Nov. 14, 1939. E. G. DORGELO 2,180,141

GAS-FILLED ELECTRIC LAMP

Filed June 26, 1939

Fig.1.

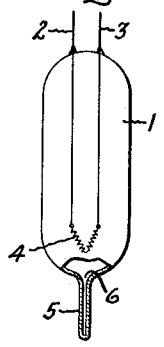


Fig.2.

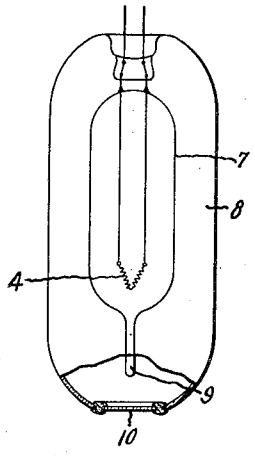


Fig.3.

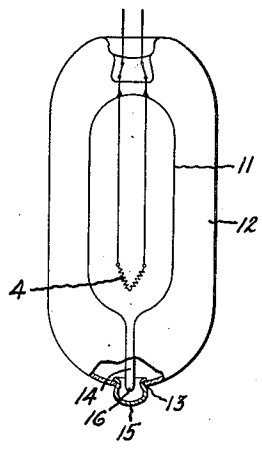


Fig.4.

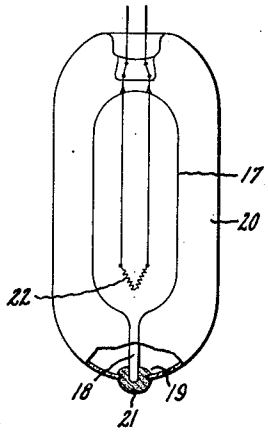
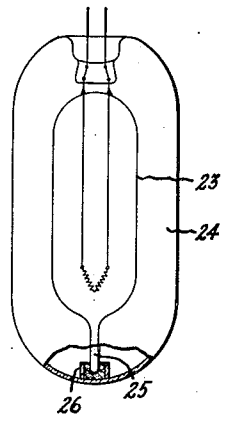


Fig.5.



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Patented Nov. 14, 1939 2,180,141

UNITED STATES PATENT OFFICE

2,180,141

GAS-FILLED ELECTRIC LAMP

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Application June 26, 1939, Serial No. 281,287
In the Netherlands June 14, 1938

6 Claims. (Cl. 176—16)

My invention relates in general to hermetically sealed vessels containing a gaseous filling above atmospheric pressure, and in particular to electric devices, such as electric incandescent lamps, having such a high pressure gas filling. Still more particularly, my invention relates to an enclosure or envelope for such devices.

Electric incandescent lamps with a gas filling pressure above one atmosphere have the disadvantage that they may constitute a danger to the surroundings even when the lamp is out of operation. In general, this danger is not present when the lamp is located in a holder or in a fitting. However, when the lamp is defective and it is laid aside by the consumer, the possibility remains that unknowing persons may break the lamp and be subjected to the dangers of the explosion which results.

The object of the present invention is to provide a lamp construction which can be rendered harmless to the surroundings by giving the filling gas within the lamp an opportunity to escape. A feature of the invention is the provision of a lamp bulb with a capillary tube which is closed off at its end and which protrudes outwardly of the lamp bulb. By filing or breaking off the capillary tube when the lamp has become unsatisfactory for use, the filling gas is liberated and will flow out of the lamp into the atmosphere without causing accidents. Because of the very narrow canal in the capillary tube, the escape of the filling gas will take place without danger to the surroundings.

In one physical embodiment of the invention, in which the lamp is enclosed within a second bulb, the end of the capillary tube is located in such a way with respect to a normally closed opening of the outer bulb that the canal in the capillary tube can be readily opened to the surroundings by at least a partial removal of a sealing element in the outer bulb. This sealing element may consist, for instance, of a glass plate which is fastened by suitable means in the said opening in the outer bulb. By the removal of this glass plate, the space between the lamp and the outer bulb becomes accessible so that the capillary tube can be readily opened by breaking the same, for instance, by means of pliers. It is advantageous, according to the invention, that the end of the capillary tube be located in the immediate vicinity of the opening in the outer bulb, which opening is closed off by the removable element. The expression "element" is to be given a broad interpretation in this connection; by this expression there is meant not only caps, screw heads and the like, but also sealing means which may consist of a material which is soft during the application and which hardens gradually.

According to another physical embodiment, the opening in the outer bulb may be sealed with a quantity of material in which the end of the capillary tube is embedded, the said material being softer than the material of the capillary tube.

In another physical embodiment, the lamp is enclosed in an outer bulb the wall of which is provided with a tubular element which encloses the capillary tube. This tubular element may consist of an outwardly protruding tubular extension on the outer bulb, or it may consist of a tubular part which is cemented to and located within the outer bulb. In this form of the invention, the capillary tube is opened by the breaking of the outer bulb so that the tubular element is given a sideward motion with respect to the capillary tube which then breaks off as a result.

Further objects and advantages of my invention will appear from the following description of species thereof and from the accompanying drawing in which:

Fig. 1 is an elevation, partly in section, of a high pressure electric incandescent lamp comprising my invention; and Figs. 2 to 5 inclusive are elevations, partly in section, of various modifications of my invention.

Referring to Fig. 1, the lamp there shown comprises a hermetically sealed vitreous bulb or envelope 1 within which an electric energy translation element or filament 4 is mounted on a pair of current supply wires 2 and 3. The bulb is filled with a rare gas, such as krypton plus a small quantity of nitrogen, at a pressure above that of the atmosphere, such as, for instance, three atmospheres. The bulb is provided, preferably at its tip end, with a capillary tube 5 closed at its outer end. When the filament 4 burns out or otherwise becomes defective, the lamp can be made harmless to the surroundings by filling or breaking off the capillary tube 5 whereby the filling gas located within the lamp will very slowly flow out of the bulb through the canal 6 in the capillary tube 5.

