July 24, 1951 A. H. WILLOUGHBY 2,561,898

ELECTRIC DISCHARGE LAMP

Filed April 5, 1949

Fig. 1.

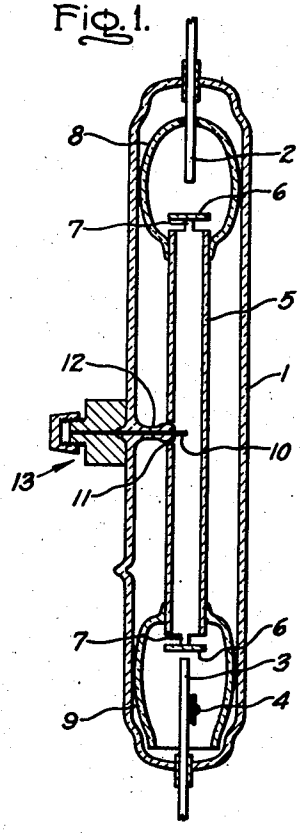
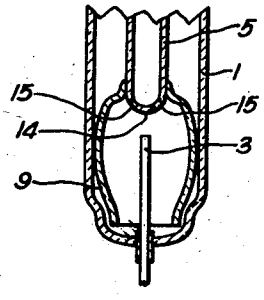


Fig. 2.



Inventor:
Anthony H. Willoughby,
by Vernet C. Kaufman
His Attorney.

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ELECTRIC DISCHARGE LAMP

Anthony Haydn Willoughby, Carston, Watford, England, assignor to General Electric Company, a corporation of New York

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5 Claims. (Cl. 313—204)

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This invention relates to electric discharge lamps generally, and more particularly to lamps of the type wherein in normal operation the pressure of the gas or vapor filling is not less than 10 mms. of mercury and which include within the sealed vitreous envelope of the lamp an unsealed transparent or translucent inner tube which is of material more refractory than the envelope and which extends between two electrodes so as to contain the discharge between these electrodes in normal operation of the lamp. The inner tube in general constricts the discharge and provides a bright light source for cooperation with optical apparatus.

In such lamps it is found that the inner tube tends to become rapidly obscured by the deposition on it of metal sputtered from the electrodes and the efficiency of the lamp is thereby quickly impaired. An object of this invention is to reduce this difficulty.

According to the invention an electric discharge lamp of the type specified comprises, in the neighborhood of at least one of said electrodes, baffle means arranged so as to screen at least the greater part of the inner surface of the said inner tube from the corresponding electrode. Metal sputtered from the said electrodes which would have been deposited on the inner surface of the tube is thus intercepted by the baffle means and prevented from reaching the tube. The said baffle means are preferably of the same material as the inner tube and sealed to or integral with it. Preferably the said material is quartz and the sealed envelope of the lamp is of glass.

The said baffle means are preferably positioned outside and extend across the ends of the inner tube so as to leave gaps for the passage of the discharge, for example, the means may consist of baffle discs positioned across the ends of the inner tube, being attached to the ends at spaced points, or the baffle means may be integral with the tube and consist of domes across the ends of the inner tube, each dome having one or more apertures to provide a path for the discharge therethrough.

In one preferred form of this invention an electric discharge lamp has the baffle means outside and extending across the ends of the inner tube and this inner tube is provided, near its ends, with expanded end members which extend from the outer surface of the inner tube and which surround the baffle means and also extend around the electrodes. These expanded end members are also preferably of the same material as the inner tube, e. g. of quartz.

If the lamp comprises an auxiliary electrode for starting purposes, which electrode is sealed

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through the outer vitreous envelope and projects into the discharge path through the wall of the said inner tube at a point between the electrodes, preferably the auxiliary electrode is sheathed throughout all of its length between the inner tube and the envelope by vitreous material so as to minimize the possibility of the discharge striking outside the inner tube.

One electric discharge lamp in accordance with the invention will now be described in detail by way of example, namely, an electric discharge flash lamp of the type suitable for stroboscopic purposes and adapted for operation on direct current. In the drawing, Fig. 1 is an elevation, in section of such a lamp, and Fig. 2 is a partial sectional view of a modification.

The lamp comprises a hermetically sealed tubular glass envelope 1 having a gas filling or argon at a pressure of about half an atmosphere; the envelope has sealed through it at each tungsten rod electrodes 2 and 3 one of which (3) is activated to act as cathode and the other of which (2) serves as anode. A cup or tab 4 for supporting a getter is attached to the cathode, and the parts of the electrode rods outside the envelope may be welded to nickel tubes (not shown) which may be in turn soldered to metal caps (not shown) which act as terminals for the lamp. A quartz inner tube 5 of substantially smaller diameter than the envelope 1 extends between, but not touching, the electrodes so that its axis is roughly collinear with the axis of the electrodes. This inner tube 5 is constructed with quartz baffle discs 6 of substantially the same area of cross section as the open ends of the said inner tube, each of which baffle discs is rigidly attached to the periphery of the corresponding and of the tube 5 by two narrow quartz straps 7 so as to leave gaps between the peripheries of the said ends of the inner tube 5 and the baffle discs 6, through which gaps the discharge is adapted to pass. The inner tube 5 and the baffle discs 6 are thus so positioned and dimensioned that each baffle disc screens the inner surface of the tube from the corresponding electrode. Bulbous quartz members 8 and 9 are sealed to the outer surface of the inner tube 5 near its ends and extend near the ends of the envelope 1 and around the electrodes 2, 3, one fitting closely around the anode 2 and the other more loosely around the cathode 3 to permit the insertion of the cathode 3 and the getter cup 4 in manufacture, but fitting closely around the inner wall of the envelope.

