Feb. 5, 1935. T. E. FOULKE 1,990,174

ELECTRIC DISCHARGE DEVICE

Filed July 27, 1929

Fig. 1

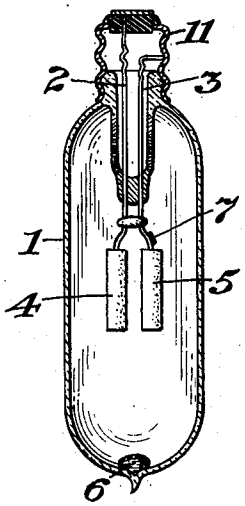


Fig. 4

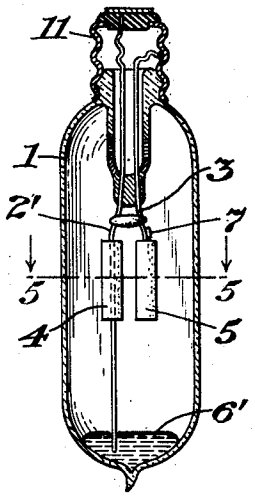


Fig. 5

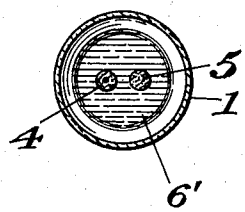


Fig. 2

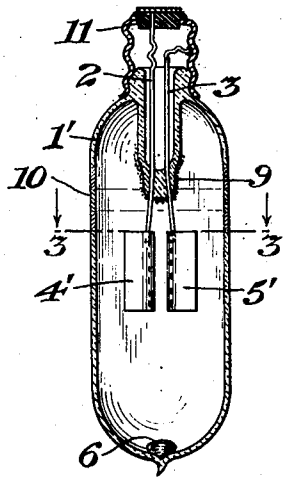
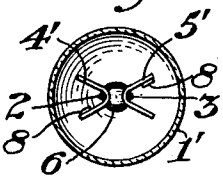


Fig. 3



INVENTOR
Ted E. Foulke
BY
Thos. A. Brown
HIS ATTORNEY

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1,990,174

ELECTRIC DISCHARGE DEVICE

Ted E. Foulke, Nutley, N. J., assignor to General Electric Vapor Lamp Company, Hoboken, N. J., a corporation of New Jersey

Application July 27, 1929, Serial No. 381,423

6 Claims. (Cl. 176—122)

The present invention relates to gaseous discharge devices and particularly to devices producing ultra violet radiations.

Various objects and advantages of the invention will be obvious from the following particular description of forms of lamps embodying the invention or from an inspection of the accompanying drawing. The invention consists in certain new and useful features of construction and combinations of parts as hereinafter set forth and claimed.

In the accompanying drawing there is shown for purposes of illustration one form of lamp, with certain modifications thereof, embodying the invention, in which

Fig. 1 is a vertical sectional view of a glow discharge device embodying the invention,

Figs. 2 and 3 are respectively a vertical, sectional elevation view and a transverse sectional view taken along the line 3—3 of Fig. 2 of an alternative embodiment of the invention, and

Figs. 4 and 5 are respectively vertical sectional elevation view and a transverse sectional view taken along the line 5—5 of Fig. 4 illustrating another alternative embodiment of the invention.

In Fig. 1 of the drawing the envelope 1 is of a material such as fused silica, which is transparent to ultra violet light, or a boro-silicate glass such as pyrex or G702P glass, which is transparent to only a portion of the ultra violet radiations. By means of a graded seal the leads 2, 3, of tungsten or other suitable material are sealed into said envelope 1. To the ends of said leads 2, 3 are attached the cylindrical electrodes 4, 5 which are of nickel, iron, magnesium, cadmium or other suitable material. A small body of mercury 6 is provided in the envelope 1 and a gaseous filling is provided for said envelope. A gas mixture which is suitable for this purpose comprises about 75% of neon and 25% of helium together with a trace, say 0.25%, of argon. In a preferred embodiment of the invention there is mounted on one of said leads 2, 3 a bead 7 of getter material. This getter material is a compound such as the oxide, hydroxide, or carbonate of sodium, potassium, lithium, calcium, magnesium or other alkaline or alkaline earth metals. The gas filling is sealed in at a pressure of about 30 mm. of mercury. The operating voltage of such a device with the electrodes spaced apart at a distance of .5 to 2.0 mm. is in the neighborhood of 100 to 110 volts direct current or about 75 volts alternating current.

