United States Patent

[11] 3,611,258

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[21] Appl. No. **849,625**
[22] Filed **Aug. 13, 1969**
[45] Patented **Oct. 5, 1971**

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[54] **ELECTRIC LAMP STRUCTURE**
9 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **339/72,** 339/144
[51] **Int. Cl.** **H01r 19/00**
[50] **Field of Search** 339/69–72, 144–146, 176, 182; 313/314, 318

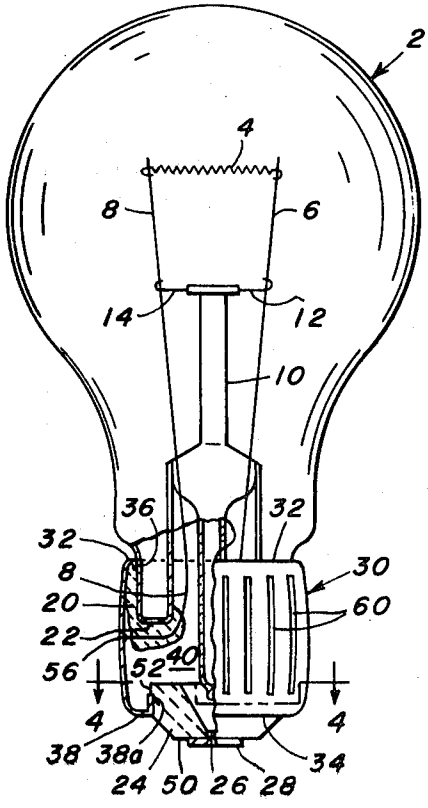
[56] **References Cited**

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1,761,344	6/1930	Huber	339/72
3,020,437	2/1962	Horan	313/318
3,215,972	11/1965	Eriksson	339/72
3,256,507	6/1966	Ackerman	339/144

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ABSTRACT: A lamp structure having a sealed enclosure provided with a source of radiant energy. An annular resilient electrically conductive base member adapted to yield upon insertion into an electrical socket. The base member having a peripheral configuration which is substantially symmetrical with respect to its central vertical axis. At least one series of circumferentially spaced openings in the base member. The base member having an upper annular edge and a lower annular edge. At least one of the upper and lower annular edges being secured directly to a portion of the remainder of the lamp structure. An upper electrical insulator element secured to the sealed enclosure. A lower electrical insulator element separating the lower annular edge and a lower lamp contact element. Circuit means connecting the radiant energy source with the lower lamp contact element and the annular base member.



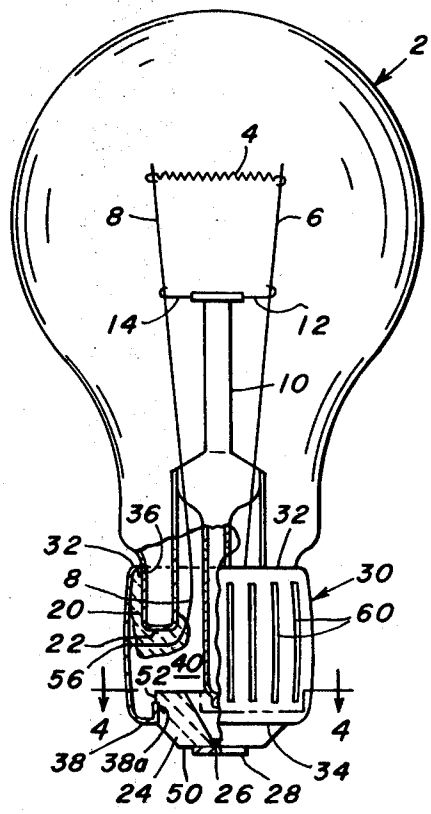


FIG. 1.

