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E. M. BELLOTT ET AL
FILAMENT MOUNT AND HEAT SHIELD STRUCTURE FOR
ELECTRIC INCANDESCENT LAMP

3,283,198

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2 Sheets-Sheet 1

Fig. 1.

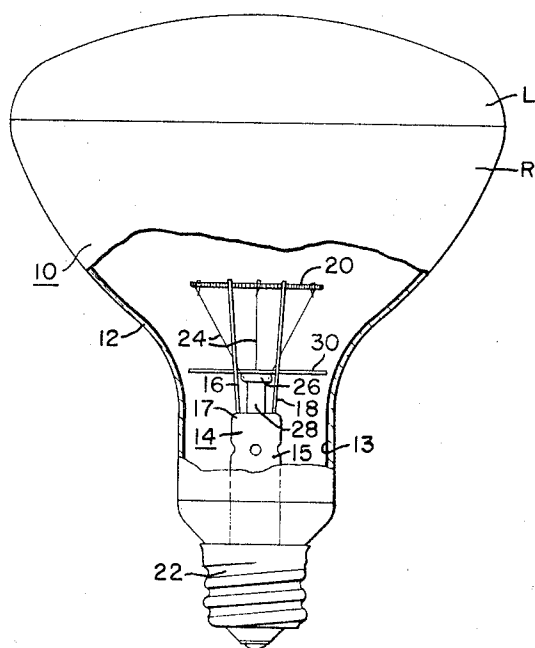


Fig. 2.

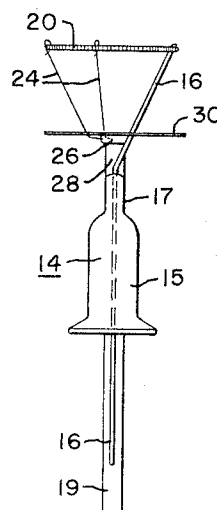


Fig. 3.

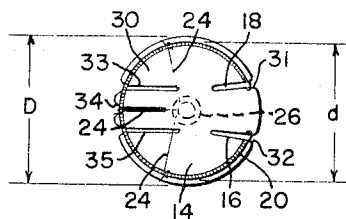


Fig. 4.

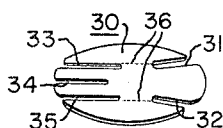


Fig. 6.

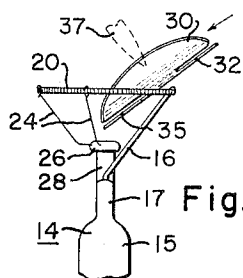


Fig. 8.

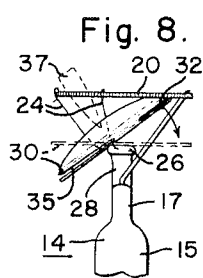


Fig. 5.

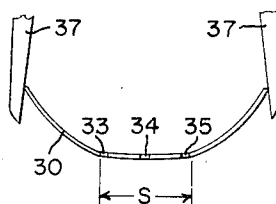


Fig. 7.

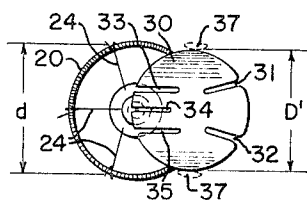
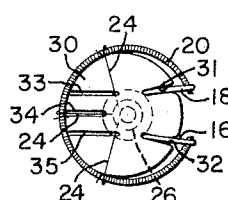


Fig. 9.



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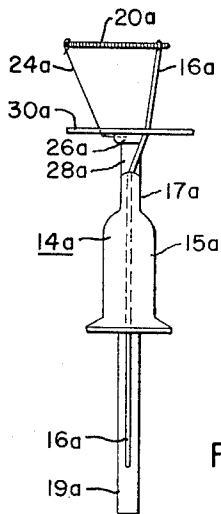


Fig. 10.

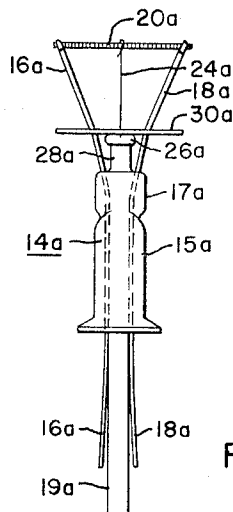


Fig. 11.

