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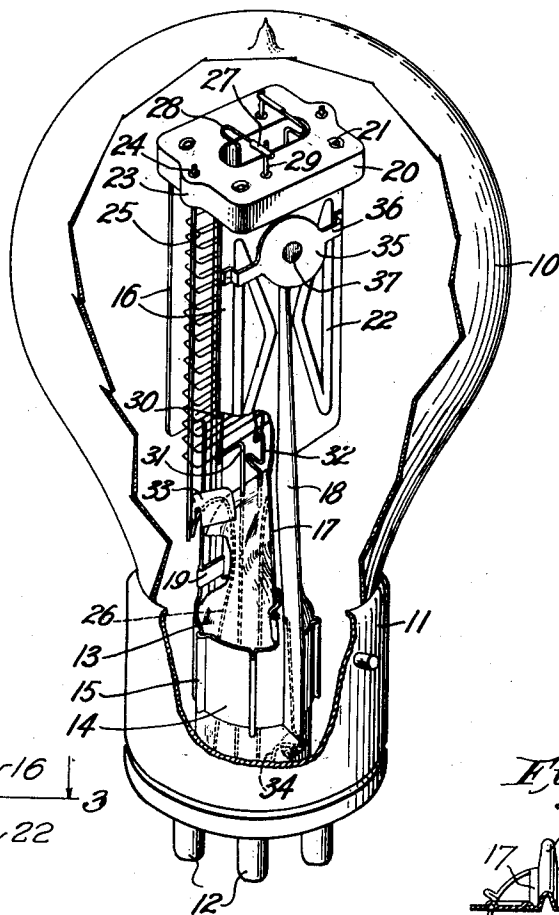
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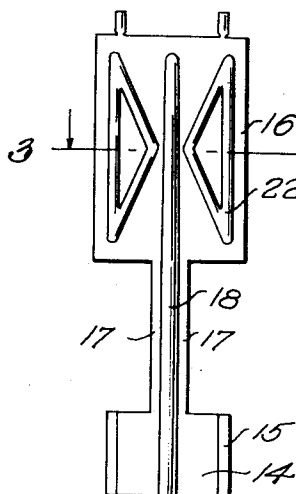
ELECTRON DISCHARGE DEVICE

Filed May 29, 1926

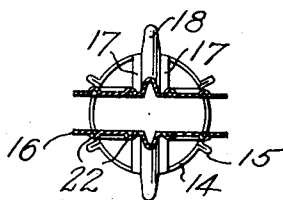
*Fig. 1*



*Fig. 2*



*Fig. 3*



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# UNITED STATES PATENT OFFICE

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## ELECTRON DISCHARGE DEVICE

Application filed May 29, 1926. Serial No. 112,472.

This invention relates to electron discharge devices and has for its principal object a rugged electrode assembly which will withstand high operating temperatures.

Another object is to prevent the deposition of a gas absorbing film on the electrode surfaces.

A further object of the invention is to prevent loosening of the electrode structure due to expansion during the excessive heating period of the evacuation process.

In accordance with one of the features of this invention, triangular corrugations are formed in the plate surfaces of a high voltage electron discharge device to prevent buckling or warping of the plate during the evacuation process and normal operation, due to the high temperature maintained in the device.

Another feature of the invention is a metallic disc, which is supported on the outer surface of the plate electrode and carries a pellet of vaporizable material which is vaporized in the final stage of the evacuation of the device to absorb residual gases. This arrangement forms an efficient shield to prevent the vapor of the pellet from depositing on the electrode surfaces.

Another feature of the invention consists in bridging the supporting arms of the plate electrode by means of metallic links which prevent expansion of the arms during the heating process and the consequent dislocation of the assembly from the glass stem to which it is frictionally attached.

These and other features of the invention will be clearly understood from a study of the following detailed description in connection with the accompanying drawing in which Fig. 1 illustrates in perspective an electron discharge device embodying this invention with parts broken away to show the detailed construction, Fig. 2 shows in elevation the plate structure, and Fig. 3 is a cross-sectional view of Fig. 2 on the line 3—3.

The electron discharge device comprises a glass enclosing vessel 10, having its lower end cemented to a cylindrical metal base 11 which carries the contact studs or terminals 12 to which the leading-in wires from the elec-

trodes are soldered. An inwardly projecting stem 13 is sealed to the lower end of the glass enclosing vessel 10 and forms a support for the electrodes and a seal for the leading-in wires. A cylindrical metal collar 14 surrounds the stem 13 and is frictionally held thereon by means of the corrugations 15. A pair of parallel plate electrode surfaces 16 is supported from the collar 14 by means of integral arms 17. Each of these arms is provided with a projecting rib 18, which extends from a point near the top of the plate 16 to the end of the collar 14 and forms a strengthening means for the supporting arm 17. An integral tab 19 extending from one edge of arm 17 adjacent the corrugated collar is bent over the recess formed by the rib 18 and welded to the opposite side of the arm to form a bridging member for the metallic arm. This arrangement prevents displacement of the assembled structure from the glass stem due to the expansion of the metal as a result of the excessive heating of the electrodes to remove occluded gases therefrom. Projecting from the free end of each plate surface is a pair of integral tabs which are formed into tubular extensions and project through the apertures in an insulating block 20, preferably of "lavite." The end of each tubular extension projecting beyond the upper surface of the block 20 is preferably spun over or otherwise fanned as shown at 21, to rigidly support the insulating block on the plate electrode 16. The plane surfaces of the plate electrode 16 on each side of the rib 18 are provided with divergent triangular embossments 22, the base of each triangle being parallel and adjacent to the longitudinal edge of the plate surface 16. This arrangement provides a rigid plate surface which will not buckle or warp during the operation of the discharge device.

