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ACCELERATION AND VIBRATION RESISTANT LAMP

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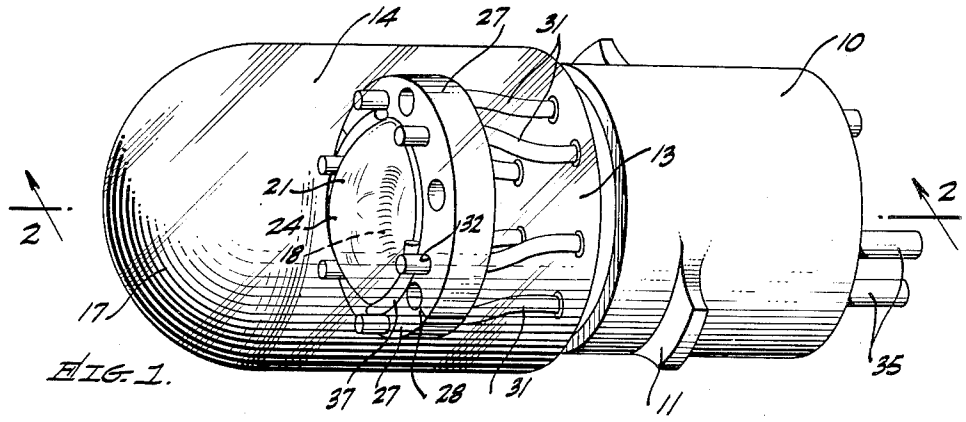



FIG. 1.

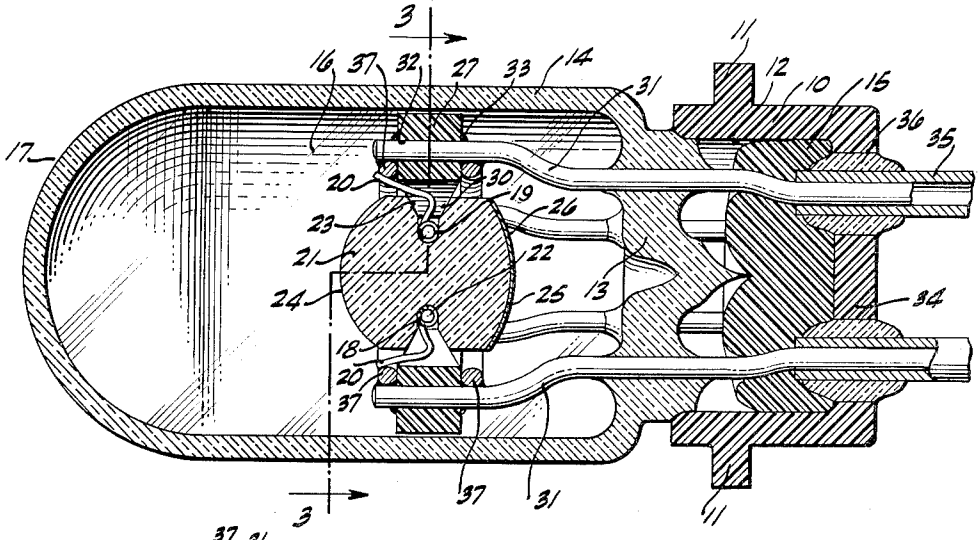



FIG. 2.

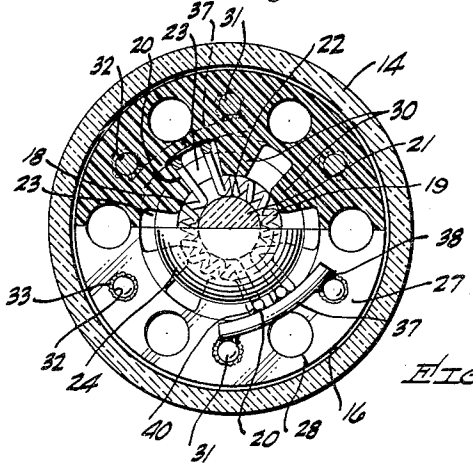



FIG. 3.