In the modification shown in Fig. 2, a small high pressure lamp 7, similar to the lamp shown in Fig. 1, is enclosed within an outer bulb 8 which serves as protection for the lamp against external influences. As before, the lamp 7 is provided with a capillary tube 9 extending outwardly from its

tip end. The tip end of the outer bulb 8, opposite the capillary tube 9 on the lamp 7, is provided with a removable cap-like sealing element 10, preferably consisting of a small glass plate. This glass plate can, for instance, be made elliptical and be fastened in the bulb 8 with a soft type of cement. When the lamp has become unfit for use, for instance because of the failure of the filament, it can be made harmless by removing the glass plate 10 and snapping off the capillary tube 9 by means of scissors or pliers which can be introduced into the outer bulb 8 through the opening which was originally closed by the plate 10.

In the physical embodiment of the invention shown in Fig. 3, a small high pressure lamp 11 is enclosed within a bulb 12 having an opening 13 at its tip end. Through this opening protrudes the end of a capillary tube 14 on the lamp 11. The opening 13 is normally closed by a small metal cap 15 which is held therein by means of an elliptical or curled edge. When the lamp 11 becomes defective, the cap 15 is pulled out of the opening 13 and the point 16 of the capillary tube 14 filed off whereby the lamp becomes harmless by the escape of the gas filling within the lamp 11.

In the modification shown in Fig. 4, a small high pressure lamp 17, similar to the lamp illustrated in Fig. 1, is provided with a capillary tube 18 the end of which protrudes through an opening 19 in an outer bulb 20. The opening 19 is closed off by a quantity of cement 21, which cement also surrounds and holds the end of the capillary tube 18 with respect to the outer bulb 20. After the filament 22 in the lamp 17 fails, the quantity of cement 21 is removed, for instance by filing, whereupon the end of the capillary tube 18 can be opened and the lamp made harmless to the surroundings by the escape of the gas filling in the small lamp 17. In place of cement, it is, of course, also possible to use any other material such as, for instance, synthetic resin or soft metals such as lead.

In the physical embodiment of the invention shown in Fig. 5, a small high pressure lamp 23, similar to the lamp shown in Fig. 1, is enclosed within an outer bulb 24. The end of the capillary tube 25 of the lamp 23 rests within a relatively small tubular element 26 which is fastened to the inner side of the bulb 24, for instance, by means of cementing, the end of the capillary tube preferably being embedded in the cementing material. By breaking the outer bulb 24, the part 26 of the capillary tube 25 is broken off.

It will be evident that the construction according to the invention is suitable both for lamps with a large bulb volume and also for lamps with a very small bulb volume, for instance of an order of magnitude of 15 cm.^{3} or less.

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

1. An electrical device comprising a hermetically sealed container of vitreous material having a gas filling at a pressure in excess of one atmosphere, said container being provided with a readily fracturable capillary tube extending outwardly therefrom and closed off at its outer end whereby fracturing of said tube releases the gas in said container without rupturing said container.

2. An electric lamp comprising a hermetically sealed vitreous envelope containing a gas filling at a pressure in excess of one atmosphere, an electric energy translation element mounted within said envelope, and a readily fracturable capillary tube extending outwardly from said envelope and communicating with the interior thereof, said capillary tube being closed off at its outer end whereby fracturing of said tube releases the gas in said envelope without rupturing said envelope.

3. An electric lamp comprising a hermetically sealed vitreous inner envelope containing a gas filling at a pressure in excess of one atmosphere, an electric energy translation element mounted within said inner envelope, a readily fracturable capillary tube extending outwardly from said inner envelope and communicating with the interior thereof, said capillary tube being closed off at its outer end, whereby fracturing of said tube releases the gas in said envelope without rupturing said envelope, and an outer envelope enclosing said inner envelope and having an opening therein located opposite the end of said capillary tube, said opening being normally closed by a readily removable sealing element.

4. An electric lamp comprising a hermtically sealed vitreous inner envelope containing a gas filling at a pressure in excess of one atmosphere, an electric energy translation element mounted within said inner envelope, a readily fracturable capillary tube extending outwardly from said inner envelope and communicating with the interior thereof, said capillary tube being closed off at its outer end, whereby fracturing of said tube releases the gas in said envelope without rupturing said envelope, and an outer envelope enclosing said inner envelope and having an opening therein normally sealed by a quantity of readily removable sealing material, said capillary tube extending through said opening and having its end embedded in said sealing material.

5. An electric lamp comprising a hermetically sealed vitreous inner envelope containing a gas filling at a pressure in excess of one atmosphere, an electric energy translation element mounted within said inner envelope, a readily fracturable capillary tube extending outwardly from said inner envelope and communicating with the interior thereof, said capillary tube being closed off at its outer end, whereby fracturing of said tube releases the gas in said envelope without rupturing said envelope, and an outer envelope enclosing said inner envelope and having a relatively small inwardly extending tubular extension enclosing the outer end portion of said capillary tube.

6. An electric lamp comprising a hermetically sealed vitreous inner envelope containing a gas filling at a pressure in excess of one atmosphere, an electric energy translation element mounted within said inner envelope, a readily fracturable capillary tube extending outwardly from said inner envelope and communicating with the interior thereof, said capillary tube being closed off at its outer end, whereby fracturing of said tube releases the gas in said envelope without rupturing said envelope, and an outer envelope enclosing said inner envelope and having an opening therein located opposite the end of said capillary tube, said opening being normally closed by a cap-like member removably sealed over said opening.

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