

April 4, 1939.

H. EWEST ET AL

2,152,989

GASEOUS ELECTRIC DISCHARGE LAMP DEVICE

Filed Jan. 29, 1937

Fig. 1

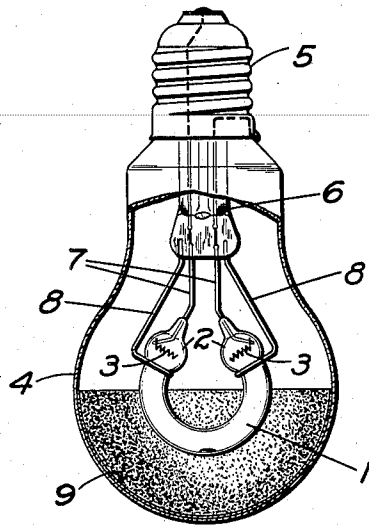
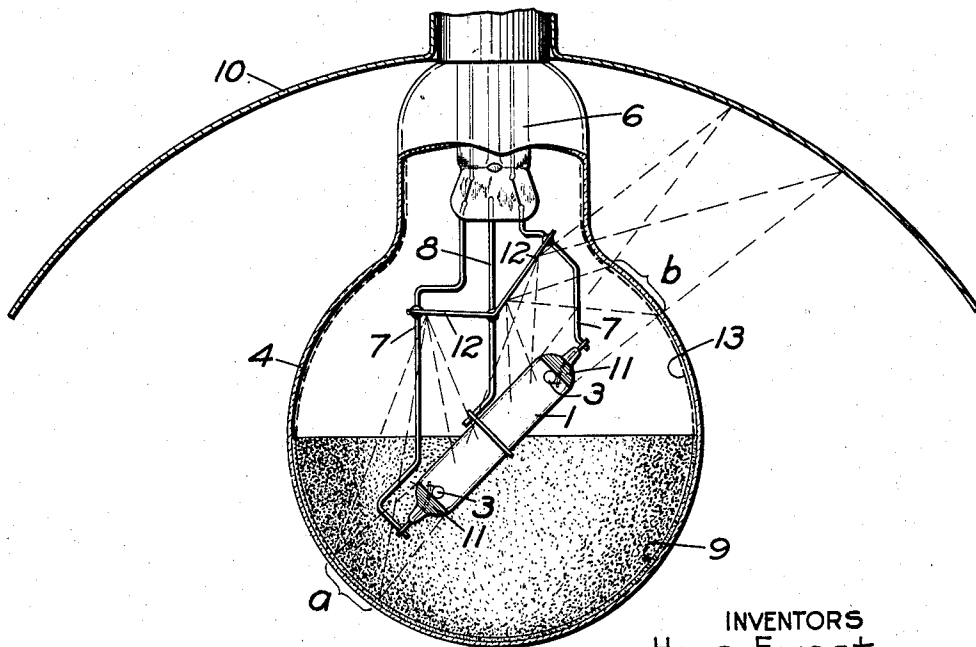


Fig. 2



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UNITED STATES PATENT OFFICE

2,152,989

GASEOUS ELECTRIC DISCHARGE LAMP
DEVICE

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Application January 29, 1937, Serial No. 123,058
In Germany February 4, 1936

4 Claims. (Cl. 176—122)

The present invention relates to gaseous electric discharge lamp devices generally and more particularly the invention relates to lamp units incorporating such devices and comprising a heat conservator having luminescent material associated therewith which material emits light when excited by the radiations emitted by the lamp device to complement and supplement the light emitted by said device.

A lamp unit of the above type is disclosed in co-pending application Serial Number 153, filed January 2, 1935, the inventor being John Walter Ryde. The lamp unit of the co-pending application comprises a gaseous electric discharge lamp device having an ultraviolet transmitting sealed container which has thermionic, activated electrodes, a starting gas, such as argon, neon, xenon, or a mixture of such gases, and a quantity of vaporizable metal such as mercury, therewithin. The discharge lamp device is capable of operation at vapor pressures in the order of one atmosphere and is mounted in a sealed envelope having a luminescent material covering the surface thereof. The luminescent material is emissive in the red spectral ranges upon excitation by the radiations incident thereon during the operation of the lamp device. We have observed that lamp units of this type are not completely satisfactory as sources of white light due to the fact that the red and blue components of the emitted light are not of sufficient intensity. The blue rays emitted by the excited mercury vapor are apparently absorbed at least in part by the luminescent material and the output of red rays from the luminescent material is not enough for the purpose of balancing the light of other colors emitted by the lamp device.

