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SINGLE-ENDED ELECTRIC INCANDESCENT LAMP WITH IMPROVED BASE
AND TERMINAL STRUCTURE, AND METHOD OF ASSEMBLY
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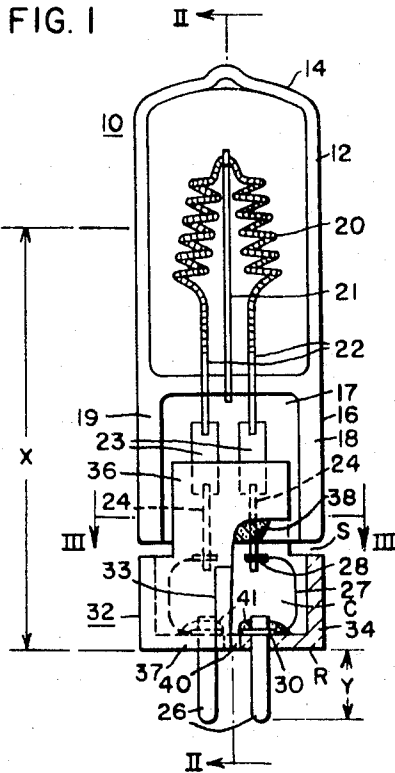


FIG. 4

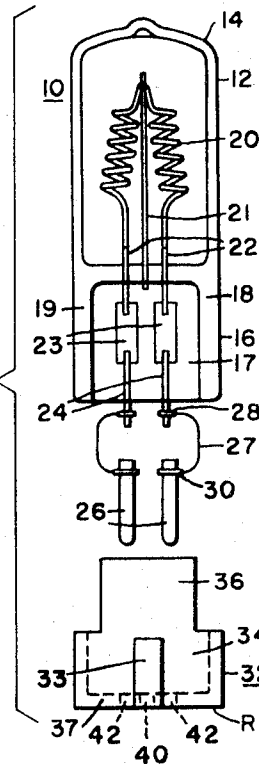


FIG. 2

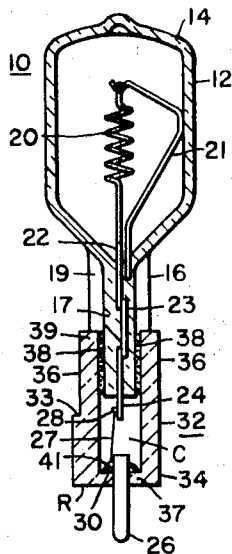
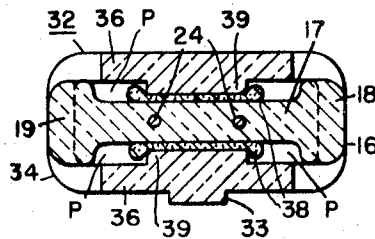


FIG. 3



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**SINGLE-ENDED ELECTRIC INCANDESCENT
LAMP WITH IMPROVED BASE AND TER-
MINAL STRUCTURE, AND METHOD OF
ASSEMBLY**

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9 Claims

ABSTRACT OF THE DISCLOSURE

A compact projection-type lamp having a press seal and an open-sided ceramic base that is cemented to the seal, is adapted to fit various size lamps, has vent passages that cool the seal, and is disposed in prefocused relationship with the filament. Contact pins anchored in the bottom of the base are connected to the lead-in conductors by flexible fuse wires that are enclosed by the base and permit the latter to be precisely oriented relative to the envelope and filament during the basing operation.

BACKGROUND OF THE INVENTION

This invention relates to electric incandescent lamps of the type used in slide and movie projectors and has particular reference to such a lamp having an improved base and terminal structure, and to a method for fabricating such lamps.

As is well known, the efficiency and life of an incandescent lamp can be greatly improved by introducing a predetermined quantity of a halogen such as iodine or bromine into the lamp envelope that "getters" vaporized tungsten and redeposits it on the hot filament. Naturally, the improved performance afforded by the halogen gettering cycle prompted the development of compact single-ended halogen-containing lamps for use in slide and movie projectors. To facilitate their manufacture such lamps are terminated by a press seal that is fitted with a base member having a pair of pin terminals. However, the prior art bases were not entirely satisfactory since they enclose the press seal which construction, due to the high wattage rating of such lamps, increased the operating temperature of the base and seal.

In addition, the standard practice in the prior art was to attach the terminal pins directly to the lead-in conductors and adjust the position of the base relative to the pins during the basing operation. This procedure was very tedious and time consuming and made it difficult to control the critical "light center length" and overall-length dimensions of the lamp.

SUMMARY

It is accordingly the general object of the present invention to provide a single-ended incandescent lamp having an improved base and terminal structure that will avoid the prior art problems and disadvantages.

