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R. F. STRICKLAND

2,104,680

ENCLOSED ARC DEVICE

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Fig. 1

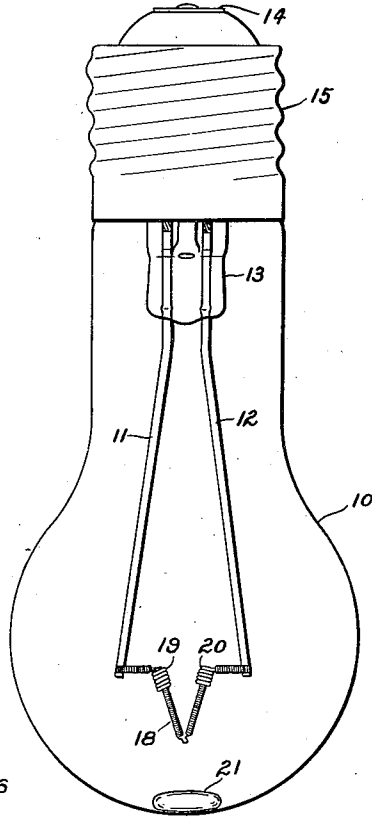


Fig. 3

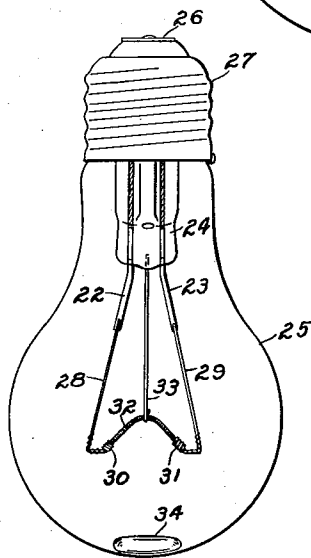
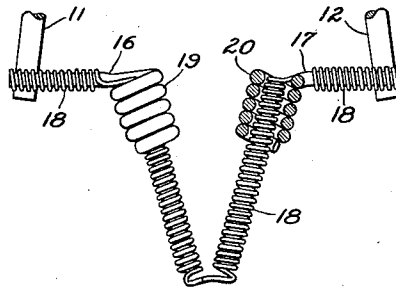


Fig. 2



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UNITED STATES PATENT OFFICE

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ENCLOSED ARC DEVICE

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Application February 25, 1931, Serial No. 518,146

4 Claims. (Cl. 176—1)

My invention relates to arc lamps of the type which comprise highly refractory electrodes sealed in a light transmitting enclosure containing an inert gas or vapor. More particularly, my invention relates to lamps of the concentrated arc type such as are disclosed in my applications Serial No. 301,645, filed August 23, 1928, and Serial No. 407,817, filed November 18, 1929. The said lamps each comprise a bulb containing a pair of electrodes connected to a pair of leads sealed in said bulb and a filament in multiple with the arc gap between the electrodes. In operation the filament is first caused to glow and afterwards the arc forms, taking most of the electrical energy. The voltage which is necessary to start the device is considerably higher than that of the device during operation, and it is necessary to use a device, such as a transformer having a drooping characteristic. In each of the aforesaid applications, the specific disclosure is of a lamp in which a pair of electrodes are mounted comparatively close together and the filament is mounted so that its extremities are spaced apart a considerably greater distance than are the electrodes. Under these circumstances the power factor of the transformer is quite low on account of the fact that the starting voltage must be very high as compared with the operating voltage. According to the present invention, the difference in the distance between the electrodes and that between the extremities of the filament is reduced to a minimum. The result is that there is considerably less difference between the starting and operating voltages. Moreover, there is a quicker transference of energy translation from the filament to the arc between the electrodes. Considered as a source of ultraviolet radiation, the longer the arc, the more ultraviolet radiation can be obtained inasmuch as the mercury vapor is the main source of such radiation in this device. According to my invention, a wider electrode gap with a corresponding longer arc than in the prior lamp may be utilized without requiring any higher starting voltage than before.

More specifically, according to my invention, I utilize hollow bodies or sleeves as electrodes and pass an end of the filament through each of them so that each electrode surrounds a portion which I term an extremity of the said filament. I prefer to constitute such hollow or sleeve electrodes of coiled metal, each electrode coil thus surrounding an extremity of the filament coil. The location of the filament extremities in the hollow electrodes has the additional function of protecting such extremities from burnout. Vari-

ous other features and advantages of my invention will appear from the detailed description which follows of a species thereof, and from the accompanying drawing.

