United States Patent

[11] 3,633,024

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[54] **LAMP RETAINER STRUCTURE**
2 Claims, 9 Drawing Figs.

[52] **U.S. Cl.** ..... **240/52 R,** 240/81 R
[51] **Int. Cl.** **F21v 21/00**
[50] **Field of Search** ..... 240/151, 52, 54, 52.1, 1.2, 51.11 A, 52 HT, 102 A

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ABSTRACT: A bulb retainer device in which a lamp bulb is preloaded, to facilitate bulb mounting and replacement in a lamp-housing structure adapted to support either a single bulb or a bank of two or more bulbs. The retainer is particularly useful in the mounting and replacement of high intensity "-PAR"-type bulbs which become too hot for direct handling and require frequent replacement. The retainer cooperates in a new way for the removable mounting of bulbs having ferrule-type terminals in lamp structures having cooperating spring contacts, the biasing force of the contacts providing spring-seated mounting of the bulb.

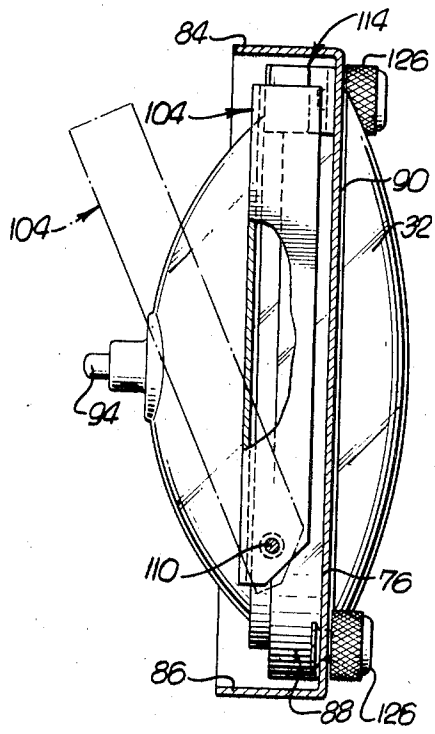


FIG. 1.

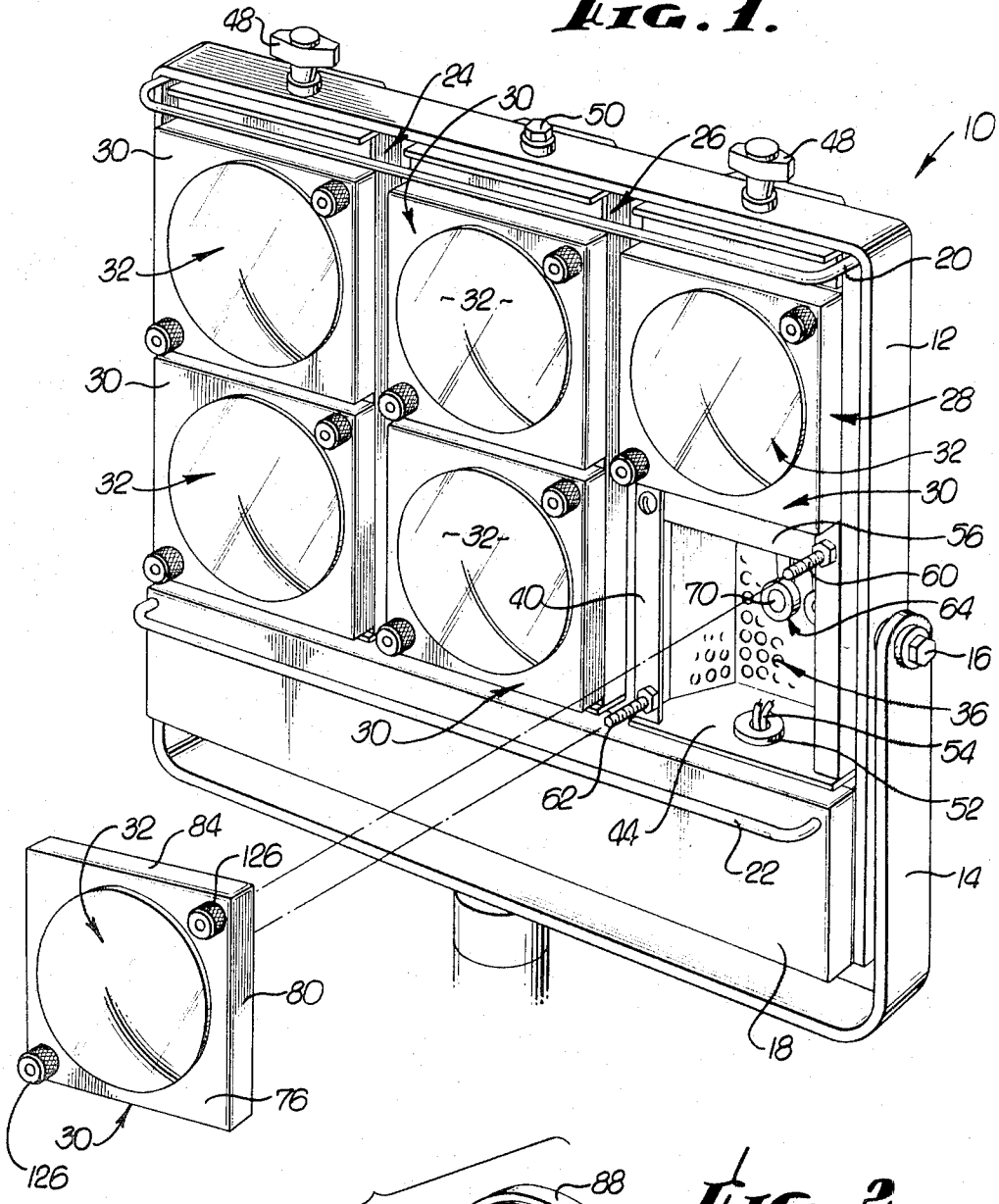
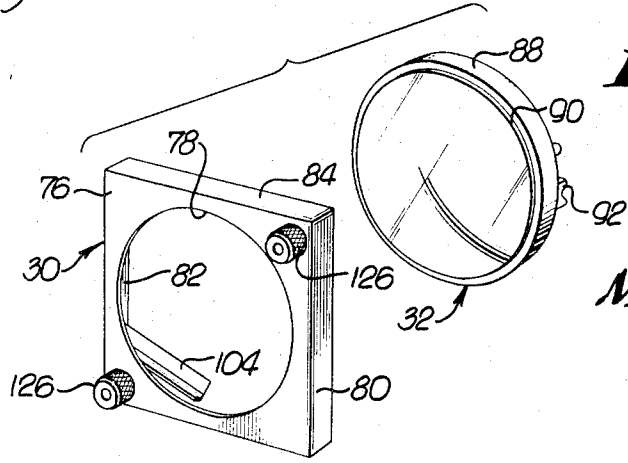


