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CRATER LAMP

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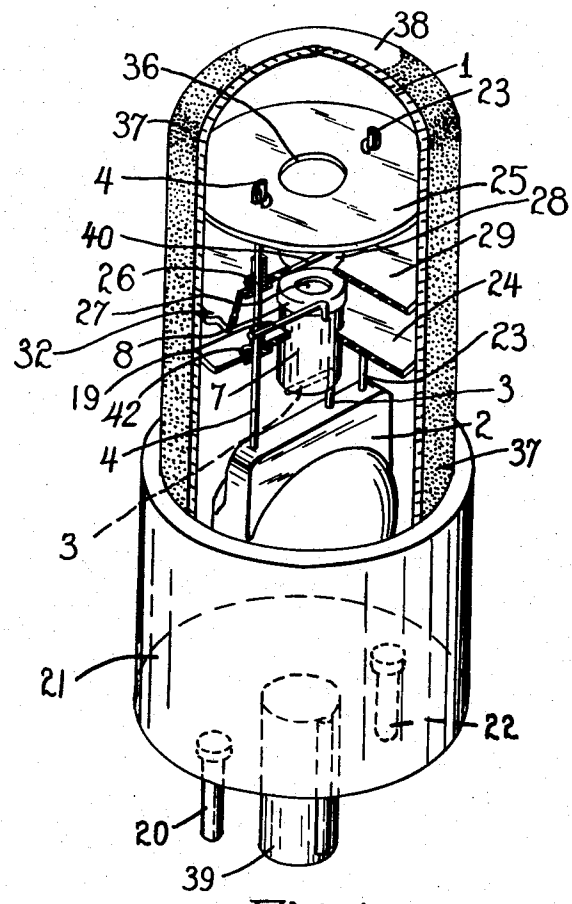


Fig. 1

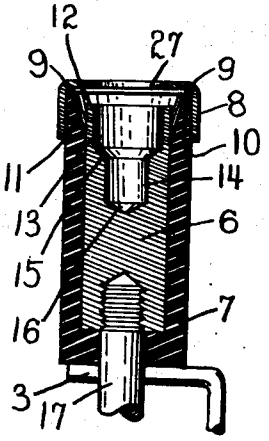


Fig. 2

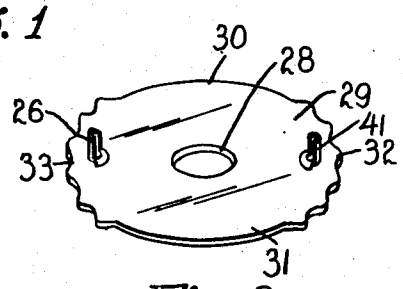


Fig. 3

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CRATER LAMP

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7 Claims. (Cl. 176—122)

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This invention relates to electric discharge devices and particularly to electric discharge lamps of the crater type.

Such lamps have a hollow electrode from the interior of which light is emitted. Light is emitted in the general direction of the open mouth of the electrode, but sputtered particles of the electrode material are also emitted therefrom, but apparently do not travel in as straight a path or in the same direction as the light.

My invention allows the light to travel in the general direction of the axis of the hollow electrode, at the same time aligning the electrode and preventing a considerable part of the sputtered material from depositing on the lamp walls in the path of the light.

This is achieved by a mica disc, preferably serrated, which extends from the mount support in the lamp to the walls of an enclosing tube. An additional mica disc aids further in reducing tube blackening, and a third disc helps further to position the hollow electrode which emits the light.

Further objects, advantages and features of the invention will be apparent from the following specification, taken together with the accompanying drawings, in which:

Figure 1 shows a lamp according to the invention;

Figure 2 shows the cathode-anode assembly in further detail; and

Figure 3 shows one of the discs in detail.

In Figure 1, the glass envelope 1 has sealed therein a gas such as neon and argon at say, 15 mm. of mercury pressure, for example the gas filling shown in my copending application Serial No. 719,611 filed December 31, 1946. The usual stem press 2 at one end of the tube has sealed therethrough the lead-in wires 3, 4 which serve as supports and also to conduct the current to anode 8 and cathode 6, shown in Figure 2. The cathode 6 is of a good electron-emitting material such as Misch metal, and is enclosed by the ceramic insulating cup 7 and anode 8, which shield it from view in Figure 1. The anode 8 is cup-shaped and fits over the open end of ceramic cup 7, being preferably spaced therefrom by an annular metal ring 9, as in Figure 2. The edge 10 of the ceramic cup 7 is preferably flat under the ring 9, and the edge 11 bevelled to a point somewhat below the open edge 12 of the hollow cathode 6. The latter is preferably hollowed in parts 13, 14 of different diameters for reasons explained in my above-mentioned copending application, with the connecting portion 15 bevelled, and the

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bottom 16 conical. A lead-in wire 17 is screwed into cathode 6 and extends through the bottom of ceramic cup 7, the lead-in and support wire 3 being welded to wire 17 at right angles at the bottom of cup 7 to support the same and to hold the cathode 6 rigid within said cup 7. Anode 8 is welded to horizontal support wire 19 which in turn is welded to lead-in wire 4, which is electrically connected to contact pin 20 in base 21 which is attached rigidly to the bottom of envelope 1. The other contact pin 22 is electrically connected to lead-in wire 3. An additional support wire may be used from the other side of anode 8 to the support wire 23, sealed into stem press 2. Such an additional support is shown in my above-mentioned copending application.