In the drawing, Fig. 1 is a side elevation of a lamp embodying my invention; Fig. 2 is an elevation partially in section and on an enlarged scale of the electrodes and filament; and Fig 3 is a side elevation of a modification.

In Fig. 1 is shown a lamp of the type disclosed in my applications hereinbefore referred to and comprising a bulb 10. The leads 11—12 may be of metal such as nickel and preferably comprise portions of tungsten sealed in the stem 13, the leads being connected respectively to the end contact 14 and the shell 15 of the base. To the opposite ends of the leads are united, preferably by welding, the wires 16—17, preferably of tungsten. The ends of the tungsten filament 18 are coiled around the corresponding ends of the wires 16—17 and the said filament extends through the coiled end portions 19—20 of said wires which constitute the lamp electrodes and between which the electric arc passes. The said electrodes constitute sleeves each of which surrounds a portion or extremity of the filament coil 18. The filament coil is preferably of such diameter and so disposed that there is a space between it and the electrode coil. The bulb 10, as disclosed in my applications hereinbefore referred to, is preferably of a special material such as borosilicate glass which transmits a high proportion of ultraviolet radiation, and the lamp also preferably contains a quantity of vaporizable metal 21, such as mercury, which makes it an efficient ultraviolet lamp producing light having the quality of sunlight.

The lamp shown in Fig. 3 is of a construction particularly desirable for smaller sizes. It comprises a pair of leads having portions 22—23 of, for instance, nickel, and having portions, preferably of tungsten, sealed in the stem 24 which is sealed in turn to the bulb 25, said leads being connected respectively to the end contact 26 and shell 27 of the base. The opposite ends of the leads 28—29 are preferably of a refractory metal such as tungsten or molybdenum. The electrode coils 30—31 and the filament 32 are directed toward the base of the lamp, the filament being supported by the anchor 33. This arrangement is preferred because there is a tendency in the case of the longer arcs for them to bow outwardly toward the tip end of the lamp due to electromagnetic action. By disposing the filament as shown, it is kept out of the path of the arc stream

thus deflected and it is not so likely to be burned out. The lamp shown in Fig. 3 is otherwise similar to that shown in Fig. 1, the bulb being preferably made of the special glass hereinbefore referred to, and the body 34 of mercury or other easily vaporizable metal being also present.

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

1. In an electric lamp of the concentrated arc type, the combination of a vitreous container, a pair of electrodes of refractory material supported within said container and having leads connected thereto, and a coiled filament, said filament extending out of line with and being in multiple relation to said arc gap and having end portions thereof each extending through one of said electrodes and connected to the adjacent lead whereby an arc first starts between portions of said filament and then travels to its final position between said electrodes.

2. In an electric lamp of the concentrated arc type, the combination of a vitreous container, a pair of electrodes of refractory material supported within said container and having leads connected thereto, said electrodes being coils and so disposed that the arc gap is between the sides of said coils, and a coiled filament, said filament extending out of line with and being in multiple relation to said arc gap and having end portions thereof each extending through one of said coiled electrodes and connected to the ad-

adjacent lead whereby an arc first starts between portions of said filament and then travels to its final position between said electrodes.

3. In an electric lamp of the concentrated arc type, the combination of a vitreous container, a pair of electrodes of refractory material supported within said container and having leads connected thereto, said electrodes being coils and so disposed that the arc gap is between the sides of said coils, and a coiled filament, said filament being V-shaped and extending out of line with and being in multiple relation to said arc gap and having end portions thereof each extending through one of said coiled electrodes.

4. An electric lamp of the concentrated arc type comprising a vitreous container containing a substantial pressure of readily ionizable gas, a pair of leads extending into said container, a pair of hollow electrodes of refractory metal connected to the ends of said leads and so disposed that the arc gap is between the sides thereof, and a substantially V-shaped filament having end portions thereof each extending through one of said electrodes and electrically connected to the adjacent lead, the said filament having its middle portion deflected away from the arc gap between said electrodes whereby an arc first starts between portions of said filament and then travels to its final position between said electrodes.

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