A more specific object is the provision of a projection type incandescent lamp having a base and pin contact construction that can be quickly and inexpensively assembled on the sealed end of the lamp envelope in pre-focused relationship with the filament.

Still another object is the provision of a base and terminal structure which will fit various sizes of single-ended press-sealed projection lamps and reduce the operating temperature of both the base and seal.

An additional object is the provision of a method for attaching terminal members and a base to the press seal portion of a partly fabricated lamp and concurrently posi-

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tioning the base and terminals in predetermined spatial relationship with respect to the lamp filament.

The foregoing objects and other advantages are achieved in accordance with the present invention by providing a base member that is fabricated from temperature-resistant ceramic material and has an open-sided upper portion that is cemented to and covers only a portion of the press seal. The body portion of the base protrudes beyond the end of the lamp envelope and defines a cavity that contains a pair of flexible wires which connect the lead-in conductors with a pair of terminal pins fastened to the bottom of the base. The base cavity is vented and at least one of the flexible wires comprises a fuse wire. The pins and flexible wires are connected to the lead-in conductors before the base is attached to the press seal thereby permitting both the base and pins to be adjusted and precisely oriented before the basing cement hardens.

BRIEF DESCRIPTION OF THE DRAWING

A better understanding of the invention will be obtained by referring to the accompanying drawing, wherein:

FIGURE 1 is a front elevational view of an incandescent projection lamp embodying the present invention, a portion of the base member being broken away to illustrate the internal pin connection;

FIG. 2 is a longitudinal sectional view on a reduced scale along the line II—II of FIG. 1;

FIG. 3 is a cross-sectional view of the base and of the lamp along the line III—III of FIG. 1; and,

FIG. 4 is an exploded elevational view of the lamp-pin subassembly in position to be inserted into the base component.

DESCRIPTION OF PREFERRED EMBODIMENT

In FIGS. 1 and 2 there is shown a 500 watt T6 incandescent projection lamp 10 having a tubular light-transmitting envelope 12 of quartz or other suitable temperature-resistant vitreous material. The top of the envelope 12 is closed by a tipped-off dome 14 and the opposite end is closed by a full press seal 16 of generally I-shaped cross-section having a flat medial portion 17 that extends inward from the end of the envelope and merges with protruding ribs or bosses 18 and 19 that comprise the edges of the seal.

The envelope 12 contains a suitable concentrated light source such as a V-shaped filament 20 of coiled tungsten wire that is held in place by a wire support 21 that is anchored in and extends upwardly from the press seal 16. If desired, the support wire can be bent so that it resiliently presses against the envelope wall, as shown in FIG. 2, and rigidifies the mount structure. The legs of the filament coil 20 are fastened to spud wires 22 that are also embedded in the press seal 16. The spud wires 22 are, in turn, connected as by welding to a pair of ribbon conductors 23, such as strips of molybdenum, the opposite ends of which are spot welded to a pair of outer leads 24 of molybdenum or the like. The conjoined spud wires 22, metal ribbons 23 and outer leads 24 thus constitute a pair of lead-in conductor assemblies that extend through the press seal 16 and protrude from the end face of the seal.

The lamp 10 is preferably of the halogen type and accordingly contains an amount of iodine or bromine sufficient to maintain the gettering cycle. The support wire 21 and spud wires 22, in this case, are fabricated from tungsten or some other suitable metal that is not chemically attacked by the halogen atmosphere.

The protruding ends of the outer leads 24 are connected in accordance with this invention to a pair of rigid elongated contactors, such as a pair of metal pins 26, by a pair of flexible conductors each of which consists of

thin wire 27 that is terminated at each end by short sections 28, 30 of stiff larger diameter wire. As shown in FIG. 1, the sections of stiff wire 28, 30 are fastened (as by spot welding) to the proximate ends of the outer leads 24 and the pins 26 in such a manner that they extend transversely of the pin axes and the longitudinal axis of the lamp 10. The length of the flexible wires 27 exceeds the axial spacing between the respective pairs of pins and outer leads so that the flexible wires are bowed outwardly as shown. At least one of the flexible wires 27 is of substantially uniform diameter, is so dimensioned and is composed of a suitable material such as nickel that it functions as a fuse wire which prevents a destructive arc from developing within the envelope 12 when the filament 20 fails.