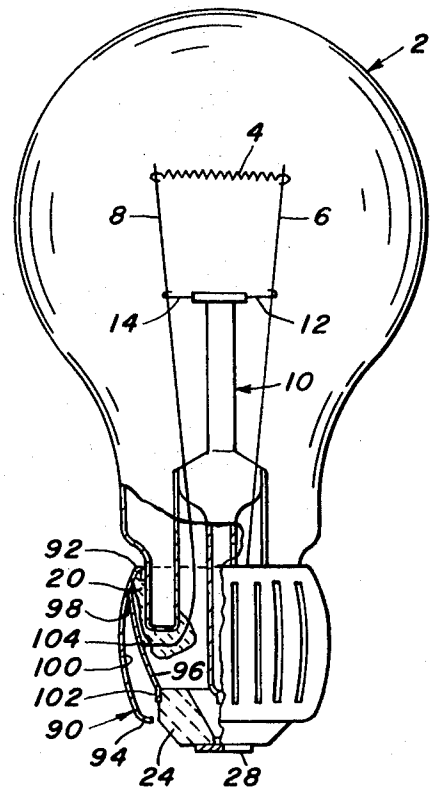


FIG. 5.

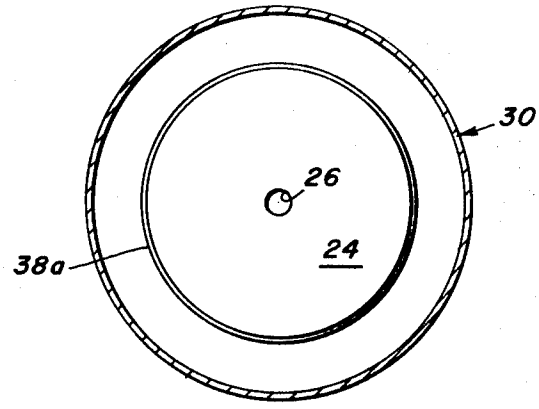


FIG. 4.

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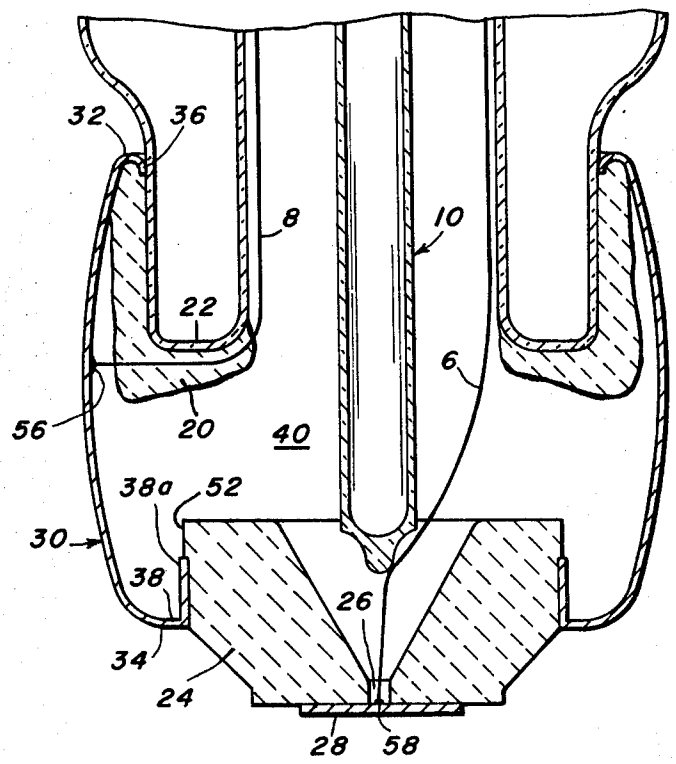


FIG. 2.