FIG. 2.



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FIG. 3.

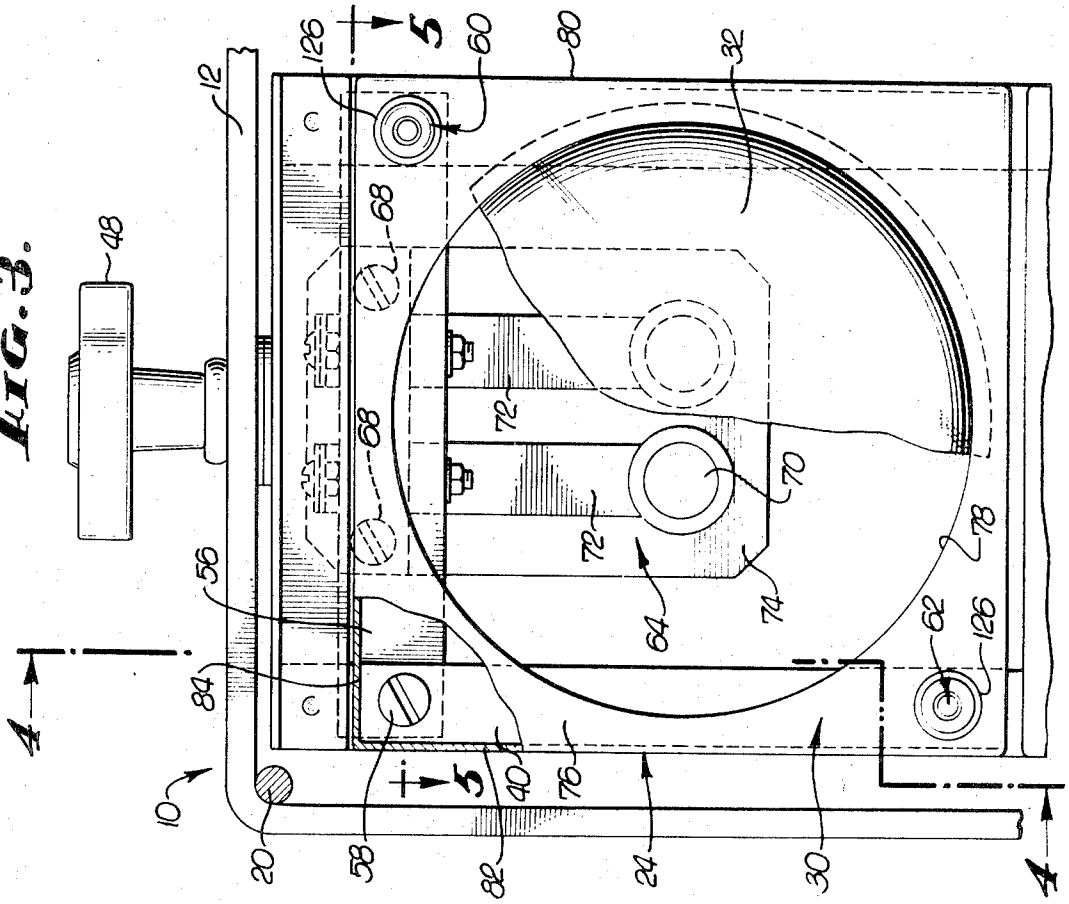
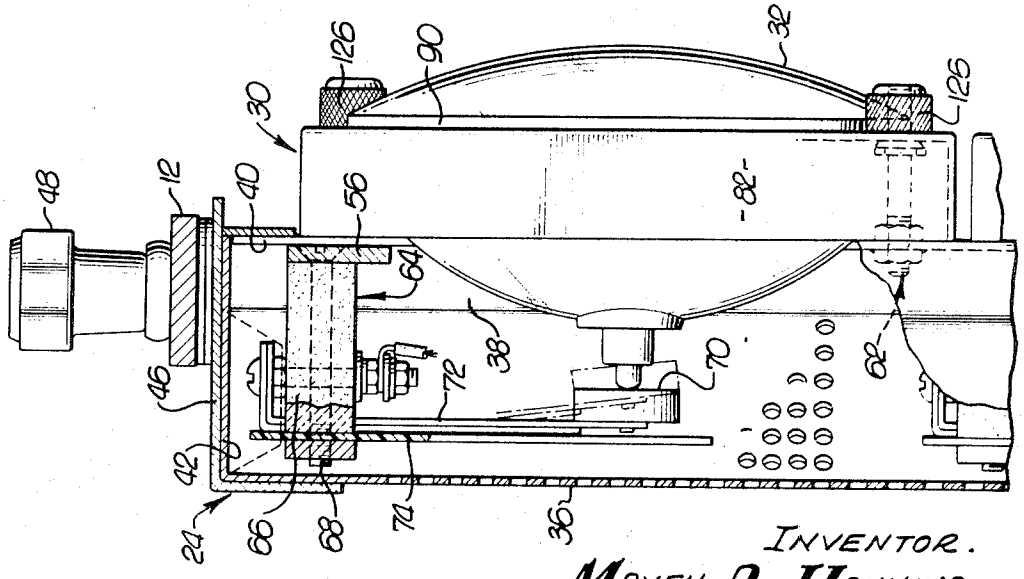


