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GASEOUS ELECTRIC DISCHARGE LAMP DEVICE

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Fig. 1

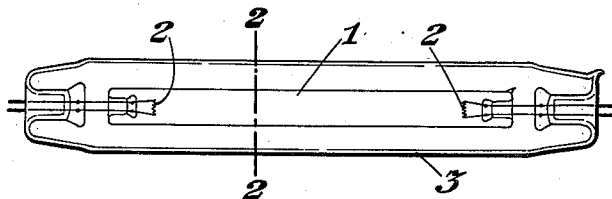


Fig. 2

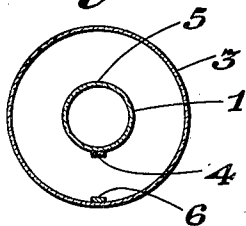


Fig. 3

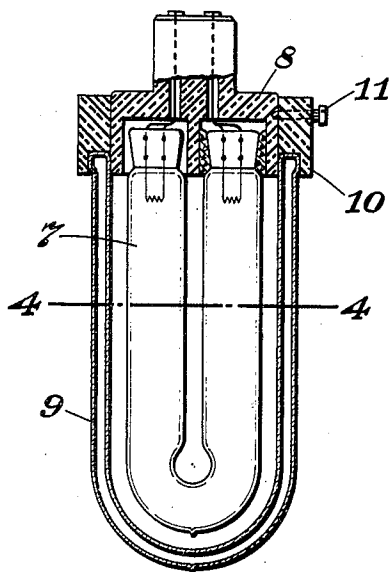
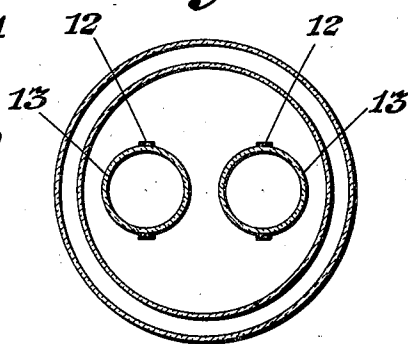


Fig. 4



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GASEOUS ELECTRIC DISCHARGE LAMP
DEVICE

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9 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 the vapor of a difficultly vaporizable metal i. e. a metal having a vapor pressure of less than 1 mm. at a temperature of 200° C., such as sodium, cadmium, thallium and zinc.

Heat conservators, such as an evacuated envelope enclosing the lamp container, or a double walled jacket having the space between the inner and outer walls thereof evacuated and in which the lamp container is mounted, which reduce the transfer of heat from the lamp container to the ambient atmosphere are useful in obtaining an effective metal vapor pressure in such devices, that is a vapor pressure such that the spectrum of the light emitted by the device is rich in rays characteristic of the metal vapor during the operation of the device.

Gaseous electric discharge lamp devices of this type usually have a surplus of vaporizable material therein and during the operation of the device this surplus material deposits on the part of the lamp container having the lowest temperature. Variations in ambient weather conditions, such as a change in wind direction, causes different parts of the container to be at the lowest temperature during the operation of the device. This is particularly true when the lamp container is mounted in a double walled jacket since the difference in temperature of different parts of the walls of the lamp container is very small. It is therefore, impossible to predict where the surplus vaporizable material will deposit on the walls of the container and this is a serious defect since the surplus metal frequently deposits on a part of the lamp container where it interferes with the emission of light by the lamp device.

The object of the present invention is to provide a lamp unit comprising a gaseous electric discharge vapor lamp device and a heat conservator therefor in which the surplus vaporizable material deposits on a definite spot on the walls of the lamp container. 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 this object the invention comprises a thin, narrow coating of a material which is a good heat interceptor either by virtue of its good reflecting qualities or by virtue of its poor heat conducting characteristics in operative relation to the container of said lamp device which coating extends along the length of the

lamp container. In the preferred embodiment of the invention a reflecting coating is applied to the walls of the lamp container. When the lamp container is enclosed by an evacuated envelope a reflecting coating applied to the wall of said envelope is effective for the purpose contemplated. When the coating is applied to the external surface of the lamp container the radiation of heat from the part of said container covered by said coating is reduced. During the operation of the lamp device the coated part as well as the parts of the container adjoining said coated part are at a higher temperature than the parts of the container opposite the coating. The highest container temperature is at the coated part of the container and the lowest container temperature is at the part of said container opposite said coated part; the container temperature decreasing as the distance from the coated part increases. Very narrow coatings 1 mm. in width, for example, are effective in producing this temperature distribution over the container walls. Any deposits of condensed vapor in the lamp form on the part of the container opposite said coated part and the narrow coating offers little obstruction to the light emitted by the discharge in the lamp device.

When the reflecting coating is applied to the inner surface of the container wall the heat rays emitted by the discharge do not strike the coated part of the container but are reflected and strike the part of the container opposite said coated part. The coated part is thus at a lower temperature than the other parts of the container during the operation of the device and the deposits of condensed vapor form on or near said coated part.