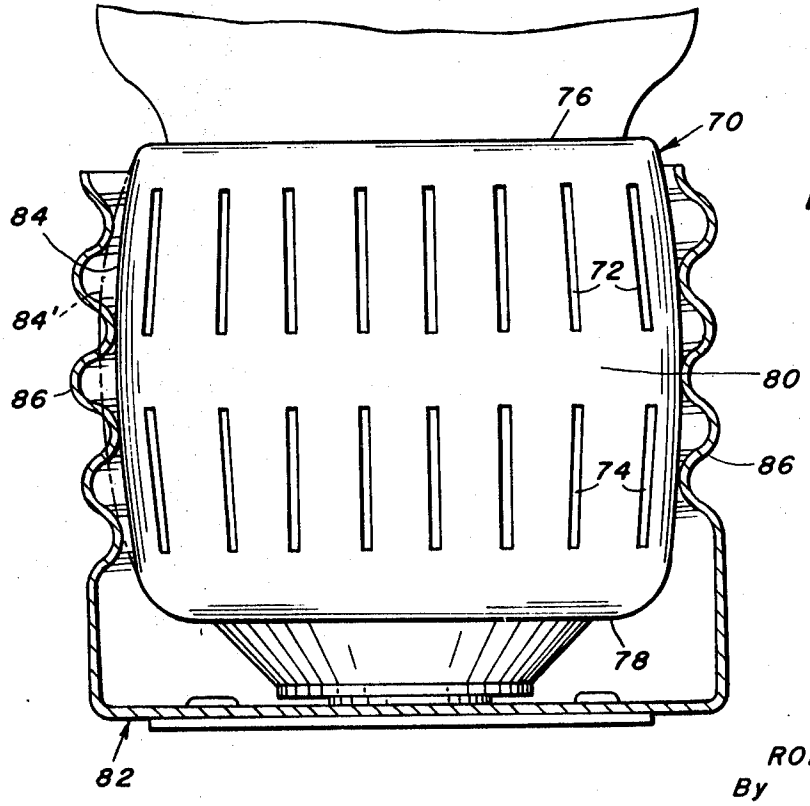


FIG. 3.

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ELECTRIC LAMP STRUCTURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a lamp structure adapted for axial insertion into an electrical socket and resilient retention therein. More specifically, this invention relates to a lamp structure having a resilient electrically conductive base member which is circumferentially substantially uniformly radially inwardly compressed upon axial insertion of the base into an electrical socket.

2. Description of the Prior Art

In the conventional incandescent lamp the metal ferrule which serves as the base portion has a threaded exterior which is adapted to threadedly engage a threaded or Edison-type electric socket. A first electrical connection is made at the base of the lamp and a second electrical connection, generally the ground, is made through the threaded sidewall. These two exteriorly exposed electrical contacts are separated by a suitable insulating material.

One substantial problem encountered with respect to these conventional bulbs is the time-consuming and cumbersome manner in which the bulbs must be inserted and withdrawn by applying rotary motion thereto. In addition, the problem becomes particularly acute where the tolerance variations are such that the two substantially rigid threaded members are not well matched dimensionally. Also, where individuals have impaired physical abilities, such as arthritis, this rotary motion action can be extremely painful. The awkwardness of such conventional systems is particularly troublesome where the electrical sockets are positioned in relatively inaccessible places such as on high ceilings and behind or close to ducts, pipes or other obstacles.

In addition, several specialty-type bulbs which are of the bayonet variety have been known. These bulbs have one or more radially outwardly directed detents in the lamp base. Upon axial insertion of the bulb into the socket and partial rotation thereof, the detents engage locks slots or recesses in the socket and are retained therein, frequently with the assist of a spring member mounted within the socket.

It has previously been known to eliminate mandatory rotary insertion of an incandescent bulb into an electrical socket. U.S. Pat. No. 2,191,336 discloses a socket structure having an insert provided with a plurality of upwardly directed leaf spring fingers which resiliently engage the threaded base portion of a conventional incandescent lamp. U.S. Pat. No. 3,422,393 discloses a socket insert having a centrally disposed resilient bulb receiving member positioned within the base of the socket insert along with inwardly directed leaf spring conductors positioned within the insert sidewall. The lamp is provided with a specially designed substantially rigid base structure.