FIG. 4.



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FIG. 5.

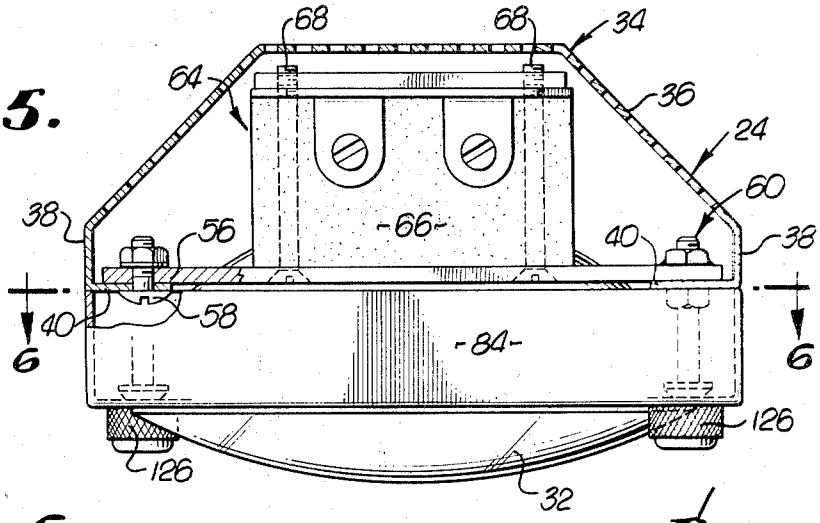


FIG. 6.