When desired the reflecting coating is applied to the wall of the heat conservator for the lamp device. When the coating is applied to the inner surface of the heat conservator, that is, the surface facing the lamp device, the heat rays are reflected back and strike the wall of the lamp container facing the reflecting coating and the temperature distribution over the walls of the container is the same as that when the reflecting coating is applied to the external surface of the lamp container wall. When the reflecting coating is applied to the surface of the wall of the heat conservator facing away from the lamp container the coated part of the conservator wall is heated by the reflected heat rays and the dissipation of heat from the part of the lamp container opposite the coated part of the conservator wall is reduced.

A coating of material having poor heat conductivity characteristics, such as asbestos, is used in place of the reflecting coating, when desired.

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

Fig. 1 is a schematic view of one embodiment of the invention,

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

Fig. 3 is a front elevational, partly sectional view of another embodiment of the invention; and

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

Like numbers denote like parts in all the figures.

Referring to Figs. 1 and 2 of the drawing the new and novel gaseous electric discharge lamp device comprises an elongated tubular container 1 mounted in an elongated tubular, evacuated envelope 3. Said container 1 has a filamentary electrode 2 sealed therein at each end thereof, a starting, rare gas, such as neon or argon, and a quantity of vaporizable material, such as sodium, therein. Said electrodes 2 consist of a filament, such as a tungsten filament, having another filament, such as a tungsten, or nickel filament, wrapped around said first named filament and a coating of electron-emitting material applied to said filaments. The electrodes 2 are wound in the form of a helix. The container 1 is supported in the envelope 3 by the electrode inleads which are resilient to permit the container 1 and the envelope 3 to expand at different rates without fracturing the walls thereof. Other support means are used for these elements 1 and 3 when desired.

A narrow strip 4 (shown in Fig. 2) having a reflecting surface, such as a thin silver coating, is applied to the outer wall of said container 1 and extends along and is parallel with the discharge path between said electrodes 2. When the diameter of the container 1 is approximately 24 mm., for example, a strip approximately 2 mm. wide is effective for the purpose contemplated. Said strip 4 reduces the radiation of heat from that part of the container 1 covered thereby and part 5 of the container 1 opposite said strip 4 is thus at a lower temperature than the coated part during the operation of the lamp device so that the deposits of condensed sodium form on said part 5 and the light emitted by the discharge between said electrodes 2 is transmitted without obstruction through the other parts of said container 1. The narrow strip 4 offers so little obstruction to the light as to be almost negligible.

As illustrated in Fig. 2 of the drawing a narrow reflecting strip 6 can be applied to the inner surface of the envelope 3 instead of being applied to the outer wall of said container 1, when desired. The strip 6 reflects the heat rays from the discharge in said container 1 back to the wall of said container 1 opposite said strip 6 so that the part 5 of said container is again at a lower temperature than the part thereof opposite said strip 6 with the result pointed out above.

We prefer that the narrow reflecting coating be a dust-like deposit, or a very thin film which transmits all the visible light emitted by the lamp device but which reflects the infra-red, or heat rays emitted by the device. Such a coating is applied to the lamp container or the heat conservator by methods well known in the art, such as by chemical deposition or cathode sputtering.

The embodiment of the invention illustrated in Figs. 3 and 4 of the drawing is similar to that shown in Figs. 1 and 2 except that in this embodiment the gaseous electric discharge lamp

device has a U-shaped container 7 having a bayonet base 8 cemented to one end thereof and the heat conservator is a double walled jacket 9 having the space between the inner and outer walls thereof evacuated and having a base 10 which frictionally engages with and is locked by pin 11 to the base 8. Said container 7 has a thin, narrow strip 12 of heat insulating material, such as asbestos, applied on the exterior surface of the walls thereof and on opposite sides thereof which strips 12 reduce the dissipation of heat from the parts of the walls covered thereby. The parts 13 of said container 7 are thus the coolest parts of said container 7 during the operation of the lamp device and the condensed metal vapor deposits on said parts 13 so that the other parts of said container 7 are unobstructed by light opaque deposits.

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 spirit and scope of the invention, for example, the reflecting coating illustrated in Figs. 1 and 2 of the drawing is used in the embodiment of the invention illustrated in Figs. 3 and 4 and the coating of heat insulating material illustrated in Figs. 3 and 4 of the drawing is used in the embodiment of the invention illustrated in Figs. 1 and 2 of the drawing, when desired.

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

1. A gaseous electric discharge device comprising a container, electrodes sealed therein, a gaseous atmosphere and a vaporizable material therein, a narrow strip heat interceptor applied to the wall of said container, said strip being electrically isolated from said electrodes and extending along and being parallel to the discharge path between said electrodes to reduce the dissipation of heat from the part of said container covered by said heat interceptor whereby deposits of condensed vaporous material are localized at a selected part of said container.

