrode spacing.

It is a principal object of my invention to provide a low impedance power tube having such construction as to maintain the operating characteristics throughout the life of the tube.

According to one feature of my invention I accomplish the results by providing an electrode supporting assembly for the cathode and grid, comprising a pair of spaced insulating discs having offset portions to support the cathode and grid in permanently fixed spaced relation. The cathode and grid are thus supported in the form of cylinders of relatively large diameter the spacing between which may be made very small, but which may be maintained accurately.

Preferably a resilient spring means is provided to maintain the desired tension on the grid wires which are threaded back and forth between the two supporting discs.

A better understanding of my invention as well as other objects and features thereof will be had from the particular description thereof made in connection with the accompanying drawing the single figure of which shows a sectional view in perspective of a preferred structural embodiment of my invention.

The basic idea of my invention resides in the provision of a construction which will enable the maintenance of a very fine mesh grid in very close spaced relation with respect to the cathode. Since the cathode structure passes through heating and cooling cycles it is desirable that the grid be also mounted on this structure to avoid variations in spacing.

The tube shown in the figure embodies these features. On a central supporting stem 10 are fixed two spaced discs 11, 12 of insulating material, for example, ceramic material. When ceramic is used it is preferable that a relatively low anode voltage be applied usually in the order of 1000 volts or less. The inner faces of discs 11 and 12 are provided with stepped offsets on the inner one of which is mounted a reflecting cylinder 13 on which is wound the cathode heating winding 14. The cathode comprises a thin metallic cylinder 15 mounted on another of the stepped portions of discs 11, 12. The metal cathode shell is coated with an electron emitting coating such as barium oxide, strontium oxide or the like.

On the outer face of discs 11, 12 are fixed flanged metal discs 17, 18, respectively, having ears 20 provided at closely spaced points around their periphery. Flanged discs 17, 18 extend outwardly beyond cathode 15 and serve as supporting and spacing means for a filamentary grid 21. The grid 21 is looped over projections 20 at one end and at the other end of the structure are maintained tensioned by a spring such as 22, the projections 20 here merely serving to maintain spacing. In the illustrated embodiment spring 22 is shown as a single coil at one end of the spindle about each turn of which is looped the grid wire. Alternatively, and particularly for high power tubes, individual springs may be provided for each of the grid wires, the grid then being composed of separate wires looped at one end over projections 20 and fastened at the other end to the spring.

Grid bias and control potential may be supplied to grid 21 over supporting rod 10, by means of conductive connection to the flange 17 or 18. Perforations 24 may be provided for the cathode heater leads. Furthermore, annular channels 25 may be provided in each of the discs 11, 12 to increase the leakage path between the grid and cathode.

The tube is completed by anode 26 sealed to an envelope 27.

By the structure outlined above a very close spacing may be maintained and consequently a large power output may be obtained from a relatively small tube operating at comparatively low voltages. As an example, a tube such as shown in the drawing if made with a cathode, a diameter of about two inches and length about two and a half inches may have the following structural specifications. Using very fine wire the grid may be spaced a distance in the order of 0.01 to 0.02 inch from the cathode. The anode may then be spaced from ⅛ to ¼ inch from the grid. Such a tube has a very low impedance. At zero grid potential and 100 volts on the anode the space current may easily be in excess of an ampere.

Higher voltages and higher currents may, of course, be applied but the structure is intended primarily for high power low voltage operation and generally should not have an anode voltage in excess of 1000.

While I have shown by way of illustration only a single preferred embodiment of my invention, it is clear that the principles thereof apply equally

well to other tube structures. What I consider my invention and the scope thereof is embodied in the accompanying claims.

What I claim is:

1. A vacuum tube electrode assembly comprising a supported rod, a pair of discs of insulating material fixed to said rod in spaced relation, a cylindrical cathode supported on said discs, metallic discs mounted on said insulating discs and extending a short distance beyond said cathode, a filamentary grid arranged between said metallic discs to surround said cathode, and resilient means arranged at one end of said assembly for maintaining said grid under tension.

2. A vacuum tube electrode assembly according to claim 1 further comprising a cylindrical reflecting means arranged within said cathode and a cathode heating winding arranged between said reflecting means and said cathode.

3. A vacuum tube provided with an electrode assembly according to claim 1, further comprising a cylindrical anode spaced from said grid, and a tube envelope sealed to said anode and enclosing said assembly.

4. A vacuum tube assembly according to claim 1, wherein the spacing between said cathode and grid is in the order of .01 inch.

5. A vacuum tube comprising a supporting means, a pair of insulating discs fixed in spaced relation on said supporting means, a cylindrical cathode arranged between said discs and supported thereby, flanged grid supporting discs mounted on said insulating discs and extending a short distance beyond said cathode, projecting means on said grid supporting discs, a resilient spring means mounted on one of said insulating discs adjacent the corresponding grid supporting disc and a filamentary grid of substantial, cylindrical form, the individual conductors of said grid extending between said resilient spring means and the projecting means on the grid supporting disc remote from said spring means.

6. A vacuum tube according to claim 5 further comprising a reflecting cylinder within said cathode and mounted on said insulating discs, and a cathode heating means arranged between said reflecting cylinder and said cathode.

CHARLES V. LITTON.