United States Patent [19]

Oram

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[54] **LIGHTING DEVICES**

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[52] **U.S. Cl.** ..... **240/41 R,** 240/11.2 R, 240/41 BM, 240/47

[51] **Int. Cl.** **F21m**

[58] **Field of Search** ..... 240/41 R, 11.2 R, 41 BM, 240/47, 20, 41.15, 41.3

[56] **References Cited**

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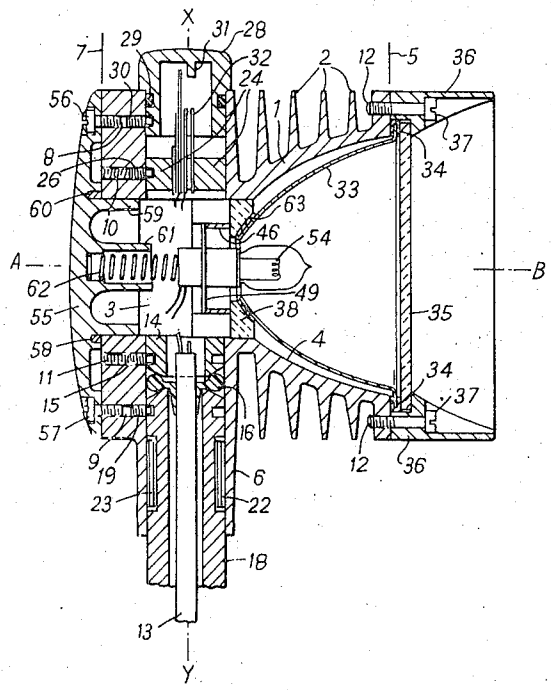
[57] **ABSTRACT**

A sealed lighting device embodies a tungsten-halogen lamp providing high-intensity light. The device includes sealing and insulating means and novel cooling means enabling the lamp to be safely used in environments where it may be drenched with oil or other liquids and foreign matter and the exterior surfaces of the device are cool enough to prevent oil from congealing thereon.

