July 14, 1942. D. D. KNOWLES 2,289,972

DISCHARGE LAMP

Filed June 8, 1940

Fig. 1.

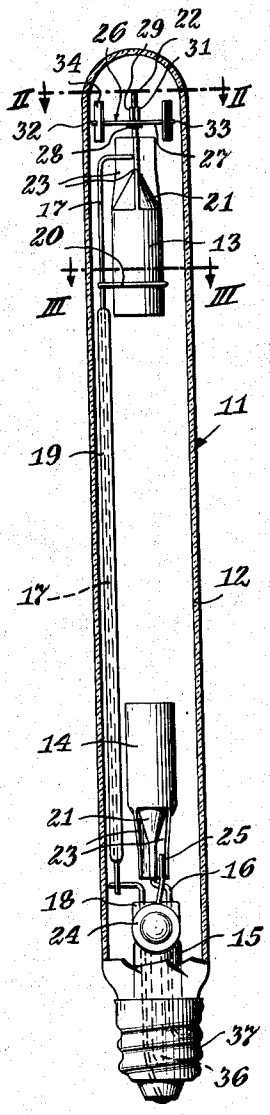


Fig. 2.

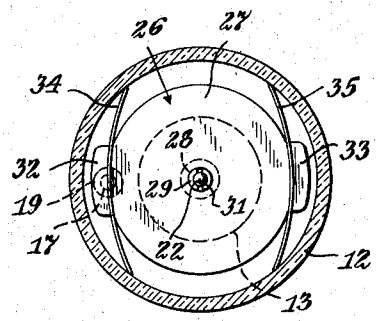


Fig. 3.

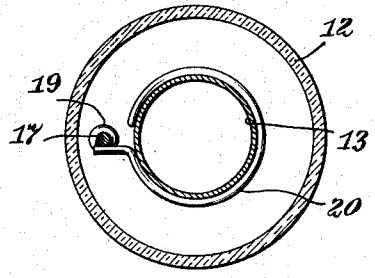
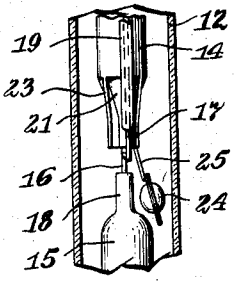


Fig. 4.



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DISCHARGE LAMP

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Application June 8, 1940, Serial No. 339,441

14 Claims. (Cl. 176—122)

This invention relates to discharge lamps, and more particularly to such adapted for sterilizing purposes.

The principal object of my invention, generally considered, is to provide an elongated lamp, based at one end, and with an electrode disposed in each end portion, and means for supporting the electrode at the end of said envelope away from the base in a manner which allows it to slide freely longitudinally without lateral displacement.

Another object of my invention is to provide a single ended or based discharge lamp, of the type adapted to generate bactericidal radiations, in which one electrode is provided adjacent a supporting press or flare tube, and the other is disposed in the opposite end of the elongated envelope and braced therein by means which allows longitudinal or axial movement, while preventing lateral displacement.

A further object of my invention is to provide a support for a discharge lamp electrode, which support is fixed adjacent one end of the envelope, and the associated electrode, or a supporting wire affixed thereto, slides freely therein.

Other objects and advantages of the invention, relating to the particular arrangement and construction of the various parts, will become apparent as the description proceeds.

Referring to the drawing:

Figure 1 is a side elevational view of a discharge lamp embodying my invention, the envelope being broken away to more clearly show the interior construction.

Figure 2 is an enlarged transverse sectional view, on the line II—II of Figure 1, in the direction of the arrows.

Figure 3 is an enlarged transverse sectional view, on the line III—III of Figure 1, in the direction of the arrows.

Figure 4 is a fragmentary side elevational view from the left of the lamp as shown in Figure 1, the envelope being broken away.

Various types of spring supports, spiders and the like, have been tried for holding the upper electrode, or that remote from the base, in single end discharge devices generating ultra-violet radiations for sterilization purposes, and manufactured generally in accordance with the pending application of Robert F. James, Serial No. 734,620, filed July 11, 1934, and owned by the assignee of the present application.

If the structure is made heavy and stiff enough to afford adequate support for the electrode, it is likely to bind and not slide in the glass or vitreous envelope during the sealing-in process. If it is light enough to slide freely, it is mechanically too weak to afford adequate support.

The problem is made even more difficult by the relatively large variation in inside diameter of the glass tubing used for the envelope. In every case known, the support has been mechanically attached to the electrode and thus required to slide in the tube.

In accordance with my invention, I propose to allow the support, which may be constructed of mica, metal, or other suitable material, to remain fixed in the tube, and allow the electrode, or a supporting wire attached thereto, to slide freely with respect to said support, as by passing through an aperture therein.

