Aug. 28, 1934. G. ZECHER ET AL 1,971,890

ELECTRIC DISCHARGE TUBE

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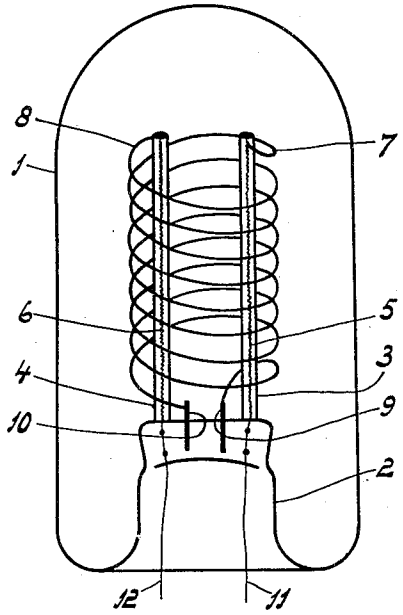


Fig. 1.

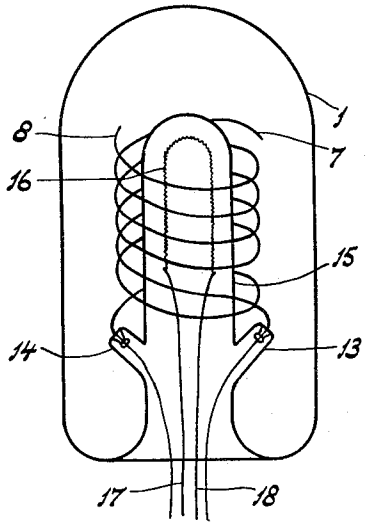


Fig. 2.

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ELECTRIC DISCHARGE TUBE

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1 Claim. (Cl. 176—122)

This invention has reference to electric discharge tubes and more particularly to electric glow discharge tubes containing metal vapour, preferably mercury vapour.

The invention has for its object to cause the metal vapor enclosed within the discharge tube to take part intensively in the discharge. For this purpose, according to the invention, a heating element is arranged adjacent to the path of discharge between the electrodes. The discharge tubes may contain, in addition to a metal vapor, a gas, preferably a rare gas. The heating element may be enclosed within the discharge tube, and may in this case consist with advantage of one or more tungsten wires arranged in one or more small insulation tubes, which may be fixed to the stem of the discharge tube, and which may be used to support the electrodes between which the discharge takes place. Another object of the invention is to lessen the chances of condensed metal vapor forming on the walls of the tube, which is accomplished by reason of the higher and more uniform temperature of operation maintained by the heating elements referred to above.

Alternatively the heating element may be arranged outside the discharge tube within a re-entrant part of the latter.

The wall of the discharge tube may be at least partly of material that is transparent to ultra-violet rays.

Preferably the heating element acts as a current limiting resistance. In some instances it may be used to entirely replace such a resistance, thus saving energy.

The arrangement of a heating element adjacent the path of discharge is of great advantage in connection with glow discharge tubes, as a higher metal vapour pressure can thus be attained. In discharge tubes having a discharge of a kind other than a glow discharge, for example a positive column discharge, a sufficient vapour pressure can always be ensured by a sufficiently intense current which cannot be resorted to in the case of glow discharge tubes.

The invention will be more clearly understood by reference to the accompanying drawing in which two embodiments of the invention are diagrammatically illustrated,

Fig. 1 is an elevation of a tube, illustrating a form of the invention with a heating element within the tube; and,

Fig. 2 is an elevation of a form of the invention which uses a heating element outside the walls of the tube.

The wall of the glow discharge lamp shown in Figure 1 is of a material that is transparent to ultra-violet rays. The stem 2 has fixed to it two small insulating tubes 3 and 4 which contain heating elements 5 and 6 constituted, for example by helically wound tungsten wire and connected to the electrodes 7 and 8 which are helically wound together and which are supported at their upper ends by the tubes 3 and 4, at their lower ends by supporting rods 9 and 10. The tube contains argon and mercury vapour which during the operation of the tube is heated by the heating element and attains a high pressure so that an intense ultra-violet radiation is ensured. In this case the heating elements serve at the same time as current limiting resistances of the discharge tube, because the discharge electrodes 7 and 8 are energized through the heater wires 5 and 6, respectively.

The glow discharge lamp 1 shown in Figure 2 has two electrodes 7 and 8 helically wound together which are fixed to and taken out of the lamp by two small tubes 13 and 14 at the re-entrant part 15 of the discharge tube. The gaseous filling of this lamp also contains mercury vapour which may be heated by a heating element 16 that is arranged outside the discharge tube within the re-entrant part 15 and which is connected to the leading-in wires 17 and 18 by which a separate heating current can be supplied.

Three important results follow the use of the heater elements described as part of this invention—the electrodes discharge more readily and at a lower impressed voltage; the operation of the tube as a light source is steadied; and finally the carrier vapor for the discharge itself enters more freely and efficiently in the reaction to emit radiation.

What we claim is:

A glow discharge lamp comprising a transparent envelope containing helically wound electrodes each concentric to the axis of the envelope, and supporting means for said electrodes provided with heater coils carried adjacent the windings of the electrodes, and within the envelope.

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