The object of the present invention is to provide a lamp unit of the above type which emits a white light closely approximating daylight. Another object of the invention is to provide a daylight lamp unit of small size. 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 a lamp unit embodying the present invention comprises a gaseous electric discharge lamp device comprising a tubular container of small bore, thermionic, activated electrodes mounted at the ends thereof and a gaseous atmosphere therein comprising a starting gas and a quantity of mercury, similar to those disclosed in co-pending application, Serial No. 46,952, filed October 26, 1935, the in-

ventors being Cornelis Bol, Willem Elenbaas and Hendricus J. Lemmens. Discharge lamp devices of this type are capable of operation at vapor pressures of about 10 atmospheres and more and at such pressures emit an appreciable quantity of red rays. The container of the lamp is made of an ultra violet transmitting, vitreous material, such as quartz, and is mounted in a sealed envelope having a coating of fluorescent material emissive in the red spectral ranges, such as zinc-cadmium sulphide, on the walls thereof. The luminescent coating is limited to a part only of said envelope so that part of the light from the discharge lamp device goes through the envelope without striking or passing through the fluorescent coating. A lamp unit having this structure is a compact one and emits light closely approximating daylight.

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

Fig. 1 is a front elevational, partly sectional view of one embodiment of the invention, and

Fig. 2 is a similar view of another embodiment of the invention.

Like numbers denote like parts in both the figures.

Referring to Fig. 1 of the drawing the gaseous electric discharge lamp device comprises a circular, tubular container 1 of small bore having an electrode 3 mounted in an electrode chamber 2 at each end thereof. Said container 1 has a starting gas therein, such as argon, neon, xenon, or a mixture of such gases. A quantity of vaporizable material, such as mercury, is present in said container 1 and the vapor of said material is light emitting during the operation of the lamp device. Said container 1 consists of a vitreous material, such as an aluminum-borosilicate glass, a phosphate glass, or quartz, which transmits the visible and ultra-violet rays emitted by the gaseous electric discharge in said container 1. Preferably the quantity of mercury in said container 1 is such that it is wholly vaporized when the device is at operating equilibrium. Said electrodes 3 are of the thermionic, activated type and are heated to an elevated, electron emitting, arc supporting temperature during the operation of the device by the discharge current flow therethrough and the voltage drop thereat. Preferably the current input is such that a vapor pressure in the order of atmospheres, such as a pressure of 10 atmospheres, is present in said container 1 during the operation of the device. At operating pressures of this order the light

emitted by the lamp device emits an appreciable amount of red rays as well as rays of a color typical of the high pressure mercury vapor spectrum. The structure and operating characteristics of gaseous electric discharge lamp devices of the above type is disclosed in greater detail in the co-pending application referred to above.

Said container 1 is mounted in an exhausted, sealed envelope 4 which is spherical at one end thereof and has a screw base 5 fastened to the opposite end thereof. Said envelope 4 has a stem 6. The current leads 7 of the gaseous electric discharge device and the support wires 8 of said device are fused into the press of said stem 7. Said envelope 4 has a coating 9 of fluorescent material, such as zinc-cadmium sulphide, on the inner surface of the spherical part thereof. Said coating emits visible yellow-red light when excited by the radiations from the gaseous electric discharge lamp device to complement the visible light emitted by said lamp device. Said coating 9 is applied to the inner surface of said container 1 by methods now known in the art, such as by using a volatilizable binder material. The coating 9 is applied to a part only of the inner surface of the spherical part of the container 1 and the container 1 is mounted in said envelope 4 in such position with respect to the coating 9 that part of the light emitted by the discharge lamp device passes through the uncoated part of said envelope 4. A lamp unit having this structure emits light which is a close approximation of daylight.

The circular shape of the container 1 is particularly advantageous in that dull or dark spots, caused by the light obstructing ends of the container 1, on the outer surface of the coated part of the envelope 4 are avoided. When desired, the container 1 is mounted at an oblique angle with respect to the longitudinal axis of the envelope 4 or is mounted in a plane normal to said axis.

