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(54) Single-ended discharge lamp

(57) A single-ended discharge lamp has a discharge tube (2) comprising at least two tube legs (3a-3h) and a housing (4) for mechanical and electrical connection to a lampholder. The housing (4) comprises a tube supporting part (5), a housing part (6) and a lamp cap (7). Holes are provided in the tube supporting part (5) through which the legs (3a-3h) of the discharge tube (2) extend. The ends of the legs of the discharge tube inside the supporting part are fixed thereto with a bonding material (9). The bonding material (9) is applied to the radially outer (11) portion of the tube supporting part.

The bonding material is also applied to the radially inner portion of the tube supporting part.

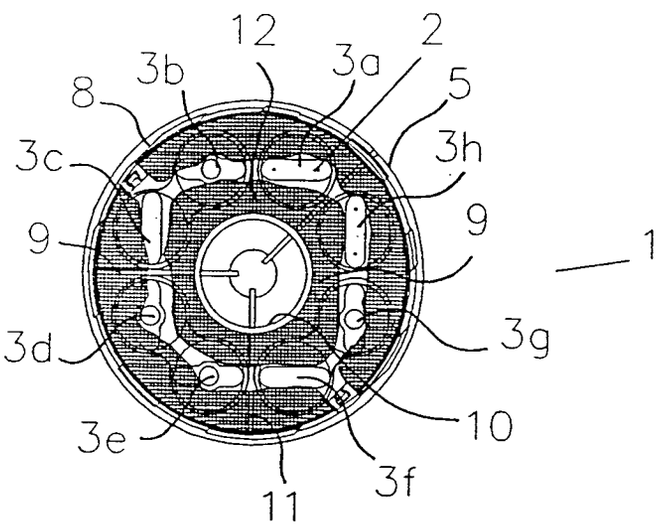

Fig.2

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Description

The present invention relates to a discharge lamp.

Single-ended discharge lamps, primarily compact fluorescent lamps, are commercially available which have a discharge tube comprising four or six glass legs. The ends of the legs of the discharge tube are fixed inside a tube support part of a housing with a thermosetting cement. The cement is placed between the legs of the tube and the outer rim of the tube supporting part. During manufacturing the cement is set by heating it and keeping it at a given temperature for a certain time. During this time the cement swells and sets and bonds to the glass tube legs and to the outer rim of the tube supporting part. Thus the tube legs are fixed in the tube supporting part.

It has been found that the tube legs may crack or break.

According to the present invention there is provided a single ended discharge lamp comprising a discharge tube having a plurality of legs, the ends of which are held in a tube support member by bonding material which bonds the said ends to the support member, characterised in that the bonding material is arranged substantially symmetrically with respect to each of the said ends.

The invention is based on the recognition that mechanical forces are exerted to the glass by the bonding material which further increases the stresses generated in the glass in earlier stages of manufacturing. The stresses produced in this way are reduced, in accordance with the invention, by fixing the ends of tube legs of the discharge tube inside the tube support member with bonding material applied not only to the outer portion of the support member surrounding the tube ends but also to the inner portion of the discharge tube bordered by the tube legs.

In accordance with an embodiment of the invention, there is provided a single-ended discharge lamp having a discharge tube comprising at least two tube legs, and a housing for mechanical and electrical connection to a lampholder, which housing comprises a tube supporting part, a connection part and a lamp cap, holes in the tube supporting part through which the legs of the discharge tube extend with the ends of the legs of the discharge tube inside the housing fixed with a bonding material applied to the outside portion of the tube supporting part which portion surrounds the discharge tube and, furthermore, the ends of the legs of the discharge tube are fixed to the tube supporting part with bonding material also applied to the inside portion of the discharge tube bordered by the tube legs.

In a preferred embodiment of the invention, there is a rib on the tube supporting part, the ends of the legs being between the rib and the rim. The rib extends towards the inside of the housing and supports the bonding material. Thereby, both the rib and the outer rim of the tube supporting part support the bonding material and ensure that the force generated by the bonding material is taken up.

The bonding material may be a thermosetting cement which swells when setting.

