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ELECTRIC GASEOUS DISCHARGE DEVICE

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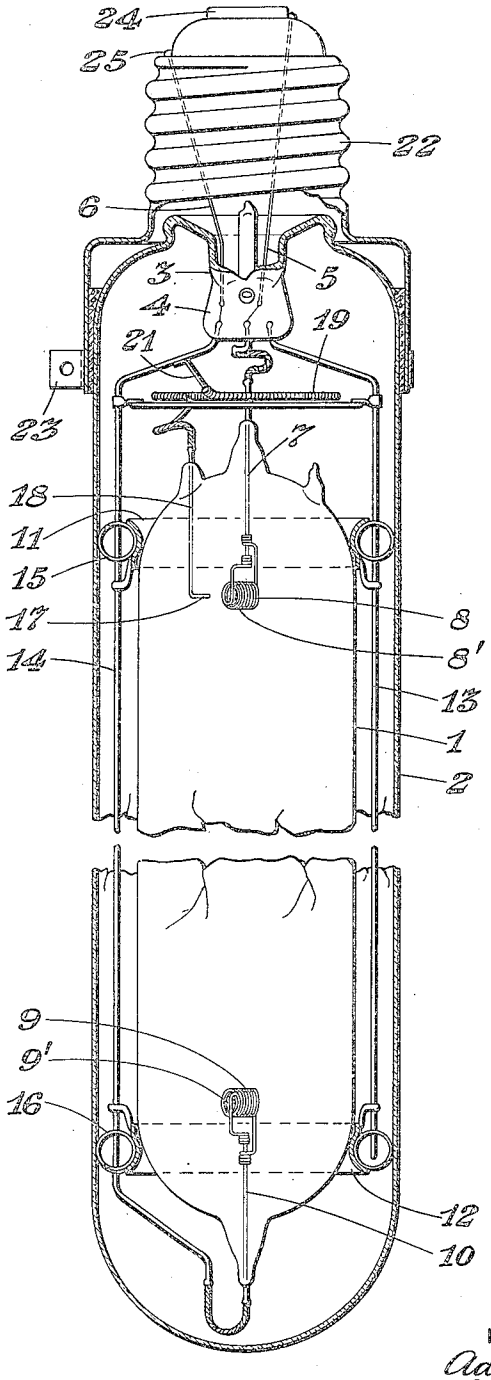

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ELECTRIC GASEOUS DISCHARGE DEVICE

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4 Claims. (Cl. 176—122)

The present invention relates to electric gaseous discharge devices generally, and in particular to those devices which are enclosed during operation in an outer envelope.

A particular object of the invention is to provide a novel means for supporting a gaseous discharge device within an outer jacket. Other objects and advantages of the invention will appear from the following detailed description or from the accompanying drawing.

The invention consists in the new and novel combination of elements hereinafter set forth and claimed.

Gaseous electric discharge devices, and especially those with thermionic electrodes, are in many cases equipped with a protective jacket which conserves the heat therein and also minimizes the effects of external drafts and the like. To accomplish its purpose this jacket must, of course, be spaced from the discharge device, and this structure results in a serious breakage hazard, particularly during shipment. Some means of resiliently supporting the discharge device within its jacket is therefore a necessity. The problem of supplying such a support is complicated, however, by the fact that this supporting means must withstand comparatively high temperatures, and at the same time must not transmit enough heat either to strain the outer jacket or to materially affect the operation of the discharge device.

We have now discovered that a novel supporting means of our invention effectively solves this problem. According to our invention the inner vessel is supported within its jacket by means of a plurality of rings formed of helically wound resilient wire, these rings being clamped tightly between the outer jacket and metal rings which are slipped over the discharge device. In order to retain the ring of helical wire in a fixed position some means such as a grooved seat is preferably provided therefor. In practice the metal rings on the discharge device are ordinarily formed with a groove for this purpose. This shape of the latter rings also serves another purpose, in that it provides only a limited zone of contact with the discharge device, so that the amount of heat received thereby by conduction from the discharge device is relatively small. As a result the resilient helical wire rings are not heated unduly during operation of the discharge device, and hence retain their resiliency and usefulness throughout the useful life of the discharge device. Likewise, the amount of heat conducted by these helical rings to the jacket is not only minimized, thus improving the operation of the discharge device, but is also so widely and uniformly distributed by the many turns of the ring that no thermal strains are imparted to the jacket. The many points of contact between these turns and the jacket also provide exceptionally good bracing for the discharge device, together with adequate resilience to withstand such blows as may be received during shipment.

In order to hold the metal rings, and with them the resilient helical wire rings, in a fixed position the metal rings are ordinarily attached to one or more stiff wires extending along the discharge device. These wires are also preferably anchored in the stem of the jacket, and one thereof serves as the current lead to the thermionic electrode which is remote from said stem. These wires together with the rings form a frame or cradle for the discharge device which make our novel device unusually resistant to damage by shocks.

For the purpose of illustrating our invention we have shown an elevational view, in part section, of an electric gaseous discharge device, intended for use as a lamp, which embodies a preferred form thereof.

