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[21] Appl. No. **622,290**
[22] Filed **Mar. 10, 1967**
[45] Patented **Jan. 12, 1971**
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[54] **INCANDESCENT LAMP**
5 Claims, 3 Drawing Figs.

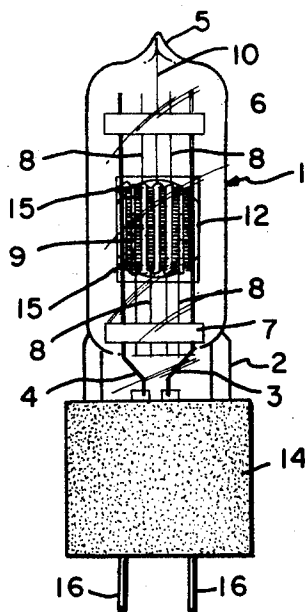
[52] U.S. Cl. **313/113,**
313/115, 313/273, 313/315
[51] Int. Cl. **F21v 7/02,**
H01k 1/18, H01k 7/02
[50] Field of Search. **313/113E,**
222, 115, 272, 273, 274, 275, 277

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ABSTRACT: A single-ended quartz-halogen lamp which includes a vitreous glass envelope containing a halogen for regeneratively gettering tungsten particles which evolve from the filament and a reflector disposed behind the filament and inside of the lamp.



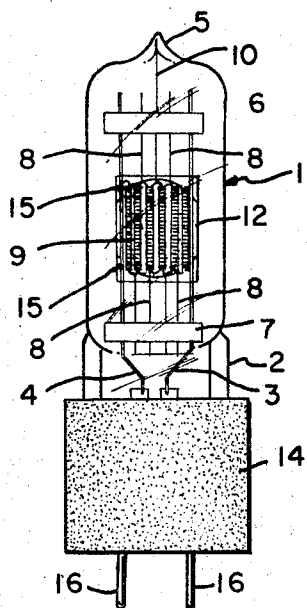


FIG. 1

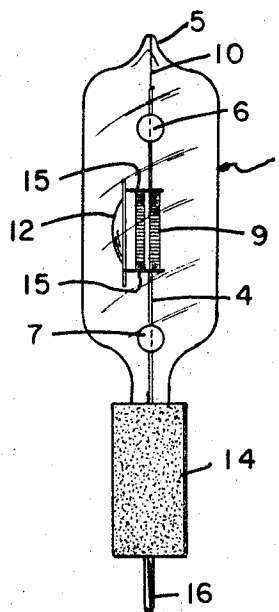


FIG. 2

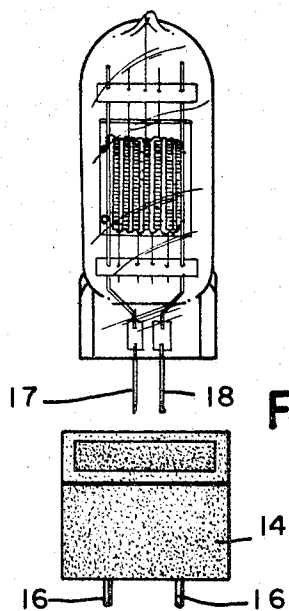


FIG. 3

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INCANDESCENT LAMP

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to incandescent lamps and particularly to those which include a halogen disposed within the envelope. More particularly, this invention relates to such devices in which the envelope is formed of a high silica glass, preferably quartz, and a reflector is disposed within the envelope, adjacent to the filament and adapted to reflect the light.

2. Description of The Prior Art

In the prior art, incandescent lamps containing halogens have previously been described. Moreover, incandescent lamps having internal reflectors are also known. The latter, however, were not designed to be operated with halogen fills and the internal supports for the filament and the reflector were not designed to be operated at the temperatures of the quartz-halogen types.

SUMMARY OF THE INVENTION

Quartz-halogen lamps are of a small and compact size when compared to ordinary incandescent lamps. They are highly efficient, frequently in excess of 20 lumens per watt, and can have a better maintenance and longer life than ordinary incandescent lamps. In the operation of the lamp, when the filament incandesces, tungsten atoms evaporate from the surface. The halogen, preferably iodine, reacts with these atoms which would normally deposit on the envelope wall. The tungsten and halogen atoms react in the zone between the filament and the bulb wall to form a tungsten iodide compound which migrates towards the incandescing filament and decomposes into tungsten and free iodine. The tungsten atoms deposit upon the filament and the iodine is freed to begin the cycle anew.

