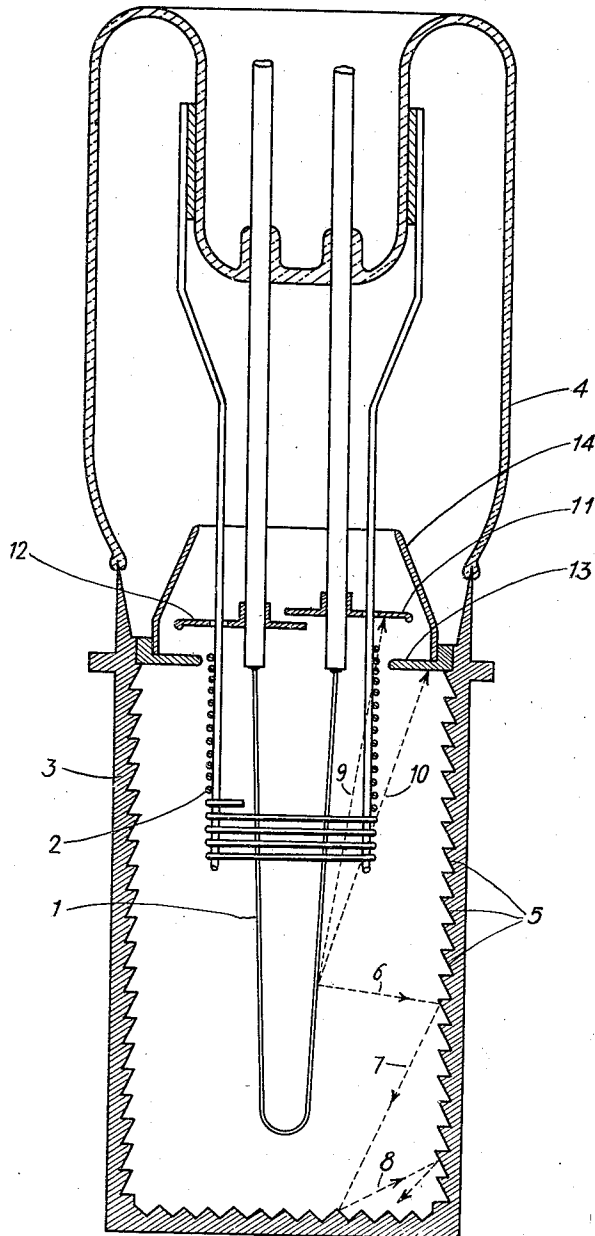


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ELECTRON DISCHARGE TUBE

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ELECTRON DISCHARGE TUBE

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4 Claims. (Cl. 250—27.5)

The present invention relates to high power short wave electron discharge tubes operating with a plate artificially cooled by an outside fluid.

It is known that in the construction of high power transmitter tubes with a chilled plate or anode, particularly the kind designed for operation with short waves, it is usual to employ simple cathodes possessing a relatively small specific electron emission such as pure metals, as, tungsten. The use of such cathodes, if a high saturation current be insured, requires that they be of large emitting area, and that they be raised to high temperatures. Dissipation of large quantities of energy presents no inconvenience in ordinary tubes for there is practically no limit so far as the power is concerned that may be dissipated in the cathode. By a suitable choice of dimensions, heating of the glass portion of the envelope, representing the insulating and hermetic support for the electrodes as a result of thermal radiation, may be reduced sufficiently so that it will not become dangerous. This, however, results in an increase of the dimensions of the plate relative to those of the cathode.

It is known that to produce oscillations of considerable short wave power it is necessary that the interelectrode capacities of the tubes be as low as possible. In other words, the electrodes should be as short as possible, while they should be spaced apart as far as feasible.

The construction of high power tubes, in view of the foregoing, encounters the difficulty, assuming the plate has a length approximating that of the active length of the filament, of considerable thermal energy radiated by it emerging from the anode to heat the glass of the bulb connected with the plate or anode. This glass, in operation, is subject to the RF voltages which prevail between the electrodes of the tube, and which are higher the greater the amount of power that is used.

The heat given off by radiation from the cathode raises the glass to a high temperature, and inasmuch as the dielectric losses, in RF work, increase rapidly in glass with this temperature, it will be seen that the heating sets a limit on the power that may be handled or produced by the tube. This heating may assume unduly large proportions and result in the failure of the glass.

Heating of the glass portion of the bulb by heat emerging or issuing from the anode is prevented, in accordance with this invention by a series of reflections of the heat radiations interiorly of the plate. These multiple reflections are produced by walls of grooves or striations suitably cut in

the interior wall of the anode. The interior surface of the anode may be considered as a cylindrical area with spaced circumferential ridges or ribs. At the instant of each such reflection, part of the energy of the incident heat is drained off by conduction through the plate to the cooling source on the outside. The part of the radiation which normally traverses the open section at the upper end of the plate is stopped by means of a system of screens mounted baffle-fashion on the supports of the filament. The addition of these supports does not increase the grid-plate capacitance, and it raises but inappreciably the input or grid-filament capacitance compared to the capacitance which would be occasioned by an increase in the length of the plate that would become necessary in the absence of the means here disclosed to insure sufficiently low heating of the glass bulb. The principle underlying the invention will be more clearly understood from the figure wherein the invention is illustrated.

Referring to the drawing 1 stands for the cathode, 2 for the grid, 3 for the plate, and 4 for the glass body or envelope; the plate is relatively larger in diameter and shorter than the usual plate. According to the invention the inner surface is provided with rip saw toothed striae resulting in reflecting facets 5, the purpose of which is to reflect the heat rays 6, 7 and 8 towards the bottom of the plate as indicated. The grooves are of such cross-sectional configuration that facets 5 present, transversely of the anode, a greater reflecting surface to the filament than is presented by the other facets of the grooves. The direct rays 9 and 10 traveling towards the glass body across the opening of the anode are stopped and reflected or absorbed by screens such as indicated at 11 and 12 carried by cathode supports, and screening or baffle means indicated at 13 and 14 attached to the plate.

The invention, as will be understood, is capable of a great many modifications in embodiment and construction outside of those hereinbefore described by way of example.

We claim:

1. An electron discharge device comprising a cylindrical anode, heat reflecting means formed on the interior wall of said anode comprising circumferential grooves triangular in cross section, one of the facets of each groove presenting, transversely of the anode, a greater surface to the center line of the anode than is presented by the other facet of each groove.

2. An electron discharge device comprising an envelope with an insulating wall portion, and a

cylindrical anode sealed gas tight at its upper end to said insulating portion, grid and filament electrodes supported within said anode by said insulating portion, and circumferential ridges on the interior wall of said anode being rip saw toothed in cross sectional configuration, the inner edges of the ridges being pointed upwardly to deflect radiant heat toward the lower end of the anode.

3. An electron discharge device comprising a cylindrical anode, a heated filament positioned centrally of said anode, heat reflecting means formed on the interior wall of said envelope comprising circumferential grooves, said grooves being triangular in cross section and having a plurality of reflecting surfaces, the radial projection on the center line of the side of each groove nearest the upper end of the anode being

greater than the projection on the center line of the other side of each of said grooves.

4. An electron discharge device with an envelope comprising an insulated wall portion, and a tubular anode closed gas-tight at one end with said insulating portion, grid and filament electrodes supported in said anode by said insulating portion, circumferential grooves on the interior wall of said anode, the radial projections of the facets of the grooves on the longitudinal axis of the anode being such that the projection on said axis of the facet nearest the seal of each groove is larger than the projection on said axis of the facet of each groove farther from the seal to deflect radiant heat away from said insulating portion.

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