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# ACCELERATION AND VIBRATION RESISTANT LAMP

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5 Claims. (Cl. 313—110)

The present invention relates generally to projection lamps and relates more specifically to incandescent lamps that may be used in various devices utilizing an optical system in the projection of slides, motion picture films or other types of transparent or semi-transparent objects.

In projection type lamps the filament thereof being the most frangible portion is subject to damage or destruction under vibration conditions as may be encountered in aircraft or other moving vehicles. Attempts have been made toward protection of the filament against the damage of vibration, with these attempts having taken the form of heavier filament elements, shorter filament elements supported at various points and other like structures. These structures employed in the attempts to protect the filaments have required the use of larger, heavier structures, have produced light qualities that have been below optimum requirements and/or have produced uneven patterns of light and have therefore all been unsatisfactory for the present purposes. Additionally, physical support of filaments has been impractical due to the heating of these supports, associated destruction thereof and damage to the lamp, filament or other structures.

It is therefore one important object of the present invention to provide an improved incandescent projection lamp structure.

It is another object of the invention to provide an incandescent projection lamp structure having means for fully supporting a filament thereof.

A further object of the invention is to provide a lamp structure having a fully supported filament and means associated with the filament support for gathering, distributing and directing light produced by the filament.

Still another object of the invention is to provide an improved incandescent projection lamp structure having a simple, efficient and yet reliable supporting means for a circular filament.

Other and further important objects of the invention will become apparent from the disclosures of the following detailed specification, appended claims and accompanying drawing, wherein:

FIGURE 1 is a side perspective view of the present incandescent projection lamp;

FIG. 2 is a longitudinal sectional view of the lamp structure as taken substantially as indicated by line 2—2, FIG. 1, and

FIG. 3 is a transverse sectional view taken in a step fashion through the filament support and surrounding structure and as indicated generally by the line 3—3, FIG. 2.

With reference to the drawing, the lamp structure of the present invention includes a base 10 which may be made from any suitable preferably nonconductive material such as a plastic and which may include any desired means for connecting the lamp to an adjacent structure such as, for example, bayonet lugs 11. The base 10 has a recess 12 and is adapted to be mounted in association with an end portion 13 of a transparent envelope 14. In accordance with usual practice, the envelope 14 and end portion 13 thereof are secured in association with the base 10 by means of a suitable basing cement 15, this particular structure forming no part of the present invention. The envelope 14 may be of any suitable transparent material, such as glass, to enclose a space 16 that is evacuated in accordance with usual principles associated with the manufacture of lamps. The envelope 14 is further substantially elongated and semicircular as at 17, there being a considerable area within the space 16, whereby to improve the bulb life through disposition of inner surfaces at a substantial distance from the lamp filament, thus to reduce blackening effects caused by normal evaporative tendencies of the filament.



As shown, a filament, in the form of a pair of semicircular segments 18 and 19 having leads 20, is carried by a combination optical element and filament carrier 21. The carrier 21 is preferably made from a transparent material that will withstand high temperatures, this material being quartz, fused aluminum oxide, sapphire or other similar substances. The carrier 21 has an annular groove 22 therein and in which the filament segments 18 and 19 are positioned. A V-shaped annular groove 23 is provided radially outwardly from and intersects with an outer periphery of the groove 22. The optical element and filament carrier 21 may also be optically ground on both axial ends as at 24 and 25 and the rearward end surface 25 may be coated with a suitable reflective coating as at 26, in order to provide light gathering and distributing functions in combination for a physical support for the filament segments.

With reference to FIGS. 2 and 3, an outer support element 27 is provided within the envelope 14, the support element 27 comprising an annular ring of a high temperature, nonconductive material such as ceramic, for example. The support element 27 is preferably made in segments joined as at 28 and radially outwardly surrounds the optical element and filament carrier 21. The support element 27 further includes a plurality of circumferentially spaced, inwardly directed projections 30 that are tapered in cross section and conform to the shape of the V-shaped groove 23 in the carrier 21. The projections 30 serve to confine the outer periphery of and to retain the coils of the filament segments 18 and 19 in the groove 22.

