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(54) **Lamp with a reflector envelope.**

(57) In a lamp with a reflector envelope ensuring modified light output, comprising a conical reflecting body (2), an insert light source (4) arranged within the conical reflecting body (2) and a light transmitting front element (3) fixed to the conical reflecting body (2), there is between the conical reflecting body (2) and the front element (3) a clearance (10)

determined by the dimensions and the inner spring force of a mechanical fixing body (5) connecting the conical reflecting body (2) and the front element (3), wherein at least a part of the clearance (10) is occupied by a deformable sealing material (6) or adhesive.

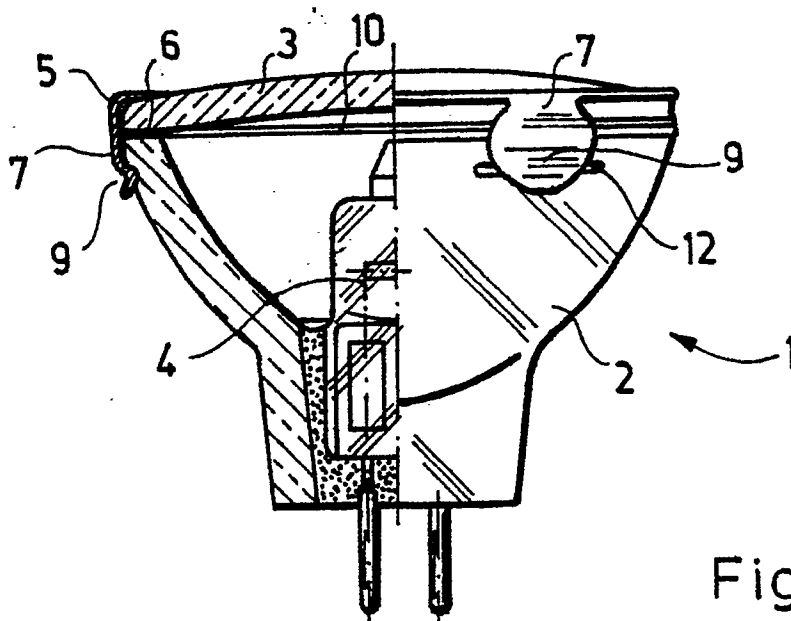


Fig.1

EP 0 419 084 A2

LAMP WITH A REFLECTOR ENVELOPE

FIELD OF INVENTION

The present invention refers to a lamp with a reflector envelope of modified light output. The lamp is made with a conical reflecting body, in given case covered by a thin dichroic or metallic layer, an insert lamp emitting light, preferably a halogen incandescent lamp and a front element fixed to the conical body in a mechanical way or by adhesion.

BACKGROUND OF THE INVENTION

The demand on lamps with reflector envelope equipped with a halogen incandescent insert lamp of modified light is gradually increasing. They are very advantageous for illumination objects arranged in a shop-window, but they are very often used for general lighting purposes owing in first line to the fact that they give a concentrated illumination at low energy consumption.

The lamps having reflector envelope came firstly in general use in opened embodiments, i.e. they did not comprise a front element, as can be found for example in the patent specifications nos. US-4 021 659, US-4 169 237 and 4 169 238.

There has arisen, however, a demand on the illuminating lamps having closed reflector envelope. In these lamps the conical reflecting body was united with a front element and so a closed envelope was received. The front element is either simply a light transmitting plate matching the front surface of the conical element or an edge extending from the front surface of the conical element, or it constitutes a special optical element modifying the light emitted by the insert lamp due its structure.

There is known a lamp, wherein the conical body is united with the front element by mechanical means, for example by the use of a metallic pressure ring having edges from two sides, as can be seen for example in the patent specification no. US-4 213 170.

Further, there is known also a lamp, wherein the conical reflecting body is united with a front element by adhesive, as can be seen in the German open-laid specification no. DE-2 228 684.

The known solutions prescribing uniting a conical reflecting body and a front element have not fulfilled the requirements as expected.

The rigid fixation made by adhesive is not durable enough, especially not in the case of insert light source consisted of a halogen incandescent lamp. For example, if the front element arranged in

a recess made along the front surface of the conical reflecting body is fixed by an adhesive of high thermoresistivity, the recess made on the front surface of the conical reflecting body should be prepared so that the front element match by its mantle surface the edge through a substantially small matching clearance. This is important because the conical reflecting body made of hard glass having linear thermal expansion coefficient of about 36×10^{-6} cm/cm. $^{\circ}$ C value should be kept together with the front element of generally highly differing thermal expansion coefficient by the adhesive applied. If the matching clearance between the outer mantle surface of the front element and the recess surrounding the edge of the conical reflecting body is greater than a few times ten microns, the thermal movements cause the adhesive bond to crack and gradually to decompose during the work of the lamp. The adhesive bond will slowly leave and between the front element and the conical body a harmful resonance comes into being. If the lamp is applied upwardly or in horizontal position it is a further problem that the cracked adhesive bond after a time cannot ensure further keeping of the front element which falls out from the conical body.

