April 17, 1951 E. H. NELSON ET AL 2,549,328

ELECTRIC DISCHARGE LAMP

Filed April 13, 1946

FIG. 1

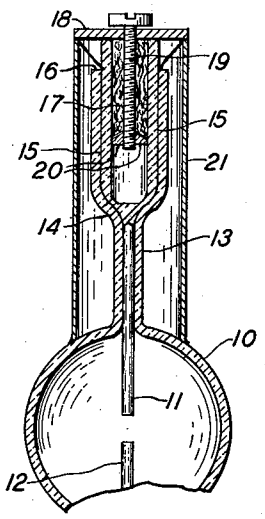


FIG. 2

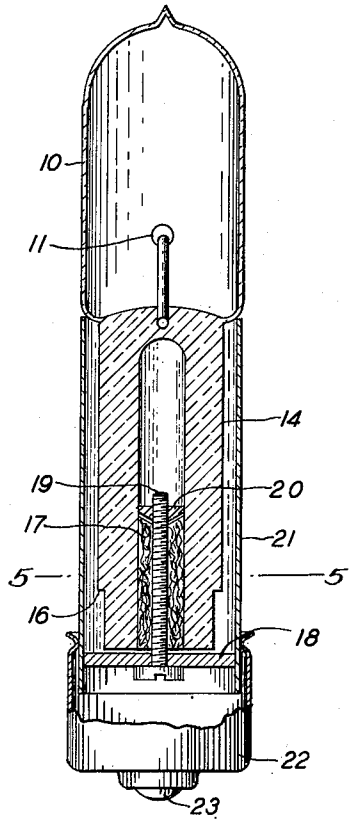


FIG. 3

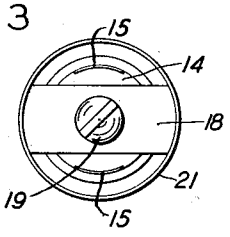


FIG. 4.

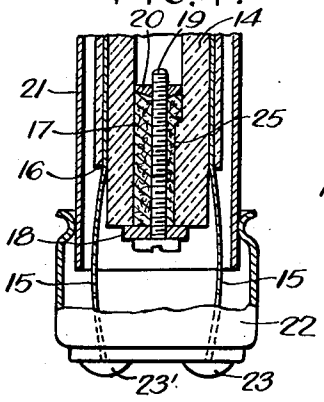
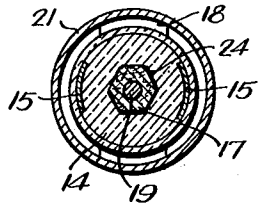


FIG. 5.



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ELECTRIC DISCHARGE LAMP

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5 Claims. (Cl. 176—126)

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The present invention relates to electric discharge lamps of the type having quartz envelopes and particularly, but not exclusively to high pressure mercury vapour lamps. The present invention is concerned with the basing of electric discharge lamps.

The electric discharge lamps, bases have usually to perform two functions, namely

(1) To provide convenient means for introducing current into the lamps;

(2) To protect the leads and seals of the lamps and improve their appearance.

The usual method of attaching bases to lamps is to use a cement capable of cementing the base material, which is usually brass, to the material of the lamp envelope. In discharge lamps without an outer envelope, surrounding the quartz envelope of the lamp proper, this method is not usually convenient as it is difficult to form the quartz into a shape favourable to receiving a cemented base, moreover it is generally desirable that the lamps should be as small as possible, in which case the base must be close to the discharge path within the envelope and it is then difficult or impossible to obtain a cement which will withstand the high temperature, which may for example be about 300° C., and also have the other required properties.

It is the object of the present invention to provide an electric discharge lamp in which these difficulties are avoided.

According to the present invention, an electric discharge lamp comprises a quartz stem tube open at one end and closed at the other end, a hermetically closed quartz envelope fixed to said tube in such a manner that the open end thereof lies outside the envelope, at least one electrode within said envelope, connecting means, such as a base having one or more terminals connected to said electrode or electrodes and securing means for attaching said connecting means to said quartz tube, the said securing means comprising a compressible refractory material, such as asbestos, within the said tube and a member passing through the said refractory material and serving to expand this material outwards against the inner wall of said tube.

The said member may comprise a threaded bolt provided with a nut, preferably of conical shape, the bolt being tightened on to the nut and thus exerting pressure upon the said refractory material in a direction parallel to the axis of the tube and causing it to expand outwards against the inner wall of the tube.

The invention will be described by way of example with reference to the accompanying drawing in which:

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Fig. 1 is a view in sectional elevation of part of one embodiment of the invention applied to a lamp having two electrodes and two seals at opposite ends, and

Figs. 2 and 3 show in sectional elevation and underside plan views respectively the way in which the embodiment of Fig. 1 can be applied to a lamp having two electrodes and only one seal at one end thereof. In the view of Fig. 3 the lamp base has been removed.