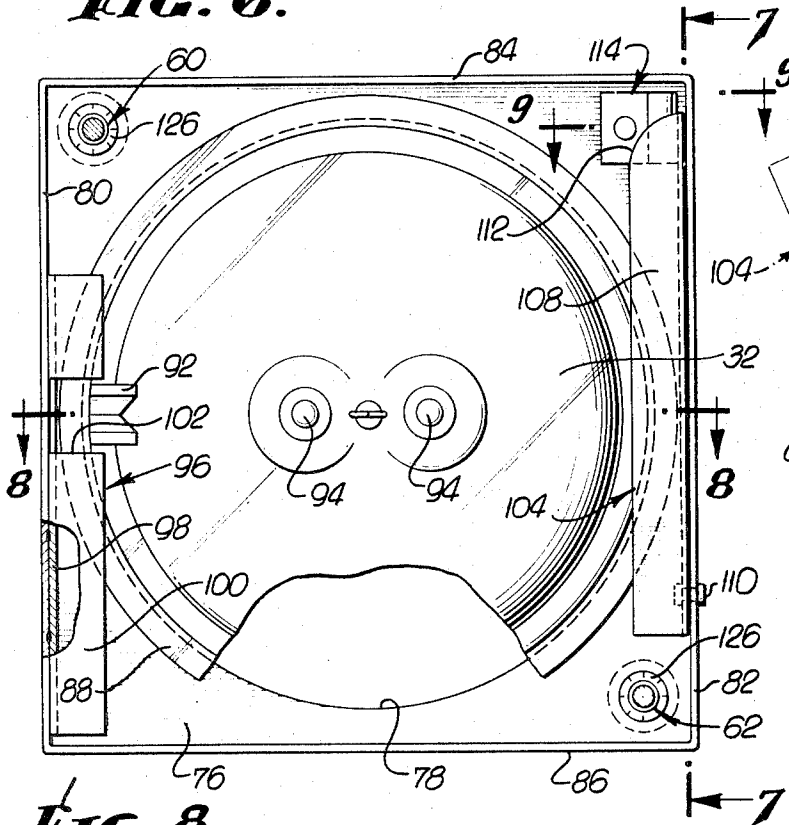


FIG. 7.

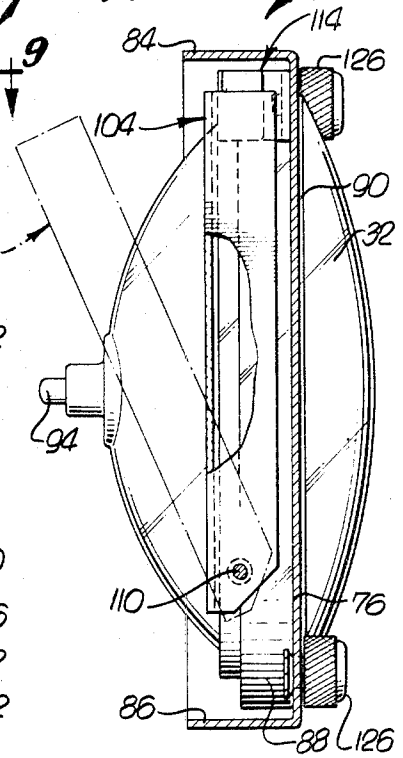


FIG. 8.

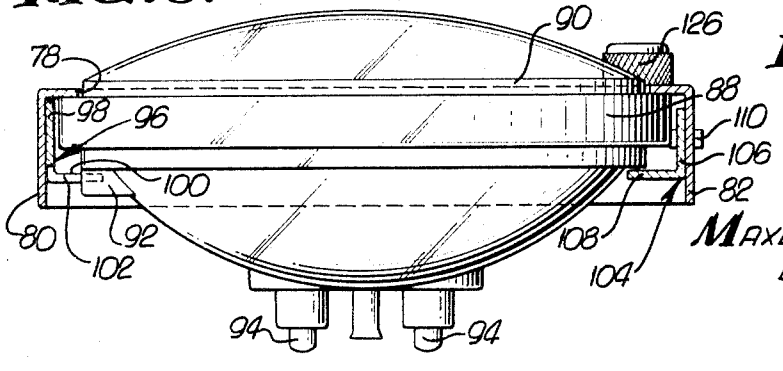
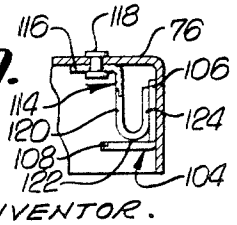


FIG. 9.



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LAMP RETAINER STRUCTURE

BACKGROUND OF THE INVENTION

The present invention relates generally to the mounting of high-intensity bulbs in the housing structures of lamps employed principally for photographic-type illumination, as for example to illuminate either indoor or outdoor scenes for television, motion picture or still picture photographic purposes.

Historically, lamp bulbs have been directly inserted into socket structures in the lamp housing, even the high-intensity type of bulbs commonly employed in the television and motion picture industries. This presents a difficult handling problem because such high-intensity bulbs generally have only a short operational life, and therefore must be frequently replaced. However, such bulbs are generally too hot to handle when they first go out, thus resulting in expensive "down time" of the equipment while waiting for the bulb to become sufficiently cool to be handled.

This problem is compounded where the bulbs are of the "-PAR" high-intensity type resembling a "seal-beam" headlamp wherein glass reflector and lens components come together at a sealed peripheral flange that is gripped in the mounting. Bulbs of this type having screw-type terminals on the back have typically been mounted by tilting the bulb and sliding one edge thereof into a channellike retainer, and then straightening the bulb into its operative position and moving a spring retainer device over the opposite edge of the bulb. On the other hand, bulbs of this general type which were equipped with ferrule-type terminals on the back thereof adapted to mate with spring contacts in the housing, were typically pushed into place against the spring biasing of the contacts, and a retainer rim placed over the periphery of the face of the bulb and clamped down against the front of the lamp structure by engagement of captive thumb nuts on the retainer rim with forwardly projecting threaded studs on the front of the housing.

