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ELECTRON TUBE WITH EXTERNAL ANODE

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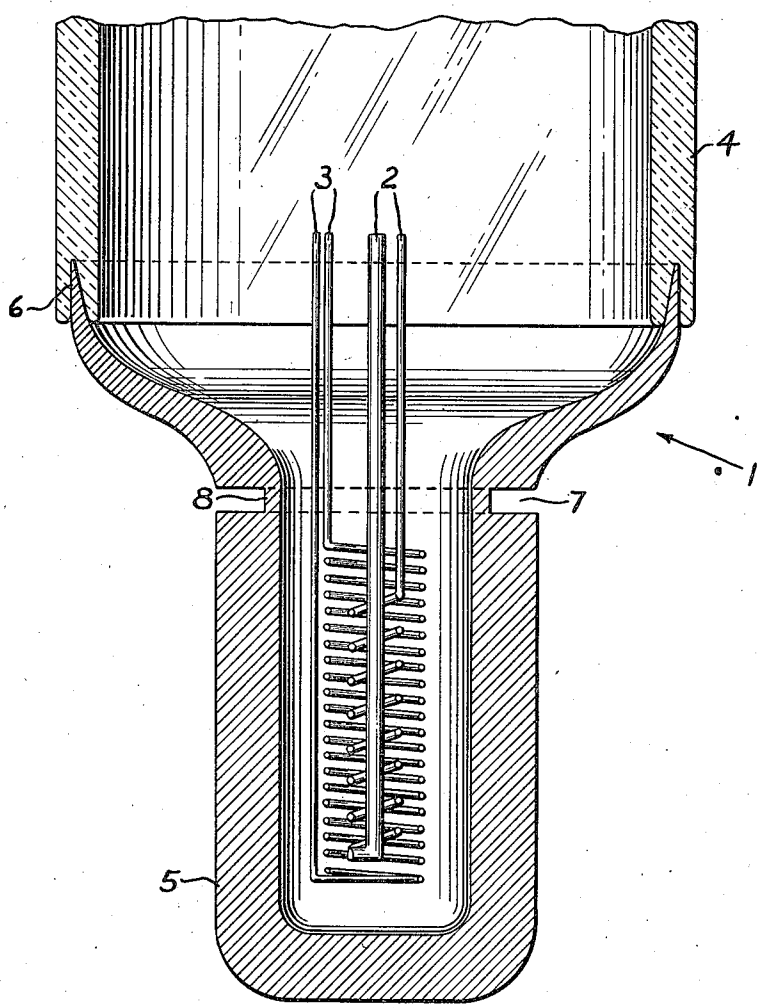

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ELECTRON TUBE WITH EXTERNAL ANODE

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The present invention relates to electron tubes and more particularly to an electron tube having an envelope, a portion of which is made of metal.

In such a tube the envelope may be an electrode of the tube such as an anode. For best results it is desirable that the distribution of heat be uniform over the entire anode so that its entire surface will be effective in cooling the electrode. In the process of evacuating the tube the external electrode is also heated. The best vacuum is obtained when the distribution of heat over the metal envelope is uniform and the entire wall is maintained at the proper exhaust temperature.

Therefore an object of the present invention is to provide an electron tube having a thick electrode as an external envelope of the tube over which the distribution of heat will be uniform.

The external electrode which forms part of the envelope of the electron tube is sealed to the glass portion of the envelope of the tube. It has been found that this seal may be damaged by the heat of the external electrode generated either during operation or during evacuation, and so it is desirable that the electrode at the location of the glass seal be kept at a lower temperature than that of the metal portion of the envelope. Heretofore separate means have been provided for cooling the external electrode near the glass-to-metal seal. Such cooling means result in several detrimental features. In particular cooling means has made a uniform distribution of heat difficult. Moreover, the thicker the wall for good heat conductivity and hence for uniform heat distribution the more need there is for cooling.

Therefore a further object of my invention is to provide an electron tube with an external electrode so formed that the electrode-to-glass seal may be maintained below a temperature at which the glass will soften and at the same time the distribution of heat over the electrode may be uniform.

A further object of my invention is to provide an electron tube with an external electrode whose thermal impedance is increased between the thick electrode and the electrode-to-glass seal.

A more particular object of the invention is to increase the thermal impedance by decreasing the thickness of the electrode at a region between the heated part of the external electrode and the electrode-to-glass seal.

Other objects and advantages of the present invention will be seen from the following description of a preferred physical embodiment of the invention and from the illustration thereof in the accompanying drawing, in which the single figure is a central longitudinal cross section of a portion of an electron tube with an external electrode forming part of the envelope.

In the figure a portion of an electron tube 1 is shown with a cathode 2 and grid 3 enclosed

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by an envelope formed of a glass portion 4 and an anode portion 5. The anode portion 5 is flared and tapered to a knife edge 6 where it is sealed to the glass envelope 4. The external electrode is grooved at 7 around the entire tube and just below the flared knife edge portion 6. The groove 7 should be wide enough and deep enough so that it leaves a relatively long thin section 8 of the metal wall which acts as a thermal impedance between the main body of the anode and the seal. In the form disclosed the thickness of the section 8 is less than half the anode thickness.

With such an arrangement heat is prevented from flowing between the main body of the anode and the seal and the seal may be cooled independently by any suitable external means without affecting the uniform distribution of heat in the anode. The disadvantages that arise from using merely a separate means for cooling the electrode-to-glass seal are thus eliminated. By using my invention it is possible to provide a thick wall which will insure uniform heat distribution, while at the same time retaining ease of processing which will allow the best degree of vacuum to be obtained. At the same time the electrode-to-glass seal is protected from overheating.

I do not intend to limit the invention to the preferred embodiment shown, except as may be required by the claims which follow.

What I claim is:

1. An electron tube comprising a glass portion forming part of the envelope of said tube, a metal electrode forming another part of the envelope of said tube, and a metal-to-glass seal therebetween, said metal electrode being tapered to a point in the region of said seal, said electrode being subject in its operating region to temperatures detrimental to said metal-to-glass seal, and said electrode having an area of substantially reduced cross-section, said reduced cross-sectional area completely separating said operating region from said region about said seal for preventing the flow of heat to said seal.

2. An electron tube according to claim 1 in which the cross-sectional area is reduced so that the reduced portion is less than half the cross-sectional area of the rest of the electrode.

3. An electron tube according to claim 1 in which the electrode is an anode of said tube.

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

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