If the fixation is realised only by mechanical means, it is not stable enough. An accidental vibration load can cause light movement of the front element and this has harmful effect especially when the front element should play an optical rule.

SUMMARY OF THE INVENTION

The present invention is intended to create a solution for avoiding the drawbacks shown above in the case of lamps equipped with a reflector envelope closed by a front element and to ensure a reliable assembly of the lamps.

It was experienced that for avoiding the drawbacks known from the state of the art a lamp should be prepared, wherein the mechanical fixing element can in an unambiguous way determine the position of the front element fixed on the front surface or the edge of the conical reflecting body and the clearance made therebetween. The shape and the elastic deformation of the fixing element can influence the dimension of the clearance in an interdependent way. This interdependency means that the two factors should be harmonized in order to give a satisfactory solution to the known problems depicted above. The clearance regulated to the required value should be filled at least partly with a deformable thermoresistant sealing material.

Hence, the invention is based on the recognition that the stability of the adhesive or sealing material introduced between the front surfaces of the (e.g. conical) reflecting body and the front element can be ensured if the dimension of the clearance is predetermined with high accuracy by an elastic fixing element which presses to one another the two elements to be assembled by the means of a sealing materials with predetermined force. In this way the thickness of the adhesive or rather sealing layer arranged between the parts can be regulated with high accuracy and a minimal amount of the material is sufficient for assembly. As an elastic fixing element, a disc can be applied which is equipped with ears surrounding the front element and the edge of the conical reflecting body.

On the basis of this recognition the invention, i.e. a lamp having a reflector envelope was created, which ensures modified light output and is equipped with a front element which is free of the drawback characterizing the state of the art, can be made with material savings, and during the life period determined by the insert lamp works reliably from both optical and mechanical aspects.

Hence, the present invention refers to a reflector lamp of modified light output, which is equipped with a reflecting body carrying in given case a thin dichroic or metallic layer and made preferably of pressed glass, with a light emitting insert lamp, preferably a halogen incandescent lamp, and a front element fixed to the conical body. In the sense of the development ensured by the present invention a clearance is made between the conical body and the front element for fixation, the clearance determined by the dimensions and the inner spring force of a mechanical fixing element, and at least partly filled out with a deformable sealing material.

The mechanical fixing element is preferably a disc made of an elastic material equipped with at least three curved ears arranged along its periphery and made with an opening cut out in its middle part.

The ears of the mechanical fixing element are advantageously equipped with at least one cam, or rather with at least one lug.

The deformable sealing material consists preferably of teflonTM or silicone rubber or a thermoresistive adhesive.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will further be described on the basis of some preferred embodiments shown by way of example with reference to the accompanying drawing. In the drawing

Figure 1 illustrates in partial cross-section a lamp with a reflecting body having flat front surface,

Figure 2 illustrates in partial cross-section a lamp with a conical reflecting body having front surface with an edge, and

Figure 3 shows an advantageous embodiment of the fixing element constituted by a pressing disc.

DETAILED DESCRIPTION OF THE INVENTION AND PREFERRED EMBODIMENTS

The invention proposes a novel construction of a reflector lamp 1 shown in Figs. 1 and 2, comprising a quasi-conical reflecting body 2 made of glass and carrying, if necessary, on its inner surface a dichroic or metallic layer for determining and in given case for modifying the spectral composition of the light emitted by the reflector lamp 1. The inner surface of the conical reflecting body 2 is shaped according to the known principles, e.g. as a paraboloid having an opening closed by a front element 3. At the closed end of the conical reflecting body an insert lamp 4 is arranged.

The front element 3 is connected with the conical reflecting body 2 by the means of a fixing element 5 and either a sealing material 6 or an adhesive filling at least partly a clearance 10 between the front element 3 and the conical reflecting body 2.

The fixing element 5 is equipped with at least one ear 7 equipped with at least one cam or projection (Figs. 1 and 3) or with at least one lug 8 (Fig. 2) matching by their inner surface corresponding intrusions 12 made in the outer surface of the conical reflecting body 2.

The fixing element 5 ensures a mechanical pressure uniting the front element 3 with the conical reflecting body 2 (Fig. 3). The upper part of the fixing element 5 is a ring with an inner opening 11 wherein the width of the ring is selected so that the fixing element 5 does not shield the light output of the proposed reflector lamp to an appreciable extent.

For preparing the reflector lamp 1 in the first step in the narrow end of the conical reflecting body 2 made of pressed glass the insert lamp 4 is fixed which is generally a halogen incandescent lamp and the drawing (Fig. 1 and 2) shows also such lamps. Thereafter the deformable sealing material 6 or adhesive is either pasted to or placed on the front surface of the conical body 2 or in a recess constituted by the edge of the conical reflecting body 2 and the front element 3. The thickness of the layer or rather of the ring of the deformable sealing material is determined by both

the shape and the inner spring force of the fixing element 5. This should be such that the fixing element 5 should be able to exert pressure through the front element 3 on the deformable sealing material 6. In this way the smallest and the biggest value of the cross-section of the clearance 10 can reliably be adjusted in dependency on the inner spring force of the fixing element 5. At the same time the tolerance limits are very narrow in the case of a predetermined fixing element 5, for example the dimensional fluctuation may be about $\pm 0.05 \text{ mm}^2$ in the case of lamps of the same type.

After arranging the sealing element 6 the front element 3 is placed on the conical body 2 and the fixing element 5 is snapped on the fixture.

The modulus of elasticity of the fixing element 5 is preferably about $2.8 \times 10^7 \text{ N/mm}^2$; generally an element made of steel and having thickness about 0.15 mm is applied, wherein the width is determined by the fact that it should screen the light emitted by the insert lamp 4 to the least possible extent, but it should be wide enough to be reliably supported on the front element 3. The length of the ears 7 is determined from one side by the thickness of the front element 3 and from the other side by the fact that they should safely grasp the conical body 2. This is ensured by the cams 9 in the case of lamps shown in Figures 1 and 3 and by one or more lugs 8 in the case of the embodiment shown in Fig. 2.

An example attached hereto should illustrate the invention in yet more detail, but without any restriction.

Example

Reflector lamp for illuminating shop-windows

The insert lamp 4 is a 12 V, 50 W halogen incandescent lamp having life period about 3000 hours and this is characteristic for the life period of the lamp illuminating a shop-window.

The conical body 2 is made of pressed glass and is not equipped with any thin layer. Its greatest diameter amounts about 5 cm; the front surface has a rim. The front element 3 is a lens made of pressed glass which directs accordingly the light emitted by the insert lamp 4. Its diameter amounts to about 4.7 cm, the thickness is according to the height of the edge of the conical reflecting body 2 about 1 mm; it is slightly convex. A similar lamp 1 is shown in Fig. 2.

Between the front element 3 and the conical reflecting body 2 the sealing material 6 is arranged

in the form of a silicone ring having a cross-sectional area of 1.1 mm^2 .

The fixing element 5 is a steel disc having an opening 11 cut out in the middle part and equipped with eyed ears 7 arranged equispacedly along the outer periphery. The outer diameter of the disc is about 5 cm, the inner diameter, hence, the diameter of the inner opening 11 is about 4.2 cm and the thickness of its material is about 0.15 mm. The force of deformation exerted by the fixing element 5 is about 0.5 N.

The mentioned force determines a clearance 10 of about 1.09 mm thickness between the conical body 2 and the front element 3. Because the diameter of the sealing material 6, i.e. the silicone ring is 1.1 mm, it is about 0.01 mm thicker than the thickness of the clearance 10 to be adjusted. This difference is equalized by the deformation of the silicone rubber.

The lamp for illuminating shop-windows remained as an integral unit during the whole life period. In an upwardly oriented and in a horizontally oriented position respectively 10 trial lamps were ignited and in no case did any displacement of the front element 3 with regard to the conical reflecting body 2 occur.

Summarising, a lamp realized according to the present invention is especially advantageous in the case where the coefficients of thermal expansion of the materials of the conical reflecting body and of the front element differ significantly. In this case the adhesive bond will very probably lose its ability to bind before the end of the life period of the insert lamp and this must be avoided.

Claims

1. A lamp with a reflector envelope, comprising a reflecting body (2), an insert light source (4) arranged within the reflecting body (2) and a light-transmitting front element (3) fixed to the reflecting body (2), **characterized in that** between the reflecting body (2) and the front element (3) there is a clearance (10) determined by the dimensions and the inner spring force of a mechanical fixing body (5) connecting the reflecting body (2) to the front element (3), wherein at least a part of the clearance (10) is occupied by a deformable sealing material (6).
2. The lamp according to claim 1, **characterized in that** the fixing body (5) is a disc made of elastic material and equipped with, e.g. at least three, curved ears (7) arranged along its periphery and with an opening (11) made in its middle part.
3. The lamp according to claim 2, **characterized in that** the ears (7) are equipped with at least one cam (9) or at least one lug (8).

4. The lamp according to any preceding claim, **characterized in that** the sealing material (6) in the clearance (10) is made of teflon™ or silicone rubber.

5. The lamp according to any of claims 1 to 3, **characterized in that** the said sealing material (6) is a heat-resistant adhesive.

6. A lamp with a reflector envelope, comprising a conical reflecting body (2) made of pressed glass and covered on its inner surface with a dichroic or metallic layer, an insert light source (4) made in the form of a halogen incandescent lamp arranged within the conical reflecting body (2) and a light-transmitting front element (3) constituting a lens-shaped member fixed to the conical reflecting body (2), **wherein** between the conical reflecting body (2) and the front element (3) there is a clearance (10) determined by the dimensions and the inner spring force of a mechanical fixing body (5) attached to the conical reflecting body (2) and the front element (3), and at least a part of the clearance (10) is occupied by a deformable sealing material (6).

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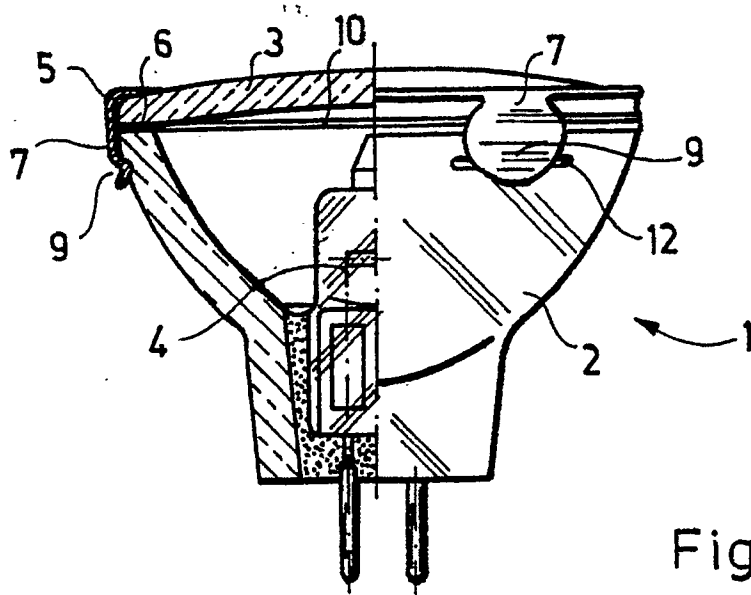


Fig. 1

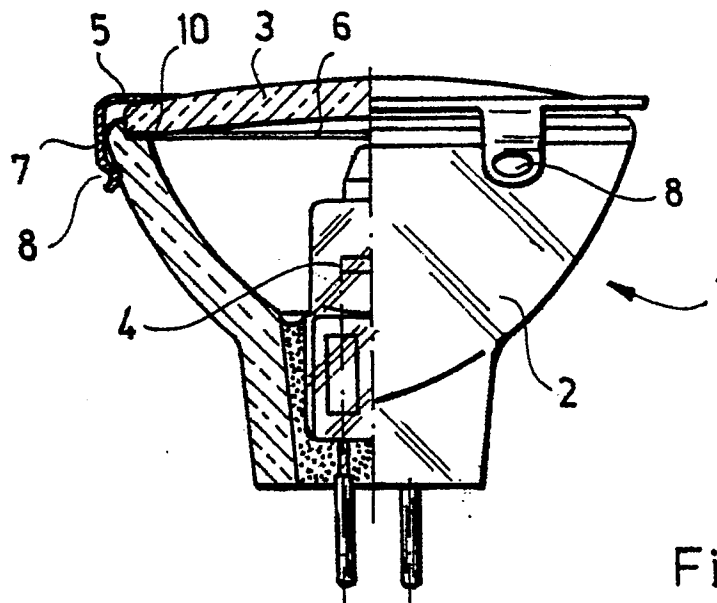


Fig. 2

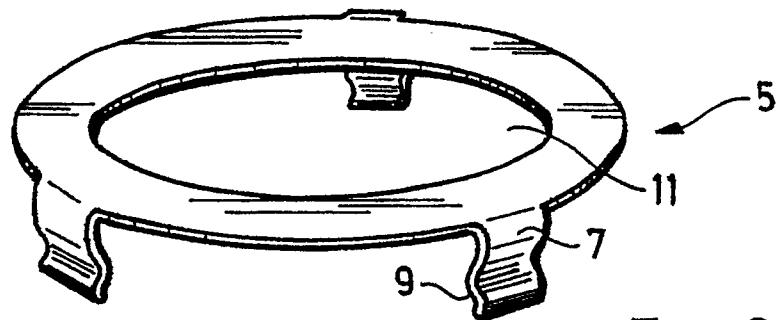


Fig. 3