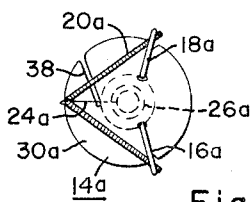


Fig. 12.

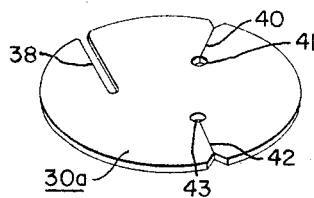


Fig. 13.

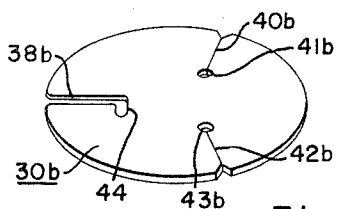


Fig. 14.

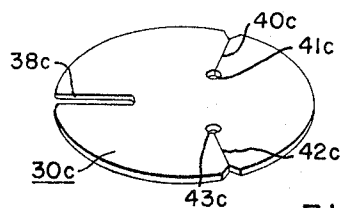


Fig. 15.

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FILAMENT MOUNT AND HEAT SHIELD STRUCTURE FOR ELECTRIC INCANDESCENT LAMP

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8 Claims. (Cl. 313-240)

This invention relates to electric incandescent lamps and has particular reference to an improved filament mount and heat shield structure for such lamps.

In certain types of incandescent lamps, such as reflector type infrared heat lamps and photoflood lamps for example, an elongated filament coil is required and held in the desired position and shape within the reflectorized envelope by the lead wires and one or more support wires. To avoid the potential danger of shorting out parts of the filament or weakening the stem the support wires are anchored in a glass button rather than in the stem press, which button is formed on the end of an arbor attached to the end of the press. Due to the proximity of the filament to the button a heat shield is mounted on top of the button to prevent the latter from softening when the lamp is in use and thus retain the support wires in their inserted positions in the button. The shield also serves to protect the base and prevents excessive base temperatures.

Prior to the present invention lamps requiring the aforesaid construction were manufactured by manually inserting the support wires into the arbor button and bending two of the wires around the edges of a rigid ceramic heat-deflector disc to lock it in place on top of the button. The filament was then hand-mounted on the upstanding ends of the lead and support wires. While this method of assembly was satisfactory as regards lamp operation, it was very inefficient and costly because of the hand-inserting and hand-mounting operations involved.

With the foregoing in mind, it is the general object of the present invention to provide an improved mount structure for electric incandescent lamps that will obviate the foregoing manufacturing problems and other disadvantages encountered in the production of mounts requiring a heat shield and one or more support wires.

A more specific object is the provision of an electric incandescent lamp mount that has an arbor-supported heat shield and can be fabricated almost entirely on automatic equipment.

The foregoing objects, and others which will become apparent to those skilled in the art as the description proceeds, are achieved in accordance with the present invention by providing a heat shield that is so dimensioned and shaped that it can be inserted into an otherwise completed mount and locked in place on the end of the stem solely by means of the overlying terminal portions of the lead and support wires. Specifically, the heat shield is provided with slots that extend inwardly from the periphery of the shield and are so oriented that they enable the shield to be slipped over the respective lead and support wires as the shield is being inserted into position on top of the stem. Assembly of the shield with the mount is thus accomplished without permanently deforming or displacing either the wires or the filament from their mounted positions.

According to one form of the invention the heat shield for a mount having a filament of arcuate configuration is fabricated from flexible electrically-nonconductive material, such as mica, and is slightly larger than the opening defined by the mounted filament. As-

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sembly of the shield is accomplished by temporarily distorting the shield to reduce its size and then inserting it into the mount while the shield is in such temporarily contracted condition.

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

FIGURE 1 is a front elevational view of a reflector type infrared heat lamp embodying the improved mount construction of the present invention, a portion of the lamp envelope being removed to expose the mount structure;

FIGURE 2 is a side elevational view of the filament mount shown in FIGURE 1 before it is sealed into the envelope;

FIGURE 3 is a plan view of the mount shown in FIG. 2;

FIGURE 4 is a perspective view of the heat shield shown in the preceding figures;

FIGURE 5 is an enlarged end view of the heat shield illustrating the manner in which it is bowed and temporarily reduced in size during the assembly operation;

FIGURES 6 and 7 are side and plan views, respectively, illustrating the first step in assembling the temporarily contorted heat shield with an automatically fabricated mount assembly in accordance with one form of the invention;

FIGURES 8 and 9 are similar views of the last phase of the shield assembly operation;

FIGURES 10 to 12 are side elevational, front elevational and plan views, respectively, of an alternative lamp mount structure according to the invention;

FIGURE 13 is an enlarged perspective view of the modified heat shield used in the aforementioned alternative embodiment; and

FIGURES 14 and 15 are similar views of other types of shields.