In the particular type of lamp which we describe in this application, a polished, refractory metal reflector, preferably of a concave configuration, is mounted directly behind the filament. Through the use of the particular type of support structure herein described, the regenerative getter cycle of the iodine can be used to achieve the high efficiency of quartz-halogen lamps while still attaining the optical advantages of the internally mounted reflector.

According to the present invention, a biplanar filament is pendantly disposed upon a bridge, the latter including a pair of spaced-apart, parallel quartz rods, the axes of which are aligned substantially intermediate and parallel to the two planes of the biplanar filament. The rods are disposed outside the filament area. Disposed within each of the quartz rods at each end thereof and orthogonal to their axes are a pair of rigid, parallel conductor rods which space them from each other. The ends of the filament are attached in an electrical conducting relationship with the rods which in turn pass through the envelope to an outside power source. The end of at least one of the upper support wires extends into a residual fused tip of an exhaust tube located at the top of the envelope so that the entire internal structure is fairly rigid.

A reflector is located behind the filament and arranged so as to be electrically insulated from one end thereof while reflecting the maximum amount of light produced. The reflector is disposed upon one of the conductor rods.

DESCRIPTION OF THE DRAWING

FIG. 1 is a front elevational view of a preferred embodiment of the lamp according to the present invention.

FIG. 2 is a side elevational view of the lamp of FIG. 1.

FIG. 3 is a perspective view of the lamp shown in FIG. 1 with the base separated from the lamp envelope.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1 of the drawing, a lamp is shown which includes a quartz envelope 1, press sealed according to

conventional techniques at the lower end. A pair of support rods 3 and 4 extend at one end into the press seal 2 and at the other end into the envelope. The support rods flare out near the press seal from the axis of the envelope 1 and thence again vertically so as to be adjacent, but not touching, the wall. Internally, the support rods 3 and 4 pass through lower quartz rod 7 and upper quartz rod 6 at points adjacent their ends. Each of the quartz rods 6 and 7 is substantially parallel to the other and has its axis in the same plane. The axes of the quartz rods 6 and 7 are substantially orthogonal to the axis of the envelope.

Disposed between the support rods 3 and 4 and partially embedded within the quartz rods 6 and 7 are retaining wires 8. The retaining wires preferably are substantially parallel to the support rods 3 and 4. Preferably the innermost ends of the retaining wires 8 have small hooks which engage uncoiled loop sections of a pendantly disposed biplanar filament 9. Each end of the filament 9 respectively engages each of the support rods 3 and 4 so that a potential can be established across the filament.

One of the retainer wires 10 may extend upwardly from the upper quartz rod 6 into a residual fused tip 5 of an exhaust tube; however, if desired, a separate wire may be used. Generally, retainer wire 10 is substantially coaxial with the axis of envelope 1. If desired, the free ends of the support rods 3 and 4 and the retainer wires 8 (except retainer wire 10) which pass through the upper quartz rods 6 may be removed.

As mentioned above, the biplanar filament 9 is pendantly supported within the lamp by retainer wires 8 which engage uncoiled loop sections. The sections of the filament 9 which are disposed between the loop sections are positioned substantially in a side-by-side relationship in two parallel planes to form a generally square shaped grid.

Closely disposed behind the filament 9 is a reflector 12 which is attached to one of the support rods but spaced from the remainder of the internal structure. Preferably, the reflector is fabricated of a refractory metal such as tungsten, molybdenum or tantalum so as to withstand the temperature of 2,600 to 3,400° Kelvin generally associated with the incandescent filament. Each of these metals has high melting points and is reflective even at the high operating temperatures.

Preferably the reflector 12 is spheroidal or ellipsoidal in shape; however a flat plate can be advantageously used in some applications. With the preferred shapes the light emanating rearwardly from the incandescing filament 9 is reflected back through the filament 9 towards the front of the lamp.