2. A lamp unit comprising in combination a gaseous electric discharge lamp device comprising a container, electrodes sealed therein, a gaseous atmosphere therein and a vaporizable material therein, a heat conservator for said lamp device and a narrow heat interceptor applied to the walls of said lamp unit, said heat interceptor being electrically isolated from said electrodes and being interposed between said lamp device and the ambient atmosphere to localize the deposits of condensed vaporous material in said container at a selected point.

3. A lamp unit comprising in combination a heat conservator and a gaseous electric discharge lamp device comprising a container, electrodes sealed therein, a gaseous atmosphere and a vaporizable material therein, a narrow strip heat interceptor applied to the wall of said container, said strip being electrically isolated from said electrodes and extending along and being parallel to the discharge path between said electrodes to reduce the dissipation of heat from the part of said container covered by said heat interceptor whereby deposits of condensed vaporous material are localized at a selected part of said container, said heat conservator reducing

the dissipation of heat by conduction and convection from the walls of said container.

4. A lamp unit comprising in combination a heat conservator and a gaseous electric discharge lamp device comprising a container, electrodes sealed therein, a gaseous atmosphere and a vaporizable material therein, a narrow strip heat interceptor applied to the wall of said heat conservator, said strip being electrically isolated from said electrodes and extending along and being parallel to the discharge path between said electrodes of said lamp device to reduce the dissipation of heat from the part of the container wall opposite the part of said heat conservator covered by said heat interceptor whereby deposits of condensed vaporous material are localized at a selected part of said container, said heat conservator reducing the dissipation of heat by conduction and convection from the walls of said lamp container generally.

5. A lamp unit comprising in combination a heat conservator and a gaseous electric discharge lamp device comprising a container, electrodes sealed therein, a gaseous atmosphere and a vaporizable material therein, a narrow strip heat interceptor applied to the wall of said container, said strip being electrically isolated from said electrodes and extending along and being parallel to the discharge path between said electrodes to reduce the dissipation of heat from the part of said container covered by said heat interceptor whereby deposits of condensed vaporous material are localized at a selected part of said container, said heat conservator being an evacuated envelope enclosing said lamp container and reducing the dissipation of heat by conduction and convection from the walls of said container.

6. A lamp unit comprising in combination a heat conservator and a gaseous electric discharge lamp device comprising a container, electrodes sealed therein, a gaseous atmosphere and a vaporizable material therein, a narrow strip heat interceptor applied to the wall of said heat conservator, said heat conservator being an evacuated envelope enclosing said lamp container, said strip being electrically isolated from said electrodes and extending along and being parallel to the discharge path between said electrodes of said lamp device to reduce the dissipation of heat from the part of the container wall opposite the part of said heat conservator covered by said heat interceptor whereby deposits of condensed vaporous material are localized at a selected part of said container, said heat conservator reducing the dissipation of heat by conduction and convection from the walls of said lamp container generally.

7. A lamp unit comprising in combination a heat conservator and a gaseous electric discharge lamp device comprising a container, electrodes sealed therein, a gaseous atmosphere and a vaporizable material therein, a narrow strip heat interceptor applied to the wall of said container, said strip being electrically isolated from said electrodes and extending along and being parallel to the discharge path between said electrodes to reduce the dissipation of heat from the part of said container covered by said heat interceptor whereby deposits of condensed vaporous material are localized at a selected part of said container, said heat conservator being a double walled jacket having the space between the inner and outer walls thereof evacuated and reducing the dissipation of heat by conduction and convection from the walls of said container.

8. A lamp unit comprising in combination a heat conservator and a gaseous electric discharge lamp device comprising a container, electrodes sealed therein, a gaseous atmosphere and a vaporizable material therein, a narrow strip heat interceptor applied to the wall of said heat conservator, said heat conservator being a double walled jacket having the space between the inner and outer walls thereof evacuated, said strip being electrically isolated from said electrodes and extending along and being parallel to the discharge path between said electrodes of said lamp device to reduce the dissipation of heat from the part of the container wall opposite the part of said heat conservator covered by said heat interceptor whereby deposits of condensed vaporous material are localized at a selected part of said container, said heat conservator reducing the dissipation of heat by conduction and convection from the walls of said lamp container generally.

9. A lamp unit comprising in combination a gaseous electric discharge lamp device comprising a container, electrodes sealed therein, a gaseous atmosphere therein and a vaporizable material therein, a heat conservator for said lamp device and a narrow heat interceptor applied to the walls of said lamp unit, said heat interceptor being electrically isolated from said electrodes, being interposed between said lamp device and the ambient atmosphere and having an infra-red ray reflecting surface facing the discharge path between said electrodes to localize the deposits of condensed vaporous material in said lamp container at selected parts of said container.

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