United States Patent

Notelteirs

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[54] ELECTRIC INCANDESCENT LAMP WITH AN IMPROVED PINCH SEAL

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[52] **U.S. Cl.**.....**313/332,** 174/50.61, 174/50.64, 287/189.36 D, 313/331

[51] **Int. Cl.**.....**H01j 5/52**

[58] **Field of Search**.....174/50.61, 50.64; 287/189.365; 313/331, 332

[56] **References Cited**

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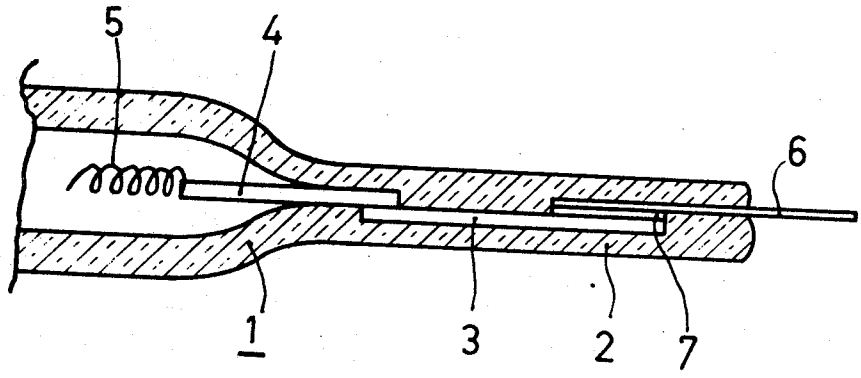
[57] **ABSTRACT**

An electric incandescent lamp, having a quartz bulb provided with at least one pinch seal, has substantially reduced cracking of the pinch seal during operation of the lamp by the interposition of a foil of vanadium or vanadium alloy between the usual thin foil molybdenum connection to the wire-type current conductors of the lamp.

3 Claims, 2 Drawing Figures



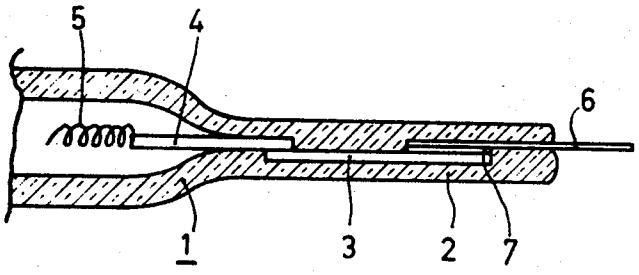


Fig.1

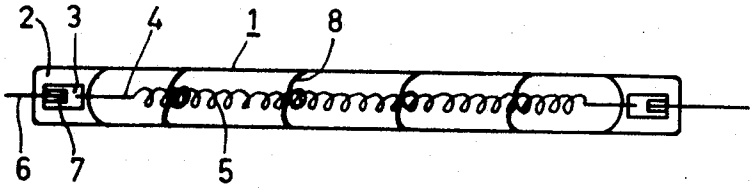


Fig. 2

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ELECTRIC INCANDESCENT LAMP WITH AN IMPROVED PINCH SEAL

The invention relates to an electric incandescent lamp having a quartz bulb provided with at least one pinch in which current conductors formed by a thin foil portion of molybdenum connected at both ends to wire-shaped conductors are sealed at least by the thin foil portion.

When lamps of this kind are employed in copying apparatus, in which in operation the lamps are regularly switched on and off for a few seconds over a fairly long period of time, cracking of the pinch material often occurs. In most cases this means that the lamp can no longer be used.

With lamps of this kind the pinch temperature remains, in operation, below about 300° C, that is to say below the temperature at which molybdenum oxidizes in air. Cracking of the pinch material is therefore not due to stesses produced by oxidation of the molybdenum but has to be attributed to a locally excessively high current density in the metal parts in the pinch, particularly in the junction between the wire-shaped conductor and the thin foil portion of molybdenum. At this junction very high temperatures may occur. Owing to unequal expansions of the pinch materials stresses occur which may give rise to cracking of the pinch.

The invention has for its object to provide a lamp structure in which this phenomenon is avoided.

According to the invention a lamp in which this detrimental effect does not occur is characterized in that the wire-shaped conductor located outside the bulb is welded to the molybdenum foil with the interposition of a foil of vanadium or a vanadium alloy.

The foil of vanadium or a vanadium alloy may have a thickness lying between 10 and 50 μ. Suitable vanadium alloys are alloys of vanadium with about 0.1 to about 10 percent of molybdenum, tungsten, zirconium or hafnium.

The use of the intermediate vanadium foil provides a reduction of the transitional resistance at the weld.

This phenomenon might be accounted for by the fact that the oxide skin at the surface of the areas to be welded dissolves in the intermediate foil so that it can no longer give rise to locally high transitional resistances.

With reference to the accompanying drawing, in which FIG. 1 is an enlarged cross sectional view of the pinch of a lamp embodying the invention and FIG. 2 shows one embodiment of the lamp in accordance with the invention, the invention will now be described more fully.

Referring to FIG. 1, reference numeral 1 designates the quartz bulb of a halogen incandescent lamp; the bulb 1 has a pinch 2, in which a strip of a molybdenum foil 3 is sealed. At one end this strip 3 is welded to a current conductor 4, which in turn is fastened to the tungsten helix 5. At the other end the molybdenum foil 3 is fastened to the current conductor 6, by means of which the lamp can be connected to a current source. The current conductor 6 is welded to the molybdenum strip 3 with the interposition of a foil 7 of vanadium.

FIG. 2 shows a so-called copying lamp. The numerals in the Figure have the same meaning as in FIG. 1, 8 designates helical stays for the tungsten helix 5. The foil 3 has a length of 9 mms, a width of 4 mms and a maximum thickness of 35 μ. The conductor 6 of molybdenum has a diameter of 0.6 mm.

With a lamp of the kind shown suitable for a voltage of 230 V and a load of 1,500 W the pinch temperature rises to about 100° C, when this lamp is switched on for 3 seconds and switched off for 12 seconds over a longer period of time. If no particular precautions are taken, about 30 percent of the lamps will show cracking of the pinch before the lamp has been switched on and off 50,000 times.

If a foil of vanadium or a vanadium alloy of a thickness of 10 μ is arranged between the molybdenum strip and the conductor 6 no defects of the said kind occur any longer.

What is claimed is:

1. An electric incandescent lamp comprising a quartz bulb provided with at least one pinch seal; at least two current conductors included within said seal, each of said current conductors including a thin foil portion of molybdenum connected at one end to an internal wire-type conductor and at the other end to an external wire-type conductor, said foil portion being within said pinch seal; and a foil of vanadium being interposed between the external wire conductor and said molybdenum foil, said molybdenum foil being welded to the external conductor with said vanadium foil so interposed.

2. The lamp according to claim 1 wherein said interposed foil is of a vanadium alloy.

3. The lamp of claim 2 wherein the interposed foil consists of a vanadium alloy containing 0.1 to 10 percent of molybdenum, tungsten, zirconium or hafnium.

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