4 Claims, 5 Drawing Figures



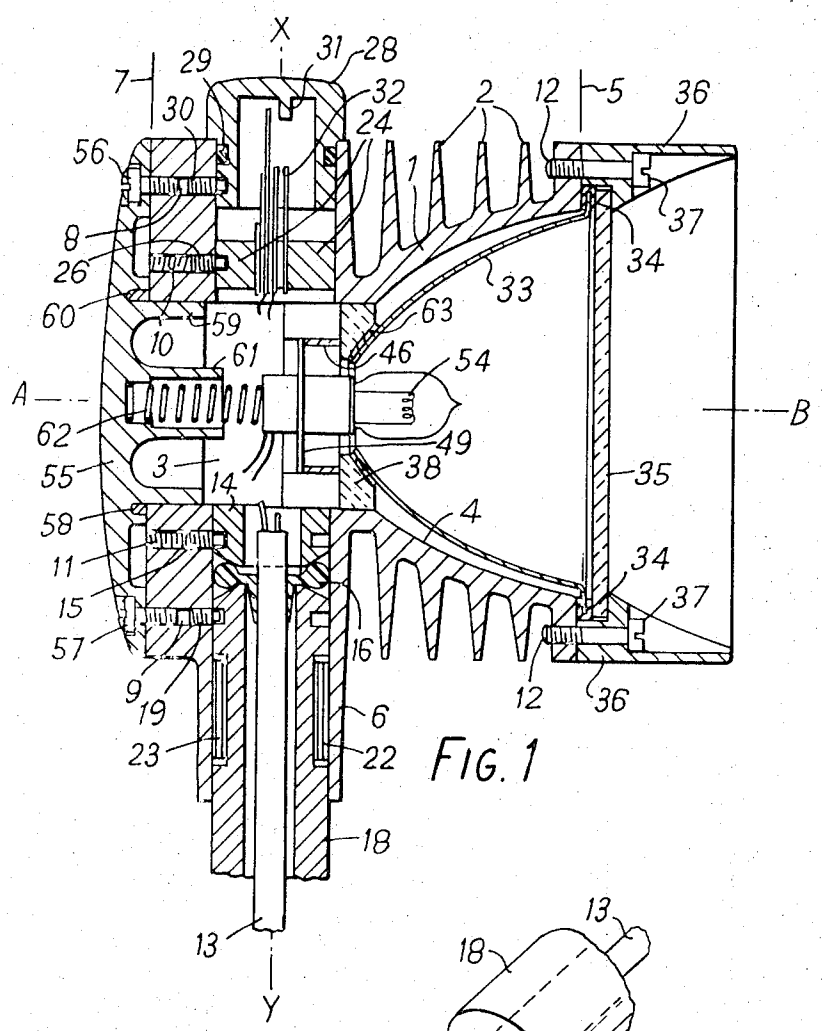

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FIG. 1

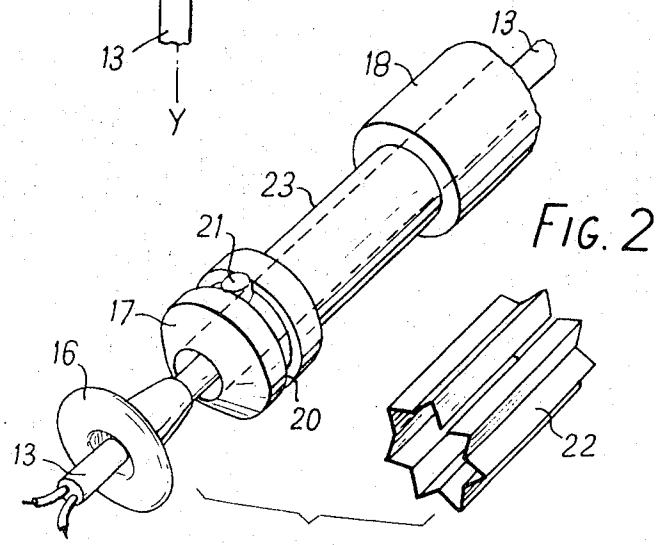
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FIG. 2

FIG. 3

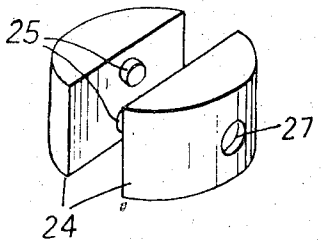


FIG. 4

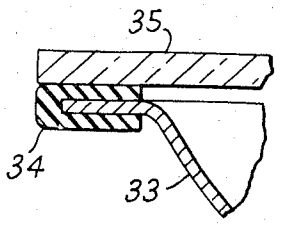
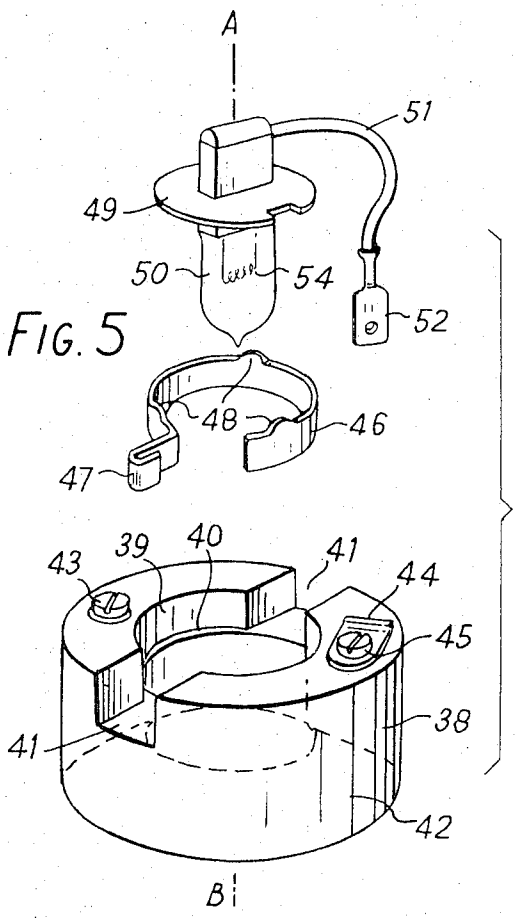


FIG. 5



LIGHTING DEVICES

The present invention relates to improvements in lighting devices and in particular to a lighting device that incorporates a high-intensity light source, such as a tungsten halogen lamp.

The device is fully sealed and insulated and has very adequate provision for cooling with the result that the device can be used in places where it may be drenched with cutting oil. Even in such an environment, the internal optical surfaces are not contaminated and the exterior of the device is not hot enough to cause oil to congeal into a varnish-like coating.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings of which:

FIG. 1 shows an axial cross-section of a lamp;

FIG. 2 shows a perspective view of a support spigot, spring and seal of the lamp of FIG. 1;

FIG. 3 shows a perspective view of two saddle pieces of the lamp of FIG. 1;

FIG. 4 shows an enlarged fragmentary cross-section of the reflector and glass of the lamp of FIG. 1, and

FIG. 5 shows an exploded perspective view of the bulb and a ceramic ring of the lamp of FIG. 1.

Referring to FIG. 1, a hollow, light-alloy casting 1 generally symmetrical about an axis A-B has a multiplicity of circumferential, cooling fins 2. An axial, cylindrical bore 3 opens out into a cup like cavity 4 which terminates in a front flange which is machined flat on line 5.

The casting has a transverse bore made on axis X–Y and concentric with this bore is the ingegral sleeve 6.

The rear face of the casting 1 is machined flat at line 7 while the casting is revolved about the axis A–B.

Four tapped holes 8, 9, 10 and 11 are arranged normal to the rear face and so that their axes intersect the axis X–Y.

A multiplicity of tapped holes 12 on a common radius are formed normal to the face of flange 5.

The lamp is mounted on an arm or support (not shown) with freedom for angular motion with smooth frictional restraint about the axis X–Y. An electrical cable 13 is provided and sealed against ingress of liquid and dirt.

A grooved stop ring 14 slides into the bore X–Y and is retained by a grub screw 15 set in the tapped hole 11.

A resilient seal 16 (see also FIG. 2) is a tight fit onto the cable 13 and incorporates an integral "O ring" that is an interference fit into bore X–Y and becomes compressed between the chamfered face of the ring 14 and a similar face 17 of a support-spigot 18.

The support spigot 18 is attached to the arm or support and is a running fit in the bore X–Y. It is held in firm contact with seal 16 (also shown in FIG. 2) by the engagement of the dog tip of a grub screw 19 in an annular groove 20 in the spigot.

Excess angular motion of the lamp about spigot 18 is prevented by pin 21 set in the groove 20 (FIG. 2) which abuts the grub screw 19.

Smooth frictional restraint is provided by a split tubular spring 22 (see also FIG. 2) that is formed with longitudinal corrugations. This spring fits into an annular groove 23 which is of such a depth that when inserted into the bore X–Y the corrugations exert firm radial pressure between the spigot 18 and the bore X–Y.

The continuations of the bore X–Y on the side remote from the spigot 18 is used to house a switch. A proprietary Q.M.B. switch 32 is fitted between two identical saddle pieces 24 (see also FIG. 3) located by spigots 25. This assembly is slid into the bore X–Y and secured by a grub screw 26 which engages a recess 27 in one of the saddle pieces.

A hollow cylindrical rotary knob 28 is sealed in the bore X–Y by an "O ring" 29 set in an annular groove in the knob 28. The knob 28 is axially retained in the bore and is permitted limited angular motion by the engagement of the dog end of a grub screw 30 in a groove in the knob 28 which extends over a limited arc. An eccentric spigot 31 formed on the inside of the knob 28 engages the moving member of the switch 32.

A reflector 33 mounted inside the cup of the casting 1 has an annular seal 34 (also shown in FIG. 4) of U-shaped cross-section fitted around its radial flange and is secured together with a toughened glass 35 to casting 1 by a bezel 36 which is secured by screws 37 in tapped holes 12. The bezel 36 is so stepped that, when desired, compression of the seal 34 is attained. The face of the bezel 36 abuts the face 5. An enlarged section of part of the reflector, seal and glass is shown in FIG. 4.

A ceramic ring 38 (also shown in FIG. 5) has an axial bore 39 that forms a step 40 level with a diametrical slot 41. One end face 42 is made concave and abuts the reflector 33 or a ring 63 thereon. A brass threaded bush is fixed with adhesive in a cavity to take a wiring junction screw 43. A similar bush is fitted to secure a spade socket 44 which lies in a cavity in the ceramic ring 38 and is secured by a screw 45 which also secures a connecting wire.

A springy brass ring 46 fits tightly into the bore 39 and abuts the step 40 with its wire-fixing end 47 protruding into the slot 41. The ring 46 has formed on its upper edge three equally spaced protrusions 48 that support the flange 49 of the bulb 50. The axial bore 39 into which the ring 46 fits is of such a diameter that the flange 49 is accurately located. A flexible lead 51 to the bulb terminates in a spade connector 52 which will plug into the spade socket 44.

The ceramic ring 38 is a good heat-conducting fit in the cylindrical bore 3 and abuts the rear face of the reflector or the ring 63 thereon. The abutment of the ceramic ring on the reflector and the location of the flange 49 in the ceramic ring ensures that the lamp filament 54 is at the focal point of the reflector 33.

An insulated back cover 55 moulded from a rigid heat-resisting plastics, is secured by two screws 56 and 57 which engage tapped holes 8 and 9 respectively.

An annular groove 58 at the root of a tubular extension 59 of the cover houses a sealing ring 60 which is compressed and seals the cover against the face 7.

A smaller concentric tubular extension 61 of the cover locates and secures a compression spring 62 which urges the bulb onto the ring 46 and thus both ensures its correct location and good electrical conduction between the three protrusions 48 and the lamp flange 49. The two lead-in conductors of the cable 13 are connected to the screws 43 and 45 respectively. A wire is connected between the screw 43 and the wire fixing end 47 of the ring 46 to provide an electrical connection through the ring 46 to the flange 49 of the bulb. An electrical connection is provided between the screw

45 and the bulb by means of the spade socket **44**, the spade connector **52** and the flexible lead **51** to complete the circuit through the bulb.

I claim:

1. A lighting device, comprising

a main housing cast in metal with cooling fins therein,

a cup-shaped reflector mounted in a cup-shaped cavity in the reflector,

a glass cover-plate sealed over the mouths of the cavity and reflector,

a tungsten-halogen electric lamp mounted in the housing and projecting through an aperture in the rear of the reflector with the filament of the lamp at the focus of the reflector,

a ceramic ring mounted in a bore in the metal housing and in heat-conducting contact therewith,

a metal ring closely fitting a bore in the ceramic ring,

a flange on the lamp in close contact with the said metal ring,

a spring urging the said lamp, flange, metal ring and ceramic ring forwardly to the position in which the said filament is at the said focus,

a cover-plate sealed over the rear of the housing,

and a supply cable sealed through an entry into the housing.

2. A lighting device as claimed in claim **1**, wherein the cooling fins on said housing are circumferential relative to said cavity.

3. A lighting device as claimed in claim **1**, wherein the bore in said ceramic ring has a step therein and said metal ring abuts said step.

4. A lighting device as claimed in claim **1**, wherein said cable entry includes a sleeve integral with said cast metal housing, a tubular spigot in said sleeve, and an elastomeric sealing device at the inner end of said spigot, said cable passing through said spigot and said sealing device and said sealing device sealing said cable relative to said spigot and said spigot relative to said sleeve.

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