

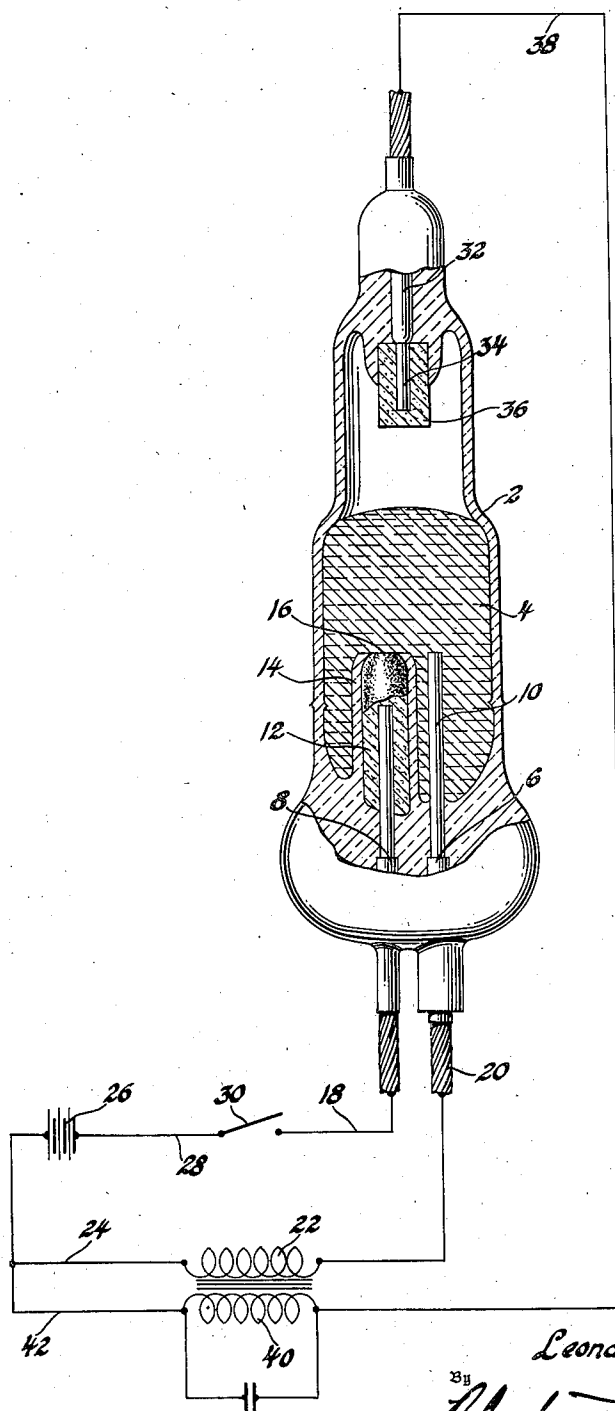
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NONSPUTTERING ELECTRODE FOR MERCURY ARC DEVICES

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NON-SPUTTERING ELECTRODE FOR
MERCURY ARC DEVICES

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3 Claims. (Cl. 250—27.5)

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This invention relates to a light generating means or more particularly to means generating ultraviolet rays from a low voltage source of current. There are of course many uses for ultraviolet light and one may be cited as an example in lighting during dimout or blackout conditions where it is necessary to ascertain the position or location of various objects without undue illumination to disclose their whereabouts to adverse parties. Ultraviolet light is well adapted for such usage since when transmitted and allowed to impinge upon a surface covered by fluorescent material, will cause the latter to glow and therefore its position will be determined with few light rays being dispersed in other directions and therefore not discernible by other parties. However, it has in the past been necessary to develop relatively high voltage and to apply this to means having mercury or mercury vapor therein in which the arc was established. This equipment was therefore cumbersome and expensive. Recently equipment has been developed in which, utilizing only a storage battery as a source of power, an ultraviolet arc has been established, which means may be utilized as lighting equipment on such vehicles as army trucks to allow the same to be operated with a minimum of illumination.

Lighting means of this type are shown generally in a patent to Brian, No. 2,289,623, issued July 14, 1942. In that instance it will be noted that there are actually two parts of the system, one an interrupter section which interrupts a low voltage direct current, and secondly, an arc producing section in which the actual ultraviolet rays are generated. However, one of the electrodes in the arc producing section has been in the past metallic and when an arc is drawn therefrom to the mercury pool which forms the second electrode, metal has sputtered or vaporized from the metallic electrode and becomes imbedded in the inner surface of the transparent casing and in time therefore blackens the inside to cut down materially on the amount of light or ultraviolet rays transmitted therethrough.