A curved extension 23 is provided at opposite ends of the insulating block 20, equidistant between the parallel plate surfaces 16 and is provided with an aperture through which a supporting wire 24 slidably extends parallel with the plate electrode 16. This wire supports a continuously wound wire grid 25 which is welded to the wire 24 at the

point of contact of each successive turn of the grid 25. The sliding support of the grid supporting wires 24 in the insulating block 20 provides an efficient means to compensate for the expansion and contraction of the wire grid during the operation of the device, and tends to maintain the proper space relation of the associated electrodes. One of the supporting wires 24 is connected to a leading-in wire 26 which is sealed in the stem 13, and also supports a metallic hood 33 arranged to cover the portion of the glass stem between the filament leading-in wire 31 and the grid leading-in wire 26, so that any active material thrown off the filament during operation does not deposit on the glass stem and form a conductive path between the filament and grid leading-in wires. An elongated aperture 27 in the insulating block 20, forms a well through which resilient supporting hooks 28 extend. These hooks are provided with metal sleeves to provide a larger surface for welding the fine resilient wire hooks to the supporting wire 29 held in the insulating block 20. Resiliently supported on the hooks 28, is the M shaped filament 30 which is attached at its lower end to leading-in wires 31, the midpoint of the filament being held by a hook 32 embedded in the top of the glass stem 13. The plate leading-in wire 34 is sealed in the glass stem at a point below the collar 14 and extends within the rib 18 to the surface of the arm 17 to facilitate the welding of the wire to the metal electrode.

35 Attached to the outer surface of the plate electrode 16 is a metallic disc or shield 35 which is arranged parallel to the plate surface and affixed thereto by means of integral arms 36 which extend in opposite directions on one diameter of the disc 35 and have the ends of the arms bent and welded to the plate surface 16. A pellet 37 of a vaporizable material, such as magnesium, is centrally attached to the outer surface of disc 35. This arrangement provides an efficient support for the pellet 37 and a shield for the electrodes, since the magnesium vapor emitted by the pellet when vaporized in the final evacuation process of the device is projected toward the wall of the glass vessel 10 to fix or absorb the residual gases in the device and does not deposit on the electrodes.

While the invention has been disclosed with respect to a detailed construction of the discharge device, it is to be understood that various modifications may be made in the structure without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. An electron discharge device, comprising an enclosing vessel, a filament, and a plate electrode having at least two triangular embossments on the outer surface thereof, the base portions of said embossments ex-

tending longitudinally of said plate electrode.

2. An electron discharge device, comprising an enclosing vessel, a filament, and a plate electrode having a pair of triangular ridges on the longitudinal surface thereof, the apices of which face each other.

3. An electron discharge device, comprising an enclosing vessel, a filament, and a plate electrode having a longitudinal central rib and a triangular embossment on each side of said central rib, the bases of each embossment being parallel to the edges of said plate electrode and said central rib.

4. An electron discharge device, comprising a glass vessel, a plurality of electrodes supported therein, one of said electrodes being mounted within the other with respect to the side walls of said vessel, a vaporizable medium, and a shield between said vaporizable medium and said other electrode.

5. An electron discharge device, comprising an enclosing vessel, a filament and a plate electrode supported in said vessel, a disc parallel with said plate electrode, spacing means between said plate electrode and disc, and a pellet of vaporizable material centrally affixed to said disc.

6. An electron discharge device, comprising an enclosing vessel, a filament and a plate electrode supported in said vessel, a metallic disc parallel with a surface of said plate electrode having integral arms projecting from said disc and attached to said plate electrode, and a pellet of vaporizable material affixed to the outer face of said disc.

7. An electron discharge device comprising a vessel having a glass stem, a collar surrounding said stem, a pair of plate electrodes having integral ribs joining said electrodes to said collar, each of said electrodes having a triangular rib on each side of the integral rib, an insulating block attached to said electrodes, and a grid and filament between said electrodes, said grid and filament being supported from said block.

8. In an electron discharge device comprising an enclosing vessel, a plurality of electrodes mounted therein, a getter material, and a support for said getter material comprising a metallic member having a central portion of relatively large area compared to said getter material positioned between said electrodes and said material and a pair of arms extending from said central portion and affixed to opposite sides of one of said electrodes.

In witness whereof, I hereunto subscribe my name this 10th day of May A. D., 1926.

PAUL SCHWERIN.