United States Patent

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[72] Inventors Teddy J. Peacher;
Dorwin L. Kilbourn, Huntsville, Ala.

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[73] Assignee The United States of America as represented by the Secretary of the Army

[54] **BUTTON SHORT-ARC GAS LAMP**
6 Claims, 3 Drawing Figs.

[52] U.S. Cl. 313/184, 313/217, 313/218, 313/220, 313/221
[51] Int. Cl. H01j 61/06, H01j 61/30, H01j 61/36
[50] Field of Search 313/182, 184, 217, 218, 220, 221, 311

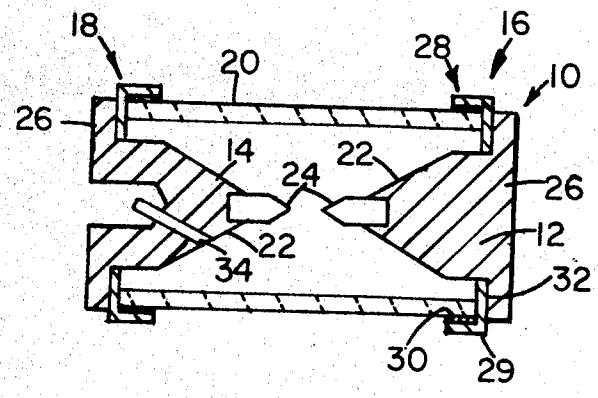
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Primary Examiner—John Kominski
Assistant Examiner—Palmer C. Demeo
Attorneys—Harry M. Saragovitz, Edward J. Kelly, Herbert Berl and Harold M. Hilton

ABSTRACT: An arc lamp having short length. The lamp includes an anode extending into one end of the lamp envelope and a cathode extending into the other end of the envelope. Both electrodes include a shoulder portion outside of the envelope in abutting relation with the ends of the envelope. The ends of the envelope are metallized on the outer surface thereof and a sealing ring includes an annular portion enclosing the ends of the envelope for sealing relation with the metallized bands on the envelope. The ring further includes a radially inwardly extending seat portion disposed intermediate the ends of the envelope and the shoulder portion of the electrodes.



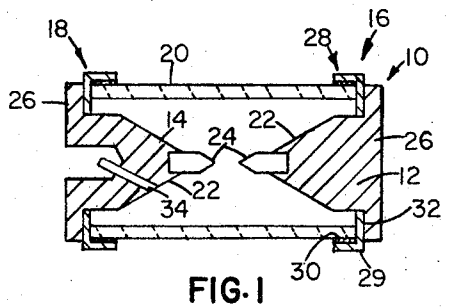


FIG. 1

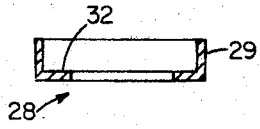


FIG. 2

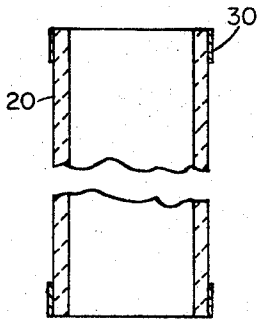


FIG. 3

Teddy J. Peacher
Dorwin L. Kilbourn
INVENTORS.
Harry M. Saragovitz
Edward J. Kelly
Herbert Berl
Harold W. Hilton

BY

BUTTON SHORT-ARC GAS LAMP

BACKGROUND OF THE INVENTION

High pressure short-arc gas lamps used in a certain class of small guided missiles have hand-crafted quartz bodies. In order to seal the lamps, tungsten ribbons are attached to the electrodes and the quartz is drawn to fit snugly about the ribbon to serve both as a cavity seal and as a mechanical fix for the electrodes. This mechanism requires the lamps to have a length considerably longer than the effective window area of the envelope. The invention herein disclosed constitutes a lamp which is considerably shorter but has the same effective radiating surfaces.

The lamp of the present invention allows for miniaturization of systems using the lamp. It relieves stresses to which currently used lamps have been subjected because of their lengths. It conserves materials and eliminates hand crafting of lamps.

SUMMARY OF THE INVENTION

The present invention relates to an arc lamp of short length having an envelope provided with a pair of electrodes sealed at opposite ends of the envelope and extending therein. A seal means is provided to seal the electrodes to the opposite ends of the envelope in a manner which will provide a lamp length which is only slightly longer than the effective window area.

