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ELECTRIC DISCHARGE VESSEL

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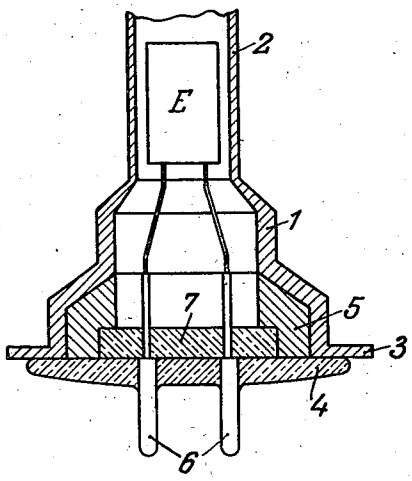


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## ELECTRIC DISCHARGE VESSEL

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In order to protect heat-sensitive seals applied to vacuum apparatus, such as glass seals, from the influence of rapid changes of temperature bad heat conductors have been arranged or means have been provided to lead the heat flow past such seals, or still other means adapted to effect the desired thermal relief have been employed, such for instance as resistances to heat flow. However, any means of this kind is effective only with larger-sized vacuum apparatus, such as discharge tubes or the like. Such means must be large in relation to the dimensions of these devices and large especially as compared with the seals to be protected thereby, thus also being comparatively heavy, and hence cannot be applied to somewhat small discharge tubes. In addition, the heat radiation from a highly heated part of the discharge tubes, such as a wall portion thereof constituting the anode, in the case of small tubes will not be prevented from impairing the seal if the protective means consists in resistances to heat interposed between the two.

As is well-known, discharge vessels in which the bulb or envelope is entirely or in part made of a metal in order to serve as anode, may be heavily loaded. The load may be such that this envelope or bulb will become red hot. However, in order to allow of such a high load the envelope is required not to be porous when red hot since otherwise the vacuum would be impaired. In addition a second requirement is to be fulfilled, namely, that the cover of the vessel and the sealing means, this being usually of a vitreous material, should be protected from the resultant quick changes of temperature and from nonuniform distribution of temperature.

The invention is concerned with this second requirement, as will be understood from the following description, reference being had to the accompanying drawing, which shows a somewhat diagrammatic fragmentary sectional view of an example of discharge vessels as provided by the invention.

The metallic envelope or bulb of this discharge vessel comprises a tubular portion 2 that constitutes the anode thereof, and a conical enlargement 1 formed integral with this anode and provided with a flange 3. The wall of the enlargement 1 is thicker than that of part 2. A metal ring 5 is firmly pressed into the enlargement 1, thus adding to the wall thickness thereof, and encloses an insulating disc 7 in which leads 6, connected to an electrode system E, are mounted. Disc 7 preferably consists of ceramic material which is porous or is pierced with holes in well-known manner. The leads 6 are sealed by means of a glass layer 4 arranged to cover also the joints between the parts 7, 5, 1.

In this way the cover 7, 4 for bulb 2, 1, 3 is separated from the anode 2 by ring 5 and enlargement 1. Owing to the shape and wall thickness of the assembly 1, 5 this separation is such that the thermal behaviour of the anode 2 will be different from that of cover 7, 4. In fact, quick variations of temperature of the anode, this being substantially free from thermal inertia, and especially the abrupt rise in temperature thereof on loading the discharge vessel, are prevented by the separating or screening means 1, 5 from affecting the cover 7, 4, while the thermal inertia of cover 7, 4 will in its turn decrease temperature variations thereof. The novel arrangement in this way acts to minimize the heat transferred from the anode to seal 4 and hence allows this seal to be made of a low-melting material, such as a soft glass, for instance.

Furthermore, the heat from the glowing anode 2 will be transferred by ring 5 directly to the middle of the glass layer 4, or nearly so, whereas in prior devices this layer is heated from its edge only. Ring 5 thus acts to minimize differences of temperature in the layer 4. The ceramic disc 7, arranged to contact with ring 5, will thus aid in distributing the heat, so as to prevent strains in the glass layer and hence to obviate the formation of cracks therein even if the layer 4 be composed of a number of vitreous layers whose coefficients of expansion are different from each other. Such will be the case also with pulsating loads on the discharge vessel which cause the anode to become bright red hot. The invention will hence be useful also in the mass production of such devices.

Ring 5 need not be of a metallic material but may be a ceramic or other suitable insulating body.

The fact that the seal 4 is protected from being unduly heated is of advantage especially in the case of complicated seals or seals difficult to produce free from strains. Devices of this kind are those having two or more seals fitted to a metal bulb and spaced apart by a comparatively small distance and which are not applied to the bulb all at the same time but are applied one after another.

The ring 5, serving as a heat accumulating means, is useful also inasmuch as it acts to retard the cooling down of the glass layer 4 when

this has been melted onto the cover 7, and thereby causes the layer 4 to undergo a sort of tempering whereby this layer will be able to withstand high demands during the remaining steps of manufacture as well as during operation.

It will be seen that the novel arrangement comprises two parts of different thermal properties, that is, one part substantially free from thermal inertia and constituting the anode, and a second part which carries the leads and is possessed of high thermal inertia on account of its great heat capacity, this part being the cover for the discharge vessel.

Appropriately bulb 2, 1, 3 is manufactured by using a method that avoids chip waste. In such case ring 5 or another auxiliary body, employed instead thereof, may be pressed into the enlargement 1 while producing the bulb in this way.

What is claimed is:

1. An envelope for an electric discharge vessel provided with an opening, said envelope comprising a part having a relatively thin wall substantially free from thermal inertia and a section having a thicker wall disposed between said part and said opening, a metal ring contacting the wall of said vessel disposed within said tube at the opening therein, said ring and said section cooperating to minimize the effect of sudden thermal changes in the thin walled part of the tube on the edge of the opening.

2. An envelope for an electric discharge vessel provided with an opening, said envelope comprising a part having a relatively thin wall substantially free from thermal inertia and a section having a thicker wall disposed between said part and said opening, a metal ring contacting the wall of said vessel disposed within said tube at the opening therein, a ceramic disc disposed within said ring and a member arranged to seal said opening and engage said ring and disc whereby heat from said envelope is uniformly distributed to said member.

3. An envelope for an electric discharge vessel provided with an opening, said envelope comprising a part having a relatively thin wall substantially free from thermal inertia and a section having a thicker wall disposed between said part and said opening, a metal ring contacting the wall of said vessel disposed within said tube at the opening therein, a member for sealing said opening; said ring and the edge of said opening in said envelope cooperating to minimize the effect of sudden thermal changes in the thin walled part of the tube and to distribute heat uniformly to said seal.

4. An electric discharge vessel comprising electrodes and a metallic envelope therefor, said envelope being formed with thin walls adjacent to said electrodes and considerably thicker walls between said electrodes and said opening, a metallic ring closely fitting inside said tube disposed flush with the edge of said opening, a disc of ceramic material disposed within said ring and a member adapted to seal said ring and disc to the opening in said envelope.

5. An electric discharge vessel comprising electrode means and a metallic envelope therefor provided with an opening, the walls of said envelope adjacent to said electrode means being thin and relatively free from thermal inertia, while the part of the wall of the envelope between said opening and said electrode means is considerably thicker, a metal ring disposed within said tube so that the edge thereof is flush with the edge of said opening, and means to seal said opening, the arrangement being such that the ring cooperates with the thicker portion of the wall of said envelope to minimize the effect of temperature variations of the thinner part and distribute heat evenly to said sealing means.

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