While the present invention can be used with advantage in various types of electrical devices that have a glass stem or the like that must be protected from excessive heat by a shielding element, it is especially adapted for use in so-called "R40" infrared heat lamps and related reflector lamp types employed for floodlighting and the like and it has, accordingly, been so illustrated and will be so described.

EMBODIMENT I

With specific reference to the drawing, in FIGURE 1 there is shown a 250 watt "R40" heat lamp 10 having a bowl-shaped envelope 12 and a mount 14 that includes a re-entrant stem 15 which is sealed to the neck of the envelope and extends into the enlarged portion thereof. The stem 15 includes the usual pair of lead wires 16 and 18 that project beyond the inner end of the stem and are connected, as by clamping or the like, to a filament 20 of coiled tungsten wire. The outer ends of the lead wires are connected in the usual manner to the terminals of a suitable base 22 that is attached to the sealed end of the envelope neck. The filament 20, as shown more particularly in FIG. 3, is held in the form of a C-shaped loop by the lead wires 16 and 18 and three support wires 24 to provide a so-called "C-9" type mount.

As shown more clearly in FIGS. 1 and 2, the aforementioned support wires 24 have their ends embedded at circumferentially spaced locations in a glass button 26 formed on the end of an arbor 28 that is fused to a press seal 17 provided on the inner end of the stem. The lead wires 16 and 18 are embedded in the press seal on opposite sides of the arbor 28 in the customary fashion and extend beyond the button 26 and to one side of the press seal 17. The support wires 24, on the other hand, are disposed on the opposite side of the stem press. Both the lead and support wires diverge outwardly from one

another and the stem axis, with the lead wires being located approximately in a plane that is tilted away from the stem axis (as shown in FIGS. 2 and 3).

As indicated in FIGURE 1, the side wall and neck portions of the envelope 12 are interiorly coated with a layer 13 of vaporized aluminum or the like so that this segment of the envelope serves as a built-in reflector R. The domed end of the envelope is left uncoated and thus provides a radiation-transmitting lens portion L.

As shown in FIG. 2, the mount 14 as received from the automatic mounting machine is provided with an exhaust tube 19 that is fused to the interior of the stem 15 and connects with an opening below the press seal 17. After the mount 14 is sealed into the envelope 12 the latter is evacuated and then filled with a suitable inert gas, such as a mixture of nitrogen and argon, through the exhaust tube 19 which is then tipped off in the usual manner.

The essence of this invention resides in the heat shield portion of the mount 14 and this feature will now be described.

As will be noted in FIGS. 1 and 2, the button 26 is protected from the heat generated by the filament 20 by a shield 30 that is seated on the button and is disposed in a plane transverse to the stem axis. As will be noted in FIG. 3, the shield 30 is centrally located relative to the stem axis and has a minimum lateral dimension that exceeds the maximum spacing between the lead and support wires in the plane of the shield.

As shown more particularly in FIG. 4, the improved heat shield 30 according to the present invention comprises a generally circular disc of flexible electrically non-conductive sheet material having a pair of lead-wire openings, such as substantially straight slots 31 and 32, that extend inwardly from circumferentially spaced points on its periphery. Located on the opposite side of the shield are three support-wire openings, such as slots 33, 34 and 35, that are also substantially straight and extend inwardly toward the central portion of the shield from its periphery. Each of the aforementioned slots are of a length such that the inner ends thereof substantially coincide with the positions occupied by the respective lead and support wires in the transverse plane occupied by the shield when it is assembled with the mount 14, that is, in a plane that is substantially normal to the stem axis and tangent to the face of the button 26.

The lead-wire slots 31 and 32 are slightly divergent with respect to one another by an amount equal to the divergence of the upper terminal portions of the lead wires 16 and 18 (see FIGURE 1). In this embodiment, the support-wire slots 33, 34, and 35 are disposed parallel to one another and the lead-wire slots 31 and 32 are approximately in line with the outermost support-wire slots 33 and 35. Thus, the heat shield 30 can readily be flexed along a pair of imaginary parallel-spaced lines 36 (indicated in FIG. 4) that join the ends of the lead-wire slots and the afore-mentioned outermost support-wire slots.