In order to compensate for the stress force exerted by the bonding material more uniformly, it is advantageous particularly in case of discharge lamps having a large number of tube legs, e.g. at least six tube legs to use a rib which is cylindrical.

Using the solution according to the invention the glass tube legs are not exposed to asymmetrical load, so that they are more evenly mechanically stressed. In addition, the solution according to the invention provides a bond between the tube legs and the housing which withstands higher mechanical loads. The invention is particularly advantageous when the discharge tube has six, eight or more tube legs.

For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made by way of example to the accompanying drawings, in which:

FIG. 1 is a side view of an embodiment of a discharge lamp according to the invention; and

FIG. 2 is a sectional view, along section AA of Figure 1, of the discharge lamp.

The discharge lamp according to Figures 1 and 2 is an OCT type compact fluorescent lamp having a discharge tube 2 having eight legs 3a to 3h and a ballast housing 4. Discharge tube 2 contains electrodes (not shown) and a gas and metal vapor fill as known in the art. The eight tube legs 3a, 3b, 3c, 3d, 3e, 3f, 3g, 3h have an outside diameter of about 12mm. The legs are joined one to another to form a continuous discharge space. Housing 4 comprises a tube supporting portion 5, a housing portion 6 and a lamp cap 7, e.g. an Edison screw cap. The supporting part 5 has circular openings, the centres of which are on a circle of 37 mm diameter. The openings accept the tube legs 3a, 3b, 3c, 3d, 3e, 3f, 3g, 3h of the discharge tube 2. In addition, on tube supporting part 5 there is an integral, radially inner rib 10 which projects towards the inside of housing 4. The rib 10 is cylindrical and has a thickness of 1 mm, a height of 6.5 mm, and an inside diameter of 20 mm. The rib 10 is concentric with the outer circular rim 8 of the supporting part 5. The run 8 has a wall thickness of 2 mm and an outside diameter of 53.5 mm.

Tube supporting part 5 and housing portion 6 are of plastic material, e.g. polybutylene terephthalate, and are fixed to each other by snapping then together, or by adhesive. Lamp cap 7 is fixed to housing portion 6. An electronic circuit or ballast for operating the discharge tube 2 is housed in the housing part 6. The ballast is connected with the electrodes of discharge tube 2 and with the contacts of the lamp cap 7.

The ends of the tube legs 3a, 3b, 3c, 3d, 3e, 3f, 3g, 3h of the discharge tube 2 are fixed inside the supporting part 5 with a bonding material 9 (denoted by cross-hatch

in the Figures). The material 9 is applied to two areas within the supporting part 5:-

1) a radially outer substantially circular area 11 bounded by the outer circular rim 8 and the ends of the tube legs; and
2) a radially inner substantially circular area bounded by the inner rib 10 and the ends of the tube legs. A roughly circular zone about 1 to 3 mm wide between the tube legs between the two zones is free of bonding material 9.

Bonding material 9 is a thermosetting cement which, prior to application, is composed of natural and artificial resins and a solvent. After application, the cement is heated for a few minutes at temperatures between 100 and 180°C to set it to the shape of the ends of tube legs. It is provided on two sides of the pinched portions of the ends of tube legs. Having set, bonding material 9 has a depth, relative to the surface of supporting part 5, of 7 to 8 mm in the radially inner area and 8 to 9 mm in the radially outer area.

The discharge lamp described in the example is, on average, able to withstand without damage a torsion moment of 5 Nm between the tube supporting part 5 and the discharge tube 2. An OCT discharge lamp of the same size in which the bonding material 9 is applied only to the radially outer area 11 can withstand a torsion moment of approx. 2.5 Nm.

Claims

1. A single ended discharge lamp comprising a discharge tube having a plurality of legs, the ends of which are held in a tube support member by bonding material which bonds the said ends to the support member, characterised in that the bonding material is arranged substantially symmetrically with respect to each of the said ends.

2. A lamp according to claim 1, wherein the support member has an outer rim surrounding the said ends of the legs and a first portion of the bonding material fills an outer zone bounded by the outer rim and the ends of the legs and a second portion of the bonding material fills an inner zone bonded at least by the ends of the legs.