The terminal pins 26 are held in place by a base 32 of suitable ceramic material such as steatite. The base has a hollow generally rectangular body portion 34 and a pair of matching tongues or tabular extensions 36 which are integral with and extend from the sides of the body portion and are fastened by a suitable cement 38 to the flat faces of the medial portion 17 of the press seal 16. These extensions are of generally rectangular configuration and are smaller than the medial portion 17 of the seal, as illustrated in FIGS. 1 and 2. The protruding outer end of the base 32 is closed by an end wall 37 the outer face of which is substantially flat and defines a reference surface R that is substantially normal to the lamp axis and axially spaced a predetermined distance "X" from the center of the filament 20 (see FIG. 1). The bottom of the base 32 thus serves as a registration surface that controls the light-center-length dimension of the lamp 10 and, thus, the position of the filament 20 relative to the optical system when the lamp is placed into its socket.

The pins 26 also protrude a predetermined distance Y (see FIG. 1) from the reference surface R to insure that positive electrical connection is made with the socket contacts and that the overall length of the lamp is within the specified tolerance limits. The stiff wire sections 30 are seated against the inner face of the basal end wall 37 and thus control the pin-length dimension Y. The pin length is accordingly controlled by the points at which the stiff wire sections 30 are spot welded to the pins 26 prior to the basing operation.

As will be noted in FIG. 3, the tabular extensions 36 of the base 32 are provided with relatively narrow planar protuberances 39 that extend axially of and are centrally located on the inner surfaces of the respective extensions. The layers of cement 38 which secure the base to the press seal are restricted to these planar protuberances 39 thus leaving a series of axially-extending passageways P between the flat medial portion 17 of the press seal 16, and the overlying marginal portions of the tabular extensions 36. These passageways P, in conjunction with the cavity C defined by the hollow body portion 34 of the base (see FIGS. 1 and 2) permit air to circulate through the base and around the end and sides of the press seal 16. The base temperature is thus maintained at a safe value when the lamp is energized. This is of particular advantage in the case of projection lamps in view of the trend toward very compact projectors.

The circulation of air through the base 32 and around the press seal 16 can be further enhanced by providing an aperture 40 (see FIGS. 1 and 4) in the basal end wall 37 between the base pins 26. The axial length of the body portion 34 of the base can also be made such that spaces S (see FIG. 1) are provided between the rim of the cut-away sides of the base and overlying end edges of the press seal 16. The dimensions of the body portion 34 and tabular portions 36 are also preferably so selected that the same base will fit press seals formed on lamps having envelopes of different sizes, for example, T4, T5, T6 etc. The base and terminal construction of the present invention can accordingly be used on a variety of lamp

types designed for different services, such as prefocus, non-prefocus, convection cooled or forced air cooled, etc.

As will be noted in FIGS. 1 and 2, the base pins 26 are securely anchored in place in the basal end wall 37 by a quantity of cement 41 that forms a filling around the inner ends of the pins. Any high-temperature basing cement may be used and a cement designated in the trade as "Sauereisen" No. 31 has been satisfactory. The deposition of the cement 41 around the inner ends of the pins 26 is preferably accomplished through holes (not shown) in the body portion 34, after the base 32 has been placed over the seal 16 and the transverse stiff wire sections 30 have been seated against the bottom of the base so as not to interfere with the control of the pin-length dimension Y.

An axially-extending rectangular key 33 is provided on one side of the body portion 34 of the base 32 to insure that the filament 20 will be axially aligned with the optical system of the projector when the lamp 10 is placed into its socket. The key is axially aligned with the filament 20, as shown in FIG. 1, and is adapted to engage a key-way in the socket.

METHOD OF ASSEMBLY

As shown in FIG. 4, assembly of the sealed-in lamp 10 with the base 32 and terminal pins 26 is readily accomplished by first fastening the pins to the protruding portions of the outer leads 24 with the flexible conductors formed by the conjoined wires 27, 28, and 30. The resulting subassembly is then inserted into the base 32 and the pins 26 are threaded through a pair of apertures 42 provided in the basal end wall 37. The pins are pulled through the apertures until the transverse stiff wire sections 30 seat against the basal end wall 37, thereby automatically providing the desired pin-length dimension Y. Basing cement is then applied to the inner ends of the pins 26 and the position of the base 32 is adjusted until the registration surface R and the key 33 are properly oriented with respect to the filament 20. The layers of cement in the inner surfaces of the tabular extensions 36, which are preferably applied before the base is slipped over the seal, are still soft at this stage of the operation so that the necessary adjustments can easily be made.

After the desired alignment of the filament 20, pins 26 and base 32 has been achieved, the cement is cured and rigidified (preferably by the application of heat to the base) while the aforesaid components are held in the aforesaid alignment, as by means of a jig.

It will be apparent from the foregoing that the objects of the invention have been attained in that an improved base and terminal structure for compact single-ended incandescent projection type lamps have been provided. The base is simple and inexpensive and yet, when placed on the press seal, provides a venting action which reduces the operating temperature of both the seal and base. The side cut-outs and resulting tabular extension portions of the base, in conjunction with the flexible connectors attached to the leads and pins, facilitate the basing operation and permit the base to be quickly aligned in pre-focused orientation with the filament.