It has also been known to provide for resilient connection between a lamp and an electrical socket by securing separate resilient elements to the lamp base. Such structures are shown in U.S. Pat. Nos. 3,056,941 and 3,215,972. Each of these patents disclose spiderlike elements having resilient legs which extend through openings in the lamp base and project radially therebeyond. Resilient engagement between these individual elements and the socket provide localized resilient lamp retention.

In lieu of the use of a separate element to provide a number of resilient leaf spring fingers, it has been known to provide such outstruck fingers which have been integrally formed within a lamp base element. These also provide circumferential localized resilient retention of the lamp within the socket. See U.S. Pat. Nos. 1,628,636 and 3,020,437.

There remains, however, the problem of having to rely upon localized resilient retention of the lamp. Also, the effectiveness of this localized retention is directly related to the precise configuration of the leaf spring elements, which are highly susceptible to departure from tolerances and permanent deformation during initial manufacture, handling and use.

There is no effective means of circumferentially uniformly providing for effective resilient insertion, retention and removal of a lamp from an electrical socket. In addition, there is no means for obtaining a structure which may be readily economically manufactured within desired tolerances and will resist damaging deformation during lamp manufacture, handling and use.

Another problem is that of providing the desired structure while permitting the use of the base in a conventional incandescent lamp which provides a sealed enclosure containing a source of radiant energy and electrical circuits connecting the source of radiant energy with a lower lamp electrical contact and with a lamp base electrical contact.

SUMMARY OF THE INVENTION

The above enumerated problems have been solved by the lamp structure of this invention which provides a uniquely configurated base element adapted for circumferentially substantially uniform radially inwardly directed deformation upon insertion into an electrical socket, which may be either the conventional Edison type or threaded socket or a specially designed socket.

The lamp structure of this invention has a sealed enclosure containing a source of radiant energy with electrical contacts connecting the radiant energy source with the exterior of the sealed enclosure. An annular resilient electrically conductive base member is secured to a portion of the lamp structure adjacent the lower portion of the sealed enclosure. The base member has a peripheral configuration which is substantially symmetrical with respect to its central vertical axis. At least one series of circumferentially spaced openings which facilitate radial compression of the base member are provided therein. A first electrical circuit connects the radiant energy source with the base member. A second electrical circuit connects the radiant energy source with a lower lamp contact element. A lower electrical insulator element separates the base member from the lower lamp contact element.

The base member has an upper annular edge and a lower annular edge, with at least one of the edges secured directly to the remainder of the lamp structure. An upper insulating member is secured to the lower portion of the sealed enclosure. In one embodiment the upper and lower edges are secured to the upper and lower insulating members, respectively. In another embodiment of the invention the upper annular edge is secured to the upper insulating element, but the lower annular edge is not directly secured to the lamp structure. In this embodiment an inwardly disposed collar member may be secured to the inner surface of the annular base member and to the lower insulating element.

It is an object of this invention to provide a lamp structure having an annular conductive base member which is of substantially symmetrical configuration with respect to a central axis through the member.

It is another object of this invention to provide a resilient base member for an otherwise conventional incandescent lamp which base is adapted for circumferentially uniform resilient bulb retention within either a conventional threaded socket, an Edison-type socket or a specially designed socket.

It is another object of this invention to provide such a bulb structure wherein the uniform resiliency of the base element is such that the bulb may be readily axially inserted or removed from an electrical socket, but will not accidentally fall out of the socket.

It is yet another object of this invention to provide such a bulb structure which may be readily economically manufactured and employed with an otherwise conventional incandescent lamp structure, and in addition is adapted to resist damage from ordinary handling and use.

These and other objects and advantages of the invention will be understood from the following description of the invention on reference to the illustrations appended hereto.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view partially in section showing one form of lamp structure contemplated by this invention.

FIG. 2 is an elevational section, partially broken away, of a lamp similar to that shown in FIG. 1.

FIG. 3 is an elevational view, partially in section, of another form of the invention.

FIG. 4 is a sectional view taken through 4—4 of FIG. 1.

