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ELECTRON DISCHARGE DEVICE

Filed Oct. 29, 1925

Fig. 1.

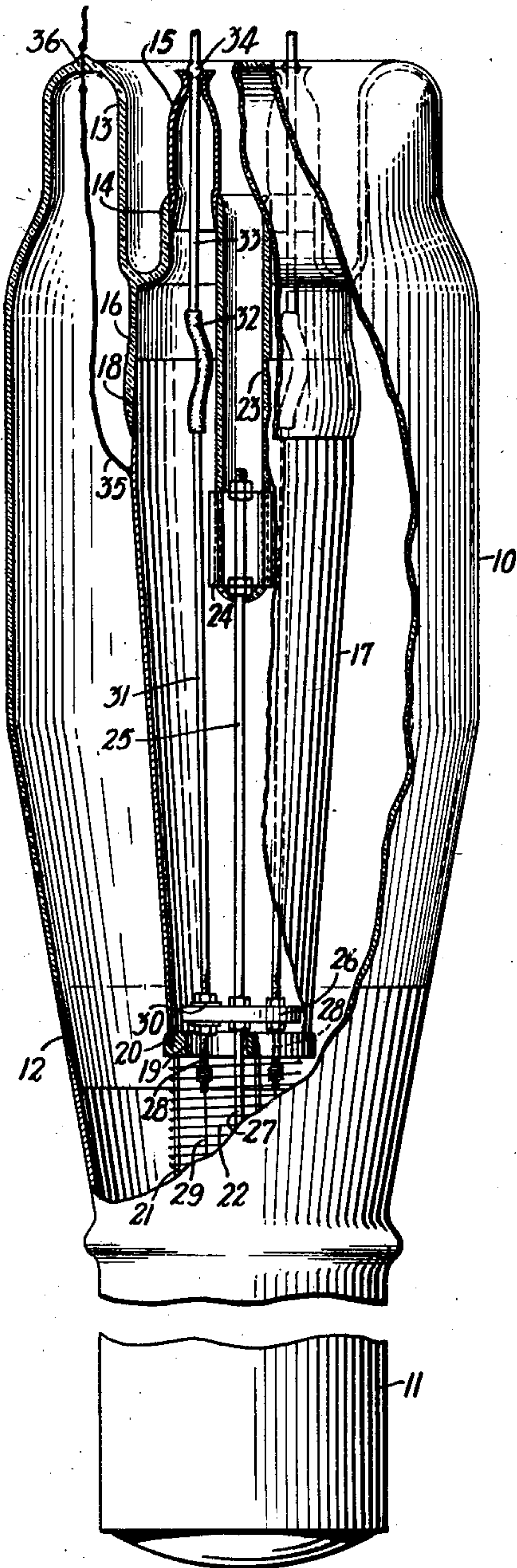
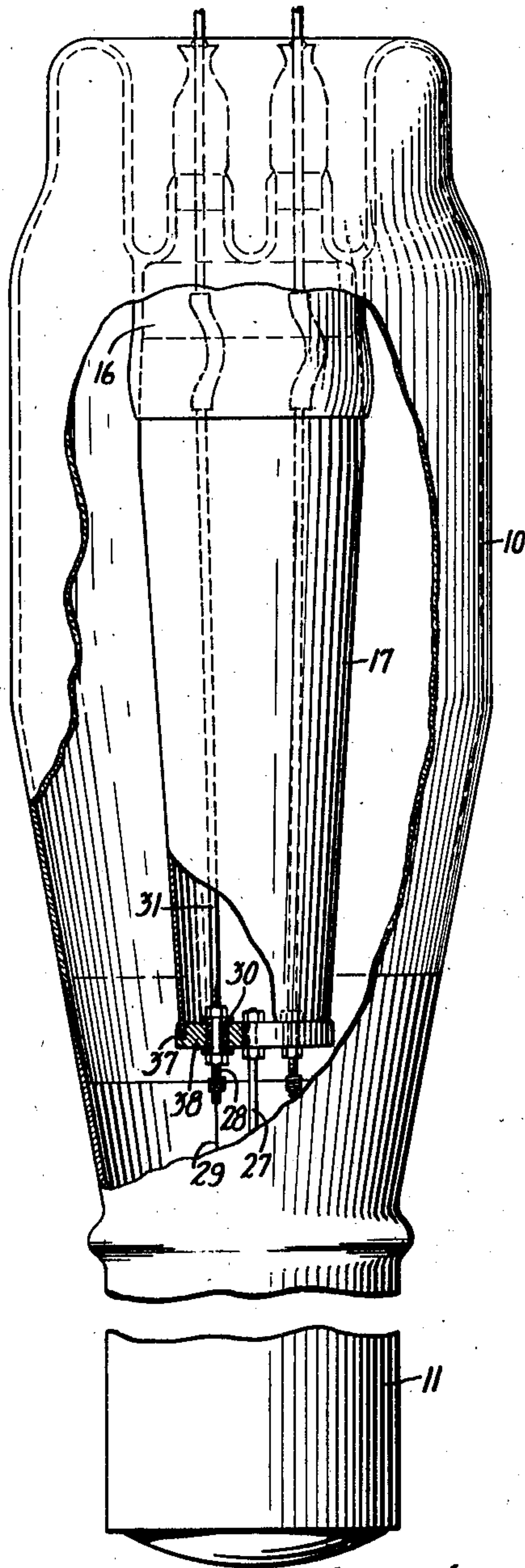