It is therefore an object of my invention to provide means for creating a mercury arc without the sputtering of any metallic particles on the inner portion of the casing.

It is a further object of my invention to provide mercury arc means in which no metallic electrode is exposed to the arc.

With these and other objects in view which will become apparent as the specification proceeds, the embodiments of my invention will be best understood by reference to the following

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specification and claims and the illustrations in the accompanying drawing, in which the figure of the drawing shows a vertical section through a tube of my invention showing the external electrical circuit for supplying the various electrodes of the same. In this figure there is shown a substantially cylindrical transparent casing 2 formed of glass or similar material, the lower portion of which is filled with mercury 4 and supports a pair of terminals 6 and 8 which are fused into the lower portion of the casing. Terminal 6 projects through into the center portion of the tube and forms electrode 10 which is in conductive relation with the mercury pool 4. Terminal 8 is staked into an electrode 12 formed of carbon or material having a similar electrical resistivity, which electrode 12 is substantially enclosed by a cylindrical glass envelope 14 formed as part of the tube 2 and leaving only an upper surface 16 of the electrode 12 exposed to the mercury.

Terminal 8 is connected to exterior line 18 and terminal 6 to exterior line 20. Line 20 is connected in turn to primary 22 of a transformer, the opposite terminal of which is connected through line 24 to a battery 26 whose opposite terminal is again connected through line 28 to a switch 30. This last-named switch completes the circuit in cooperating with line 18. The upper portion of the tube has fused therein terminal 32 whose lower portion is connected to a metallic electrode 34. Upon this electrode 34 is secured a relatively porous ceramic body 36 which is heat resisting and at the same time encases the metallic electrode. Through its porous openings however electrical arc currents may flow between the upper surface of the mercury pool 4 and the metallic electrode 34. Terminal 32 is connected by external line 38 with one terminal of the secondary 40, the opposite terminal of which is connected through line 42 with line 24.

When switch 30 is closed, current flows through the primary circuit from battery 26, line 28, switch 30, line 18, terminal 8, electrode 12, mercury pool 4, electrode 10, terminal 6, line 20, transformer winding 22 and line 24 back to the battery. As this current flows, the current density at surface 16 of electrode 12 is sufficient to heat up the mercury in contact therewith and causes the same to vaporize, thereby interrupting the flow of current in the primary. However as soon as this flow is interrupted, the mercury vapor at that point will recondense, reforming the circuit, and thus providing an automatic interruption of the primary current flow. This pulsating current through transformer

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winding 22 will induce in the secondary 40 a secondary current of sufficient voltage to cause an arc to be formed between the upper surface of the mercury pool and the electrode 34.

Above the mercury pool 4 there will be mercury vapor present which will enter the interstices of the porous ceramic member 36 and remain there as mercury globules, thus aiding the flow of current from the mercury pool 4 to the electrode 34 and simulating a mercury-to-mercury arc. Any tendency therefore of the metallic electrode 34 to sputter away or discharge small bits to be deposited on the inner wall of the tube 2 will be deposited on the porous channels of the ceramic body and therefore no metallic deposit will be effected on the inner surface and the efficiency of this portion of the tube to transmit light rays will remain substantially constant.

I claim:

1. In a mercury arc device, a hollow enclosure, a pair of spaced electrodes carried by the enclosure, a pool of mercury partially filling the enclosure and contacting one of the electrodes and a porous, heat resisting electrically insulating means supported on the second electrode and encasing the same said mercury vapor entering said porous means to provide conductive paths and said porous means acting to prevent metallic sputtering of the metal on the enclosure walls.

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2. In a mercury arc device, a transparent non-conductive housing, a metallic electrode mounted therein and forming one electrode of an arc discharge device, and a porous heat resistant electrically insulating means mounted upon and encasing the metallic electrode to prevent sputtering of the metallic pieces on the housing.

3. In a mercury arc device, a transparent non-conductive housing, a metallic electrode mounted therein and forming one electrode of an arc discharge device, and a porous ceramic member mounted upon and encasing the metallic electrode to prevent sputtering of the metal upon the housing during arcing.

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The following references are of record in the file of this patent:

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