As shown in this drawing our novel lamp has a tubular inner envelope 1 of glass or the like which is filled with any desired gas or vapor or mixture thereof. For example, in some cases we fill this inner envelope with argon at a pressure of the order of 5 m. m., together with enough mercury to provide substantially atmospheric pressure when it is all vaporized. Other gases, such as neon, and vapors, such as sodium, may, of course, be used where desired. Surrounding said envelope 1 there is a tubular jacket 2 which is also of glass or the like. The space between the envelope 1 and the jacket 2 can be evacuated or filled with any suitable gas. For instance, a filling of nitrogen at half an atmosphere pressure has been found to give good results. At one end of the jacket 2 there is a reentrant stem 3 through the pinch 4 of which are sealed a pair of inleads 5 and 6. Said inlead 5 is flexibly connected to the inlead 7 which is sealed into the adjacent end of the envelope 1. A thermoinic electrode 8 is carried by the inner end of said inlead 7, while a similar thermionic electrode 9 at the other end of the envelope 1 is carried by a similar inlead 10. These thermionic electrodes can be of any desired type or composition, but as here shown consist of a wound tungsten helix within which are retained the rods 8' and 9' of electron emitting oxides, such as a sintered mixture of 90 parts of barium

oxide and calcium oxide with 10 parts of tungsten, since such an electrode has been found to give exceptionally good results in our novel lamp. A pair of metal rings 11 and 12 whose smallest diameter is slightly less than that of the envelope 1 are placed snugly against the ends of said envelope and are held in this position by the rigid longitudinal wires 13 and 14, to which they are affixed in any suitable manner. In the preferred structure these rings 11 and 12 are formed with a groove therein, as shown. The wires 13 and 14, which together with the metal rings 11 and 12 form a stiff frame or cradle surrounding the envelope 1, are anchored in the pinch 4. As shown the wire 14 is preferably connected to both the inlead 6 and the inlead 10, so that it also serves as the current conductor for the thermionic electrode 9. The rings 15 and 16, which are formed of any suitable resilient wire wound into a loose helix, are tightly inserted between the rings 11 and 12, respectively, and the jacket 2, the grooves in said rings 11 and 12 firmly holding said rings 15 and 16 in the desired position. Since these wire rings 15 and 16 are inherently very flexible and likewise touch the jacket 2 at many points the envelope 1 is firmly but resiliently held in its axial position, with the result that my novel device is unusually immune to damage from mechanical shocks, such as received during shipment. Likewise the heat transmitted to the jacket 2 by the wire rings 15 and 16 is not only relatively small but is also so well distributed over a large area that breakage of said jacket due to thermal strains is avoided. Likewise the smaller amount of heat received by these rings 15 and 16, due to the small contact area of the rings 11 and 12 with the envelope 1, results in a long useful life for these wire rings without any decrease in their resilience.

An auxiliary electrode 17 is arranged near the thermionic electrode 8. This may consist of a short piece of tungsten or a small helix thereof, but in any case is preferably activated with an active thermionic substance, such as barium oxide, in any usual manner. This auxiliary electrode is carried by the inlead 18 which is sealed through the adjacent end of the envelope 1, said inlead in turn being flexibly connected to one end of a high resistance 19 which is arranged on a mica disc 20 carried by the wires 13 and 14. The other end of said resistance is connected by the wire 21 to the wire 14, and thus to the other thermionic electrode 9. A screw base 22 is placed over the stem end of the jacket 2, and tightly clamped thereon by means of the band 23. The inlead 5 is connected with the tip 24 of said base while the inlead 6 is connected to the screw shell or sleeve 25 thereof.

While we have described our invention by reference to a specific embodiment thereof it is to be understood that various additions, substitutions and changes, within the scope of the appended claims, can be made therein without departing from the spirit of our invention.

What we claim as new and desire to secure by Letters Patent of the United States is:—

1. An electric gaseous discharge device comprising a sealed envelope containing a gaseous atmosphere, electrodes sealed therein, a jacket enclosing said envelope and spaced therefrom, a metal ring in contact with said envelope, a ring of helically wound resilient wire filling the space between said metal ring and said jacket, and means to retain said wire ring in a fixed position on said metal ring.

2. An electric gaseous discharge device comprising a sealed envelope containing a gaseous atmosphere, electrodes sealed therein, a jacket enclosing said envelope and spaced therefrom, a metal ring in contact with said envelope, a ring of helically wound resilient wire filling the space between said metal ring and said jacket, said metal ring being grooved to retain said wire ring in a fixed position thereon.

3. An electric gaseous discharge device comprising a sealed envelope containing a gaseous atmosphere, electrodes sealed therein, a jacket enclosing said envelope and spaced therefrom, a metal ring positioned on said envelope with only a small part of the surface of said ring in contact with said envelope, a ring of helically wound resilient wire filling the space between said metal ring and said jacket, and means to retain said wire ring in a fixed position on said metal ring.

4. An electric gaseous discharge device comprising a tubular sealed envelope containing a gaseous atmosphere, electrodes sealed therein, a tubular jacket surrounding said envelope, and means to resiliently support said envelope concentrically within said jacket comprising a pair of grooved metal rings positioned against the rounded ends of said envelope with only a small part of their surface in contact with said envelope, a pair of wires connecting said rings to form a cradle for said envelope, and a ring of helically wound resilient wire between each ring and said jacket, said wire rings being retained in a fixed position by the grooves in said metal rings.

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