United States Patent

Bolt

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[54] ELECTRICAL DISCHARGE LAMP

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[52] **U.S. Cl.** **313/217**, 313/184, 313/214, 313/218

[51] **Int. Cl.** **H01j 17/04**

[58] **Field of Search** 313/184, 214, 217, 218; 314/34

[56] **References Cited**

UNITED STATES PATENTS

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[57] **ABSTRACT**

An electrical discharge lamp comprising a light transmissive envelope containing a pair of electrodes and an ionizable atmosphere, the electrodes being spaced-apart axially of each other internally of the envelope and forming an arc gap therebetween, one of the electrodes being a cathode and the other electrode being an anode, a link wire electrically bridging the anode and cathode, one end portion of the wire being welded to the cathode, the other end portion of the wire being welded to one metal component of a composite bimetallic tab, and the tab being weld-bonded to the anode with the metal component to which the wire is welded being positioned adjacent the anode surface.

7 Claims, 3 Drawing Figures

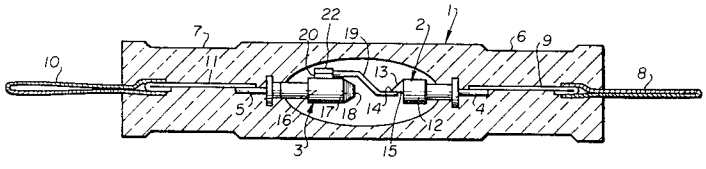


FIG. 1

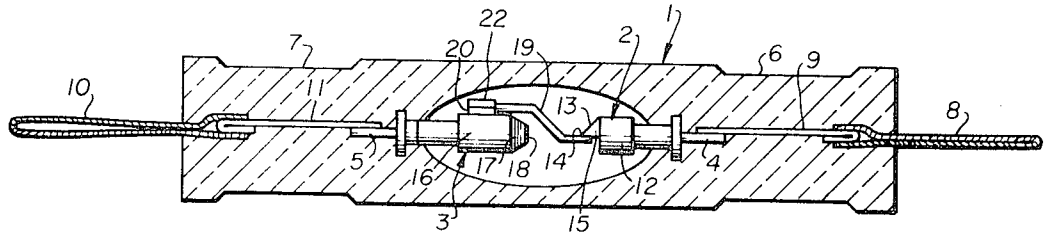


FIG. 2

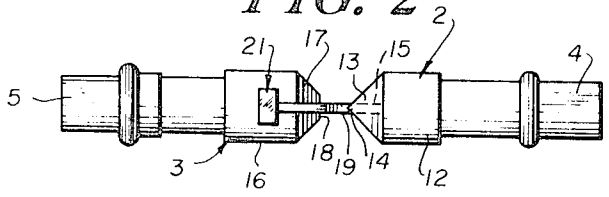
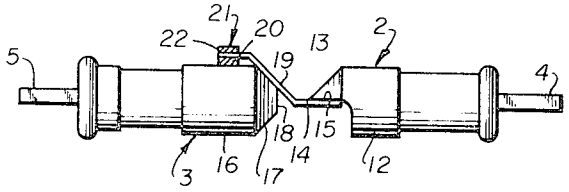


FIG. 3



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ELECTRICAL DISCHARGE LAMP

BACKGROUND OF THE INVENTION

In most conventional electrical discharge lamps of the compact source type, the electrodes are made of tungsten or thoriated tungsten. For some applications it is required that a small and very highly loaded compact source lamp be started only once during its lifetime. In order to avoid the use of a heavy and costly starter, the lamp is usually started by burning out a link wire connected between the two electrodes. This wire is of necessity thin, e.g. 0.005 inch diameter and is usually composed of tantalum to facilitate spot welding and not interfere with the operation of the lamp. However, the energy required to spotweld this wire to the more massive electrodes, especially a tungsten anode, causes it to become embrittled and often to break during the electrode sealing-in process.

SUMMARY OF THE INVENTION

The invention deals with an electrical discharge lamp of the compact arc type comprising a light transmissive envelope containing an ionizable atmosphere and a pair of electrodes spaced-apart axially of each other internally of the envelope and forming an arc gap of less than 1 centimeter therebetween, one of the electrodes being a tantalum cathode and the other electrode being a tungsten anode, a tantalum link wire electrically bridging the anode and cathode, one end portion of the wire being welded to the tantalum cathode, the other end portion of the wire being welded to a tantalum component of a composite bimetallic molybdenum-tantalum tab, and the tab being weld-bonded to the tungsten anode with the tantalum tab component being positioned adjacent the anode surface and welded thereto.

DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a partly cross-sectional and partly elevational side view of an electrical discharge lamp according to the invention,

FIG. 2 illustrates an enlarged top view of the electrode components of FIG. 1, and

FIG. 3 illustrates a side view of FIG. 2 with a tab member thereof shown in cross section.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, the electrical discharge lamp of the invention comprises an elongated light transmissive fused quartz envelope 1 containing an ionizable atmosphere, e.g. xenon, and a pair of electrodes 2 and 3 spaced-apart axially of each other and forming an arc gap of less than 1 centimeter therebetween. The electrode 2 is a tantalum cathode. The electrode 3 is a tungsten anode. The tantalum cathode is provided with an extension 4 extending rearwardly therefrom and the tungsten anode is provided with an extension 5 extending rearwardly therefrom. The envelope 1 is provided with seal stem portions 6 and 7 axially positioned on opposite ends of the envelope. The seal stem 6 is provided with a lead-in conductor 8 connected to one end of a vacuumtight seal strip 9, e.g. of molybdenum, the other end of which is connected to the extension 4 of cathode 2. Portions of the lead-in conductor 8, the seal strip 9, the extension 4 and a portion of the cathode are embedded by said seal stem 6. The seal stem 7 is provided with a lead-in conductor 10 connected to one end of a vacuumtight seal strip 11, e.g. of molybdenum, the other end of which is connected to the extension 5 of anode 3. Portions of the lead-in conductor 10, the seal strip 11, extension 5 of the anode and a portion of the anode are embedded by said seal stem 7.

The cathode 2, as particularly illustrated, comprises a head portion 12, positioned in the arc chamber of the envelope 1, having a hemiconical nose 13 with its apex 14 directed axially

toward the anode 3. The flat portion 15 of the hemiconical nose 13 is positioned at the common axis of the anode and cathode.

The anode 3, as particularly illustrated, comprises a head portion 16, positioned in the arc chamber of envelope 1, having conical nose 17 with a flattened end face 18 facing the apex 14 of the cathode 2.

A link wire 19 composed of tantalum bridges the arc gap between anode and cathode and has one end portion thereof welded to the flat surface 15. The opposite end portion of the wire is first welded to a tantalum component 20 of a molybdenum-tantalum bimetallic tab 21 with the molybdenum component indicated at 22. The composite tab 21 is welded to the anode. The cathode is provided with a hemiconical nose having a flat surface at the common anode-cathode axis for the purpose of insuring against migration of the arc after ignition of the lamp with the attendant fusion and breakage of the link wire 19. In this manner the arc is insured centered stabilization.

In securing the link wire to the anode, it would be disadvantageous to weld the thin tantalum wire directly to the comparatively massive higher melting point tungsten anode because the welding operation would cause the thin link wire to become embrittled and to break during the electrode sealing-in process. The tantalum wire, therefore, is first welded to the weld-compatible tantalum thin strip component 20. If this thin strip were to be directly welded to the tungsten anode, there would be a tendency for it to weld and stick to the welding tip. Therefore, a thin molybdenum strip is placed over the tantalum strip to provide a bimetallic tab with the molybdenum strip positioned between the tantalum strip 20 and the welder electrode. In this manner both components of the bimetallic tab 21 are welded together and simultaneously the tantalum component 20 is welded to the tungsten anode 3. Alternatively, the bimetallic tab may be first welded together and then spotwelded to the anode.

Various modifications of the invention are contemplated within the scope of the appended claims.

I claim:

1. An electrical discharge lamp comprising a light transmissive envelope containing an ionizable atmosphere and a pair of electrodes spaced-apart axially of each other, one of the electrodes being a cathode and the other electrode being an anode, a link wire electrically bridging the anode and cathode, one end portion of the wire being welded to the cathode, the other end portion of the wire being welded to one metal component of a composite bimetallic tab, and the tab being weld-bonded to the anode with the metal component to which the wire is welded being positioned adjacent the anode surface.

2. An electrical discharge lamp according to claim 1, wherein the cathode comprises a head portion having a hemiconical nose with the apex thereof directed toward the anode, a substantially flat surface on the nose positioned at a common longitudinal axis of the anode and cathode, and an end portion of the link wire being welded to said substantially flat surface.

3. An electrical discharge lamp according to claim 1, wherein the link wire is composed of tantalum.

4. An electrical discharge lamp according to claim 1, wherein the anode is composed of tungsten.

5. An electrical discharge lamp according to claim 1, wherein the cathode is composed of tantalum.

6. An electrical discharge lamp according to claim 1, wherein the cathode is composed of tantalum, the link wire is composed of tantalum and the anode is composed of tungsten.

7. An electrical discharge lamp according to claim 1, wherein bimetallic tab is composed of a tantalum component and a molybdenum component, the link wire is composed of tantalum and is welded to the tantalum component.

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