As shown in FIG. 3, the diameter D of the heat shield 30, when the shield is in its normal relaxed and planar condition on top of the button 26, is slightly greater than the diameter d of the C-shaped filament 20 so that the latter is circumscribed by the shield. In the case of the 250 watt "R40" infrared heat lamp 10 shown in FIGURE 1, the diameter of the C-shaped filament 20 was approximately 32 millimeters and the diameter of the heat shield was approximately 34 millimeters. The heat shield was fabricated from mica having a thickness of approximately 0.153 millimeter (0.006 inch).

Method of assembling heat shield

The manner in which the heat shield 30 is assembled with the previously fabricated mount 14 is illustrated in FIGS. 5 to 9. The first step in this operation is shown

in FIG. 5 and consists of gripping the shield at diametrically opposite points by means of a suitable tool, such as a pair of tweezers 37, and applying sufficient pressure to buckle the shield and cause it to bow along the aforementioned imaginary lines 36. The shield is thus temporarily bowed in a direction substantially normal to the direction in which the slots 31-35 extend. The central portion of the shield, accordingly, remains substantially flat and the spacing S between the outermost support-wire slots 33 and 35 remains unchanged.

The next step in the assembly operation is shown in FIGS. 6 and 7 and consists of inserting the temporarily bowed shield 30 into the opening defined by the oppositely-disposed portions of the C-shaped filament 20 that extend from the lead wires 16 and 18 to the adjacent support wires 24. As shown in FIG. 6, the shield is inserted along an angular path that is transverse to the stem axis and intersects the base portions of the support wires 24 immediately adjacent the button 26. As noted in FIG. 7, the curvature of the bowed heat shield 30 is such that its lateral dimension D' in a plane normal to the slots 33-35 is slightly less than the diameter d of the filament and enables the shield, while in such contracted condition, to clear and be freely inserted into the filament end of the mount 14 without disturbing or distorting the filament in any way.

Insertion of the bowed heat shield 30 along the aforesaid angular path is continued until the support wires 24 enter their respective slots 33 to 35 and are seated at the ends thereof, as shown in FIGS. 8 and 9. The shield is then pivoted around the engaged base portions of the support wires toward the stem 15 and the lead wires 16 and 18 are concurrently threaded through their respective slots 31 and 32, as indicated by the arrow in FIG. 8. After the shield 30 is seated against the end of the button 26, it is released and allowed to return to its normal planar condition thereby effecting a snug fit between the lead and support wires and the slotted portions of the shield and positioning the shield in the desired transverse plane between the button 26 and filament 20.

Since the lead-wire and support-wire slots 31-35 extend inwardly toward the center of the shield 30 from opposite sides of the shield body, the insertion and pivoting of the shield into place on the stem 15 is accomplished without bending any of the wires or displacing them, or the filament, from their mounted positions. As will be noted in FIGS. 3 and 9, the terminal portions of the two support wires 24 closest to the lead wires are offset relative to the slots 33 and 35, respectively, and thus overlie and frictionally engage the shield. The center support wire, on the other hand, is disposed in the same plane as its slot 34. Displacement of the shield 30 in either an axial or lateral direction relative to the stem 15 is thus prevented by the lead and support wires and the shield is securely locked in place in the desired position on the mount 14 solely by means of such wires without any additional parts or operations.

EMBODIMENT II

The present invention can also be used with other types of mounts such as a so-called "C-2V" mount shown in FIGS. 10 to 12. As there shown, this type mount 14a consists of the same basic components (a stem 15a, a pair of lead wires 16a and 18a, etc.) as those employed in the C-9 mount structure described above in connection with Embodiment I. In this type mount, however, the lead wires are spread outwardly from one another to a much greater degree (as shown in FIGURES 11 and 12) and only one support wire 24a is used. The lead wires are also offset toward the sides of the stem press 17a and the support wire 24a is disposed approximately in a plane that passes between and is equidistant from the ends of the lead wires so that the filament 20a is held in form of a V, as illustrated in FIG. 12.

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The modified heat shield 30a according to this embodiment is somewhat smaller in diameter than the maximum lateral dimension of the filament structure, as shown in FIG. 12, but it is still much larger than the maximum spacing between the lead and support wires in the plane occupied by the shield, as in the previous embodiment.

