June 20, 1939. G. E. INMAN 2,163,428

ENCLOSED ARC LAMP

Filed July 21, 1931

Fig. 1

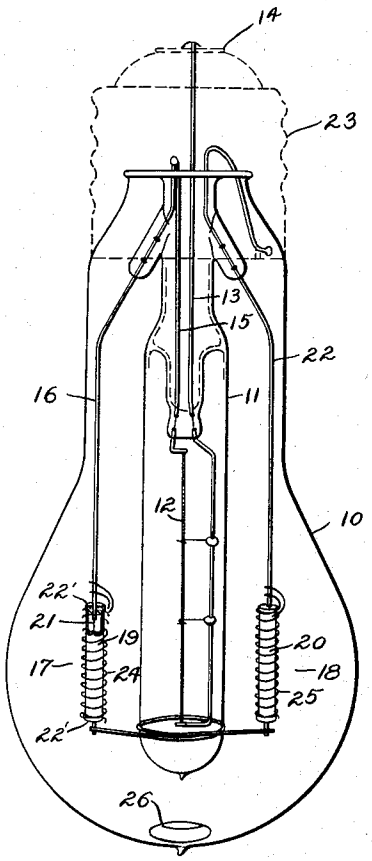
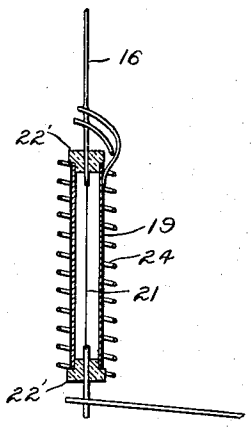


Fig. 2



INVENTOR:
GEORGE E. INMAN,
BY Charles E. Sullar.
HIS ATTORNEY.

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ENCLOSED ARC LAMP

George E. Inman, Cleveland Heights, Ohio, assignor to General Electric Company, a corporation of New York

Application July 21, 1931, Serial No. 552,209

3 Claims. (Cl. 176—122)

My invention relates to enclosed electric arc lamps particularly of the type comprising electrodes sealed in a bulb containing gas or evacuated. Still more particularly, my invention relates to lamps of that character in which the vapor pressure is comparatively low so that the discharge between the electrodes takes the character of a glow which is not concentrated but distributed over a fairly large area. The starting voltage of such lamps is considerably higher than the voltage required during the operation of the lamp, and it is necessary to include in the circuit a suitable transformer or a ballast resistance to take care of this. According to my invention, I enclose within the bulb containing the aforesaid electrodes, another bulb in which is sealed an incandescent lamp filament and suitable connections are provided so that the said filament is in series with the gap between the said electrodes. In this way a ballast resistance is provided and moreover, the light from the filament supplements that of the arc so as to give greater illumination. It is usual to have a globule of mercury in the outer bulb which is vaporized by the heat developed therein. This is particularly desirable where the lamp is used to produce ultra violet radiation as the spectrum of the mercury increases the amount of such radiation. I have found that the character of the ultra violet radiation is improved by increase in temperature in the bulb, and my invention provides means whereby such temperature is increased.

Another feature of my invention is the use of grids surrounding and in multiple with the electrodes which are ordinarily coated with metal oxides or other high electron emitting material and are protected by such grids from disintegration since the grids take part of the load. This feature of my invention is applicable to lamps in which the arc is concentrated as well as where it is not concentrated. Other features and advantages of my invention will appear from the detailed description which follows of a species thereof and from the accompanying drawing.

In the drawing Fig. 1 is an elevation of a lamp embodying my invention and Fig. 2 is a vertical section through an electrode thereof.

The lamp shown in the drawing comprises a bulb 10 which may be of a material which will transmit a large proportion of ultra violet radiation. I prefer to use a special glass such as borosilicate glasses, for example, Pyrex or Corex, for this purpose inasmuch as they transmit ultra violet radiation within the so-called health range and do not transmit to the very short ultra violet radiation which must be handled with considerable care. Of course, if the very short wave length radiation is desired, quartz may be used as the material for the bulb. Within the bulb 10 is mounted the inner bulb 11. The said bulb contains the filament 12 which is preferably of the coiled type and also preferably of tungsten. The said bulb may be gas-filled with argon, nitrogen or both, as disclosed in the Langmuir Patent No. 1,180,159. One of the leading-in wires or conductors 13 is connected to center contact 14 of the lamp base. The other leading-in conductor 15 is connected to the leading-in conductor 16 of the arc device contained in the outer bulb. The said arc device comprises a pair of electrodes 17 and 18. As shown, these are of the type comprising heaters surrounded by electron emitting elements, which, as shown, comprise metal sleeves 19 and 20 coated with oxides such as barium and strontium oxides. Through the center of each of the electrodes extends a heating filament 21 which filaments are connected in series with the leading-in conductor 22, the outer end of which is connected to the shell 23 of the lamp base. Bushings 22' of lava or other insulating material serve to insulate the filaments from the electrode sleeves. Electrodes 17 and 18 are connected to leads 16 and 22 respectively. Surrounding each of the electrodes, I prefer to have grids 24 and 25. These protect the oxide coated electrodes as they take part of the load. They are connected in multiple with the sleeves of the electrodes. The outer bulb may be well evacuated or maybe filled with an inert gas, such as neon or argon, at a low pressure, preferably less than 1 mm. A globule of mercury 26 is also contained in the bulb.

In operation, when the current is switched on, the filament 12 glows and its resistance increases on account of the fact that tungsten has a positive temperature coefficient of resistance. The arc starts between the electrodes and as the voltage drop between the electrodes decreases, this is compensated for by the increase in the resistance of the filament. The light from the filament supplements the glow from the arc and increases the illumination obtained. The increased heat due to the presence of the inner incandescent lamp improves the quality of the ultra violet light.

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

1. An electric discharge lamp comprising an envelope containing an ionizable medium, a pair of lead-in conductors extending into said envelope, a pair of spaced electrodes in said envelope

each comprising a metallic tube having a coating of material adapted to emit electrons when heated, a filamentary heater within each of said tubes, an end of each of said tubes and its cooperating heater being electrically connected to one of said lead-in conductors, a conductor electrically connecting the opposite ends of said heaters, and a metallic grid member of open structure surrounding substantially the full length of each of said tubes and in electrical communication therewith but spaced therefrom to serve as a shield therefor.

2. An electric discharge lamp comprising an envelope containing an ionizable medium, a pair of lead-in conductors extending into said envelope, a pair of spaced electrodes in said envelope each comprising a metallic tube having a coating of material adapted to emit electrons when heated, a filamentary heater within each of said tubes, an end of each of said tubes and its cooperating heater being electrically connected to one of said lead-in conductors, a conductor electrically connecting the opposite ends of said heaters, and a metallic grid member consisting of a coil of refractory wire surrounding substantially the full length of each of said tubes and in electrical communication therewith but spaced therefrom to serve as a shield therefor.

3. An electric discharge lamp comprising an envelope containing an ionizable medium, a pair of lead-in conductors extending into said envelope, a pair of spaced electrodes in said envelope each comprising a metallic tube having a coating of material adapted to emit electrons when heated, said tubes being disposed substantially parallel so that the discharge gap is between the sides thereof, a filamentary heater within each of said tubes, an end of each of said tubes and its cooperating heater being electrically connected to one of said lead-in conductors, a conductor electrically connecting the opposite ends of said heaters, and a metallic grid member of open structure surrounding substantially the full length of each of said tubes and in electrical communication therewith but spaced therefrom to serve as a shield therefor.

GEORGE E. INMAN.