A base 14 of any desired configuration and of conventional materials is attached to the lower end of the lamp about the press seal 2. A pair of connectors 16 extend from the base 14 so as to provide electrical contacts for the support rods 3 and 4 of the lamp. The base should be designed so that it will easily fit into a socket in only one position so that the reflector 12 will always be disposed behind the filament 9 with respect to the surface upon which the light will be directed. Frequently with this type of base, a centering pin can be disposed thereon so as to align the lamp in one position in the socket.

Referring now to FIG. 2, the internal structure of the lamp is shown. The support rod 4, one end of which is embedded in press seal 2, passes upwardly into the envelope 1 through lower quartz rod 7 and upper quartz rod 6. Reflector 12 is mounted behind filament 9 which is disposed in two planes, preferably on each side of support rod 4. A pair of rods 15 are attached at one end to support rod 4 at the other end to the reflector 12. Rods 15 rigidly hold the reflector at a predetermined distance behind filament 9 so that the optics of the lamp can be fixed.

As shown in FIG. 3, the lamp of FIGS. 1 and 2 is inserted in a conventional refractory material base 14 so that lead-in wires 17 and 18 extend into connectors 16 and are welded thereto. A basing cement (not shown) holds the lamp rigidly in place. Other bases, adapted to other types of sockets can be substituted for the illustrated base, as desired.

In the manufacture of this lamp, preshaped support rods 3 and 4 together with retaining wires 8 and 10 are mounted in a suitable holding or forming device. A quartz rod of suitable length and diameter is heated to softening, generally between 1,500 and 2,000° C., and then quickly impressed upon the elements so that the quartz-rod flows around each wire. Greater flow of quartz occurs at the edges of the rod than at the center so that the cross-sectional shape perpendicular to the axis is substantially uniform. When the rod cools, the wires are held securely. A similar operation is repeated (or may be done simultaneously) with the other quartz rod for the lamp.

Preferably, a pair of molybdenum foil sections are disposed at the end of the rods and lead-in wires, in turn, are attached to the molybdenum foil sections.

The filament is then strung upon the bridge by attaching uncoiled loop sections to the wire retainers and the ends are attached to the support rods. The reflector can then be attached to one of the support rods.

The internal assembly is then inserted into a tubular quartz glass envelope having an exhaust tube disposed at the top. The open end of the quartz tube is then heated to the softening point and physically squeezed to form a hermetically tight press seal about the support rods, the molybdenum foil sections and the lead-in wires.

After evacuation of the envelope, a predetermined quantity of nitrogen and iodine are added to the lamp through the exhaust tube which is then sealed.

It is apparent that modifications and changes can be made within the spirit and scope of the instant invention, but it is our intention only to be limited by the appended claims.

We claim:

1. An incandescent projection lamp comprising: a quartz

glass envelope having a press seal at one end thereof and an exhaust tube tipoff at the opposite end and containing halogen; a pair of parallel tungsten support rods extending along a plane parallel to the axis of said envelope but spaced therefrom, the lower ends of said support rods being disposed and supported in said press seal; an upper quartz rod and a lower quartz rod orthogonally disposed upon and fastened to said support rods and spacing them from each other, each of said support rods extending through each of said quartz rods; at least one support wire extending from each of said quartz rods, said support wires extending towards the center of said envelope; a filament disposed between said upper quartz rod and said lower quartz rod and supported therebetween by said support wires, each end of said filament being attached to one of said support rods; a reflector disposed behind said filament and fastened to one of said support rods; means to connect said support rods to a power supply.

2. The lamp according to claim 1 wherein a support wire extends upwardly from said upper quartz rod into said exhaust tube tipoff, but is not fastened thereto, whereby the positioning of the structure is stabilized.

3. The lamp according to claim 1 wherein the filament is disposed in two planes, one behind the other.

4. The lamp according to claim 3 wherein said support wires have hooks disposed upon the inwardly directed end and as said hooks are seated in uncoiled loop sections of the filament.

5. The lamp according to claim 1 wherein the lower ends of the support rods are bent inwardly towards the axis of the lamp and thence bent again at a location above the press-seal area in a direction substantially parallel to the axis of said lamp.

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