Nov. 28, 1967 R. F. REED, SR 3,355,619

INCANDESCENT LAMP

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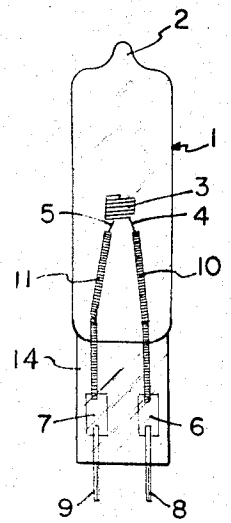

FIG. 1

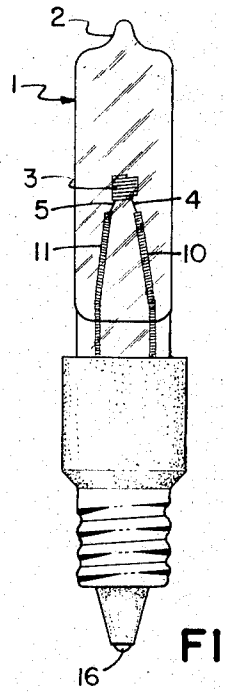

FIG. 2

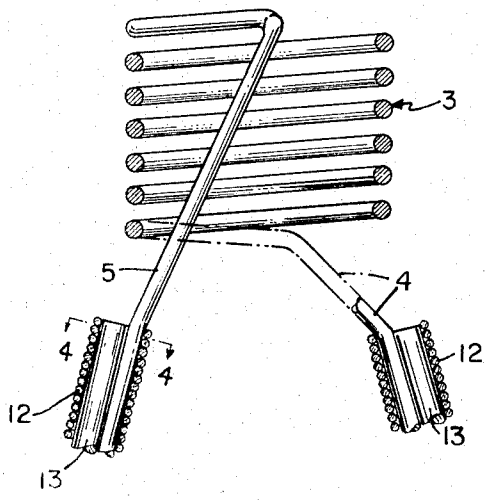

FIG. 3

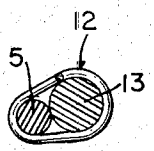

FIG. 4

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INCANDESCENT LAMP

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This invention relates to lamps having tungsten filaments enclosed in envelopes, the latter usually being of fused quartz or other suitable glass. Such devices are generally called iodine or iodine-quartz lamps. More particularly this invention concerns a single ended iodine lamp having a means to improve electrical contact and reduce resistance of an incandescent filament and its cooperating lead-in wires.

Incandescent lamps having quantities of iodine in the envelope are known to the art. Such lamps operate on a tungsten-iodine cycle which is a regenerative, continuing process in which tungsten iodide is produced when the iodine combines chemically with particles of tungsten evaporating from an incandescing tungsten filament. Subsequent thermal decomposition of this compound replaces the tungsten particles on the filament. In conventional filament lamps, not containing controlled quantities of iodine, these particles are deposited on the envelope, thus gradually causing a loss of light output due to "blackening." Rupturing of the filament may occur when a sufficient quantity of tungsten particles evaporates and the lamps must be replaced. However, the iodine-tungsten cycle eliminates lamp blackening and reduces lamp outage by its getter action.

The iodine, together with the heat of the lamp, prevents the tungsten from accumulating on the lamp envelope and darkening it. As the vaporized tungsten iodide circulates back into the area of the incandescent filament, the intense heat of the filament frees the tungsten from the tungsten iodide by thermal decomposition and this tungsten is deposited back on the filament, leaving the iodine free to begin a new cycle. Theoretically, if the evaporating tungsten particles could be returned to the filament in a perfectly even coating, the lamp might never burn out. But since there is no way to control exactly where the tungsten particles return to the filament, one spot will eventually wear out, thus rendering the iodine-quartz lamp inoperative. This condition, however, occurs after operation in the order of hundreds of hours and possibly even thousands of hours before lamp failure. Furthermore, during the life of an iodine lamp the maintenance of light output is substantially constant.

In single-ended incandescent lamps, it has become necessary to position the filament fairly centrally within the envelope in order to produce the regenerative-getter action mentioned previously. Such positioning requires rather long legs. If they are the legs of the filament, when current is applied they will incandesce. Because the incandescence is not located in about the center of the lamps, the regenerative-getter action of the iodine will not occur evenly and the lamp will fail prematurely.

I have discovered that such failure can be avoided by placing a support leg along the filament leg and then tying the two together with a minor coil of wire extending along their length. In this manner, the resistance of the filament will be decreased on the legs and they will not incandesce. Only the coiled section of the filament which is substantially centrally positioned will incandesce. Preferably, the coil of wire is ovoidly shaped so that a firm connection between the lead-in wire and the support will be attained.

An object of this invention is to reduce resistance of lead-in wires of filament legs in quartz-iodine lamps.

Another object of this invention is to prevent lead-in

wires or legs of filaments from incandescing during operation of the lamp.

Another object of this invention is to increase the stability and rigidity when centrally positioning a tungsten filament in quartz-iodine lamps.

A feature of my invention is disposing a support leg along the filament leg and then tying it together with a minor coil of wire extending along their length.

The many other objects, features and advantages of my invention will become manifest to those conversant with the art upon reading the following specification when taken in conjunction with the accompanying drawings.

Of these drawings:

FIGURE 1 is an elevational view of a quartz-iodine lamp having a single end. A coiled filament is positioned substantially in the center of the envelope.