Fig. 2.



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UNITED STATES PATENT OFFICE.

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ELECTRON-DISCHARGE DEVICE.

Application filed October 29, 1925. Serial No. 65,510.

This invention relates to electron discharge devices and more especially to such devices capable of handling large amounts of power.

An object of the invention is to prevent corona discharges between the anode and the supporting structure for the other electrodes, at the high potentials used in such devices.

This object is attained by affixing a cylindrical metal shield to the glass stem, by a metal to glass seal, thereby eliminating the possibility of sharp edges being formed to create arcing paths. The other end of the shield is fitted into a circular groove in the electrode supporting block and the edge of the block spun over to form a tight connection. This arrangement forms a rigid structure for the electrode support and provides a shielding surface without sharp points, thereby reducing the establishment of discharge paths between the anode and either the shield or the electrode structure within the shield.

Referring to the drawings, Fig. 1 shows an electron discharge device of the amplifier type, with parts broken away clearly to illustrate the invention; Fig. 2 shows an embodiment of the invention as applied to a rectifier type or two electrode device.

The electron discharge device of this invention, consists of an evacuated vessel having a glass portion 10, and a cup-shaped metal portion 11, which acts as the anode of the device. The anode 11 is fused to the glass portion 10 at 12, in accordance with the disclosure set forth in W. G. Houskeeper Patent 1,294,466 dated February 18, 1919. A reentrant glass stem 13 is joined to the end of the glass portion 10, and is provided with two tubular extensions 14, reentrant with respect to the stem 13. Attached to each tubular extension is a metallic thimble 15. A cylindrical glass shell 16, is formed on the inner end of the stem and projects within the vessel. This shell is provided to support the metallic tubular member or shield 17, which may be of the same diameter throughout or of a conical form as shown in the drawing. The end of the shield 17 adjacent the shell is provided with a knife edge 18, to form a sealed joint with the glass shell 16 as disclosed in the Houskeeper patent mentioned above.

A circular metallic ring or collar 19, is provided with a circular groove 20, on one face thereof, and close to the periphery of the collar. This groove is fitted over the free end

of the shield 17 and the thin edge of the collar spun over or clamped, in any desirable manner, to secure the collar to the shield. A plurality of rods 21 are carried by the collar 19 and project within the anode 11. These rods support the helical wire grid 22.