A preferred structure using mica will now be described, although it is obvious that I do not wish to be restricted to the use of this material.

Referring to the drawings in detail, like parts being designated by like reference characters, there is shown a discharge device 11 especially adapted for sterilization purposes. The discharge lamp as illustrated, comprises an elongated vitreous envelope 12 formed of material which efficiently transmits the ultra-violet radiations in the bactericidal range, such material preferably being what is designated as Corning 972 high transmission ultra-violet glass, which is a form of Corex glass.

One end of the tube is closed, and the other, which is initially open to allow for the introduction of the electrodes 13, 14 and supporting parts, is closed by the supporting flare tube 15, as by sealing the peripheral edge portion thereof to the edge of the open end of the envelope 12, as will be understood.

The mount comprising the flare tube 15, the electrodes 13 and 14, the supporting lead 16 for the inner or flare-tube-adjacent electrode 14, and the lead 17 extending from the press 18 of the flare tube 15 to the other electrode 13, are first assembled outside of the envelope 12. The lead 17 is desirably insulated by coating the main portion between the electrodes 13 and 14 with glass 19. The inner or cylindrical portion of the electrode 13 is desirably braced to the lead 17 by a supporting ring 20, the outer end of the forming wire of which is desirably spot welded to the lead 17, and which substantially encircles the cylindrical portion of the electrode 13, as shown most clearly in Figure 3.

Each electrode preferably comprises a hollow cylindrical body portion terminating in a closed, generally conical end 21, formed about a rod connector, which for the electrode 14 is the lead-in

conductor 16 and which for the electrode 13 is a supporting wire 22. The excess folds of material are formed into a plurality of outstanding fins or ribs 23, extending from the conical portion 21, and continued for a distance about the supporting lead or wire.

The flare-tube-adjacent electrode 14 desirably carries a getter holder or "helmet" 24, desirably formed of two pressed sheet nickel shallow circular pans, assembled face to face, with peripheral flange portions united and enclosing mercury, or a compound which liberates mercury on heating, in order to provide for the introduction of the desired amount of this material. The holder 24 is desirably secured in position by a wire 25, one end of which is spot welded to its rim, and the other spot welded to one of the fins 23 of the electrode 14, so that it is positioned close to, but spaced from, a flat side of the press 18 and with the flange portions nearly parallel thereto.

In order to keep the electrode 13 in proper position with respect to the envelope 12, I provide a support 26 which, in the present embodiment, comprises a generally circular mica disk 27, having a nickel eyelet 28, from which extend a plurality of tabs 29 and 31, adapted to guide the supporting wire 22. The disk 27 has outstanding side lugs 32 and 33, on which are mounted pieces of resilient mica 34 and 35, of such size that they resiliently engage the inner surface of the envelope 12, at four points which are spaced approximately equal distances around said surface, and press against said inner surface with sufficient force, so that when the assembled support is pushed into the position, illustrated in Figures 1 and 2, it will stay in place.

The manner of assembling the discharge lamp, just described, is to clean the parts and connect the flare tube, leads, electrodes and getter helmet together in any suitable manner. The metal parts may be connected by spot welding. The support 26, after assembly, may be pushed into place by first fitting on the wire 22 of the mount and then inserting the whole assembly to the position illustrated in Figure 1. Alternatively, said support may be pushed into the far or closed end of the envelope 12, and the assembled mount then inserted until the supporting wire 22 thereof passes through the nickel eyelet 28, as shown in Figures 1 and 2.

The flare tube 15 is then sealed to the open end of the envelope 12, the free longitudinal movement provided for between the wire 22 and the support 26, allowing for the usual pull-down of the flare tube at sealing, without disturbing said support, and said envelope exhausted in the usual manner through the tube 36, which after gas filling is tipped off. Said sealed end is then provided with a metal base 37 secured thereto, as by means of cement. The lamp is then seasoned and tested in accordance with well-known practice.

From the foregoing, it will be seen that I have provided a discharge lamp particularly adapted to emit ultra-violet radiations, and in which one electrode is supported close to the flare or press thereof, and the other in the far end of the envelope and kept in place by a wire extending longitudinally therefrom and slidably secured in a central aperture in a support, resiliently fixed in place in said envelope.

Although a preferred embodiment of my invention has been disclosed, it will be understood that modifications may be made within the spirit and scope of the appended claims.

I claim:

1. A discharge lamp comprising an elongated vitreous envelope, leads sealed into one end thereof, a main electrode disposed adjacent said end and supported on one of said leads, a support resiliently mounted in the opposite end portion of said envelope, another main electrode slidable with respect to said support, and another of said leads traversing substantially the length of said envelope and connected to said last-mentioned electrode.