3. A lamp according to claim 2, wherein the first portion of bonding material in the outer zone is spaced from the second portion of the bonding material in the inner zone.

4. A lamp according to claim 2 or 3, wherein the support member has an inner rib, said ends of the legs being arranged between the said rib and the said rim, the inner zone filled by the second portion material being bounded by the rib and the ends of the legs.

5. A lamp according to claim 2, 3 or 4, wherein the tube support member and the rim are circular, and the said ends lie in a circle, and the outer zone is radially outward of the circle and the inner zone is radially inward of the circle.

6. A lamp according to claim 5, when dependent on claim 4, wherein the inner rib is a circular cylinder, concentric with the said circle.

7. A lamp according to any preceding claim, wherein the bonding material is a thermosetting cement.

8. A lamp according to any receding claim, comprising 4, 6 or 8 tube legs.

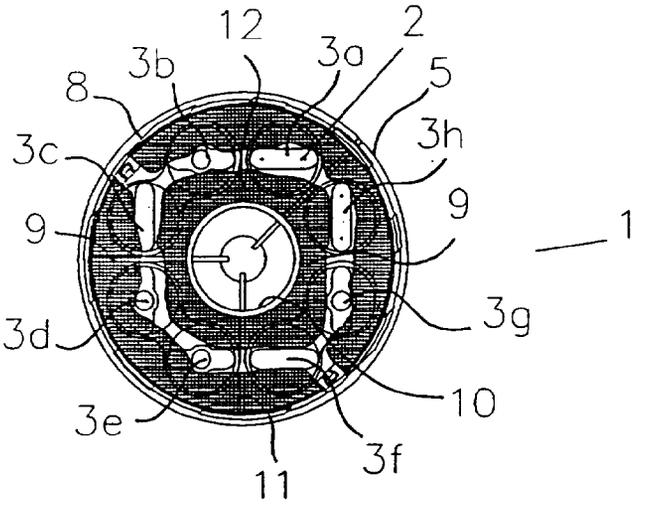

Fig.2

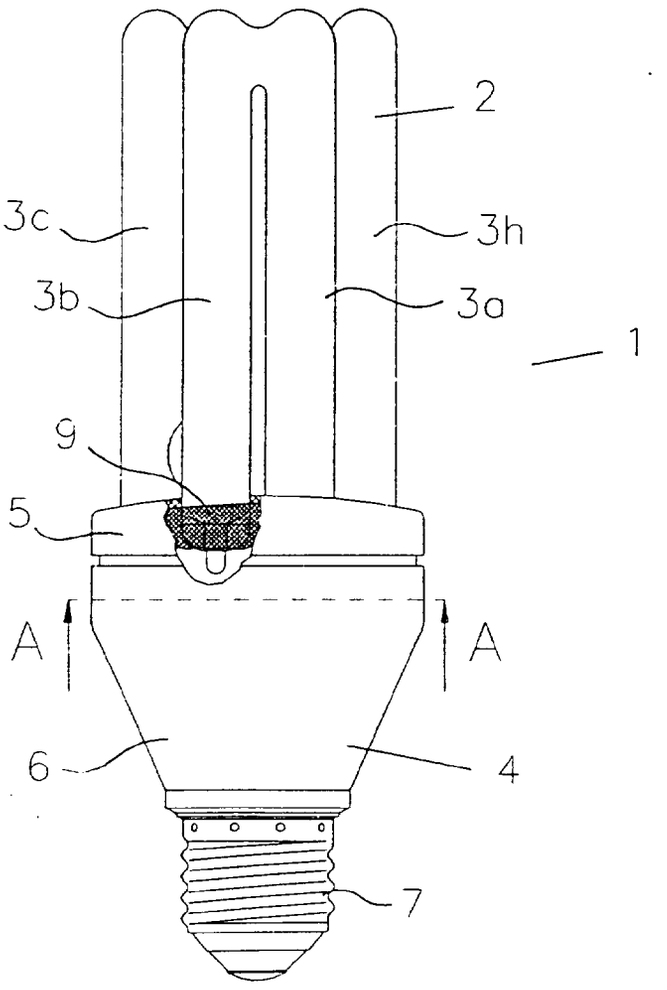

Fig.1