Both of these types of mountings for "PAR"-type high-intensity bulbs have come into widespread commercial use because of the advantages of this type of bulb, but the mounting and replacement of bulbs in each type involves a number of serious problems which are solved by the present invention. Thus, with both of these conventional mountings, when a bulb went out during the shooting of a scene, it was too hot to immediately handle, and therefore generally involved costly "-down time" of the equipment. Also, loading and unloading was generally awkward and time consuming, even after the bulb had cooled. Thus, with the screw terminal type bulb, it was necessary to first remove the screw terminals from the bulb, then push the spring retainer back off of one edge of the bulb, slide the opposite edge of the bulb out from the channel member, and then the reverse of this procedure was required for the installation of the new bulb. With the spring contact, ferrule terminal arrangement, it was generally awkward to accomplish proper centering and contact mating since the terminals and contacts were completely obscured by the main part of the bulb once the bulb was inserted into its socket, and it was also generally awkward to balance the bulb in its aligned position with the contacts mated and at the same time place the retainer rim down against the periphery of the bulb and engage and tighten the thumb nuts onto the housing studs. In practice, with this type of mounting wherein a retainer rim was clamped down against the periphery of the bulb by thumb nuts, it was found necessary to employ a high-temperature silicone rubber-type of gasket as a pad to prevent damage to the glass bulb from the tight metal clamping thereof and from physical shocks to which the lamp might be subjected.

SUMMARY OF THE INVENTION

In view of these and other problems in the art, it is an object of the present invention to provide bulb retainer structure having means therein for releasably securing a lamp bulb to the retainer structure, and also having means thereon for releasably attaching the retainer structure and captive bulb to a lamp housing structure, whereby one or more of such retainer structures may be preloaded with bulbs so that the bulbs can be mounted in the lamp housing structure without direct handling of the bulb, making mounting and replacement of bulbs more rapid and convenient, and avoiding the necessity of direct handling of hot bulbs when the rapid replacement of a burned out bulb is necessary to keep the lamp equipment in operation.

Another object of the invention is to provide lamp bulb retainer structure of the character described which is adapted to receive a lamp bulb of the type that is peripherally supported, as for example a "PAR"-type of bulb, the retainer being conveniently releasably attachable to a lamp housing to form a face portion of the housing which in effect frames the bulb, by engaging thumb nuts on the retainer with studs projecting forwardly from the housing, thereby permitting the mounting and replacement of bulbs in housing without directly handling the bulbs.

A further object of the invention is to provide a novel bulb retainer structure of the character described wherein the bulb is loosely engaged in the retainer without requiring tight metal-to-glass clamping and without requiring the use of rubber gaskets or the like to protect the bulb against damage from tight clamping between metal parts, the retainer cooperating with spring contacts in the housing which forwardly bias the bulb in the retainer to provide positive seating for the bulb in the retainer.

A still further object of the invention is to provide bulb retainer structure of the character described having releasable bulb retainer means therein which is compact, allowing a bulb retainer of minimum external dimensions, is simple and easy to operate, yet is positive and secure in its retaining function.

Further objects and advantages of this invention will appear during the course of the following part of the specification, wherein the details of construction and mode of operation of a preferred embodiment are described with reference to the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a six-bulb lamp embodying six of the retainer units of the present invention, with one retainer and associated bulb illustrated in exploded relationship with respect to the lamp.

FIG. 2 is an exploded perspective view of a retainer unit according to the invention and a "PAR"-type bulb axially aligned with the retainer unit preparatory to engagement of the bulb in the retainer unit.

FIG. 3 is an enlarged, fragmentary front elevational view showing part of the lamp illustrated in FIG. 1, with portions broken away to illustrate internal details of construction.

FIG. 4 is a vertical section taken on the line 4—4 in FIG. 3.

FIG. 5 is a horizontal section taken on the line 5—5 in FIG. 3.

FIG. 6 is a rear elevation, with portions broken away, of the retainer unit with a bulb mounted therein, independent of the lamp housing structure.

FIG. 7 is a vertical section, with a portion broken away, taken on the line 7—7 in FIG. 6.

FIG. 8 is a horizontal section taken on the line 8—8 in FIG. 6.

FIG. 9 is a fragmentary horizontal section taken on the line 9—9 in FIG. 6.

DETAILED DESCRIPTION

Referring to the drawings, and at first in particular to FIGS. 1 and 2 thereof, a lamp 10 is shown wherein six retainer units according to the invention are employed for the mounting of six respective bulbs of the "PAR"-type, in three vertical banks of two bulbs each arranged side by side, so that the lamp 10 is a generally flat, rectangular structure having the six bulbs directed generally from one side thereof.

