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POWER TUBE

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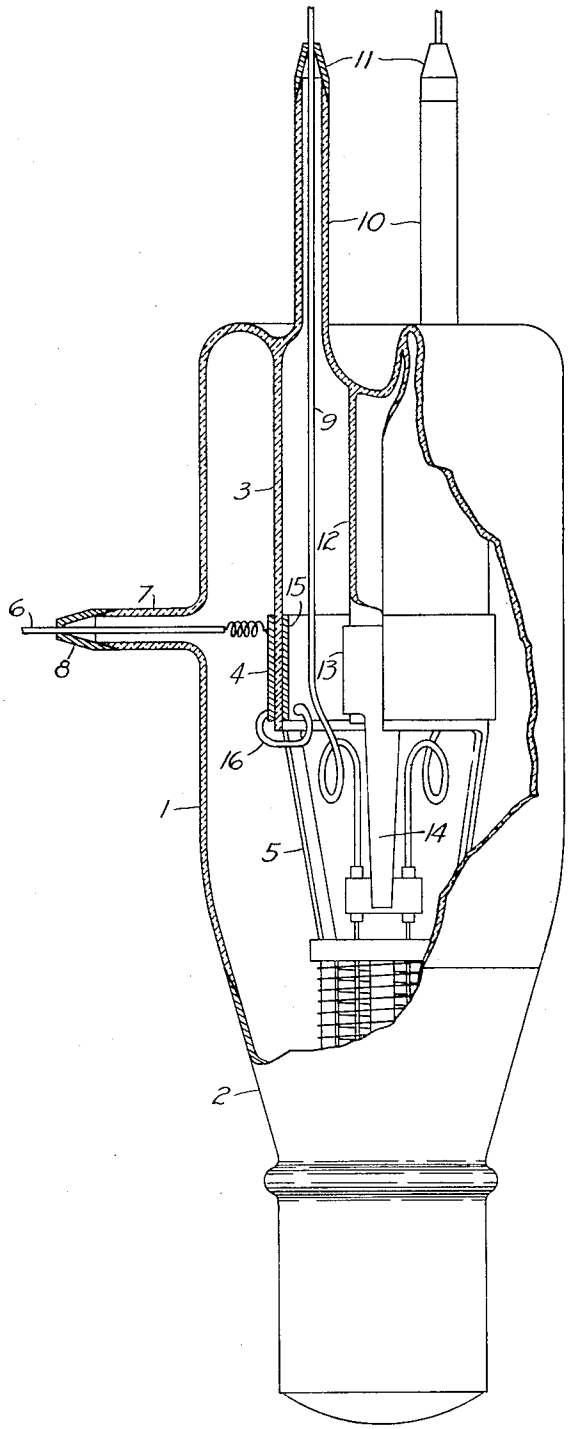

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POWER TUBE

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2 Claims. (Cl. 250—27.5)

This invention relates to electron discharge devices and more particularly to those capable of operating under high power conditions.

In devices of this character it has been the practice to support the grid and filament structures from collars each of which frictionally engages with a re-entrant glass stem. One of the limiting factors in the design of tubes of this kind when used for very short wave work is the dielectric loss which occurs at these frequencies in the vitreous material of the envelope, for instance, in a tube consuming 10 kilowatts and operating at wave lengths of say 25 meters or less the field between the grid and filament causes dielectric loss in the glass of the stem which leads to heating up, electrolysis and cracking of the glass. To a certain extent this defect may be mitigated by using material such as Pyrex glass, but even so it is not possible to go far beyond wave lengths of 25 meters without the glass being in danger of fracture.

According to the invention this drawback is overcome by eliminating the stress in the glass between the grid collar and the filament by using a potential-equalizing screen within the tube and also by extending the glass parts so as to secure a long glass path between the grid collar and the filament seals.

A better understanding of the invention will be obtained by referring to the accompanying drawing, which gives a fragmentary view of an electron discharge device of the type referred to.

In the drawing 1 represents a vitreous vessel which is fused on to an external anode portion 2. The vessel is provided with a re-entrant stem 3 which is frictionally engaged by a metal collar 4 from which is suspended the grid supporting structure 5. A grid lead-in conductor 6 is connected to the collar 4 and passes out along the laterally disposed tubular portion 7 and through the copper seal 8. The filament leads 9 pass through two externally projecting members 10, which according to the invention are made as long as conveniently possible, so that the metal seals 11 are arranged as far as possible from the grid collar 4, thus causing the glass leakage path to be extended and the field in the glass decreased. A further central tubular portion 12, preferably of glass, is suspended from the top of the vessel and carries at its lower end a metal collar 13 from which the filament supporting structure 14 is borne.

According to the invention the losses in the re-entrant tube 3 are avoided by providing it with a guard ring 15 on the inside. This may consist of copper gauze, or sheet-nickel bent around and expanded into position and conductively connected to the grid collar, for instance, as shown at 16. The result is that the inside and outside of the glass tube 3 are maintained at the same potential and all field is removed from this portion of the glass, the grid filament field being located primarily in vacuum.

Thus, the dielectric losses occurring at high frequencies are eliminated from the vitreous material of the envelope and it is possible to operate the device at very short wave lengths without any damage being done thereto.

What is claimed is:

1. An electron discharge device comprising an enclosing vessel having a metallic anode portion and a glass portion, said glass portion being provided with a reentrant tubular member, a metallic collar in contact with one surface of said tubular member, a grid supported by said collar and extending into said anode portion, a leading-in conductor between said vessel and tubular member and connected to said collar, a cathode within said grid, leading-in conductors for said cathode within said tubular member, and a metallic shield in contact with the inner surface of said tubular member and conductively connected to said collar around the internal edge of said tubular member, said shield being located between said cathode leading-in conductors and said grid leading-in conductor.

2. An electron discharge device comprising an enclosing vessel having a metallic anode portion and a glass portion, said glass portion being provided with inner and outer reentrant stems, said outer stem being of cylindrical formation, a cathode assembly supported by said inner stem, leading-in conductors for said cathode extending between said inner and outer stems, a metallic collar engaging the outer surface of the cylindrical outer stem, a grid supported by said collar and located between said cathode and anode, a leading-in conductor for said grid attached to said collar and located between said outer stem and said vessel, a cylindrical metallic guard ring engaging the inner surface of said outer cylindrical stem, and an electrical connection around the edge of said cylindrical stem joining said collar and ring together.

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