Accordingly, it is an object of the present invention to provide an arc lamp having a very short length.

It is another object of the present invention to provide such an arc lamp which is easily and rapidly fabricated and assembled.

It is another object of the present invention to provide such an arc lamp with an effective window area which is substantially equal to the length of the arc lamp structure.

These and other objects and advantages of the present invention will be more readily apparent from the following description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational sectional view of the arc lamp of the present invention.

FIG. 2 is an elevational sectional view of the sealing ring used to seal the electrode to the tubular envelope.

FIG. 3 is an elevational sectional view of the envelope and illustrating the metallized bands at the ends of the envelope.

DESCRIPTION OF THE DRAWINGS

As shown in FIG. 1 an arc lamp structure **10** includes an anode **12** and a cathode **14** at the ends **16** and **18** of a tubular housing **20**. Both the anode and cathode includes a conical portion **22** having a tip **24** extending along the axis of the housing and an annular shoulder **26** extending out of the end of the tubular envelope. A sealing member or ferrule **28** of kovar or the like, is provided with an annular surface **29** enclosing the ends of the envelope and secured to a metallized band **30** disposed around the envelope adjacent the ends thereof and a radially inwardly extending flange **32** disposed between the ends of the tube and shoulders **26** of the electrodes. The ferrules may be secured to the metallized bands as by brazing. A fill tube **34** is provided through one of the electrodes for communication into the interior of the envelope for directing gas therein.

The electrodes are comprised of copper; however, the tips of the electrodes are preferably of tungsten. The outer ends of the electrodes may be shaped to take any number of mechanical attachments such as screw threads, set screws, bayonet mounts, etc.

The seal rings are preferably an alloy of nickel, iron and cobalt similar to that known as kovar. The metallizing band is preferably of molybdenum and manganese disposed in a fine mixture, as is known in the art.

The process of manufacturing this lamp lends itself to mass production techniques. The tubing is metallized at the outer ends of its periphery. The electrodes are prepared by machine tools, and the metal ferrule is attached to the electrodes as shown in FIG. 1. The electrode ferrule structures are fitted into the ceramic tube and the ferrule is then brazed to the metallized portion of the ceramic tube. The lamp is then exhausted through the filler tube, cleaned internally by introducing hydrogen and fired to reduce unwanted oxides. The lamp is then exhausted again and filled to the desired pressure with the selected gas. The lamp filler tube is then sealed. All processes can be semiautomated.

While the above discussion has been directed to the use of a ceramic envelope, it is to be understood that sapphire or even quartz may be resorted to, it being only necessary that the ends of the tube be capable of having the end seals secured thereto in the manner described above.

The foregoing has been directed to one embodiment of our invention, it is to be understood that various modifications may be resorted to that is within the spirit and scope of the appended claims.

We claim:

1. An arc lamp structure comprising:
   a. a tubular envelope disposed for containing a gas under pressure therein;
   b. a pair of electrodes each being secured to opposite ends of said envelope, each of said electrodes having a conical-shaped tip portion, a cylindrical intermediate portion carried in the interior of said envelope, and an annular end sealing member carried externally of said envelope, said end sealing member having a seat portion disposed adjacent to and in spaced relation with the ends of said envelope;
   c. a pair of metallized bands disposed circumferentially about the outer surface of said envelope adjacent the ends thereof;
   d. a sealing ring having an annular portion carried about the periphery of said envelope adjacent the ends thereof in sealed relation with said metallized band, and an inwardly extending seat portion disposed intermediate the ends of said envelope and said seat portion of said electrodes.

2. The device as set forth in claim 1 wherein said seal ring is of an alloy consisting essentially of nickel, iron and cobalt.

3. The device as set forth in claim 2 wherein said electrodes are comprised of copper having a tungsten tip.

4. The device as set forth in claim 3 wherein one of said electrodes is provided with a passage therethrough in communication with the interior of said envelope, for the pressurization of said envelope, and, means for plugging said passage responsive to the pressurization.

5. The device as set forth in claim 4 wherein said tubular envelope is of ceramic material.

6. The device as set forth in claim 4 wherein said tubular envelope is of sapphire.