A tubular glass extension 23 is supported from the stem 13 and is concentric with respect to the shell 16. A corrugated collar 24 is frictionally supported on the extension and carries supporting rods 25 which are attached to a metallic disc 26. This disc is of larger diameter than the aperture in the collar 19 and is preferably supported close to collar 19 and within the shield 17, to form a substantially closed chamber within the shield and stem to prevent the excessive heat generated in the device from entering the shield to cause softening of the glass within the shield. The disc 26 is provided with a central supporting rod 27 and threaded connectors 28, between which the tungsten filament 29 is supported. One of the connectors passes through an insulating bushing 30 in the disc and each connector is provided with a long leading-in wire 31 which is joined to a flexible length of copper braid 32. This braid is in turn soldered to a length of wire 33, which projects through the thimble 15 and is soldered thereto at 34. A leading-in wire 35 attached to the shield 17 and sealed in the glass vessel at 36 provides an external connection for impressing a desired potential on the grid and maintains the shield at a potential with respect to the field surrounding the shield. This construction provides a rigid support for the electrode and also forms a closed shield which presents a smooth surface to the high potential of the anode, whereby the electrical field within this device is prevented from forming arcing paths between the high potential of the anode and any sharp points in the electrode structure within the shield.

As shown in Fig. 2 the invention may also be applied to a two electrode device in which the filament supporting disc 38 is provided with a circular groove 37 which fits on the shield 17, the edges of the disc being crimped or spun over to form a tight connection. In this arrangement the space within the shield is completely enclosed to prevent excessive heat endangering the small seals adjacent the leading-in wires.

Although the invention has been disclosed with respect to a particular arrangement, it

is apparent that various modifications may be made in the detailed structure without departing from the scope of the invention as defined in the appended claims.

5 What is claimed is:

1. An electron discharge device comprising a vessel having a stem, a metallic ring, said ring having a groove in one surface, an electrode supported from the opposite surface, and a tubular member clamped in said 10 groove, said member having a tapered edge sealed to said stem.

2. An electron discharge device comprising a vessel having a stem, a tubular shield sealed to said stem, a grooved metal ring attached to said shield, an electrode supported from said ring, and another electrode supported from said stem within said shield. 15

3. An electron discharge device comprising a vessel having a stem, a tubular shield sealed to said stem, a grooved metal ring attached to said shield, a grid supported from said ring, a metal block within said shield, and substantially closing said ring, and a filament 20 insulatingly supported on said metal block.

4. An electron discharge device comprising a vessel having a stem, a tubular shield supported from said stem, an apertured support carried on said shield, a helical grid on said support, a filament within said grid, and means adjacent said support to deflect heat from the shielded area. 30

5. An electron discharge device comprising a vessel having a stem, a tubular shield supported from said stem, an apertured support carried on said shield, a helical grid on said 35

support, a filament within said grid, and a metal disc supporting said filament, said disc being located adjacent said apertured support to deflect heat generated in said device. 40

6. An electron discharge device comprising a vessel having a stem, a tubular shield supported from said stem, an apertured support carried on said shield, a helical grid on said support, a filament within said grid, and a 45 metal disc within said shield, said disc being located close to said support to deflect heat generated in said device.

7. An electron discharge device comprising a vessel having a stem, a tubular shield supported from said stem, an apertured support carried on said shield, a helical grid on said support, an apertured metal disc supported from said stem and located adjacent said apertured support, a filament insulatingly 50 supported on said disc, and leading-in wires from said filament extending within said shield, said shield and disc forming a substantially closed chamber for said leading-in wires. 55

8. An electron discharge device comprising a vessel having a stem, a tubular metallic shield sealed to said stem, electrode leading-in wires sealed to said stem, an apertured support carried on said shield, a helical grid on said support, a filament within said grid, and a metal disc between said filament and the seals to said stem to deflect heat from said seals. 60

In witness whereof, I hereunto subscribe my name this 27th day of October, A. D. 1925. 70

VICTOR L. RONCI.