In the embodiment of the invention illustrated in Figs. 2 and 3 the electrode leads 2, 3 support electrodes 4', 5' of nickel, iron or the like. Each of said electrodes is of sheet metal bent in the form of a V, the closed ends of the V's being opposed. On the face of each of said electrodes 4', 5' which is away from the other electrode is mounted a small piece of magnesium 8 which serves as a getter material. When desired another getter comprising a coating 9 is mounted on the seal-in stem near said leads 2, 3. This material is an oxide, hydroxide or carbonate of an alkali or alkaline earth metal and takes the place of the bead 7 of Fig. 1. In this particular embodiment, as illustrated, the upper part of the envelope 1' is of any suitable glass while the lower part thereof is of a material transparent to ultra violet rays, the two parts of the envelope 1' being connected by a graded seal 10. A small quantity of mercury 6 is provided in the envelope 1'. Said envelope has a gaseous filling such as has been described in connection with the embodiment illustrated in Fig. 1.

The embodiment illustrated in Figs. 4 and 5 is similar to that of Fig. 1 except that a lead 2' is used to support electrode 4 and this lead 2' extends downwardly beyond electrode 4 and into the body of mercury 6' provided in the envelope. In this form of device a glow discharge is started between the electrodes 4 and 5 after which the discharge will extend downwardly from electrode 4 along lead 2' which thus serves as an extension of said electrode 4, to the surface of said body of mercury 6' where it will be continued.

In any of these embodiments, when desired, a ballasting resistance is provided in series with one of the electrodes and is preferably mounted within the base plug 11.

The mercury provided in the lamp envelope described is used as a source of vapor which under discharge conditions will produce ultra-violet radiations and particularly radiations having a wave length in the immediate neighborhood of 2536 Ångström units. Other materials can be used, however, with or in place of mercury for sustaining the discharge of ultra-violet radiations, for example chlorides or other halides of metals such as cadmium, magnesium or mercury.

Ultra violet lamps of this invention are suitable for therapeutic uses, for producing chemical actions, for ultra-violet signaling, and for general use in the arts. Lamps made according to the specifications above given can be operated on commercial circuits of about 100 to 120 volts or thereabout to produce ultra-violet radiations in quantities sufficient for practical uses.

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 devices illustrated and in their use and operation may be made by those skilled in the art without departing from the spirit of the invention.

For want of a generic term the term "alkaline", as used in the claims, is intended to refer with equal force to either the true alkalis, or to the alkaline earths.

I claim:

1. In an electric discharge device, an envelope permeable to ultra-violet rays, electrodes of the cold cathode type sealed therein, a quantity of an alkaline compound adjacent to said electrodes, and a gaseous atmosphere within said envelope.

2. In an electric discharge device, an envelope permeable to ultra-violet rays, electrodes of the cold cathode type sealed therein, a quantity of an alkaline compound adjacent to said electrodes, and a gaseous atmosphere which emits ultra violet rays when an electric discharge is passed therethrough.

3. In an electric discharge device, an envelope permeable to ultra-violet rays, electrodes of the cold cathode type sealed therein, a quantity of an alkaline compound adjacent to said electrodes, and a gas and a vaporizable substance in said envelope.

4. In an electric discharge device, an envelope permeable to ultra-violet rays, electrodes of the cold cathode type sealed therein, a quantity of an alkaline compound adjacent to said electrodes, and a discharge supporting gas and mercury within said envelope.

5. In an electric discharge device, an envelope permeable to ultra-violet rays, electrodes sealed therein, a single inlead to each of said electrodes, a quantity of an alkaline compound adjacent to said electrodes, and a gaseous atmosphere and a pool of mercury in said envelope, one of said electrodes having an extension leading into said mercury pool.

6. An electric discharge device including an envelope permeable to ultra-violet rays, electrodes therein and means supporting each of said electrodes, a quantity of an alkaline compound adjacent to said electrodes and a gaseous atmosphere and a pool of mercury in said envelope, one of said means extending into said mercury pool.

TED E. FOULKE.