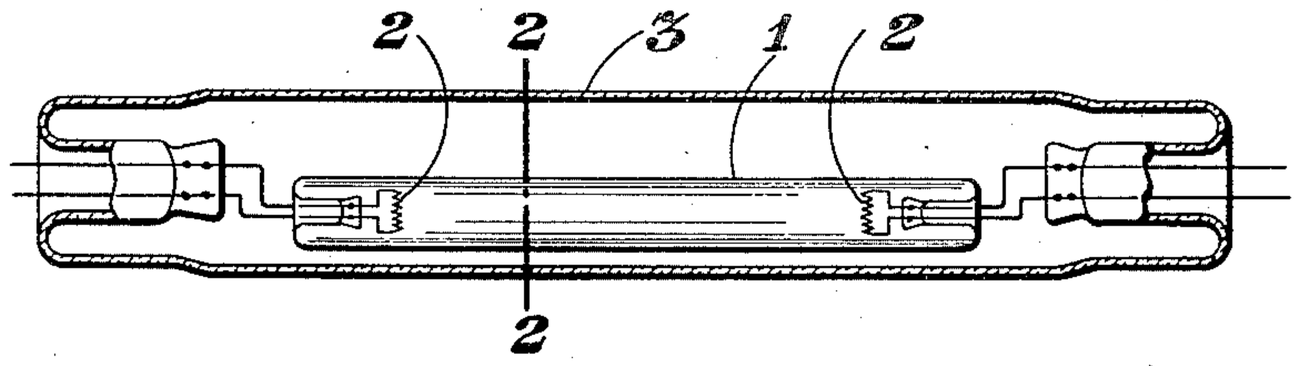
June 5, 1934. W. UYTERHOEVEN 1,961,719

GASEOUS ELECTRIC DISCHARGE DEVICE

Filed Oct. 28, 1933

Fig. 1



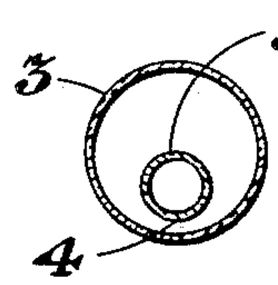


Fig. 2

Fig. 3

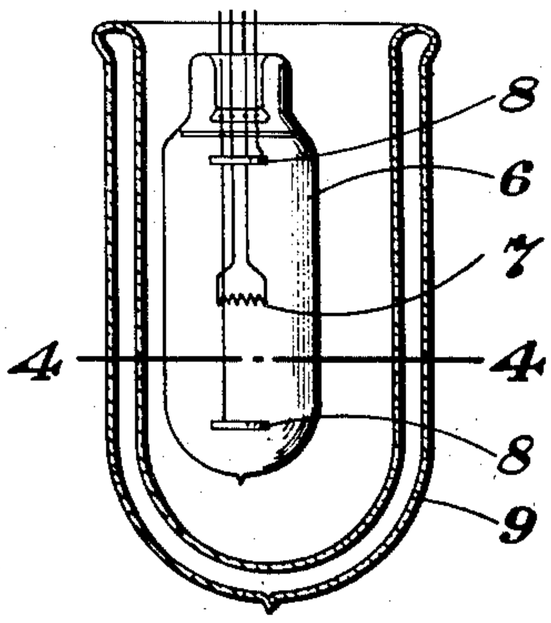
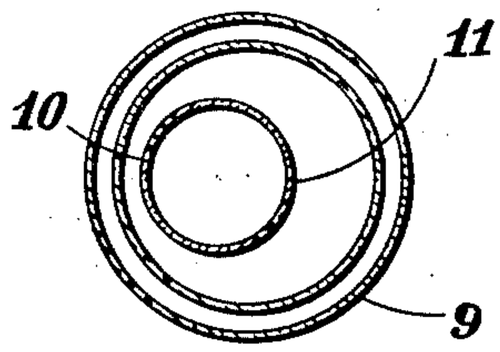


Fig. 4



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UNITED STATES PATENT OFFICE

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GASEOUS ELECTRIC DISCHARGE DEVICE

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3 Claims. (Cl. 176—122)

The present invention relates to gaseous electric discharge devices generally and more particularly the invention relates to such devices in which a metal vapor constitutes the gaseous atmosphere, or is a component of the gaseous atmosphere.

Gaseous discharge lamp devices employing the vapor of a difficultly vaporizable metal, such as sodium, cadmium, thallium, or magnesium, as a light giving element are very efficient light sources. Since these metals vaporize only at elevated temperatures it is desirable that the container of the gaseous electric lamp device be provided with a heat conservator to reduce to a minimum the radiation of heat from the walls of the container in order that the container walls may be at the required elevated temperature during the operation of the device. Two types of heat conservators are useful for this purpose. One type is a gas tight, sealed envelope enclosing the container of the lamp and the space between the envelope and the container is wholly or partially evacuated, or is filled with a gas at a pressure lower than atmospheric pressure when desired. The other type of heat conservator is a double walled jacket separate from the lamp container and in which the container of the lamp device is mounted. The space between the walls of the jacket is wholly or partially evacuated, or is filled with a gas at a pressure lower than atmospheric pressure when desired. This last mentioned type of heat conservator, that is the type wherein the heat conservator is separate from the container of the gaseous electric discharge device, has various advantages over the first mentioned type among which are a lower manufacturing cost, a lower replacement cost and facility in transportation.