FIGURE 2 is an elevational view of the lamp shown in FIGURE 1 with a ceramic screw type base disposed at the bottom of the envelope and in electrical contact with the lead-in wires of the lamp.

FIGURE 3 is an enlarged view of the filament together with a support leg and filament leg a minor coil wrapped around both.

FIGURE 4 is a cross-section taken along the lines 4—4 of FIGURE 3 illustrating the support leg and the filament leg wrapped by a minor coil.

Referring to FIGURE 1 of the drawings, the lamp includes an exterior envelope **1** with a tip-off **2** from a residual exhaust tube (not shown). A conventional press seal **14** is disposed in the bottom of the envelope. Substantially centrally disposed within the envelope is a coiled filament **3** with filament legs **4** and **5** extending downwardly therefrom. These legs extend into the press seal and are electrically connected to a pair of molybdenum foil sections **6** and **7**. A pair of lead-in wires **8** and **9** are attached to the molybdenum foil sections **6** and **7** and extend outside of the press seal **14** and the lamp.

Wrapped around the filament legs **4** and **5** are minor coils **10** and **11** which extend the entire length of the filament legs **4** and **5** into the press seal **14** and are spot welded to the molybdenum foil sections **6** and **7**. An internally disposed support leg (not shown) extends from the beginning of the minor coil to the end.

Referring now to FIGURE 2 of the drawings, the elements described with reference to FIGURE 1 are similarly shown. A ceramic base for the lamp is disposed about the end of the press seal and attached thereto with a high temperature cement. A conventional screw-type base can be disposed about the ceramic, the shell being in electrical contact with one of the lead-in wires from the filament **3**. An electrical contact **16** is disposed at the bottom of the ceramic base and in electrical contact with the other filament legs.

Referring now to FIGURE 3, the coiled filament **3** has a series of turns with one filament leg **5** extending centrally therein, in the preferred modification. Another filament leg **4** extends from the bottom of the filament **3**. Disposed around the lower end of the filament leg **5** is a minor coil **12** which holds a support leg **13** tightly. Preferably, the minor coil **12** is of an ovoid shape and the diameter of the support leg **13** is larger than the diameter of the filament leg **5**. The minor coil **12**, the support leg **13** and the filament leg **5** extend together downwardly to the molybdenum section ribbon as shown in FIGURE 1. Ovoid shaped minor coils such as shown in FIGURE 4, are preferred due to the manufacturing techniques which are used for their fabrication as will be discussed hereinafter. Construction of the minor coil around the filament leg **4** is similar to that of leg **5**.

In the manufacture of the lamp, a controlled quantity

of iodine is added to the envelope by techniques such as shown in the U.S. patent to Audesse, No. 3,063,778.

When manufacturing the minor coil, two mandrels are disposed against each other. These mandrels are of different diameters, the larger of them being made of tungsten. The smaller of the mandrels is of a different material, such as molybdenum. A coil of wire is wrapped around the two mandrels and the assembly is cut into appropriate lengths after winding. After cutting, the molybdenum mandrel is dissolved by placing the assembly in an acid bath. Such acid treatment removes the molybdenum mandrel but leaves the tungsten one untouched, which being larger is locked into position. A minor coil having an ovoid shape is produced with a tungsten mandrel enclosed within it. Preferably a molybdenum mandrel having the same diameter as the filament legs of the coiled filament is used. When fabricating the lamp, the filament legs are forced into the space left by the removed molybdenum mandrel. When the filament legs have been inserted, the assembly is welded or swaged together. Each of the minor coils is welded to a molybdenum foil section and lead-in wires are attached. The assembly is then press sealed within the envelope using conventional techniques to fabricate the lamp.

When the lamps are fabricated in the manner such as described above, the electrical contact will be improved and the electrical resistance in the area of the minor coil will be reduced, hence reducing the voltage drop between the coil and the leg. On certain lamps of relatively high current and low voltage this voltage drop becomes important since it is such a large percent of the whole. Moreover, the lamp is much stronger because the minor coil and support leg produces additonal stability.

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

As my invention I claim:

1. An incandescent lamp comprising: a quartz envelope; a single wire tungsten filament disposed within said envelope; said filament having a coiled body and substantially straight legs; at least one support leg disposed alongside of said filament legs; a minor coil wrapped about said support leg and said filament leg to tie the two together; a fill including iodine.

2. The lamp according to claim 1 wherein said minor coil is ovoidly shaped and the diameter of one of said legs is smaller than the other.

3. The lamp according to claim 2 wherein said minor coil and said support leg extend substantially the entire length of the filament legs.

4. The lamp according to claim 3 wherein said minor coil is spot-welded to a molybdenum foil section, said molybdenum foil section being disposed within a press-seal which encloses the envelope.

5. An incandescent lamp comprising: a quartz envelope, a single wire tungsten filament disposed within said envelope; said filament having a coiled body and two substantially straight legs extending therefrom downwardly substantially parallel to each other; a support leg disposed alongside each of said filment legs; two minor coils, each of said minor coils being wrapped around said support legs and said filament legs to tie them together; a press seal disposed at one end of said glass envelope, said tied support legs and filament legs extending into said press seal; a fill including iodine.

6. The lamp according to claim 5 wherein said minor coil is ovoidly shaped and the diameter of one of said legs is smaller than the other.

7. The lamp according to claim 6 wherein said minor coil and said support leg extend substantially the entire length of the filament legs.

8. The lamp according to claim 7 wherein said minor coil is spot welded to a molybdenum foil section; said molybdenum foil section being disposed within said press seal.

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