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J. L. COX

2,290,828

ELECTRIC DISCHARGE LAMP

Filed March 21, 1940

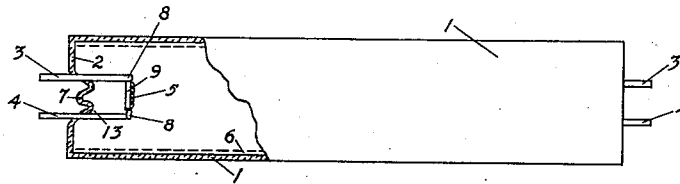


Fig. 1.

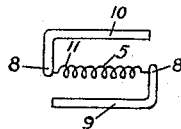


Fig. 2.

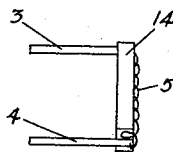


Fig. 3.

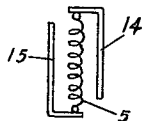


Fig. 4.

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UNITED STATES PATENT OFFICE

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ELECTRIC DISCHARGE LAMP

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Application March 21, 1940, Serial No. 325,247

1 Claim. (Cl. 176—126)

This invention relates to electric gaseous discharge lamps, and in particular to the arrangement of electrodes used in such lamps.

An object of the invention is to provide for such a device a main thermionic electrode provided with auxiliary electrodes which are arranged to provide an auxiliary discharge sufficient to facilitate the starting of the main discharge in the device, and to which auxiliary electrodes, part of the main discharge current, may flow when the composite electrode is used on alternating current.

Other objects, advantages and features of the invention will be apparent from a study of the following specification taken in conjunction with the accompanying drawing, in which:

Fig. 1 is a profile view, partly in section, of a lamp according to the invention;

Fig. 2 is a view of the electrode of Fig. 1, in a plane perpendicular to that of Fig. 1;

Fig. 3 is a side view of an arrangement in which a rectangular metal piece is used in place of one of the straight wires;

Fig. 4 is a plan view of the same arrangement.

In Figure 1, the tubular glass envelope 1 is sealed at each end to a reentrant stem 2 through which the lead-in wires 3, 4 pass at the press 13, to support the coiled wire electrode 5. The envelope may have coating 6 of fluorescent material on its inner surface, and has a filling of inert gas and mercury vapor, for example. The exhaust tube 7, which may be present on one or both of the stems 2, seals the tube. The lead-in wires project forward a short distance from the stem, and are bent at point 8 into a plane perpendicular to the tube axis, to provide the auxiliary anodes 9 and 10 in that plane. If desired, the anodes 9 and 10 may be separate pieces of nickel welded to the lead-in wires near point 8, or again they may be portions of the lead-in wires, bent near and along the filament before reaching the point at which they are connected to the filament, as shown for example in the copending application of Robert F. Reed, Serial No. 256,498, filed February 15, 1939, for Electric discharge lamps.

In the form shown in Figs. 3 and 4, rectangular flat metal pieces 14, 15 may replace the bent wire elements 9, 10. Such pieces are more effective as cathode shields than single wires. If the pieces are made of hollow tubing the ends may be pinched together to enclose a drop of mercury, as shown in my copending application Serial No. 247,252, filed December 22, 1938.

In operation, the lead-in wires 3, 4 are connected to a source of voltage sufficient to bring the filament to an electron-emitting temperature. The filament is preferably proportioned so that the voltage drop across it with a current sufficient to bring it to the electron-emitting temperature is slightly greater than the resonance or ionization voltage of the gas or vapor in the tube. There will then be sufficient voltage between each end of the filament and the lead-in wire to the opposite end to cause a discharge through the gas between said end, say end 11, and lead-in wire, say 9. This local discharge will excite the gas along the main path along the length of the glass envelope and permit the starting of that discharge. The filament voltage is preferably applied a few seconds before the main voltage, and may be cut off as soon as the main voltage is applied, the filament then acting as a self-heating electrode.

The filament 5 is preferably made of tungsten wire, and by properly proportioning the diameter and length of the wire, the filament can be made to have a voltage drop greater than the resonance or ionization voltage of the gas or vapor in the tube at a current sufficient to raise the temperature of the filament to an electron-emitting value sufficient to operate the discharge. The anodes 9 and 10 should be correlated with the filament to insure that the filament operates at a temperature satisfactory from the standpoint of electron emission and life.

The present application is in part a continuation of my copending application Serial No. 247,252, filed December 22, 1938.

What I claim is:

An electrode for a discharge device comprising a filamentary coil of a refractory metal having a coating of an electron-emissive material thereon, and a pair of auxiliary anodes spaced from each other and electrically connected to opposite ends of said filamentary coil, said anodes comprising substantially rectangular flat metal elements extending substantially longitudinally of said filamentary coil and disposed closely adjacent to and on opposite sides of said coil, said flat rectangular metal elements also extending substantially parallel to each other and to the plane of said filamentary coil, at least a portion of said coil projecting forwardly beyond the plane defined by said metal elements.

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