

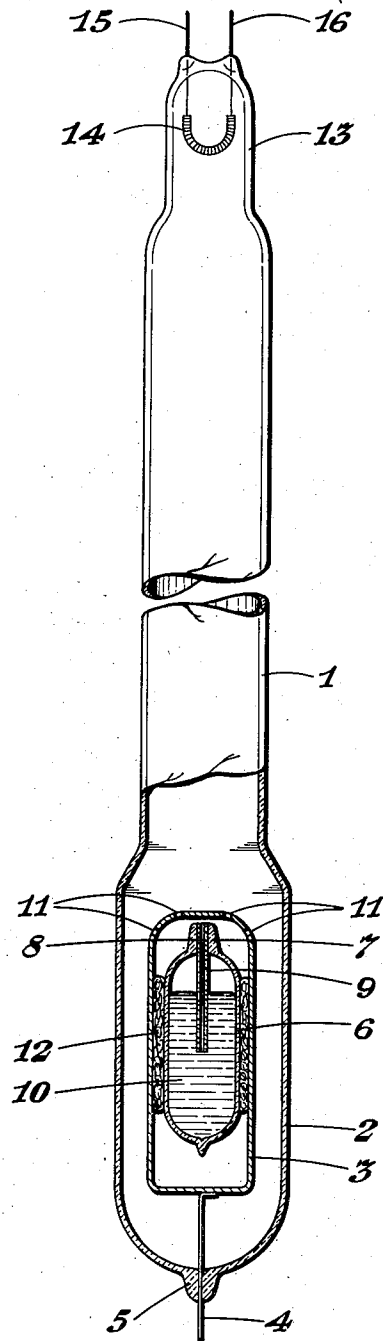
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GASEOUS ELECTRIC DISCHARGE LAMP DEVICE

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# UNITED STATES PATENT OFFICE

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## GASEOUS ELECTRIC DISCHARGE LAMP DEVICE

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4 Claims. (Cl. 176—122)

The present invention relates to gaseous electric discharge lamp devices generally and more particularly the invention relates to such devices the gaseous atmosphere of which consists of or comprises a metal vapor similar to those disclosed in United States Patent 1,994,306, granted March 12, 1935 to Hans Ewest and Alfred Rüttenauer.

In the patent referred to above a lamp operating on direct current and comprising a thermionic electrode and a filling of rare gas and the vapor of a difficultly vaporizable metal, such as sodium, is described wherein the accumulation of metal vapor at the cathode end of the lamp is avoided by using an anode of large area and by continually replenishing the metal vapor.

The object of the present invention is to provide means for introducing a small, steady supply of metal vapor to the gaseous atmosphere of such devices. A further object of the invention is to provide such a lamp having a long operating life. Still further objects and advantages attaching to the device and to its use and operation will be apparent to those skilled in the art from the following particular description.

In accordance with these objects the new and novel gaseous electric discharge device comprises a vapor replenishing means which consists of a vessel, such as a glass container, filled or almost filled with the desired vaporizable metal and mounted in a perforated, hollow anode of large area sealed into the lamp container. A capillary tube extends into the interior of said vessel for approximately half the length of said vessel and opens into the interior of the anode in which said vessel is mounted. The anode and the vessel mounted therein is heated to the vaporization temperature of the sodium during the operation of the lamp and the sodium vapor passes slowly through the capillary tube and the perforations in the anode out into the lamp container. The long length of the capillary tube makes the amount of vapor passing therethrough uniform over a long period of time.

In the drawing accompanying and forming part of this specification an embodiment of the invention is shown in a front elevational, sectional view.

Referring to the drawing the new and novel gaseous electric discharge lamp comprises a tubular container 1 having a starting gas therein, such as neon, or argon, a cathode 14 sealed into one end thereof and a hollow sheet metal anode 3 sealed into the other end thereof. Said cathode 14 has current leads 15 and 16 sealed into

the end of said container 1 and consists of a heater element, such as a tungsten, or nickel filament, coated or impregnated with an electron-emitting material, such as barium oxide. Said cathode 14 is electron emitting when heated. The electrode chamber 13 in which said cathode 14 is mounted is smaller in diameter than the container 1 and the electrode chamber 2 in which said anode 3 is mounted is larger in diameter than said container 1.