An annular mica disc 24, of diameter slightly smaller than the inside diameter of the envelope 1, fits closely around the ceramic cup 7 near its middle holding it concentric therewith and eyelet 42 fixes it to the vertically extending support wire 4 passing therethrough. Another eyelet (not shown) is used to fix the disc 24 to support wire 23 which passes through it on the other side of cup 7. The support wire 19 welded to one side of anode cup 8, together with a similar support wire 40 (not shown in full) on the other side of said cup 7, are fastened in place after the cathode-anode assembly 6, 7, 8 is centered in the mica.

The mica disc 29 above opening 27 in anode cup 8 is ovel-shaped, so that its short-axis sides 30, 31 do not touch the interior of the glass envelope 1, but the long-axis ends 32, 33 do touch the glass and are toothed or serrated, as shown, to insure good mechanical contact with bulbs of slightly varying diameter. The oval-shape gives less friction with the bulb than would be obtained with a circular disc serrated all around its circumference. Mica disc 24 centers the cathode-anode assembly 6, 7, 8, shown in Figure 2, on the support wires 4 and 23, as described above, while mica disc 29 centers the glass envelope 1 with respect to support wires 4 and 23, to which the disc is attached by welding at eyelet 26 and a similar eyelet 41 (not shown in Fig. 1) on the diametrically opposite part of the disc 29.

Annular mica disc 25, of diameter similar to disc 24, is mounted above disc 29 near the top of the envelope 1, is affixed to eyelets 4 and 23 which are welded to supports 4 and 23.

Mica discs 25 and 29 have central holes 36 and 28 in register with the opening 27 in anode-cathode assembly 6, 7, 8 and of slightly larger diameter than opening 27, which in turn is

slightly larger than the cavity 13 of the cathode, to allow passage of light from the cathode 6 to the outside of the envelope 1 through the openings 27, 28, 36 while a considerable part of the sputtered material is intercepted by the mica near the edges of these holes. The light eventually passes out of the envelope 1 through clear portion 38 in the opaque coating 37 over the remaining projecting portion of the envelope 1.

The disc 29, and preferably 24 and 25 also, are preferably of resilient material such as the mica mentioned. The disc 29 aligns the cathode 6 with the axis of the tube 1 as previously described, and the base 21, permitting replacement of one lamp by another in an optical system without shifting the light center. Without the structure including disc 29, the light center might vary somewhat from lamp to lamp requiring readjustment or replacement of a lamp. The discs 29 and 25 also serve to collect sputtered cathode particles which would otherwise darken the light emitting area 38 of envelope 1.

The base centering pin 39 aids in keeping the tube aligned in any socket into which it may be inserted.

What I claim is:

1. An electric discharge lamp comprising a sealed enclosing envelope, an insulating disc within said envelope, support wires for and attached to said disc extending into the interior of said envelope, a hollow cathode assembly fitting through the center of said insulating disc, and another insulating disc attached to said support wires in front of said hollow cathode, said last-mentioned disc having a central opening for the passage of light from said hollow cathode and extending to the wall of the envelope to align the cathode assembly therein.

2. An electric discharge lamp comprising a sealed enclosing envelope, a gas therein, an insulating disc therein of smaller dimensions than the surrounding interior of said envelope, support wires for said disc extending into the interior of said envelope, a cathode assembly fitted through said disc, a second insulating disc attached to said support wires in front of said cathode and having an opening at its center for the passage therethrough of light from said cathode, said second disc being of oval shape having its circumference serrated in the region of its longer axis and extending in that region to the walls of said envelope, said second disc having a central opening for passage of light therethrough from said cathode, and a third insulating disc attached to said support wires in front of said second disc and having an opening at its center for passage of light therethrough, said third disc being smaller in diameter than the inside of said envelope.

3. An electric discharge lamp comprising a sealed tubular envelope, a gas therein, a stem press at one end thereof, substantially parallel support wires extending from said stem press into the interior of said envelope, an annular insulating disc and smaller in outside diameter than the inside diameter of said tube attached to said support wires, a crater cathode assembly fitting through the central opening in the annular disc, a second insulating disc roughly annular and of oval outside diameter, the long edges of the oval being serrated and reaching to the interior walls of the tube, and a third annular insulating disc, smaller in outside diameter than the inside diameter of said tube attached to said support wires in front of the second disc.

4. An electric discharge lamp comprising a sealed tubular envelope, a gas therein, a stem press at one end thereof, substantially parallel support wires extending from said stem press into the interior of said envelope, an annular mica disc and smaller in outside diameter than the inside diameter of said tube attached to said support wires, a crater cathode assembly fitting through the central opening in the annular disc, a second mica disc roughly annular and of oval outside diameter, the long edges of the oval being serrated and reaching to the interior walls of the tube, and a third annular mica disc, smaller in outside diameter than the inside diameter of said tube attached to said support wires in front of the second disc.

5. An electric discharge lamp comprising a sealed enclosing envelope, a disc within said envelope, support wires for and attached to said disc extending into the interior of said envelope, a hollow cathode assembly fitting through the center of said mica disc, and another disc attached to said support wires in front of said hollow cathode, said last-mentioned disc having a central opening for the passage of light from said hollow cathode and extending to the wall of the envelope to align the cathode assembly therein.

6. The combination of claim 3, in which the crater cathode assembly has its crater facing and in register with the openings in said annular discs and is supported additionally at its bottom by a support and lead-in wire.

7. The combination of claim 3, in which the exposed portion of the tube is opaque except for a portion at the front of the tube to transmit light from the cathode assembly.

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REFERENCES CITED

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

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