PATENT SPECIFICATION (11) 1 582 115

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(21) Application No. 14332/78 (22) Filed 12 April 1978 (19)
(31) Convention Application No. 7 704 135 (32) Filed 15 April 1977 in
(33) Netherlands (NL)
(44) Complete Specification published 31 Dec. 1980
(51) INT. CL.³ H01J 61/36
(52) Index at acceptance
H1D 35 9C2 9CX 9CY 9D 9FX 9FY 9Y

(54) HIGH PRESSURE METAL VAPOUR DISCHARGE LAMP

(71) We, N.V. PHILIPS' GLOEILAMPENFABRIEKEN, a limited liability Company, organised and established under the laws of the Kingdom of the Netherlands, of Emmasingel 29, Eindhoven, the Netherlands, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a high pressure metal vapour discharge lamp having a ceramic vessel provided at at least one end with a ceramic end plug having an electrode current supply element extending therethrough, the end plug being displaced slightly inwards from the end of the discharge vessel and fused to the inner wall of the discharge vessel by means of sintering. United Kingdom patent specification 1,227,695 discloses such a lamp.

With discharge lamps having a high operating temperature (for example 1000°C or higher) the discharge vessel consists of ceramic material which must here be understood to mean a polycrystalline material such as transparent gas-tight aluminium oxide as well as a monocrystalline material, such as sapphire.

In a lamp described in the above-mentioned patent specification the current supply element is fused, by means of a very small quantity of fusing material, in the inwardly displaced sintered-in ceramic end plug. Although the method described results in a satisfactory seal between the end plug and the discharge vessel wall, the risk nevertheless exists that, during operation of the lamp, a gas leak can occur along the sintered seam of the end plug and the inner wall of the discharge vessel. Such a gas leak results in a premature failure of the lamp. It is an object of the invention to provide a lamp construction in which this risk is at least reduced.

A high-pressure metal vapour discharge lamp of the type mentioned in the opening paragraph is, according to the invention, characterized in that a glass seal is disposed in the annular space formed between the portions of the current supply element and of the discharge vessel which project beyond the end plug, at least in the region of the sintered joint between the end plug and the inner surface of the wall of the discharge vessel and in the region of the joint between the end plug and the current supply element.

By providing sealing glass in the region of the sintered joint between the end plug and the inner wall, the chance that gas leaks are produced along this sintered joint is greatly reduced. In general the entire annular space between the wall, the end plug and the current supply element is filled with sealing glass. The current supply element, consisting for example of a tube or a solid rod of niobium, is also secured in gas-tight manner by applying sealing glass between the outer surface of the current supply element and the end plug. With such a construction the provision of a ceramic sealing ring at the outside of the end plug to prevent any gas leaks along the sintered seam is not necessary. Applying such an additional sealing ring during fabrication of the lamp would be time-consuming and expensive.

The constructional arrangement in a lamp according to the invention can be used very advantageously with discharge vessels of a relatively small diameter (for example an inside diameter of approximately 5 mm), wherein the annular space between the outer surface of the current supply element and the inner wall of the discharge vessel is narrow. The sealing glass will flow, as a result of capillary action, very quickly between said walls over the end plug so that a proper seal is obtained.

The invention is applicable to various kinds of high-pressure metal vapour discharge lamps having a ceramic discharge vessel, such as high-pressure mercury vapour discharge lamps and high-pressure sodium vapour discharge lamps.

An embodiment of the invention will now be described with reference to the accompanying drawing which shows a longitudinal cross section of one end of a discharge vessel of a high-pressure sodium vapour discharge lamp according to the invention.

In the drawing the discharge vessel, whose wall consists of densely sintered aluminium oxide, is indicated by 1.

This discharge vessel has an outside diameter of approximately 9 mm and an inside diameter of approximately 7 mm. A tubular current supply conductor 2, of niobium and having a diameter of approximately 4 mm, is shown at the end of the discharge vessel. A tungsten electrode pin 3 is secured to the closed end of conductor 2 located within the discharge vessel by means of titanium solder (not shown). This pin is provided with an electron-emissive element 4 comprising a double layer of tungsten wire provided with electron-emitting material (not shown) between the turns thereof. The current supply conductor 2 is disposed in an end plug 5, consisting of densely sintered aluminium oxide, which is displaced approximately 0.5 mm inwards from the end of the discharge vessel and is fused to the inner surface of the discharge vessel by means of sintering. The gap between the end plug 5 and the conductor 2, and the annular space formed by the conductor 2, the end plug 5 and the inner surface of the end of the discharge vessel projecting beyond plug 5 are filled with a glass seal consisting of a mixture of oxides, mainly aluminium oxide, calcium oxide, barium oxide and magnesium oxide. The discharge vessel 1 contains 25 mg of an amalgam of sodium and mercury and also xenon, as a starting gas, at a pressure of approximately 30 Torr. In general the discharge vessel is located in a glass outer bulb (not shown in the drawing). At a power consumption of 400 Watt the total luminous efficiency of such a lamp amounts to 50000 Lumens.

WHAT WE CLAIM IS:—

1. A high-pressure metal vapour discharge lamp having a ceramic discharge vessel which is provided at at least one end with a ceramic end plug having an electrode current supply element extending therethrough, the end plug being displaced slightly inwards from the end of the discharge vessel and fused to the inner wall of the discharge vessel by means of sintering, characterized in that a glass seal is disposed in the annular space formed between the portions of the current supply element and of the discharge vessel which project beyond the end plug, at least in the region of the sintered joint between the end plug and the inner surface of the wall of the discharge vessel and in the region of the joint between the end plug and the current supply element.

2. A high pressure metal vapour discharge lamp substantially as herein described with reference to the accompanying drawing.

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Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1980.
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY,
from which copies may be obtained.

1582115 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*