Aug. 9, 1932. A. C. BLAKEMAN 1,870,943

ELECTRODE SPACER MEMBER FOR ELECTRON DISCHARGE DEVICE

Filed Nov. 30, 1929

Fig. 1.

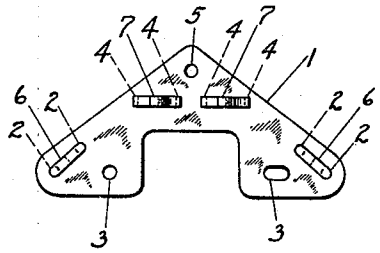


Fig. 2.

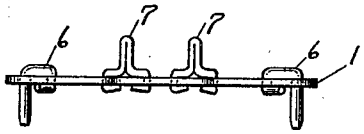
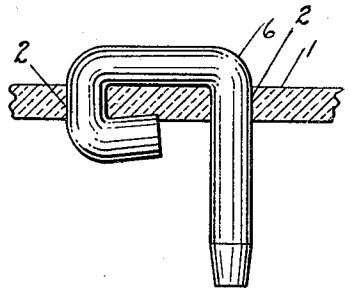


Fig. 3.



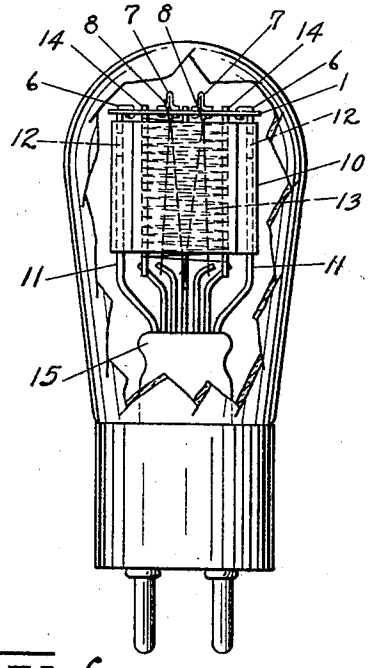
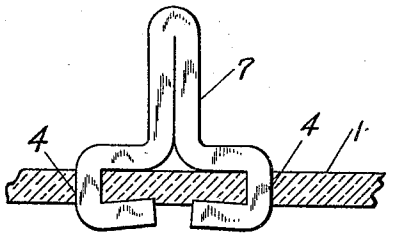


Fig. 6.

Fig. 4.



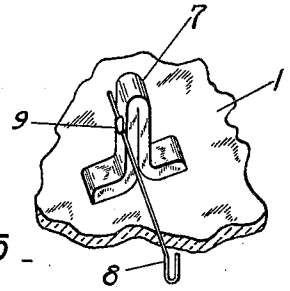


Fig. 5.

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UNITED STATES PATENT OFFICE

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ELECTRODE SPACER MEMBER FOR ELECTRON DISCHARGE DEVICES

Application filed November 30, 1929. Serial No. 410,699.

This invention relates to electron discharge devices and more particularly to spacer members adapted to maintain the cooperating electrodes of such devices in definite spaced relationship.

Heretofore in the art it has been customary to employ spacer members in the mounting and assembly of the electrodes of electron discharge devices. The most successfully applied type of spacer member is disclosed in U. S. Patent No. 1,672,233 issued June 5, 1928 to W. J. Skinner, and is substantially comprised of a mica disk or thin sheet spacer member having suitable perforations therein through which extend extensions of the plate and grid electrode support members of an electron discharge device, thereby maintaining the electrodes in definite spaced relationship.

In the use of such a spacer member in an electron discharge device employing an inverted V shaped filamentary cathode means must be provided for supporting the filament directly from the press of the device which may be in a manner as indicated in the drawing of the Skinner Patent 1,672,233. Where an M type filament or a double inverted V filament is employed additional filament supporting means must be provided.

Heretofore such additional supporting means have been comprised of a so-called "crowfoot" or glass bead supported in position by a dummy lead wire projecting from the press, and extending vertically therefrom without the concentrically aligned electrodes of the device. From the glass bead extend the requisite number of filament spring suspension members arranged so as to engage the upper loop portions of the filament to hold the filament in the desired vertical position.

This type of filament mounting has been frequently employed for the usual inverted V type filament when the central filament support member such as shown by the Skinner patent above identified is eliminated.

One of the disadvantages of the use of a "crowfoot" is the difficulty of effecting degasification of the same during the manufacture of the device.

Another disadvantage is that it requires several operations to properly position the same and to adjust the filament suspension members.

It is one of the objects of this invention to eliminate the use of "crowfeet" filament suspension members.

It is another object of this invention to simplify the assembly of the cooperating electrodes of an electron discharge device.

It is still another object of this invention to provide a spacer member for the cooperating electrodes of an electron discharge device, having filament suspension means integral therewith.

Another object of my invention is to improve the manufacture of electron discharge devices.