The lamp 10 includes a frame structure 12 in the general form of an inverted U-shaped strap which is pivotally mounted in a yoke 14 forming a portion of a support stand, so as to pivot or tilt about a generally horizontal axis 16. A rectangular control box 18 is mounted on the lower portion of frame structure 12 and contains conventional cable terminations, electrical junctions and switches for controlling the lamp 10. The control switches may be mounted on the rear panel of control box 18, and are not shown in the drawings. Horizontal bars 20 and 22 on frame 12 and control box 20, respectively, provide handle means for manipulation of the lamp 10, and convenient means for mounting filter structures or the like in front of the lamp 10.

The lamp 10 illustrated in FIG. 1 includes three discrete lamp housings 24, 26 and 28 which are generally elongated, vertically arranged housing units each being adapted to receive two retainer units 30 according to the invention in vertically stacked relationship thereon, with two respective bulbs 32 preloaded and captive in the retainer units 30.

Each of the lamp housings 24, 26 and 28 comprises a shell 34 having a rearward portion 36 of perforated sheet metal which is generally in the shape of a frustum in horizontal section, with sides 38 extending forwardly therefrom that terminate in respective inturned forward flanges or lips 40. Each shell 34 also includes a generally horizontal top wall 42 and bottom wall 44, with an angle brace 46 providing reinforcement to the top wall 42. The housings 24 and 28 at the sides of the lamp 10 are mounted for pivoting about vertical axes between the top of frame structure 12 and the box 18. Handles 48 are connected to each these pivoted housings 24 and 28 on the respective pivot axes for convenient pivotal movement of the housings 24 and 28. The center housing 26 is preferably fixedly mounted between the frame 12 and box 18, as for example by means of a bolt 50 to provide connection of housing 26 to frame 12, and a tubular connection between the bottom of housing 26 and the box 18 similar to the tubular pivot connection 52 shown in FIG. 1 which connects the bottom wall 44 of housing 28 with the control box 18, and provides a conduit for the electrical power conductor means 54 to pass from the control box 18 into the lamp housing 28.

As best seen in FIGS. 1, 3, 4 and 5, a pair of flat bars or straps 56 extends transversely across each of the lamp housings 24, 26 and 28, each of these bars or straps 56 being secured at its opposite ends to the rearward surfaces of the opposed flanges 40, with one bar or strap 56 extending across each housing 24, 26 and 28 adjacent the top thereof, and the other located just below the centerline between the top and bottom of each housing 24, 26 and 28. One end of each of the bars or straps 56 is connected to its respective flange 40 of the housing by means of a bolt 58, while the other end is connected to its respective flange 40 by the base structure of a threaded stud 60 which projects forwardly from the respective housing 24, 26 or 28. Thus, one such threaded stud 60 projects forwardly from one flange 40 near the top thereof, and another such threaded stud 60 projects forwardly from the same flange 40 just below the vertical center of that flange 40. Similar threaded studs 62 extend forwardly from the other flange 40 just above the vertical centerline and adjacent the bottom thereof. In this manner, the upper studs 60 and 62 of each housing 24, 26 and 28 provide attachment means for an upper retainer unit 30, and the lower studs 60 and 62 of each housing 24, 26 and 28 provide attachment means for a lower retainer unit 30. Each retainer unit 30 is preferably substantially square, and since it supports a substantially round bulb 32 therein there is substantial room on one pair of opposite corners thereof for the provision of captive thumb nuts adapted to engage a complementary pair of studs 60 and 62.

The two flat bars or straps 56 in each housing 24, 26 and 28 each provide support means for a spring contact assembly generally designated 64, which includes an insulator body 66 extending rearwardly from the respective bar or strap 56 and connected thereto by means of bolts 68. A pair of electrical contacts 70 is supported on respective leaf spring members 72 that are secured to each insulator body 66, and an insulation sheet 74 is supported on each insulator body 66 and extends underneath the respective contacts 70 to isolate the contacts 70 from the perforated rearward portion 36 of the respective housing.

The combination of retainer unit 30 and captive bulb 32 is best illustrated in FIGS. 2, and 6 to 9, which illustrate these components separated from the remainder of the lamp. The body of the retainer 30 may be drawn or otherwise formed from sheet metal, and includes a flat, square front wall or panel 76, the central part of which is cut away to provide a large circular aperture 78. Shell sidewalls 80 and 82 extend rearwardly from the side edges of the front wall or panel 76, while top and bottom walls 84 and 86 extend rearwardly from the respective top and bottom edges of the front wall or panel 76 the same distance as the sidewalls 80 and 82.

The "PAR"-type bulb 32 is a circular glass envelope having convex forward lens and rearward body portions which come together at a stepped annular rim comprising a flange portion 88 and a forward annular edge 90 of smaller diameter than the flange 88 which defines the periphery of the lens. A positioning lug 92 projects radially outwardly from the rearward body portion of the bulb for rotational orientation of the bulb in the retainer 30. A pair of spaced, ferrule-type terminals 94 projects rearwardly from the body of bulb 32, the terminals 94 being spaced apart substantially the same amount as the contacts 70 of the spring contact assembly 64 so as to register with a pair of such contacts 70 when the retainer unit 30 and captive bulb 32 are operatively engaged with either the upper or the lower half of one of the lamp housings 24, 26, or 28.