A tungsten auxiliary electrode 10 is sealed through the envelope 1 at approximately the mid point of the length of the envelope and passes

through an aperture 11 in the wall of the inner tube 5. This electrode 10 is sheathed with glass 12 for all of its length within the lamp envelope, except for the extreme tip lying inside the inner tube 5; a suitable terminal cap 13 is provided on the part of the electrode 10 outside the envelope.

The body formed by the inner tube 5, the baffle discs 6 and the bulbous ends 8, 9 rests loosely around and between the electrodes 2 and 3, being constrained from violent movement by the said electrodes and the glass sheath 12 of the auxiliary electrode 10, which sheath 12 fits closely into the said aperture 11 in the wall of the inner tube.

In a modification of this embodiment shown in Fig. 2, the lamp is constructed similarly except that the baffle means consist of domes 14 instead of discs, the domes being formed on the edges of and integral with, so as substantially to close, the inner tube 5, each dome having two apertures 15 in its wall to form a passage for the discharge. In manufacture these apertures 15 are blown through the domes 14 before the bulbous members 8 and 9 are sealed to the inner tube.

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

1. An electric discharge lamp comprising a sealed vitreous envelope containing a gaseous ionizable medium having a pressure during normal operation of the lamp not less than 10 mm., a pair of electrodes and an inner tube of substantially smaller diameter than said envelope and of light-pervious material more refractory than said envelope and extending between said electrodes, means to confine the discharge between said electrodes during operation of the lamp to a path through the interior of said tube, and baffle means interposed between at least one of said electrodes and the adjacent end of said tube to intercept material sputtered from the electrode.

2. An electric discharge lamp comprising a sealed vitreous envelope containing a gaseous ionizable medium having a pressure during normal operation of the lamp not less than 10 mm., a pair of electrodes and an inner tube of substantially smaller diameter than said envelope and of light-pervious material more refractory than said envelope and extending between said electrodes, means to confine the discharge between said electrodes during operation of the lamp to a path through the interior of said tube, and baffle discs interposed between each of the respective electrodes and the adjacent end of said tube and disposed across the ends of said tube but spaced therefrom to intercept material sputtered from the electrodes.

3. An electric discharge lamp comprising a sealed vitreous envelope containing a gaseous ionizable medium having a pressure during normal operation of the lamp not less than 10 mm., a pair of electrodes and an inner tube of substantially smaller diameter than said envelope and of light-pervious material more refractory than said envelope and extending between said electrodes so as to contain the discharge between said electrodes during operation of the lamp, and baffle means interposed between at least one of said electrodes and the adjacent end of said tube to intercept material sputtered from the electrode, the said end of said tube being provided with an expanded end member which surrounds said baffle means and also extends around the adjacent electrode to confine the discharge to a path through the interior of said tube.

4. An electric discharge lamp comprising a sealed vitreous envelope containing a gaseous ionizable medium having a pressure during normal operation of the lamp not less than 10 mm., a pair of electrodes and an inner tube of substantially smaller diameter than said envelope and of light-pervious material more refractory than said envelope and extending between said electrodes so as to contain the discharge between said electrodes during operation of the lamp, and baffle discs interposed between each of the respective electrodes and the adjacent end of said tube and disposed across the ends of said tube but spaced therefrom to intercept material sputtered from the electrodes, the ends of said tube being provided with expanded end members which surround the respective baffle means and also extend around the respective electrodes to confine the discharge to a path through the interior of said tube.

5. An electric discharge lamp comprising a sealed vitreous envelope containing a gaseous ionizable medium having a pressure during normal operation of the lamp not less than 10 mm., a pair of electrodes and an inner tube of substantially smaller diameter than said envelope and of light-pervious material more refractory than said envelope and extending between said electrodes, means to confine the discharge between said electrodes during operation of the lamp to a path through the interior of said tube, and baffle means interposed between at least one of said electrodes and the adjacent end of said tube to intercept material sputtered from the electrode, and an auxiliary electrode sealed through said envelope and projecting into the discharge path through an aperture in the wall of said inner tube, said auxiliary electrode being sheathed with insulating material throughout its length between the inner tube and the envelope.

ANTHONY HAYDN WILLOUGHBY.

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Certificate of Correction

Patent No. 2,561,898 July 24, 1951

ANTHONY HAYDN WILLOUGHBY

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 2, line 18, for "filling or" read *filling of*; line 20, after "each" insert *end*; line 37, for "corresponding and" read *corresponding end*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of January, A. D. 1952.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.