The embodiment of the invention illustrated in Fig. 2 of the drawing is similar to that shown in Fig. 1 except that in this embodiment the container 1 is linear in shape and is mounted at an oblique angle with respect to the longitudinal axis of the envelope 4. A single support wire is wrapped around the midpart of the straight container 1. The ends of the tubular container 1 have a metal coating 11 thereon, such as a platinum coating, to reduce the radiation of heat therefrom. Similar coatings are applied to the electrode chambers 2 of the gaseous discharge lamp device shown in Fig. 1, when desired. The envelope 4 has a screw base which is removably fastened in a socket (not shown for purposes of simplicity) which is mounted in the reflector 10. Said reflector 10 directs the light from the lamp unit in a desired direction and mixes the light from the gaseous discharge lamp and from the fluorescent material.

In the lamp unit illustrated in Fig. 2 the light obstructing ends of the straight container are interposed between the coating 9 and the reflector 10. This is deleterious to the appearance as well as to the efficiency and effectiveness of the lamp outfit since the areas "a" and "b" on the envelope 4 appear dark in comparison with the other parts of the envelope 4 and the distribution of the light from the discharge lamp incident on the surface of the reflector 10 is not an even one. These disadvantages are avoided in the lamp illustrated in the drawing by mounting reflectors 12 on the current leads 7 and the sup-

port 8 and above the gaseous discharge lamp. The reflectors are mounted in such position with respect to the discharge lamp device that the light emitted by the device in the direction of the reflectors 12 is redirected thereby through the areas "a" and "b" on the envelope 4.

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, the coating 9 is omitted and a fluorescent glass emitting yellow red rays is substituted therefor when desired; the fluorescent coating 9 is applied to the envelope 4 in strips or rings, when desired; another coating 13 of a fluorescent material emitting a differently colored light than that of the coating 9, such as zinc sulphide containing a small quantity of cadmium and which emits blue light, is applied to the part of the inner surface of said envelope 4 between the coating 9 and the stem 6, when desired.

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

1. An electric lamp comprising in combination a light transmitting heat conservator, a gaseous electric discharge lamp device mounted in said conservator, said device having a straight, tubular container of light transmitting, vitreous material, a luminosity producing gaseous atmosphere therein, and electrodes sealed into the end portions thereof, the light output of said lamp device being greater in a direction normal to the longitudinal axis thereof than in the direction of said axis, a reflector mounted in said conservator in such position relative to said lamp device that part of the light emitted by said lamp device in a direction normal to said axis is directed by said reflector in the direction of said axis to increase the density of the light in the direction of said axis.

2. An electric lamp comprising in combination a light transmitting heat conservator having a tubular stem portion and a spherical portion, a gaseous electric discharge lamp device mounted in the spherical part of said conservator, said device having a straight, tubular container of light transmitting, vitreous material, a luminosity producing gaseous atmosphere therein, and electrodes sealed into the end portions thereof, the longitudinal axis of said container being at an oblique angle with respect to the longitudinal axis of the tubular portion of said conservator, the light output of said lamp device being greater in a direction normal to the longitudinal axis thereof than in the direction of said axis, a reflector mounted in said conservator between said lamp device and the stem part of said conservator and in such position relative to said lamp device that part of the light emitted by said lamp device in a direction normal to the longitudinal axis thereof is directed by said reflector in the direction of said axis to increase the density of the light in the direction of said axis.

3. An electric lamp comprising in combination a light transmitting heat conservator, a luminous material supported by said heat conservator, a gaseous electric discharge lamp device mounted in said conservator, said device having a straight, tubular container of light transmitting, vitreous material, a luminosity producing gaseous atmosphere therein, and elec-

trodes sealed into the end portions thereof, said luminescent material being mounted in light receiving relation to said lamp device and being emissive in visible light under irradiation by said lamp device, the light output of said lamp device being greater in a direction normal to the longitudinal axis thereof than in the direction of said axis, a reflector mounted in said conservator in such position relative to said lamp device that part of the light emitted by said lamp device in a direction normal to said axis is directed by said reflector in the direction of said axis to increase the density of the light in the direction of said axis.

4. An electric lamp comprising in combination a light transmitting heat conservator, a luminescent sulphide supported by said heat conservator, a gaseous electric discharge lamp device mounted in said conservator, said device having a straight, tubular container of light

transmitting, vitreous material, a luminosity producing gaseous atmosphere therein comprising mercury vapor, and electrodes sealed into the end portions thereof, said luminescent sulphide being mounted in light receiving relation to said lamp device and being emissive in visible light under irradiation by said lamp device, the light output of said lamp device being greater in a direction normal to the longitudinal axis thereof than in the direction of said axis, a reflector mounted in said conservator in such position relative to said lamp device that part of the light emitted by said lamp device in a direction normal to said axis is directed by said reflector in the direction of said axis to increase the density of the light in the direction of said axis.

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