FIG. 5 is an elevational view, partially in section, showing another embodiment of the lamp structure of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Considering now the drawings in greater detail with reference to FIGS. 1 and 2, there is shown a sealed lamp enclosure 2, which is generally made, at least in part, of a vitreous material or other material having appropriate light transmitting and heat resisting properties. In order to reduce the tendency for oxidation to occur within the enclosure, it will generally contain a neutral gas, a gas mixture or have an internal vacuum. Within the enclosure is a radiant energy source 4 which in the form shown is a filament member made from a suitable material such as tungsten. The radiant energy source is connected at its opposed ends to electrical conductors 6, 8. A support column 10, in the form of a glass mount, is disposed within the lamp enclosure 2 and contains support elements or wires 12, 14 which are in supporting contact with conductors 6, 8, respectively. An upper electrical insulator element 20 is secured to the bottom 22 of lamp enclosure 2. A lower electrical insulator element 24 has a central opening 26 and an underlying lower lamp electrical contact 28. The annular base member 30 has an upper annular edge 32 and a lower annular edge 34. The upper annular edge 32 terminates in a generally radially inwardly directed flange 36. The lower annular edge 34 terminates in a generally radially inwardly directed flange 38 which has a generally upwardly directed portion 38*a*. In the form shown in this figure, the upper annular edge 32 is secured to the upper insulating element 20 in a circumferentially continuous manner. As the sealed enclosure is sealed independently of base member 30, the joint between annular edge 32 and insulating element 20 may be segmented and need not be continuous if desired, but a continuous joint is preferred. As will be seen from FIGS. 1 and 2, region 40 as a result of openings 60 will be open to the air surrounding the lamp structure.

The lower insulating element has a lower substantially flat surface to which the lower electrical lamp contact is secured. It has a radially outwardly disposed substantially vertical wall 52 against which flange portion 38 is positioned. The lower annular edge 34 is secured to lower insulator element 24 in this fashion.

Electrical conductor 8, which is conventionally the ground conductor, emerges from the sealed enclosure 2, extends through the upper insulating element 20 and is secured to base element 30 at joint 56. Electrical conductor 6 emerges from lamp enclosure 2, passes downwardly through central opening 26 of lower electrical insulator element 24 and is connected to lower contact 28 at joint 58. A completed circuit is therefore provided between the exterior of the lamp structure base and the radiant energy source disposed within the lamp enclosure.

Referring still to FIGS. 1 and 2, it is noted that the base member 30 is substantially symmetrical with respect to the central vertical axis thereof. In the form shown, it has a minimum diameter at its lower annular edge 34, a maximum diameter intermediate the lower annular edge 34 and the upper annular edge 32 and an intermediate diameter at its upper annular edge 32. The base member 30 has a height which is less than the maximum diameter, but greater than the minimum diameter. Upon axial insertion of the lamp structure base into an electrical socket, the base element will be circumferentially uniformly resiliently radially inwardly deformed. This resilient compression will be sufficient to maintain a continuous annular region of outwardly directed force against the socket to retain the bulb within the socket. If it is desired to remove the bulb, applying sufficient force in an axial outward direction in order to overcome the resilient retaining force is all that is required. Thus, insertion, retention and removal are simply and effectively provided for.

In order to facilitate radial compression in a uniform fashion during lamp insertion, a series of openings 60 are provided within the conductive base member 30. These openings provide void spaces which permit radial constriction of the annular base element by providing regions into which the displaced material may move. In the form shown, the openings 60 are a series of elongated slots oriented generally parallel to the longitudinal vertical axis of the base element. The slots which, in the form shown, are of generally rectangular configuration originate at a position spaced downwardly from the upper annular edge of base member 30 and terminate at a position spaced upwardly from the lower annular edge 34. The number and configuration of openings might be varied, but it is preferred to provide a series of slots oriented in the fashion illustrated substantially uniformly positioned about the circumference of the base element 30. As is seen in FIGS. 1 and 2, the base element 30 has a generally C-shaped transverse cross-sectional configuration, which, with the exception of openings 60, is substantially uniform throughout the circumferential extent of the base element.