A fixed bulb retainer bracket 96 in the form of an elongated angle member has a sidewall portion 98 thereof which is secured along the inwardly facing surface of the retainer sidewall 80, with a flange portion 100 thereof projecting laterally inwardly generally parallel to the front wall 76 of the retainer but spaced rearwardly therefrom. This flange portion 100 of the bracket 96 has a notch or recess 102 therein that is adapted to receive the positioning lug 92.

A pivoted retainer bracket 104, also in the form of an elongated angle member, has a sidewall portion 106 thereof which is pivoted proximate one end flush against the inwardly facing surface of the retainer sidewall 82 as by means of a pivot pin 110 in the form of a rivet. The retainer bracket 104 also includes a flange portion 108 which projects inwardly from the sidewall 82 generally parallel to the front wall 76 and spaced rearwardly from the latter. The flange portion 108 of the pivoted retainer bracket 104 is provided with a curved gripping edge 112 proximate its free end for comfortable engagement of the free end of the flange portion 108 with a finger to swing the pivoted retainer bracket 104 between its closed position as shown in solid lines in FIGS. 6 to 9, and an open position such as illustrated in FIG. 2.

The pivoted retainer bracket 104 is releasably secured in its said closed position by means of a retainer spring 104 mounted on the retainer body adjacent the free end of the pivoted retainer bracket 104 when the latter is in its said closed position, and disposed immediately adjacent to the retainer sidewall 82. The retainer spring 114 is preferably a leaf-type spring having a base tab 116 fixedly secured against the rearwardly facing surface of the front wall 76 of the retainer body, as by means of rivet 118, the spring having a generally rearwardly extending U-shaped operative portion including a leg 120 which extends rearwardly from the base tab 116, a curved rearward end 122 and a forwardly extending leg 124 which is immediately adjacent to the sidewall 82 of the retainer sidewall and is preferably prestressed so as to press against the wall 82, so that when the pivoted retainer bracket 104 is moved to its closed position, the sidewall portion 106 of the latter is tightly compressed between the spring leg 124 and the inwardly facing surface of the sidewall 82 of the retainer body as best illustrated in FIGS. 6 and 9. The curvature of rearward end 122 of the retainer spring 114 provides a suitable lead-in for easy entry of the forward edge of wall 106 of

the pivoted retainer bracket **104** between the spring and the sidewall **82** of the retainer body.

Two captive thumb nuts **126** are mounted in the front wall **76** of the retainer unit adjacent opposite corners thereof, having knurled gripping portions which project forwardly from the front wall **76**, and being adapted for threaded engagement with a pair of the studs **60** and **62** which project forwardly from one of the lamp housings **24**, **26** or **28**. It will be noted from FIG. **6** that the bulb retainer brackets **96** and **104** are offset so as to provide ample clearance for the thumb nuts **126** and for engagement of the threaded studs **60** and **62** therewith. Thus, as viewed in FIG. **6**, the fixed retainer bracket **96** is positioned toward the lower portion of the sidewall **80**, leaving substantial clearance above the upper end of the retainer bracket **96** for the stud **60** and the respective thumb nut **126** engageable therewith. Similarly, the pivoted retainer bracket **104** is offset toward the upper end of sidewall **82**, being pivoted a substantial distance above the bottom wall **86**, to provide ample clearance for the threaded stud **62** and its respective thumb nut **126**. By offsetting the pivoted retainer bracket **104** in this direction, instead of in the opposite direction, the center of retaining engagement of the pivoted bracket **104** with the periphery of bulb **32** is substantially closer to the pivot **110** than it is to the free end of pivoted bracket **104** which is gripped in the retainer spring **114**. In this manner, the pivoted retainer bracket **104** functions as a lever which increases the mechanical advantage of the retention force of retainer spring **114** by having a relatively short distance from the fulcrum **110** to the center of engagement with the periphery of bulb **32** proximate the section line **8—8** in FIG. **6**, and a relatively long distance between the fulcrum **110** and the free end portion of bracket **104** which is gripped by the retainer spring **114**.

In order to load an empty retainer unit **30** with a bulb **32** preparatory to the mounting of the combination of retainer and bulb in the lamp, the pivoted retainer bracket **104** is swung rearwardly to a fully opened position generally as illustrated in FIG. **2**, and the bulb **32** is arranged generally behind the retainer **30** as illustrated in FIG. **2**. The rim of bulb **32** proximate positioning lug **92** is then engaged under the flange portion **100** of the fixed retainer bracket **96**, with the positioning lug **92** disposed in notch or recess **102** so as to orient the bulb with its ferrule terminals **94** positioned for engagement with a respective pair of the contacts **70**. Then the pivoted retainer bracket **104** is simply swung forwardly to its closed position with its free end gripped by the retainer spring **114**, so as to engage the rim of bulb **32** at a point thereon diametrically opposed from the positioning lug **92**. The circular aperture **78** in the front wall **76** of the retainer body is slightly larger in diameter than the step **90** at the forward annular edge of the bulb lens, so that the latter seats forwardly into the circular aperture **78** as best illustrated in FIG. **8**. The bulb **32** is by this means quickly and easily securely retained and rendered captive in the retainer unit **30** so that further handling of the bulb is unnecessary, and the bulb can then be operatively positioned or removed from the lamp **10** as desired solely by manipulation of the retainer **30**.