Locking of the heat shield 30a in the desired transverse plane on top of the arbor button 26a is accomplished in this embodiment by providing a single support-wire slot 38 on one side of the shield (see FIG. 13) and a pair of inwardly extending slits 40 and 42 on the opposite side of the shield. These slits extend inwardly from the shield periphery and communicate with apertures 41 and 43, respectively, in the central portion of the shield. The apertures are adapted to freely receive the lead wires whereas the slits 40 and 42 are much narrower (preferably merely cuts through the shield material) and thus much smaller than the lead wire diameter. The spacing between the apertures 41 and 43 and the end of the slot 38 approximately coincide with the positions which the support and lead wires occupy in the plane of the button so that a snug fit is obtained. However, as will be noted in FIG. 13, the slot 38 is offset with respect to the center line of the shield that passes between the apertures and thus is not aligned with the support wire 24a when the shield is in place on the mount (see FIG. 12).

Assembly of the heat shield 30a with the mount 14a is accomplished in substantially the same manner as in the previous embodiment except that the upstanding terminal portions off the lead wires 16a and 18a are forcibly threaded through the slits 40 and 42. However, since the shield is smaller in lateral dimension than the V-shaped filament bowing of the shield is not necessary. Also, due to the fact that the slot 38 is offset with respect to the support wire 24a, the shield will have to be rotated after it is partially inserted into the mount and engages the support wire. When the shield is threaded over the lead wires it is locked in a transverse plane on top of the stem, as shown in FIGS. 10 to 12, even though only one support wire is used since movement of the shield away from the button in an axial direction is prevented by the offset outwardly-flared terminal portions of the lead and support wires that overlie the slit and slotted portions of the shield, respectively. The shield is, accordingly, held at three points and is prevented from rattling or gradually working itself loose.

Should the lead wires be of such dimension that they can be easily bent, then the aforementioned slits may be enlarged slightly to facilitate threading the heat shield over the lead wires and still provide sufficient frictional interlocking to hold the shield in its assembled position on the stem.

EMBODIMENT III

In FIG. 14 there is shown another form of heat shield 30b that can be used on mounts, such as the "C-2V" type described above, which have only one support wire. This shield has the same lead wire slits 40b, 42b and apertures 41b, 43b as the shield 30a described previously but in this case the support-wire slot 38b extends along the center line of the shield and is terminated by a transverse notch 44. During assembly, the support wire is slipped along the slot and then into the notch so that the wire overlies and engages the shield at this point, thereby providing the same locking arrangement as that obtained in Embodiment II.

EMBODIMENT IV

Alternatively, a straight support wire slot 38c can also be used to provide still another type of shield 30c, as shown in FIG. 15. In this case, locking of the shield would be achieved solely by the lead wire slits 40c, 42c and apertures 41, 43c. However, if the slot 38c were made short enough the support wire could be bent to extend along the bottom of the shield, through the shortened slot and then upwardly toward instead of away from the

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stem to the bight of the V-shaped filament. The upstanding terminal portion of the support wire would, in this case, also overlie a part of the shield and provide the more desirable "three point" interlock obtained with Embodiments II and III.

It will be appreciated from the foregoing that the objects of the invention have been achieved by providing an improved mount structure for an incandescent lamp or the like wherein the mount can be manufactured by automatic equipment and subsequently provided with a heat shield that can be readily incorporated into the mount structure and securely locked in place on the stem. The unique configuration of the heat shield and the ease with which it can be assembled with a prefabricated mount completely eliminates the hand inserting and mounting operations heretofore required and has reduced the manufacturing cost of C-9 type mounts by approximately 13% without detracting from the quality or performance of the lamps in any way.

While several embodiments have been illustrated and described in accordance with the patent statutes, it will be understood that various modifications in both the structure of the heat shield and manner of assembling it with the prefabricated lamp mount can be made without departing from the spirit and scope of the invention. For example, the heat shield and openings therein can be of any configuration providing the lateral dimension of the shield is larger than the maximum spacing between the lead and support wires in the plane occupied by the shield, and the openings in the shield are accessible from opposite sides of the shield body. The shield can also be fabricated from sheet metal, such as aluminum, if a sufficient number of the openings are provided with suitable grommets or the like that will insulate the lead and support wires from each other.

