

Jan. 3, 1950

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2,493,555

MOUNT FOR ELECTRON DISCHARGE DEVICES

Filed May 28, 1948

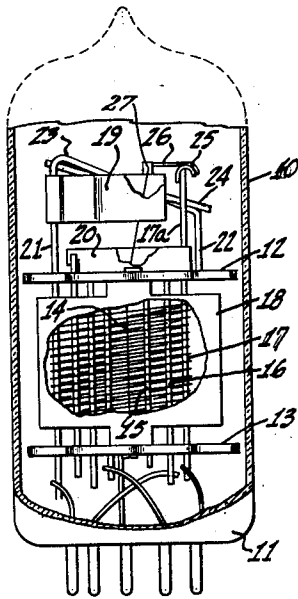


Fig. 1.

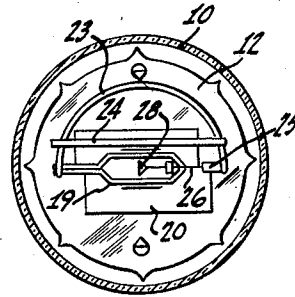


Fig. 2.

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2,493,555

MOUNT FOR ELECTRON
DISCHARGE DEVICES

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Application May 28, 1948, Serial No. 29,727

14 Claims. (Cl. 250—27.5)

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The present invention relates to improvements in electron discharge devices, and more particularly to electron discharge devices utilizing a plurality of electrode assemblies.

Certain commercial types of electron discharge devices include a pentode assembly supported between two mica spacers in the lower part of the mount and comprising an anode, a cathode and three grids, and a diode assembly positioned above the upper mica in the upper part of the mount and comprising an anode and a cathode. In devices of the type discussed the cathode referred to comprises a filamentary element extending through both electrode assemblies and serving as a common cathode therefor. Between the diode anode and portions of the pentode projecting above the upper mica, is provided a box-type shield, closed on two sides, and effectively functioning to electrically isolate the assemblies. There is also positioned in the upper portion of the mount a getter supported on a getter loop. The mount is supported from a stem closing the lower end of the tube envelope.

The diode anode is supported on a U-shaped member, one leg of which passes through both spacers for connection to a lead-in to the stem, and the other leg of which is shorter and passes through only the upper spacer for support thereby. The U-shaped member has a transverse portion provided with a loop to clear the filamentary cathode which extends above this member to engage a tension hook. In addition to serving as a support for the diode anode, the U-shaped member also serves to support a damper bar engaging the filament.

One of the problems associated with a mount structure of this type where the lead-ins are taken from one end only thereof, is to support the diode anode, the damper bar, the getter and getter loop, and a cathode tension hook at the end of the mount remote from the stem in such a manner as to insulate the diode anode from the cathode with a minimum of support members for the diode.

An expedient heretofore practiced is to provide an additional rod support passing through both spacers and connected to a lead-in in the stem. In the upper part of this rod support is mounted the getter loop and filament tension hook, the damper bar being supported on the transverse portion of the diode anode support member. The requirement for an additional rod support for the getter loop and tension hook and the need for a damper bar, represent an added structure and assembly time with consequent added expense in the

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manufacture of electron discharge devices of this type. Furthermore, where the device is of the miniature type, it complicates manufacture, since it places an additional burden on the space available therein.

It is therefore an object of my invention to provide an improved electron discharge device of the kind described in which the electrode assemblies and supports are simplified.

Another object of the invention is to simplify the structure of dual electrode assembly devices where one of the assemblies is supported above the other.

A further object is to eliminate the need for a separate support for the getter loop.

Another object is to dispense with a damper bar for the filamentary cathode by positioning the filament tension hook in such a manner as to permit the upper spacer to serve as a damper means.

A still further object is to accomplish a reorganization of the anode support, the getter support and the cathode tension hook support in an electron discharge device in order to secure an improved device.

Another object is to provide a novel support member that serves as an anode support for a getter loop.

A further object is to support the cathode tension hook on a member operating at cathode potential to thereby eliminate a separate connector between the upper end of the cathode and its associated lead-in in the base.

These and further objects and advantages will become apparent as the description proceeds.

Referring to the drawing:

Figure 1 shows a side view partly broken away of an electron discharge device employing the mount of the invention, and

Figure 2 shows a top end view of the mount illustrated in Figure 1.