In the above types of gaseous electric discharge lamp devices the quantity of metal used is usually greater than that required to provide a saturated vapor atmosphere in the lamp at the normal operating temperature of said lamp. I have observed that the excess metal, which is solid at room temperature, deposits on the coolest part of the container, and that the place at which the deposit forms varies greatly in different lamps and in the same lamp at different times. This is probably due to the fact that the difference in temperature of different parts of the wall of the container is small since the container is in an atmosphere the pressure of which is lower than atmospheric pressure. The above is particularly true where the container is mounted in a double walled jacket since the air present between the jacket and the container tends to equalize the temperature at all parts of the container. This uncertainty as to the place on the container where the metal will deposit is disadvantageous for the metal frequently deposits where it interferes with the emission of light by the lamp.

The object of the present invention is to provide a lamp unit comprising the combination of a gaseous electric discharge lamp device the gaseous atmosphere of which comprises a metal vapor and a heat conservator for said lamp device wherein the deposits of condensed metal vapor are restricted to a particular part of the container of the lamp device. 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.

The object of the invention is attained by mounting the container of the lamp device eccentrically in the heat conservator. The part of the wall of the container closest the wall of the heat conservator is then the coldest part of said container wall and, of course, the metal deposits are localized on the part of the container at the lowest temperature, the other parts of said container being unobscured by metal deposits.

In the drawing accompanying and forming part of this specification two embodiments of the invention are shown in which

Fig. 1 is a side elevational view of one type of a gaseous electric discharge lamp device and a heat conservator therefor, said conservator being shown partly in section,

Fig. 2 is a sectional view along the line 2—2 of Fig. 1,

Fig. 3 is a side elevational view of another type of gaseous electric discharge lamp device and a heat conservator therefor, and

Fig. 4 is a sectional view along the line 4—4 of Fig. 3.

Like numbers denote like parts in all views of the device.

Referring to Figs. 1 and 2 of the drawing the new and novel gaseous electric discharge lamp device comprises an elongated tubular container 1 having a thermionic electrode 2 sealed therein at each end thereof. Each of said thermionic electrodes 2 has two current inleads and comprises a coiled metal filament, such as a tungsten filament, and a coating of electron emitting material, such as barium oxide, on said metal filament. Said container 1 has a gaseous atmosphere therein comprising a mixture of a gas, such as

neon, and the vapor of a difficultly vaporizable metal which is solid at room temperature, such as sodium. An envelope 3 encloses said container 1 and the inleads of said electrodes 2 are sealed into said envelope 3. Said envelope 3 is evacuated to insure the thermal insulation of said container 1 from the outside atmosphere. The current inleads for said electrodes 2 support said container 1 in said envelope 3 and said inleads are bent so that the longitudinal axis of said container 1 is out of the longitudinal axis of said envelope 3. The bent inleads are flexible to allow for uneven expansion of container 1 and envelope 3 during the operation of the device. As shown in Figure 2 of the drawing one side 4 of said container 1 is closer to the wall of said envelope 3 than the opposite side 5 of said container 1. The side 4 is at a lower temperature than the side 5 of said container 1 during the operation of the lamp and any condensation of sodium vapor takes place on the side 4 of said container 1 so that the side 5 remains free from undesired deposits of condensed material and the light from the luminous positive column discharge between said electrodes 2 passes unhindered through the side 5.

The embodiment of the invention illustrated in Figs. 3 and 4 of the drawing comprises a gaseous electric discharge lamp device comprising a bulb shaped container 6 having sealed therein a thermionic cathode 7 and two ring shaped anodes 8 mounted on opposite sides of said cathode 7 and at equal distances from said cathode 7. Said cathode 7 is similar in structure to the electrodes 2 of the lamp device illustrated in Figs. 1 and 2 of the drawing. Said container 6 has a gaseous atmosphere therein similar to that in the lamp device of Figs. 1 and 2. The bulb shaped lamp device in this embodiment of the invention is mounted in a double walled jacket 9. The space between the walls of said jacket 9 is evacuated or filled with a gas at a pressure lower than atmospheric pressure, when desired. As shown in Figs. 3 and 4 of the drawing the gaseous electric discharge lamp device is mounted eccentrically in the double walled jacket so that the side 10 of the container 6 of said lamp device is closer to the wall of said jacket 9 than the opposite side 11 thereof. The side 10 is the coldest part of said container 6 during the operation of the lamp device and the condensed metallic material deposits on the side 10. The light emitted by the arc discharge can thus pass unobstructed through the side 11 of the lamp. It will be understood of course that in the complete lamp unit a mounting is provided for said jacket 9 and said lamp device and that the space between said container 6 and said jacket 9 is closed by a ring of heat insulating material adjacent the stem part of said lamp. These details are omitted in the drawing for purposes of simplicity of illustration.

While I 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, instead of mounting the lamp container 6 eccentrically in the jacket 9 the outer and inner walls of said jacket 9 are closer on one side thereof than on the other side thereof in which case the side of the lamp container 6 adjacent the thinner part of said jacket 9 is at a lower temperature than the opposite side of container 6.

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

1. In combination, an electric discharge lamp device comprising a container, electrodes sealed therein, a gaseous atmosphere therein comprising a difficultly vaporizable metal and a heat conservator therefor said container being mounted eccentrically in said heat conservator to localize deposits of the condensed metal in said container during the operation of said lamp.

2. In combination, an electric discharge lamp device comprising a container, electrodes sealed therein, a gaseous atmosphere therein comprising a difficultly vaporizable metal and a heat conservator therefor said heat conservator being a gas tight envelope enclosing said container, said container being mounted eccentrically in said heat conservator to localize deposits of the condensed metal in said container during the operation of said lamp.

3. In combination, an electric discharge lamp device comprising a container, electrodes sealed therein, a gaseous atmosphere therein comprising a difficultly vaporizable metal and a heat conservator therefor said heat conservator being a double walled jacket, said container being mounted eccentrically in said heat conservator to localize deposits of the condensed metal in said container during the operation of said lamp.

WILLEM UYTERHOEVEN.