Referring now to FIG. 4, a horizontal section taken through 4—4 is shown. It is there seen that the annular base element, in this form, has a generally circular peripheral configuration, as does lower insulating element 24.

Referring now to FIG. 3, the base element 70 shown therein is provided with two series of openings 72, 74 which are substantially uniformly placed about the circumference of the base element 70. In this fashion, not only are the openings spaced from the upper and lower annular edges 76, 78, respectively, but also a continuous circumferential band 80 is provided in the base element 70. In this figure, the lamp structure is shown inserted into a conventional Edison-type threaded socket. The outer surface 84 of base element 70 has been radially, resiliently deformed substantially uniformly about the circumference of base element 70. Portions of surface 84 are in contact with threads 86 of socket 82 and exert a radially outwardly directed force thereagainst. Line 84' (illustrated in exaggerated form for clarity) shows the position of surface 84 prior to axial insertion of the lamp structure into socket 82.

Referring now to FIG. 5, which illustrates another embodiment of the invention, like reference numerals will be employed to refer to similar parts illustrated in other figures. A modified base element 90 has an annular upper edge 92 and an annular lower edge 94. It is substantially uniform circumferentially in both transverse cross sectional configuration, which is generally C-shaped, and in peripheral symmetrical form with respect to its central axis. Upper annular edge 92 is secured to upper insulating element 20. Lower annular edge 94 is not directly connected to the remainder of the lamp structure. It is positioned in spaced radially outward disposition with respect to lower insulating element 24. An inner collar member 96, preferably of electrically conductive material, has an upper end secured at joint 98 to the inner surface 100 of base element 90. The lower end 102 of collar 96 is secured to lower insulating element 24. In the preferred form, the collar 96 is circumferentially continuous and is substantially continuously secured to base element 90 and insulator member 24.

Collar 96 has a lower portion of generally right cylindrical configuration and an upper outwardly flared portion.

In this embodiment of the invention, the resilient deformation of base element 90 upon insertion into a substantially rigid or nonyielding electrical socket will occur in two stages. The first stage will be a radially inwardly directed translational movement of annular lower edge 94, while the second stage will be resilient inward deformation of the base element 90.

Depending upon the relative deformation of the socket and base elements, in some instances the first or translational movement deformation stage may be all that is required to effectively engage the base of the lamp structure in substantially continuous circumferential position with respect to the socket.

In the form illustrated in FIG. 5, conductor 8 is secured to collar 96 in joint 104. If desired, conductor 8 may be connected directly to base element 90.

In a preferred form of the invention, the base element will be made from an electrically conductive material, such as aluminum, for example, of sheet thickness. This material possesses adequate strength to resist undesired permanent deformation and other damage as well as adequate resiliency to effectively function in the manner contemplated by this invention. In addition, it is an excellent conductor of electricity and possesses corrosion-resistant properties which will permit reliance upon the base element as an effective conductive part of the lamp circuitry.

It will be appreciated that the bulb structure of this invention provides an effective means for obtaining damage resistant durable circumferential uniform resilient engagement between a lamp base and either a conventional Edison-type socket or a specially designed socket which might consist simply of a generally cylindrical member or cylindrical recess provided with suitable electrical connections. It is therefore adapted for use with conventional existing socket structures and requires no change to existing buildings or systems in this regard. Also, no adapters or other inserts need be provided intermediate a conventional socket and the bulb structure. All that is required to effect engagement is simple axial insertion of the bulb into the socket. As the bulb is generally of relatively light weight, the amount of force to overcome the resistance to resilient compression inherent in the base element is not substantial, yet the positive holding force exerted is circumferentially uniform and substantial.

The structure is adapted for economical manufacture and use, and requires no special handling or delicate treatment during storage, shipment or use. It is adapted for use with conventional lamp parts including incandescent lamp structures of the type illustrated. Its use, however, is not limited to incandescent-type lamp structures but may be employed with numerous lamps.

Whereas particular embodiments of the invention have been described above for purposes of illustration, it will be evident to those skilled in the art that numerous variations of the details may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. A lamp structure comprising
a sealed enclosure containing a source of radiant energy,
an annular resilient electrically conductive base member,
said base member having a peripheral configuration which is substantially symmetrical with respect to its central vertical axis,
said base member is resilient in a radial direction,
at least one series of circumferentially spaced openings in said base member,
a first electrical circuit connecting said radiant energy source with said base member,
a second electrical circuit connecting said radiant energy source with a lower lamp contact element,
said base member and said lower lamp contact element separated by a lower electrical insulator element,
said annular base member having an upper annular edge and a lower annular edge,
at least one of said annular edges secured to a portion of said lamp adjacent the lower portion of said sealed enclosure, whereby axial insertion of the base of said lamp structure into a nonyielding electrical socket results in said base member being substantially uniformly circumferentially radially inwardly resiliently deformed,
said lamp is an incandescent lamp,
said sealed enclosure is, at least in part, composed of a vitreous material,
said base member has a generally C-shaped elevational cross-sectional configuration,
said base member has a substantially circular cross-sectional configuration in a plane which is perpendicular to its central axis,
said circumferentially spaced openings include a plurality of elongated openings oriented substantially parallel to the central axis of said base member, and
said elongated openings originate at a position spaced below said upper annular edge and terminate at a position spaced above said lower annular edge.

2. The lamp structure of claim 1, including
an upper insulating element secured to the lower portion of said sealed enclosure,
said upper annular edge of said base member secured to said upper insulating element, and
said lower annular edge of said base member secured to said lower insulating element.

3. The lamp structure of claim 2, including
said upper annular edge is circumferentially substantially continuously secured to said upper insulating element,
said lower annular edge is circumferentially continuously secured to said lower insulating element,
said annular base member, except for said openings, is of circumferentially substantially uniform transverse cross-sectional configuration, and
said annular base member having a minimum diameter at said lower annular edge and a maximum diameter intermediate said lower and upper annular edges.

4. The lamp structure of claim 2, including
said upper annular edge having a generally radially inwardly directed flange portion terminating in contact with said upper insulating element, and
said lower annular edge having a generally radially inwardly directed flange portion terminating in contact with said lower insulating element.

5. The lamp structure of claim 1, including
an upper insulating element secured to the lower portion of said sealed enclosure,
said upper annular edge of said base member secured to said upper insulating element, and
said lower annular edge of said base member disposed in spaced relationship with respect to said lower electrical insulator element.

6. The lamp structure of claim 5, including
said upper annular edge circumferentially substantially continuously secured to said upper insulating member,
a collar of electrically conductive resilient material secured to the inner surface of said annular base member,
said collar having a lower generally cylindrical portion and an upper outwardly flared portion,
said collar having its lower end secured to said lower insulating element, and
said collar disposed in noncontacting position with respect to said lower annular edge, whereby axial insertion of said lamp structure into a substantially rigid electrical socket produces radial compression of said annular base effected at least in part through translation of said lower annular edge.

7. The lamp structure of claim 6, including
said collar and said annular base are both composed of aluminum of sheet thickness,
said upper portion of said collar secured to said annular base member, and
said collar forming a part of first electrical circuit.

8. The lamp structure of claim 7, including
the maximum diameter of said annular base member being greater than the height of said base member, and
the minimum diameter of said annular base member being less than the height of said base member.

9. The lamp structure of claim 8, including

an upper insulating member secured to the lower end of said sealed enclosure,

said upper annular edge of said base member secured to said upper insulating member,

said lower insulating member having an outer annular wall, and

said lower annular edge of said base member secured to said lower insulating member at said outer annular wall.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,611,258 Dated October 5, 1971

Inventor(s) Ronald L. Kolakowski

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

Col. 6, line 70 Change "claim 7" to --claim 1--.

Signed and sealed this 14th day of March 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

ORM PO-1050 (10-69)

USCOMM-DC 60376-P69
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