Referring in more detail to the drawing, there is shown in the two figures thereof a diode-pentode mount enclosed in a miniature type envelope, which represents one embodiment of the invention. This embodiment is selected solely for the purpose of illustrating the invention and is not to be regarded as a limitation thereof.

The diode-pentode referred to includes an envelope 10 which may be of glass, and a mount supported on stem 11, and comprising a pentode supported between upper and lower insulating spacers 12, 13, adjacent the stem, and a diode supported above the upper spacer 12 and remote from the stem. Lead-ins to both the pentode and the diode assemblies are taken from the stem 11.

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The pentode includes a filamentary cathode 14, control grid 15, screen grid 16, suppressor grid 17, and anode 18. Each of the grids referred to are of wound construction, the turns thereof being supported on appropriate grid side rods.

The diode includes an anode 19 of flattened tubular form, and a cathode which comprises an upwardly extending portion of filamentary cathode 14, the latter serving as a common cathode for the pentode and diode.

Between the diode and pentode electrode assemblies is provided a metallic shield 20, which functions to shield portions of the pentode assembly projecting above the upper spacer 12 from the diode assembly.

According to the invention, the diode-anode 19 is supported on a U-shaped member having two legs 21, 22 and a transverse portion 23. Leg 21 extends through both spacers 12 and 13 for connection to a lead-in in the stem 11. On this leg is supported the anode 19. Leg 22 is shorter than leg 21 and extends through the upper spacer 12 only, for support thereby and for preventing rotation of leg 21. Since the anode 19 is fixed to leg 21, as by welding, a positive support of leg 21 against rotation afforded by the engagement of leg 22 with upper spacer 12, serves to maintain the anode 19 in a desired coaxial relationship with respect to the mount. The transverse portion 23 of the U-shaped member is in the form of a loop which extends laterally of the mount as shown in Figure 2 and lies in a plane that is angularly disposed with respect to both the longitudinal axis and a transverse axis of the mount as shown in Figure 1. The looped form of transverse portion 23, provides an appropriate support for getter 24 and a path required for induced currents required in flashing the getter. Another important advantage of the structure of the transverse portion 23 will become clear as the description continues.

Another respect in which the diode-pentode is in accordance with the invention is represented by the support means for the filamentary cathode 14. This support means includes an upwardly extending grid side rod 17a associated with suppressor grid 17 and representing an extension of one of the grid side rods serving this grid. A tab 25 is fixed to the upper end of rod 17a as by welding, and a cathode tension hook 26 is in turn fixed to tab 25. The tension hook 26 is of a length so that its end 27 to which filament 14 is fixed extends to a position laterally of the mount that is in non-coaxial relation to portions of the filament 14 extending between spaces 12 and 13. Both of these spacers may be provided with a centrally disposed aperture 28 having corner or bights and may be triangular as shown in Figure 2. The non-coaxial relation of the tension hook end portion 27 with the filament extending between the spacers referred to, results in engagement by the filament with one of the bights in the aperture in the upper spacer 12. This engagement serves to dampen vibrations that may occur in the filament and eliminates the need for a separate damper bar for this purpose.

To permit of the angular relationship between the portion of the filament 14 extending between spacers 12 and 13, and the portion thereof extending above the upper spacer 12, it is necessary that the upper portion referred to extend laterally of the mount. This lateral extension of the filament requires care that the filament be out of contact with the diode anode 19. To this

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end the anode 19 is of flattened tubular construction and is mounted in such a manner that its major transverse axis is parallel to the plane in which the lateral extension referred to, occurs.

This manner of mounting is accomplished according to the invention, in positioning the leg 21 to which the diode anode is fixed, in the plane of the grid side rods of the pentode and of the cathode, and axially fixing the anode 19 thereto so that the major transverse axis of the anode is also in the plane of the grid side rods and cathode referred to. This arrangement results in adequate clearance for the upper angularly disposed portion of the filament 14 from the anode 19.

It will thus be apparent that the invention relates to an improved electron discharge device that includes two important features, one of these features comprising the provision of a U-shaped support member for properly supporting an anode of the device, and for providing a loop for supporting and flashing a getter. The other feature resides in a novel filament support whereby such support is accomplished by a suppressor grid side rod operating at cathode potential in association with a filament tension hook of predetermined length and an angularly apertured spacer member. These features cooperate to form a novel and improved electron discharge device. Thus, the novel angular disposition of the transverse portion 23 of the U-shaped support member is designed to afford suitable spacing between the upper part of the shorter leg 22 and the tension hook tab 25 which enters into a plane of said leg, to prevent a short circuit therebetween. Although these features of construction may be utilized to advantage in an electron discharge device having only one electrode assembly, they are particularly desirable in a device having a plurality of electrode assemblies.

Various modifications may be made in the embodiment herein described and illustrated without departing from the spirit of the invention, the scope of which is pointed out in the appended claims.

What is claimed is:

1. A mount having a stem, an electrode assembly including an anode, a cathode, a support for said cathode, and a support for said anode having two legs and a transverse portion, said anode being supported on one of said legs only said transverse portion forming a loop and lying in a plane angularly disposed with respect to a major axis of said mount, for displacement of said loop with respect to said support for said cathode and a getter supported on said loop.

2. A mount having a stem and a plurality of electrode assemblies disposed longitudinally thereof, one of said assemblies being positioned at the end of the mount remote from the stem and including an anode, a cathode, a support for said cathode, and a support for said anode having two legs and a transverse portion, said transverse portion forming a loop and lying in a plane angularly disposed with respect to a major axis of said mount for displacement from said anode and from said support for said cathode, and a getter supported on said loop.

3. A mount having a stem, an electrode assembly including an anode and a support for said anode having two legs and a transverse portion, said anode being supported on one of said legs only, said transverse portion forming a loop and lying in a plane angularly disposed with respect to the longitudinal and transverse axes of said mount for longitudinal and transverse displace-

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ment from said anode, and a getter supported on said loop.

4. A mount having a stem and a plurality of electrode assemblies in longitudinal array, one of said assemblies having an anode and being more remote from said stem than one of the other of said assemblies, said one of the other of said assemblies being supported between two insulating plates, a support for said anode having two legs and a transverse member, one of said legs being longer than the other and extending through said insulating plates and being connected to a lead-in, the other of said legs extending only through the plate more remote from said stem, said anode being supported only on said one of said legs, said transverse member forming a loop, and a getter supported on said loop.

5. A mount having a stem and a plurality of electrode assemblies in longitudinal array, one of said assemblies comprising a diode having an anode, and being more remote from said stem than one of the other of said assemblies, said one of the other of said assemblies being supported between two insulating plates, a support for said anode having two legs and a transverse member, one of said legs extending through both of said insulating plates and being connected to a lead-in, the other of said legs extending through the plate more remote from said stem, said anode being mounted to engage said one of said legs only, said transverse members forming a loop in a plane that is angular with respect to the longitudinal axis and a transverse axis of said mount, and a getter supported on said loop.

6. A mount having a stem, an electrode assembly including an anode and a filamentary cathode, a support for said anode having two parallel legs and a transverse portion, said anode being fixed to one of said legs, a support for said cathode, said support for said cathode and said one of said legs having ends remote from said stem and terminating in a common plane, the other of said legs having an end remote from said stem and disposed closer to said stem than said common plane, a loop in said transverse portion, and a getter mounted on said loop.

7. An electron discharge device having an envelope enclosing a mount, said mount being supported at one end of said envelope and including an anode, a support for said anode, including a pair of parallel legs, one being shorter than the other, and a loop extending between said legs, said anode being supported by one of said legs only, a getter support extending across said loop, a cathode filament within said anode, and a support extending parallel to said legs and supporting one end of said filament.

8. An electron discharge device having an envelope enclosing a mount, said mount being supported at one end of said envelope and including an anode, a support for said anode including a pair of parallel legs, one being shorter than the other, and a loop extending between said legs, said anode being supported by one of said legs only, a getter supported across said loop, said loop and getter lying to one side of said anode, a filamentary cathode within said anode, and a support extending parallel to said legs and supporting one end of said filamentary cathode.

9. An electron discharge device having an envelope enclosing a mount, said mount includ-

ing a plurality of electrode assemblies longitudinally disposed with respect to each other, one of said assemblies including a filamentary cathode and an anode surrounding said cathode, and a grid between said cathode and anode, a pair of insulating spacer members between which said anode and grid are positioned, said grid having a side rod extending through said one of said spacers and having an end supporting the extending end of said cathode, a support rod extending through said spacers, one end of said support rod extending from the side of one of said spacers that is opposite from said anode and including a loop an anode surrounding the extending end of said cathode and supported on said support rod, and a getter supported across said loop, said filamentary cathode extending through said one of said spacers, said loop including a portion adjacent said side rod closer to said one of said spacers than said end of said side rod, whereby said loop is insulatingly spaced from said cathode.

10. An electron discharge device having an envelope enclosing a mount, said mount including a plurality of electrode assemblies longitudinally disposed, with respect to each other, one of said assemblies including a filamentary cathode and an anode surrounding said cathode, and a grid between said cathode and anode, a pair of insulating spacer members between which said anode and grid are positioned, a support rod extending through said spacers, one end of said rod extending from the side of one of said spacers that is opposite from said anode and including a loop, an anode supported on said support rod, said cathode extending through said last mentioned anode, and a getter supported across said loop, a cathode support, said loop being inclined from the longitudinal axis of said device for insulating spacing from said cathode support.

11. A mount having a stem and two electrode assemblies axially displaced, one of said assemblies comprising a diode and forming an end of said mount, said stem forming the opposite end thereof, said diode having an anode, a support for said anode, said support having two legs and a transverse member, one of said legs being connected to a lead-in in said stem, electrode support rods for the other of said assemblies lying in a common plane, said legs lying in said plane, a common filamentary cathode serving both of said assemblies, support means for the upper end of said cathode, said means including an upwardly extending portion of one of said support rods, said support for said anode and said one of said support rods terminating in a common plane, a loop in said transverse member for preventing contact between said support for said anode and said one of said support rods, a tab fixed to the end of said one of said support rods for supporting a cathode tension hook, said tab extending laterally into the plane of the other of said legs, the upper end of said other of said legs being disposed closer to said stem than said tab, whereby said tab and said other of said legs are insulatingly displaced from each other, and a getter supported on said loop.

12. A dual electrode mount having a stem, a diode and another electrode assembly disposed between said stem and diode, said diode having an anode and a cathode, said cathode also serving said another electrode assembly, a support for said cathode, said support having two legs and a transverse member, a suppressor grid for said another electrode assembly having a side rod,

said side rod and said two legs lying in a common plane, said side rod being disposed between said legs, the upper ends of said side rod and said support lying in a common plane, said transverse member having a loop to avoid contact with said rod, a metal tab on said rod disposed in said common plane and extending laterally a greater distance than separates said rod and said one of said legs, the upper end of said one of said legs being closer to said stem than the upper end of said side rod, whereby said tab is displaced from said support, said tab being connected to a cathode tension hook, and a getter mounted on said loop.

13. An electron discharge device having an envelope including a mount, said mount including a stem and a plurality of electrode assemblies spaced along the longitudinal axis of said device, a pair of spaced insulating spacer members disposed in planes parallel to a transverse axis of said device, one of said assemblies being positioned between said members, a support rod extending through both of said members, said rod extending from the outer side of one of said members and being bent to provide a loop lying in a plane disposed angularly with respect to the longitudinal axis of said device and spaced from said side of said one of said members, the other of said assemblies including an anode, said anode being supported on said rod and extending into the plane of said loop, said rod being farther bent to include a leg extending through said one of said members for preventing rotation of said anode, a getter supported on said loop, a filamentary cathode extending through said anode, and a support rod for said cathode extending from said outer side of said one of said members

and being adjacent said leg, said last-named support rod extending farther from said side than said leg and terminating in a support end, said cathode being connected to said support end, whereby said support end is insulatingly spaced from said leg.

14. A mount having a stem, an electrode assembly including tubular anode and a filamentary cathode extending through said anode, a support for said anode, said support rod being fixed to one side of said anode and extending beyond the end of said anode remote from said stem, a support for said cathode radially spaced from said anode and diametrically disposed with respect to the anode support, said anode support being bent to provide a leg parallel to the cathode support and farther spaced from said anode support than said cathode support and disposed in the plane of said anode support and said cathode support, said anode support being further bent to provide a loop spaced from said anode and inclined from the longitudinal axis of the mount for insulatingly spacing said loop from the cathode support, and a getter supported on said loop.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,857,647	Krahl	May 10, 1932
2,048,023	Parker	July 21, 1936
2,248,987	Green	July 15, 1941
2,396,170	Fulton, Jr.	Mar. 5, 1946
2,433,410	Walker et al.	Dec. 30, 1947