While one embodiment has been illustrated and described, it will be appreciated that various modifications can be made without departing from the spirit and scope of the invention. For example, the protruding key 33 can readily be replaced by a rectangular recess in the side wall of the base to provide the same keying action.

We claim as our invention:

1. A single-ended electric incandescent lamp comprising:
 - a light-transmitting envelope that contains a filament and has a press seal at one end,
 - a base of ceramic insulating material fastened to said press seal and terminating in a hollow body portion that extends beyond the end of said seal and has an end wall that is disposed transverse to

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the lamp axis and spaced a predetermined distance axially from said filament and thus constitutes a reference surface for positioning the lamp in a socket,

- a pair of spaced lead-in conductors connected to said filament and extending through said press seal toward the body portion of said base,
- a pair of spaced rigid elongated contacts anchored in the end wall of said base and protruding into the hollow body portion of said base and a predetermined distance beyond the outer face of said end wall, and
- a pair of flexible conductors connected to the exposed ends of the respective lead-in conductors and extending into the hollow body portion of said base, each of said flexible conductors being connected to the inwardly-protruding ends of the respective elongated contacts within the hollow body portion of said base by a rigid elongated conductive member that extends transversely of the associated contact and is seated against the inner face of the basal end wall and thus determines the exposed length of said associated contact.

2. The electric lamp set forth in claim 1 wherein: said flexible conductors comprise a pair of flexible wires,

each of said wires have a length that is greater than the axial distance between the ends of the lead-in conductor and elongated contact to which it is connected so that said wires are of bowed configuration and

at least one of said wires comprises a fuse.

3. The electric lamp set forth in claim 1 wherein: said envelope is of tubular configuration, said press seal extends across the full width of the envelope and has a flat medial portion that extends axially inward from the end of the envelope, and said base has a pair of matching tabular extensions that are integral with and protrude from the sides of said body portion and overlie and are secured to the respective faces of the flat medial portion of the press seal.

4. The electric lamp set forth in claim 3 wherein: said tabular extensions cover only a part of the flat medial portion of the press seal and are fastened thereto by cement, and said contacts comprise metal pins.

5. The electric lamp set forth in claim 4 wherein: each of said tabular extensions has a planar protuberance on its inner surface that extends axially along a medial portion of the respective extensions, and only the said planar protuberances are cemented to the press seal thereby providing a plurality of axially-extending air passageways between said press seal and the overlying portions of said base.

6. The electric lamp set forth in claim 5 wherein: said press seal is of generally I-shaped cross section, the body portion of said base has at least one unobstructed aperture therein that allows air to pass through said base and around the press seal, and the axial length dimension of the body portion of the base is such that there is a vent opening between the rim of said body portion and the adjacent end edges of the press seal.

7. The electric lamp set forth in claim 6 wherein: said filament comprises a coil of tungsten wire, said envelope contains a halogen atmosphere,

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the body portion of said base has a protruding key that is axially aligned with said filament, and each of said flexible wires comprise a fuse wire that is terminated at each end by a stiff wire segment that extends transversely of the pin axes.

8. In the manufacture of a single-ended electric incandescent lamp having a concentrated light source that is connected to lead-in conductors which extend through a seal formed on the end of the lamp envelope, the method of attaching a base of rigid insulating material having a hollow body portion and an apertured end wall to said envelope and concurrently orienting said light source in predetermined spatial relationship with the end wall of said base and a pair of rigid elongated contactor members, which method comprises;

attaching said rigid elongated contactor members to the protruding ends of said lead-in conductors with flexible conductors of sufficient length to allow the contactor members to be moved toward and away from said envelope during the basing operation, inserting the attached depending contactor members into and through the apertures in the end wall of said base and concurrently positioning the hollow body portion of the base over the sealed portion of the envelope,

adjusting the positions of said base and depending contactor members until the desired orientation thereof relative to each other and to said light source is achieved, and then

fastening the hollow body portion of said base to the sealed end portion of the envelope and anchoring the contactor members in the basal end wall while the base and contactor members are held in the aforesaid position.

9. The method set forth in claim 8 wherein: the orientation of said contactor members relative to the base and light source is achieved by attaching the flexible conductors to the respective contactor members with transversely-extending sections of stiff wire and inserting the contactor members into the base apertures until said stiff wire sections seat against the end wall of the base, and

said base is fastened to said contactor members and said envelope by applying a layer of cement to the interior contiguous portions of the base and subsequently curing and rigidifying said cement.

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