Mounting of the bulb-loaded retainer unit **30** in one of the housing portions of the lamp **10** is conveniently effected simply by arranging the loaded retainer unit in front of an open housing section with the retainer thumb nuts **126** axially aligned with the respective threaded studs **60** and **62** on the housing, as illustrated in FIG. **1**, and then moving the retainer unit rearwardly until the studs are engaged in the thumb nuts **126** and then taking the thumb nuts down onto the studs until the retainer unit **30** is substantially tight against the front of the lamp housing. As the retainer is thus being tightened into place, the two ferrule terminals **94** on the bulb **32** are brought into engagement with the contacts **70** and move the contacts **70** rearwardly against the biasing force of their respective leaf springs **72**, thereby effecting spring-loaded contacting engagement between the contacts **70** and the ferrule terminals **94**, and additionally biasing the bulb **32** forwardly in the retainer unit **30** so that the bulb becomes securely fixed in a forwardmost, seated position in the retainer unit **30** and will not rattle under ordinary usage of the lamp. The fit of the bulb **32** in the retainer unit **30** prior to such attachment of the retainer unit **30** with a lamp housing is preferably somewhat loose so as to rely upon the biasing force of the spring contacts **70** to hold the bulb **32** in its fully seated position in the overall lamp structure **10**. By this means economy is effected by avoiding the necessity of close-tolerance fitting between the bulb and retainer, and tight metal-to-metal gripping of the bulb is avoided, thus substantially lessening the likelihood of damage to the bulb. Additionally, the need for rubber gaskets or pads to protect the bulb against glass-to-metal contact is avoided since the amount of clamping force of the bulb against the retainer is limited by the strength of the contact springs **72**, which is a fully controllable factor.

Preferably, several retainer units **30** will be preloaded with respective bulbs **32** so that if a bulb that is in the lamp **10** goes out during operation of the lamp, it can be quickly and easily replaced without direct handling of the hot burned-out bulb by simply unscrewing the two thumb nuts **126** on the respective retainer unit **30** and setting that retainer unit and bulb combination aside until it cools off, and replacing the removed combination by a preloaded retainer unit and bulb combination.

By having only two of the captive thumb nuts **126** and respective studs **60** and **62** at opposite corners of the retainer and housing section to which the retainer is applied, regardless of which of the two positions in which the retainer can be oriented for engagement of the thumb nuts **126** with the respective studs **60** and **62**, the ferrule terminals **94** on the bulb will be generally horizontally aligned and will be axially aligned with the pair of contacts **70**. Thus, while the retainer unit **30** has been described hereinabove as having top and bottom walls **84** and **86**, in practice either one of these walls can be at the top when the loaded retainer unit is operatively engaged with the lamp.

While the instant invention has been shown and described herein in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is therefore not to be limited to the details disclosed herein, but is to be accorded the full scope of the appended claims.

I claim:

1. In a lamp having a forwardly opening housing with electrical contact means therein, and a bulb having a body with rearwardly exposed terminal means and a peripheral rim, the combination with said lamp of a bulb retainer comprising a forward wall with an aperture therethrough, a pair of flanges on said retainer located generally on opposite sides of said aperture spaced rearwardly from said forward wall and having normal retaining positions wherein they extend inwardly toward each other in opposed relationship, the bulb normally being retained in said retainer by engagement of said peripheral rim between said forward wall and said flanges, one of said flanges being movable from its said retaining position to an open position clear of the bulb rim to permit removal and replacement of the bulb, and coupling means releasably engageable between the retainer and housing for removably mounting the retainer on the front of the housing with said terminal and contact means operatively engaged, said retainer including peripheral wall means extending rearwardly from the periphery of said forward wall, said peripheral wall means generally enclosing the bulb rim and having a pair of generally parallel, opposite sidewall portions, said flanges projecting inwardly from the respective said sidewall portions, said movable flange being one side of an elongated angle member, the other side of which is disposed generally in side-by-side relationship with the respective sidewall portion and pivoted adjacent one end thereof to said respective sidewall portion.

2. The combination as defined in claim **1**, which includes spring retainer means on the bulb retainer frictionally engageable with said other side of said elongated angle member prox-

imate the free end thereof to releasably secure said movable flange in its said retaining position.

* * * * *

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,633,024 Dated January 4, 1972

Inventor(s) MAXEY A. HANKINS

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 68, after "retainer" delete "sidewall" and insert therefor --body,--.

Signed and sealed this 14th day of November 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents