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Vause et al.

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[54] **SEALED-BEAM LAMP CONSTRUCTION**

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[73] Assignee: **Thorn Electrical Industries Limited,** London, England

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[52] **U.S. Cl.**..... **240/41 BM;** 240/41 SB; 240/52 R; 313/113; 313/318

[51] **Int. Cl.**[2] **F21M 3/00**

[58] **Field of Search**..... 240/41 BM, 52.1, 41 SB, 240/7.1 R, 41 R, 52 R, 41.35 R; 339/144 R, 119 R, 276 R; 313/315, 318, 113

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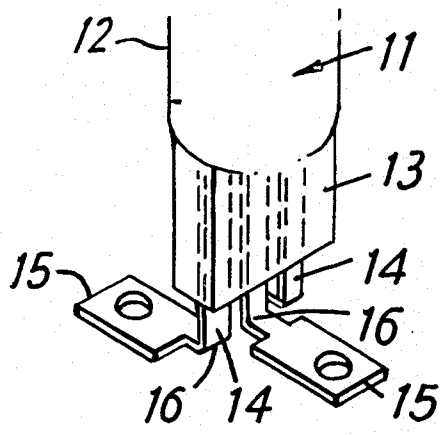
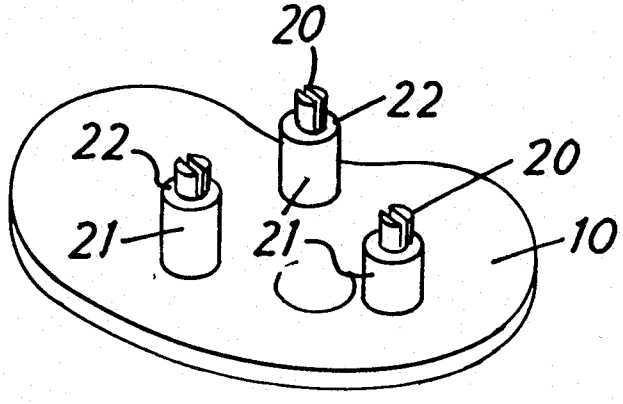
[57] **ABSTRACT**

A lighting unit, especially a sealed beam unit, having a light bulb mounted on a reflector by means of sheet metal legs extending from the lamp press and serving as lead-in conductors for the bulb, the legs interengaging with mounting posts sealed through the reflector to establish the position of the bulb relative to the reflector and provide an electrical connection to the bulb.

6 Claims, 3 Drawing Figures





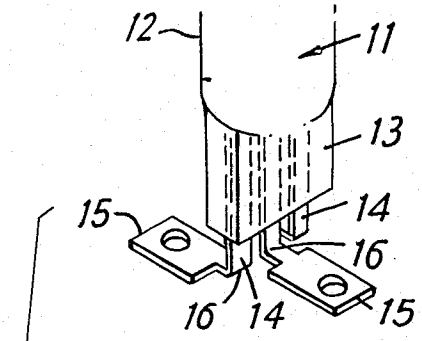

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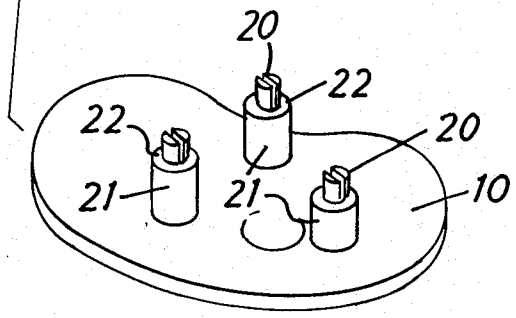
FIG. 1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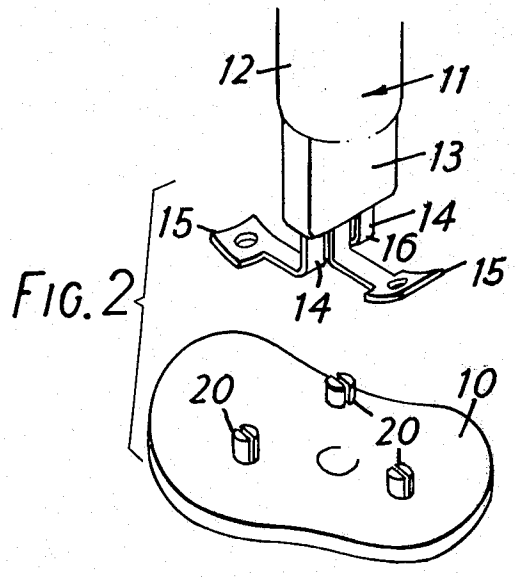
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FIG. 2

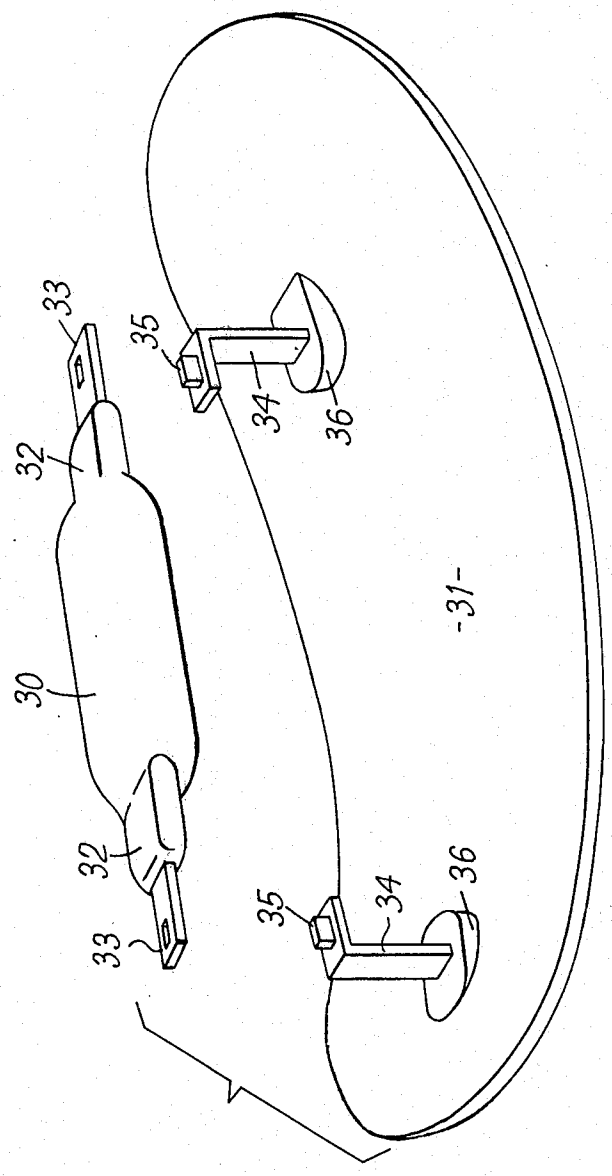

FIG. 3

SEALED-BEAM LAMP CONSTRUCTION

The present invention relates to improvements in the construction of lighting equipment such as sealed-beam units.

Lighting equipment for beam projection purposes commonly includes front and rear elements and a light source. The front and rear elements may constitute or include a lens and a reflector respectively and may define an enclosure within which the source is contained. Sometimes, such equipment has to operate in corrosive or contaminant-laden environments including humid or moist air. Then, the equipment desirable embodies the sealed-beam type of construction, because sensitive optical surfaces e.g. its reflector, as well as the source itself, are protected within the sealed structure. The sealed-beam construction is well adapted to the production of rugged lamps capable of effectively resisiting jarring and vibration. Since precise relative positioning of the various optical components can be maintained in service, sealed beam lamps are regarded as being particularly useful for road vehicle, marine and aircraft lighting. Other applications include image projection devices, portable lamps including flashlamps, signal lamps, spotlamps, floodlamps, profile beam display units and street-lighting units.

The principal aim of this invention is to provide simple and inexpensive means for locating and maintaining the light source accurately in a desired position within the unit, whether or not the unit is of the sealed-beam type.

Accordingly, the present invention provides a lighting unit including a reflector element and a light bulb attached to the reflector element, the bulb having sheet metal legs which enter the bulb and serve as lead-in conductors and the reflector having electrically conductive coupling means sealed therethrough, the said coupling means and the legs being shaped to interengage to define the position of the bulb relative to the reflector and to establish electrical connections to the bulb. The exact position of the bulb relative to the reflector will be governed by the shape of the reflector element and the nature of the desired projected light distribution; the optical considerations are well known and understood in the art. It will be appreciated that the dimensions of the legs and coupling means will determine the position of the bulb along or parallel to the principal optical axis of the unit.

The light bulb can be a compact tungsten halogen lamp or a highintensity discharge tube. The cooperating coupling means of the rear element can then be posts or pins which pass through the rear element and form terminals for connection to an external electrical supply. It will be understood that, the posts or pins have to be isolated from one another electrically.

Whilst a minimum of two legs is necessary it is preferred to provide at least three legs for more stable support of the bulb. One of the legs can then be a "dummy," where the source is of a type needing only two lead-in conductors.

In a preferred embodiment, the free ends of the legs are formed as enlargements or feet. Retention of the feet in engagement with the coupling means can be achieved in various ways. For example, the feet can be adhesively bonded thereto. Alternatively they can be notched, punched or otherwise shaped to conform to the shape of the coupling means. The feet can be

welded, brazed or soldered to the coupling means, where these are metal studs or pins and yet another alternative includes mechanically deforming the posts or pins in such a way that they securely grip the feet. Further details will be described hereinafter.

The legs can, desirably, be formed integrally with a supporting element which serves within the bulb inter alia as a filament mount, the legs constituting extensions thereof. Source constructions which embody internal sheet metal mounts are disclosed in our British Patent Specification Nos. 1,313,531 and 1,313,532.

Embodiments of the present invention will now be described in detail by way of example with reference to the drawings in which:

FIG. **1** is a partial, exploded perspective view of a portion of a sealed beam lamp showing a part of the light source and the metallic rear reflector element thereof, and

FIG. **2** is a partial, exploded perspective view of a sealed beam lamp having a glass or plastics materials rear reflector element, and with reference to the accompanying drawing, in which

FIG. **3** is a partial, exploded perspective view of a lighting unit forming another embodiment of the invention.

It will be appreciated that in the accompanying drawings, the rear reflector elements **10** and light sources **11** both of which are enclosed within the sealed structure of the lamp, are only shown in part and the front lens elements are omitted for ease of illustration.

In FIG. **1,** the light source **11** is shown as a compact tungstenhalogen bulb having twin filaments, the sealed-beam lamp constituting a dipping-type vehicle headlamp. The source **11** has a transparent vitreous envelope **12** having a press seal **13** at one end. Three electrical lead-in conductors **14** pass through the press seal **13** and are connected directly, or indirectly as is known in the art, to the two filaments. The conductors **14** are made from sheet metal and constitute legs upon which the source **11** is supported within the lamp. The free ends of the conductors or legs **14** are enlarged to form feet **15** and each leg **14** has a 90° bend **16** to set its foot **15** at right angles to itself.

The rear reflector element **10** is provided with coupling means engageable with the feet **15** and cooperable therewith to fix the source **11** in a predetermined location with respect to the element **10.** In this particular instance, the coupling means consist of three metal posts or pins **20.** The pins **20** pass through the element **10** and serve as terminal pins for connection to an external electrical supply. Since the element **10** shown in FIG. **1** is metallic, each pin **20** is shrouded in an insulating sleeve **21.** The sleeve **21** is fastened and sealed to the element **10** either by fusing them together or by adhesive bonding — e.g. with an epoxy resin cement. The inner ends of the pins **20** project beyond the corresponding ends of the sleeves **21** so that the ends of the sleeves **21** define shoulders **22** upon which the feet **15** can rest. As shown, the feet **15** have apertures **23** permitting the feet **15** to be slid over the extremities of the pins **20** until the underside of the feet **15** engage the shoulders **22.** Alternatively, the shoulders **22** can be formed as an integral part of the pins **20,** in which case the pins **20** are made of reduced diameter adjacent their free ends.

Having assembled the source **11** and rear element **10,** it is necessary to provide means for retaining the feet

15 in engagement with the shoulders 22. As shown, each pin 20 has a transverse slit which extends to the shoulder 22. Each foot can be mechanically clamped to its associated pin 20, as well as electrically connected, by expanding the inner end of the pin against the rim of the aperture 23. Such expansion is easily achieved by forcing an appropriately-shaped tool into the slit. Alternatively, a short, stiff wire can be placed in the slit so as to rest on the upper surface of the associated foot. The inner end of the slit pin 20 is then squeezed together to force the wire against the foot 15 and the foot 15 against the shoulder 22.

Instead of forming mechanical retention means, the feet 15 could be secured to the pins 20 by brazing, soldering or by means of a conductive cement.

The construction and assembly of the sealed-beam lamp shown in FIGS. 2 is similar to the lamp shown in FIG. 1. However, the FIG. 2 lamp has a rear element 10 made from an insulating material. In this case, therefore, the pins 20 do not need insulating sleeves, the pins being directly sealed or cemented into the element 10. The underside of the feet 15 bear directly against the inner surface of the element 10 and are conveniently bonded thereto. Again the pins 20 are shown to be slit so that they can be made to grip the apertures 23 of the feet 15 mechanically. Since the feet bear against the curved surface of the element 10, it is convenient to shape the feet to a corresponding curvature.

It will be recognised that the legs 14, feet 15 and the coupling means of the rear reflector element 10 cooperate to located the source 11 in a predetermined relationship to the element 10 and thus to the optical controlling features of any lens member which may be attached to element 10. Furthermore, the length of the legs 14 will determine the distances of the twin filaments from the focus of the element 10, i.e., will determine their positions along or parallel to the optical axis of the lamp. Although the precise geometry will vary from one type or design of lamp to another, the necessary geometry can be readily worked out by a competant lamp designer.

For light sources having one filament only two lead-in conductors 14 are needed. Whilst only two supporting legs could be arranged to provide stable support for the source, at least three legs are preferable. A third leg, where provided, could be a "dummy" in the sense that it has no electrical function.

The conductors/legs 14 and feet 15 can be formed, from a single metal sheet, integrally with a sheet metal support structure upon which filaments or electrodes, shields and the like are mounted with the source envelope 12. Source constructions involving sheet metal support structures are disclosed in our British Patents mentioned earlier. If such source constructions are adopted, the foot-enlargements at the ends of the legs 14 are interconnected, for reasons of strength, by bridging portions which are removed after forming the press seal 13.

Coupling means other than those described can be provided for engagement with the feet 15. Possibilities include foot-receiving depressions in the rear element 10, protrusions from the inner surface thereof which co-operate with holes or notches in the feet, and openings in the rear element 10 into which the foot ends of the legs 14 are sealed or bonded.

In the previously-described constructions, the source 11 is a single-ended bulb arranged with its central longitudinal axis substantially aligned with the optical axis of the lamp. In FIG. 3, a construction is illustrated in which the source 30 has a double-ended bulb. The source 30 has its central longitudinal axis disposed at right angles to the optical axis of the reflector element 31. At each of the opposite ends of the source 30 is a pinch seal 32 through which sheet metal legs or tongues 33 project. The coupling means in this case comprise sheet metal posts 34 or brackets which are embedded in the reflector element 31. The posts 34 are turned over through 90° towards one another adjacent their free ends and have studs 35 on their turned-over ends. The legs 33 are apertured to fit over the studs 35, and the source 30 is secured to the posts 34 by spreading the studs or otherwise.

The posts 34 and legs 33 form an electrically conductive path into the source 30, and hence the posts 34 must be insulated from one another. This construction is therefore best suited for use with reflector elements made from insulating materials. Nevertheless, the construction is readily adapted for use with metallic reflector elements. As shown, the reflector element 31 has protrusions 36 through which the posts 34 pass. These protrusions increase the thickness of the reflector element 31 locally while providing peripheral support for the joint between the posts 34 and the reflector element. In a metal reflector element, the protrusions conveniently serve to contain insulating seals between the posts and reflector element.

The constructions described above are inexpensive and facilitate manufacture, by enabling the filament(s) of the light source to be accurately positioned laterally, vertically and in correct angular relationship in the focal plane and with respect to the optical axis of the rear element. It will be appreciated that the invention is not restricted to sealed beam lighting units, but is applicable also to lighting units which are demountable for replacement of the source. In that case, the attachment of the legs 14, 33 to the coupling means must be releasable. Convenient attachments include screws and resilient fastenings such as press studs.

In the above description, it has been convenient to refer to a lighting unit having a lens, one bulb and one reflector element. It is to be understood, however, that the invention is applicable to composite units in which there are a plurality or cluster of bulbs and a plurality of individual reflector elements, all served by a single front lens element.

We claim:

1. In a lighting unit having a reflector and a light bulb mounted on said reflector, the improvement comprising sheet metal legs which enter the bulb and serve as lead-in conductors, the free ends of said legs each having apertures, and coupling means having parts shaped for engaging said apertures and mechanically cooperating to establish the bulb in a predetermined position relative to the reflector, said parts also forming electrical connections between said legs and said coupling means.

2. A lighting unit as claimed in claim 1 in which the coupling means comprise posts passing through the reflector and through the said apertures, the said free ends extending approximately perpendicular to the legs.

3. A lighting unit as claimed in claim 2 in which the reflector is of metal and the posts are surrounded by electrically-insulating sleeves which pass through the

reflector and terminate short of the inner ends of the posts, the feet abutting against the insulating sleeves.

4. A lighting unit as claimed in claim **2** in which the feet are mechanically clamped to the posts.

5. A lighting unit as claimed in claim **1** in which the bulb is sealed by a pinch seal, and the legs pass through the pinch seal and are integral with a sheet metal supporting element within the bulb.

6. In a sealed-beam lighting unit having a light bulb mounted on a reflector, the improvement comprising mounting means for said light bulb comprising sheet metal legs extending through a press-seal of the light bulb and serving as lead-in conductors, coupling means sealed through said reflector to form an electrical connection to said legs, aperture means formed on said legs, and said coupling means engaging said aperture means to establish the location of said light bulb relative to said reflector.

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