Fig. 4 is a fragmentary sectional elevation of the end portion of the quartz tube and the parts attached thereto, similar to that shown in Fig. 2, and turned 90° from the position of Fig. 2, and Fig. 5 is a sectional view along the line 5—5 of Fig. 2 turned 90° and showing a modification of the tube.

Referring to Fig. 1, a hermetically closed lamp envelope 10 has within it two electrodes 11 and 12. Since the arrangement of seals for these two electrodes is identical only one, namely that for the electrode 11, is shown. The electrode 11 passes out through a quartz neck 13 to the end of which is sealed the closed end of a relatively thick-walled quartz tube 14. One or more molybdenum strips 15 having one end connected to the electrode 11 are embedded in the wall of the quartz tube 14 and pass to the outside at a shoulder 16 near the end of the tube remote from the envelope where the tube diameter is stepped down to a smaller size. Within the bore of the tube is placed a tube of asbestos 17 and over the end of the tube is arranged an apertured metal plate 18, for instance of brass, which may be circular. A threaded bolt 19 is passed through the metal plate 18 and asbestos tube 17 and engages in a nut 20 of conical shape having its smaller diameter facing inwards and bearing on the asbestos tube. The bolt is tightened and the compression of the asbestos and the action of the conical nut causes the asbestos tube to expand against the inner wall of the quartz tube 14 and causes the metal plate 18 to be drawn firmly up against the open end of the quartz tube. In order to protect the seal, a tube 21, for example of brass, may be arranged around the seal and soldered at one end to the metal plate 18, the opposite end bearing against the quartz envelope. The outer ends of the molybdenum strip or strips 15 may be soldered to the metal plate 18 which then constitutes a terminal contact for the lamp. A metal base may be placed over the end of the head of

the bolt 19 if desired and fixed, for example by soldering to the tube 21.

Referring to Figs. 2 and 3 since leads to two electrodes (of which only one 11 is to be seen) have to be brought out to a single base, two molybdenum strips 15 are embedded in the quartz tube in diametrically opposite positions as can be seen from Fig. 3.

The metal plate 18 is, in this case made of elongated shape whereby the two molybdenum strips can pass on either side of it and remain insulated from it. A metal tube 21 is arranged as before and soldered to the metal plate 18 and a cap 22, which may be of the normal kind and of brass, is soldered over the end of the metal tube 21. The molybdenum strips 15 are soldered to two external contacts 23 and 23' (Figs. 2 and 4) mounted on the base, insulated from one another and from the base. Alternatively the cap 22 may constitute one contact in which one of the molybdenum strips is soldered thereto and only one insulated contact 23 is provided.

The asbestos tube or plug 17 may be painted with or soaked in concentrated sodium silicate to improve its adhesion to the quartz and prevent slipping.

The bore of the quartz tube 14 may be made of other than circular cross-section, for example, it may be a polygon as shown at 24 in Fig. 5 or may be provided with a local deformation, such as a longitudinally extending rib shown at 25 in Fig. 4 to prevent rotation of the asbestos plug 17 therein.

We claim:

1. An electric discharge lamp designed for operation at elevated temperatures comprising a refractory vitreous envelope having an electrically conducting seal comprising a refractory vitreous tube open at its end remote from the lamp envelope, terminal means for electrically connecting said lamp to a power source and means for holding said terminal means on said tube, said holding means including a compressible refractory material positioned in said tube, a plate across the open end of said tube and supporting said terminal means, a bolt extending through said plate and said material into said tube with its head engaging said plate and a nut on the inner end of said bolt pressing said material against said plate and into frictional engagement with the inner wall of said tube to hold said terminal means on said lamp.

2. An electric discharge lamp according to claim 1, wherein the bore of said tube is of non-circular cross-sectional shape to prevent rotation of said compressible material therein.

3. An electric discharge lamp according to claim 1 wherein the bore of said tube is provided with a local deformation to prevent rotation of said compressible material therein.

4. An electric discharge lamp according to claim 1 wherein said compressible material is asbestos including a substance which improves its adhesion to said tube.

5. An electric discharge lamp comprising a quartz envelope having a discharge supporting electrode sealed therein, a quartz tube protruding from said envelope with its inner end closed and its outer end open, an electrical conductor connected to said electrode, extending longitudinally of said tube, embedded in the tube wall and emerging from said tube adjacent its open end, a terminal contact for said lamp electrically connected to said conductor and means for securing said contact on said tube, said means comprising a metal plate over the open end of said tube and supporting said terminal contact, a bolt passing through an opening in said plate and into the bore of the tube, an asbestos plug around said bolt and a nut on the inner end of said bolt pressing said plug against said plate and into frictional engagement with the inner wall of said tube to hold said terminal contact on said lamp.

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