The outer support element 27 is retained in position within the envelope 14 by means of a plurality of rod-like supports 31 that are secured in suitable openings 32 in the element 27 and fused thereto as at 33. The supports 31 extend through the base portion 13 of the envelope 14, through the basing cement 15, have at least a portion thereof extending outwardly through a bottom wall 34 of the base 10 and are connected to suitable pins or the like 35 through which electrical connection may be made. The pins 35 are mounted in the wall 34 as by suitable cement 36.

Pairs of the portion of the supports 31 through which electrical energy is transmitted are connected by means of tie bars or stays 37 that are short segmented wire-like elements that are secured to the support pairs as by welding or the like as indicated at 38. Additionally, the leads 20 extending from the filament segments 18 and 19, are also secured to the bars 37 as by welding indicated at 40.

It may thus be seen that the coiled filament segments 18 and 19, having the shape of a circle, is insensitive to any particular axis of acceleration or vibration loading and is additionally retained and fully supported by means of the optical element and carrier 21. The spherical surfaces 24 and 25 on the carrier serve to gather the light produced by the filament segments 18 and 19, reflect this light from the surface 25 and thereafter refract the light in passage through the surface 24 in such a manner as to provide a light spot lying on the optical center line of the carrier 21, thereby converting a major portion of the available light energy into useful light output. This gath-

ering and directing of all the available light rays from the incandescent filament segments 18 and 19 results in a highly efficient projection lamp. The filament carrier is also supported and anchored to the lamp base and, due to the high natural frequency of this type of mounting, coupled with the supported filament, the lamp of this invention is therefore suitable for applications wherein high acceleration and vibration conditions are encountered. It is further to be noted that the filament carrier is attached to the base with a minimum amount of overhang, thereby increasing resistance of this structure to shock and vibration.

Having thus described the invention and the present embodiment thereof, it is desired to emphasize the fact that many modifications may be resorted to in a manner limited only to a just interpretation of the following claims.

We claim:

1. In an incandescent projection bulb: a transparent envelope; a ring shaped support element disposed within said envelope and spaced from an inner wall thereof; a plurality of radially inwardly directed projections depended from said support element; means for securing said support element in said envelope; a plural segments filament mounted concentrically within said support element; and a substantially transparent filament support carried by said projections of said support element, said filament support and said projections being disposed in contact with and substantially completely enclosing relationship about said filament.

2. An incandescent projection bulb comprising, in combination: a base structure; a transparent envelope mounted on said base structure; a support element disposed within said envelope; means for securing said support element in position within said envelope; an optical element mounted on said support element; said optical element having a peripheral groove; a composite filament positioned in contact with and carried by said groove in said optical element; and means for conducting electrical energy to said filament, said conducting means including a portion of said securing means.

3. An incandescent projection bulb comprising, in combination: a base structure; a transparent envelope mounted on said base structure; an annular ring shaped support element disposed within said envelope; means



for securing said support element in position within said envelope; an optical element mounted concentrically within said support element; said optical element having a peripheral groove; a composite filament positioned in contact with and carried by said groove in said optical element; and means for conducting electrical energy to said filament, said conducting means including a portion of said securing means.

4. A projection bulb comprising: a base structure; a transparent envelope mounted on said base structure; a support element disposed within said envelope; rod means for securing said support element in position within said envelope and in spaced relationship to an inner wall thereof; an optical element mounted on said support element; a composite filament positioned in contact with and carried by said optical element; and means comprising a portion of said rod means for conducting electrical energy to said filament, said optical element having a coated reflecting surface and being positioned with an axis thereof coincident with an axis of said envelope.

5. An incandescent projection bulb comprising, in combination: a base structure; a transparent envelope mounted on said base structure; an annular ring shaped support element disposed within said envelope; rod means for securing said support element in position within said envelope and in spaced relationship to an inner wall thereof; an optical element mounted concentrically within said support element; said optical element having a peripheral groove; a composite filament positioned in contact with and carried by said groove in said optical element; and means comprising a portion of said rod means for conducting electrical energy to said filament, said optical element having a coated reflecting surface and being positioned with an axis thereof coincident with an axis of said envelope.

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