We claim as our invention:

1. An electric incandescent lamp mount comprising, a vitreous stem, a heat shield seated on one end of said stem and substantially disposed in a plane that is transverse to the stem axis, a pair of lead wires sealed through a portion of said stem and extending beyond the aforesaid end thereof through spaced openings in said heat shield, a support wire anchored in said stem and extending beyond the said end thereof through another opening in said heat shield, and a filament fastened to the upstanding terminal portions of said lead and support wires and held thereby at a location beyond said heat shield, the portions of said heat shield which define at least two of said openings being electrically nonconductive so that said lead and support wires are insulated from each other, the openings in said heat shield extending inwardly from the shield periphery and being so oriented relative to said lead and support wires that at least one of said wires interlockingly engages the shield and holds it in the aforesaid position on the end of said stem.
2. An electric incandescent lamp mount according to claim 1 wherein; the portions of said lead wires and support wire located in the plane of said heat shield are disposed at the inner ends of the respective openings in said shield, and the upstanding terminal portion of at least one of said wires is offset with respect to both the associated opening in said heat shield and the stem axis.
3. An electric incandescent lamp mount according to claim 1 wherein; said lead wires are disposed on one side of said stem and said support wire is disposed on the opposite side of said stem, the openings in said heat shield comprise substantially straight slots that extend toward each other from opposite sides of the shield, and the upstanding terminal portion of at least one of said

wires is offset with respect to both the associated slot in said heat shield and the stem axis.

4. An electric incandescent lamp mount comprising, a vitreous stem having a press seal and a longitudinally extending arbor at one end,
- a heat shield of electrically-nonconductive material seated on the end of said arbor and substantially disposed in a plane that is transverse to the stem axis,
- a pair of lead wires embedded in said press seal and extending beyond said arbor to one side of the stem through openings in said heat shield,
- a support wire having one end embedded in said arbor and extending therebeyond to the side of the stem opposite said lead wires through another opening in said heat shield, and
- a coiled filament fastened to the upstanding terminal portions of said lead and support wires and held thereby in predetermined configuration proximate said arbor,
- the openings in said heat shield comprising substantially straight slots that extend inwardly from the periphery and opposite sides of said shield and are of such length that the lead and support wires are located at the ends of the respective slots and effect a snug fit therewith,
- the upstanding terminal portion of at least one of said wires being offset with respect to its slot so that said heat shield is wedgingly locked on the stem between the end of said arbor and said filament.
5. An electric incandescent lamp mount comprising,
- a glass stem having a press seal at one end and an arbor that axially extends from said seal and is terminated by a button,
- a heat shield of substantially circular configuration and electrically-nonconductive material seated on the end of said button and disposed in a plane transverse to the stem axis,
- a pair of lead wires embedded in said press seal and extending beyond said arbor to one side of the press seal through a pair of spaced slots in said heat shield,
- three support wires embedded in said button at circumferentially spaced locations and extending therebeyond and to the side of said press seal opposite

- said lead wires through three slots in said heat shield, and
- a filament fastened to the upstanding terminal portions of said lead and support wires and held thereby in arcuate configuration substantially in a plane that is transverse to the stem axis and spaced a predetermined distance from said button,
- said lead and support wires being located substantially at the ends of the respectively slots in said heat shield,
- said slots being substantially straight and disposed so that the three support-wire slots extend inwardly from the periphery and one side of the shield and the two lead-wire slots extend inwardly from the periphery and the opposite side of said shield,
- the upstanding terminal portion of at least one of said support wires being offset with respect to both its slot and the stem axis so that said heat shield is prevented from moving away from said button and is thereby locked on said stem between said button and the filament solely by said wires.
6. An electric incandescent lamp mount according to claim 5 wherein; said lead wires are disposed on opposite sides of said arbor and approximately in a plane that is tilted away from the stem axis, each of said support wires diverge outwardly from said button and the stem axis, and only the center support wire is disposed in the same plane as its slot.
7. An electric incandescent lamp mount according to claim 5 wherein; the upstanding terminal portions of said lead and support wires are so oriented that the filament is approximately C-shaped, said heat shield substantially circumscribes said filament, and the three support-wire slots in the heat shield are substantially parallel to one another.
8. An electric incandescent lamp mount according to claim 5 wherein said heat shield comprises a flexible sheet of mica that is centrally disposed relative to the stem axis.

No references cited.

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