Said anode 3 is mounted on a current inlead 4 sealed into the nipple like appendage 5 of the chamber 2. A small container 6 of refractory material is mounted in said anode 3 and is supported therein by a body 12 resilient, heat resisting material, such as asbestos, which is interposed between and presses against said container 6 and said anode 3. One end 7 of said container 6 is thickened and has a small opening 8 therein. A capillary tube 9 extends through said opening 8 and extends into said container 6 for about half the length of said container 6. Said container 6 is almost completely filled with a vaporizable material, such as sodium. Said anode 3 has a plurality of small openings, such as slots, in the end thereof facing the discharge path between said electrodes 3 and 14.

During the operation of the above described device the anode 3 is heated by the discharge incident thereat and the container 6 is heated by radiation and conduction of heat from said anode 3. The sodium in said container 6 is heated to the vaporization temperature thereof and the sodium vapor passes slowly and steadily through the capillary tube 9 into the interior of the anode 3 and through the openings 11 into the container 1.

A lamp device having the above structure and operating on direct current emits light characteristic of the sodium vapor from all parts thereof, between said electrodes 12 and 3 and deposits of condensed sodium vapor in the cathode end of the device do not take place.

While we have shown and described and have pointed out in the annexed claims certain novel features of the invention, it will be understood that various omissions, substitutions and changes in the forms and details of the device illustrated and in its use and operation may be made by those skilled in the art without departing from the broad spirit and scope of the invention, for example, other types of electron emitting electrodes, such as the Hull electrode or the Pirani electrode are used, when desired and the other vaporizable materials, such as cadmium, magne-

sium, zinc, or lithium are used in place of the sodium when desired.

What we claim as new and desire to secure by Letters Patent of the United States, is:—

- 5 1. A gaseous electric discharge device comprising a container, a gaseous atmosphere, electrodes sealed therein one of which is a thermionic cathode and another of which is a perforated, hollow anode having a large surface, a vessel containing  
10 a vaporizable material mounted in said anode, said vessel having an elongated tube of small cross-section opening into the interior of said anode, electrode chambers for said electrodes, the chamber in which said anode is mounted having  
15 a larger diameter than said container, the chamber in which said cathode is mounted having a smaller diameter than said container.
2. A gaseous electric discharge device comprising a container, a gaseous atmosphere, electrodes  
20 sealed therein one of which is a thermionic cathode and another of which is a perforated, hollow anode having a large surface, a vessel containing a difficultly vaporizable material mounted in said anode, said vessel having an elongated tube of  
25 small cross-section opening into the interior of said anode, electrode chambers for said electrodes, the chamber in which said anode is mounted having a larger diameter than said container, the chamber in which said cathode is mounted having  
30 a smaller diameter than said container.

3. A gaseous electric discharge device comprising a container, a gaseous atmosphere, electrodes sealed therein one of which is a thermionic cathode and another of which is a perforated, hollow anode having a large surface, a  
5 vessel containing sodium mounted in said anode, said vessel having an elongated tube of small cross-section opening into the interior of said anode, electrode chambers for said electrodes, the chamber in which said anode is mounted having  
10 a larger diameter than said container, the chamber in which said cathode is mounted having a smaller diameter than said container.

4. A gaseous electric discharge device comprising a container, a gaseous atmosphere, electrodes  
15 sealed therein one of which is a thermionic cathode and another of which is a perforated, hollow anode having a large surface, a vessel containing a vaporizable material mounted in said anode, said vessel having an elongated tube of small  
20 cross-section opening into the interior of said anode, said tube extending into said vessel and terminating approximately in the center thereof, electrode chambers for said electrodes, the chamber in which said anode is mounted having  
25 a larger diameter than said container, the chamber in which said cathode is mounted having a smaller diameter than said container.

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