2. A discharge lamp comprising an elongated vitreous envelope, a main electrode adjacent each end therein, a flare tube sealed into one end portion of said envelope, the adjacent electrode being supported on a lead extending from said tube, another lead extending from said tube to said other electrode, support means mounted in the end portion of said envelope remote from said tube, and a slidable connection between said electrode and support means.

3. A discharge lamp comprising an elongated vitreous envelope, leads sealed into one end thereof, a main electrode disposed adjacent said end and supported on one of said leads, a support positioned in the opposite end portion of said envelope, said support comprising a disk with an aperture and carrying spring elements resiliently gripping the inner surface of the envelope, another main electrode having a supporting wire slidably fitting the aperture in said support, and another of said leads traversing substantially the length of said envelope and connected to said other main electrode.

4. A discharge lamp comprising an elongated vitreous envelope, leads sealed into one end thereof, a main electrode disposed adjacent said end and supported on one of said leads, a support mounted on the opposite end portion of said envelope, another main electrode slidably positioned thereby, another of said leads traversing substantially the length of said envelope and connected to said other main electrode, and an additional support extending laterally from said other lead and substantially encircling said other main electrode.

5. A discharge lamp comprising an elongated vitreous envelope, leads sealed into one end thereof, a main electrode disposed adjacent said end and supported on one of said leads, a support mounted in the opposite end portion of said envelope, another main electrode, said last mentioned electrode being generally cylindrical with its outer end portion formed about a supporting wire, said wire slidably fitting said support, and another of said leads traversing substantially the length of the envelope and connected to said other main electrode.

6. A discharge lamp comprising an elongated vitreous envelope, leads sealed into one end thereof, a main electrode disposed adjacent said end and supported on one of said leads, a support in the opposite end portion of said envelope and engaging the inner surface thereof at four points around its periphery, another main electrode slidable with respect to said support, and another of said leads traversing substantially the length of said envelope and connected to said last-mentioned electrode, that portion of said lead between said electrodes, being covered with insulating material to keep the discharge from passing thereinto.

7. A discharge lamp comprising a vitreous en-

velope, a flare tube terminating in a press and closing one end of said envelope, leads sealed through said press, a main electrode disposed adjacent said press and supported on one of said leads, said electrode being generally cylindrical, opening inwardly, and closed at its outer end by forming about the supporting lead, with the excess material shaped to provide outstanding ribs, and a mercury holder disposed adjacent, but spaced from, a flat side of said press, said holder comprising a shallow hollow circular container with a peripheral flange disposed nearly parallel to said press and held in position by means extending between said flange and one of said ribs.

8. In a discharge lamp having an envelope, means for preventing lateral displacement of an electrode comprising a support mounted in an end portion of the envelope and comprising elements resiliently engaging the inner surface thereof at points spaced around its perimeter, and a convection permitting longitudinal sliding between said electrode and said support.

9. In a discharge lamp having an envelope, means for positioning an electrode therein, comprising a flare tube closing one end of said envelope, a lead extending from said tube to approximately the opposite end portion of said envelope, said electrode being connected to said lead and having a wire extending outwardly therefrom, and a support mounted in the adjacent end portion of said envelope and slidably receiving said wire.

10. In a discharge lamp having an elongated vitreous envelope, a main electrode disposed in one end portion thereof, and means for keeping said electrode in place comprising a support consisting of a disk with an aperture and carrying spring elements resiliently gripping the inner surface of the envelope, said electrode having a wire extending outwardly therefrom and slidably fitting said aperture.

11. In a discharge lamp having an elongated vitreous envelope, means for supporting an electrode therein comprising a lead extending from a press at one end of said envelope and connected to said electrode, a bracing member extending laterally from said lead and encircling said electrode, and a wire extending axially outward from said electrode and slidably fitting a support mounted in the end portion of said envelope.

12. In a discharge lamp, an electrode having a flange, and a pair of metal plates, outwardly embossed, provided with connected peripheral flanges, enclosing mercury therebetween, and support means united to said plate flanges and extending therefrom to said electrode flange.

13. A discharge lamp comprising an envelope, a main electrode adjacent each end therein, one of said electrodes being supported on a lead extending between said electrodes, and means for preventing laterial displacement of said electrode, comprising a support slidably mounted in the end portion of said envelope adjacent said electrode and a slidable connection between said electrode and support.

14. In a discharge lamp, an enclosing envelope, an electrode, and means for preventing lateral displacement of said electrode while allowing limited longitudinal movement thereof, comprising a disk formed with a generally central aperture, a wire projecting from said electrode and slidably received in said aperture, and spring elements carried by said disk and resiliently gripping the inner surface of said envelope.

DEWEY DEFOREST KNOWLES.