In accordance with the objects of my invention I have provided a spacer member comprised of a thin sheet of insulating material, such as mica, soapstone, and the like which may be readily shaped to the desired shape and size and means are provided on this spacer member for rigidly positioning the member to the plate or anode of the device, additional means are provided for spacing the grid or control electrode with respect to the plate or anode electrode, and filament suspension members integral with the said spacer members are also provided, all as will be more fully hereinafter disclosed.

Referring to the accompanying drawing, forming a part of this specification, there is shown by way of illustration a practical embodiment of the present invention.

Fig. 1 is a top view of the spacer member showing the elements thereof in their preferred position;

Fig. 2 is a side elevational view of the same;

Fig. 3 is an enlarged cross sectional view of the spacer mounting member;

Fig. 4 is an enlarged cross sectional view of the filament suspension member integral with the spacer member;

Fig. 5 is a perspective view of the same; and

Fig. 6 is a side elevational view of an electron discharge device incorporating the present invention, with the enclosing glass envelope broken away to disclose the assembly of cooperating electrodes.

As may be noted the customary V shaped type of spacer member 1 is employed, and is in the present invention preferably comprised of a thin sheet of mica through which suitable perforations 2—2, 3—3, 4—4, and 5 are made in any convenient manner, in the desired position for the proper spacing of the electrodes of the device incorporating the same.

Into orifices 2—2 are inserted by means of a standard type of stapling machine a U shaped staple 6, one leg of which is bent under in such manner as to firmly engage the mica disk, as is shown in Fig. 3, the other leg of which is left unbent. The unbent leg being adapted to be firmly united to the plate or anode electrode in any convenient manner, such as by welding.

Into orifices 4—4 are inserted by means of a modified type of stapling machine, two staples 7—7 shaped so as to provide a vertical extending portion with both legs of the staple firmly gripping the underneath surface of the mica disk, such as is shown in Fig. 4.

Other types of staples may be employed than these two types specifically set forth in this drawing provided the same desired functions may be performed.

It may be noted that staple 6—6 is inserted in the mica disk in such manner as to extend along the horizontal surface of the disk towards the apex of the V, thereby providing means when the unbent leg of the staple is firmly united to the plate or anode electrode, for supporting the disk in a substantially horizontally rigid position, and the necessity of a third point of support is thereby eliminated.

The staples 6 and 7 may be comprised of any suitable material, preferably, however, of such material that may be readily worked when cold, and of such material that may be readily welded, and to which tungsten may be welded. I have found that nickel wire of approximately .035 inches diameter, suitably annealed may be employed for staple material.

In the assembly of electrodes in an electron discharge device it is customary to provide a two sectioned rectangular plate or anode, which is arranged so that when the two sections are brought together to form the electrode, a trough is formed into which the lead support wires may be inserted. The assembly is then welded together.

In Fig. 6 is shown such a type assembly with lead support wires 11—11 inserted into the groove 12 of plate 10. The support wires extend only part of the way in the groove, the upper end of the grooved portion being left open for the unbent legs of the spacer member support members 6—6 to be inserted therein as shown. The legs of the support member and the walls of the plate groove 12 are then welded together in the customary manner, after first properly positioning the extension members 14—14 of the grid support wires in the provided orifices 3—3 of the insulator.

Filament suspension members 8—8 are then welded to the staples 7—7 in the manner indicated in Fig. 5, the hook portion engaging the loops of the filament 13. For the purpose of assisting in the aligning of the electrodes and spacer member a dummy support member may be provided integral at one end with the press 15 of the device and extending along the exterior of the electrode assembly in such manner as to pass through the orifice 5 in the apex of the V shaped spacer member. This, however, may be dispensed with if desired.

It may be readily noted from the above description in view of the attached drawing that the provision in the spacer member of means for supporting filament suspension members and means for rigidly attaching the spacer member to the supporting wires of the electrode assembly, as well as means for maintaining definite spaced relationship of the electrodes of the device, provides a marked advantage in the mounting and assembly operation, facilitates the manufacturing process, and substantially eliminates the deleterious results heretofore obtained through the use of the old type crowfoot method of suspending the filament.

There are undoubtedly many variations and combinations of structure and materials that will substantially produce the same desired result as set forth in the specific embodiment of the present invention, but such variations and departures are anticipated as may fall within the scope of the accompanying claims.

What is claimed is:

1. A spacer member for an electron discharge device comprising a sheet of insulative material, a support for a filament suspension member comprising a metallic strip folded to provide a shank, portions of said strip being bent in opposite directions and parallel with the surface of said sheet and having their ends extending through apertures in the sheet and bent to clamp the shank in perpendicular relation to the upper surface of the sheet.

2. A spacer member for an electron discharge device comprising a sheet of insulative material, a support for a filament suspension member comprising a metallic strip folded to provide a shank, portions of said strip being bent in opposite directions and parallel with the surface of said sheet and having their ends extending through apertures in the sheet and bent to clamp the shank in perpendicular relation to the upper surface of the sheet and pins extending from the lower surface of said sheet.

In testimony whereof, I have hereunto subscribed my name this 22nd day of November, 1929.

ARTHUR CLIFFORD BLAKEMAN.