June 4, 1940. F. ALEXANDER 2,203,482

GASEOUS CONDUCTION LAMP

Filed Jan. 27, 1931

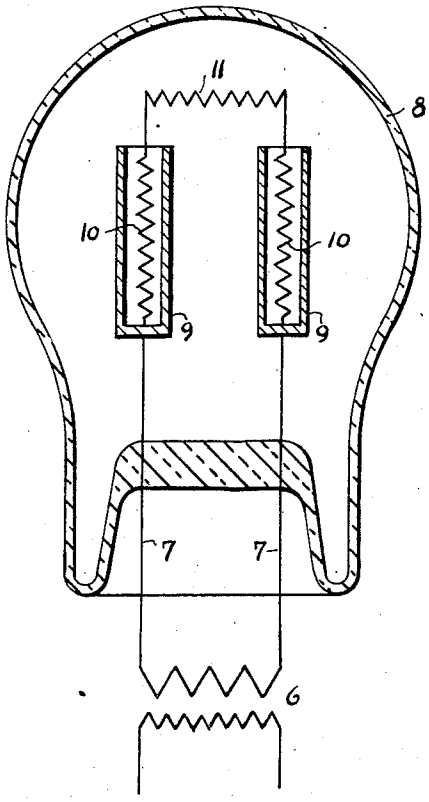


Fig. 1.

Fig. 2.

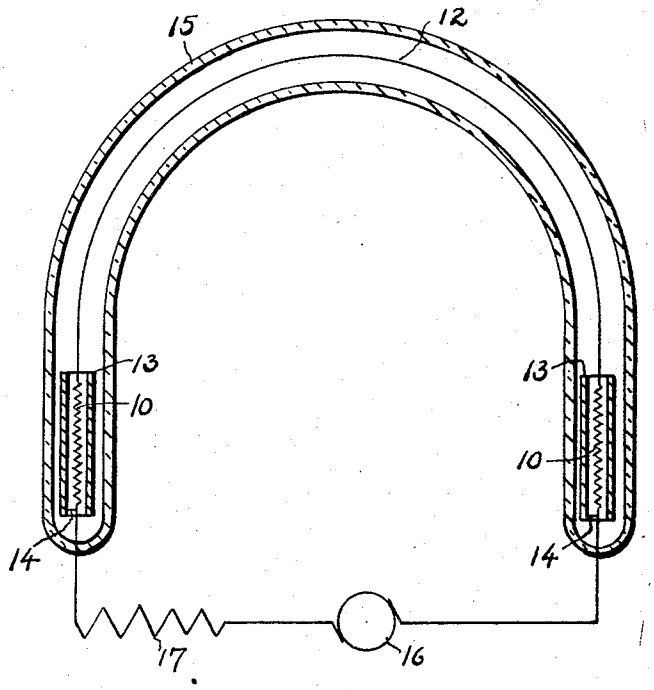
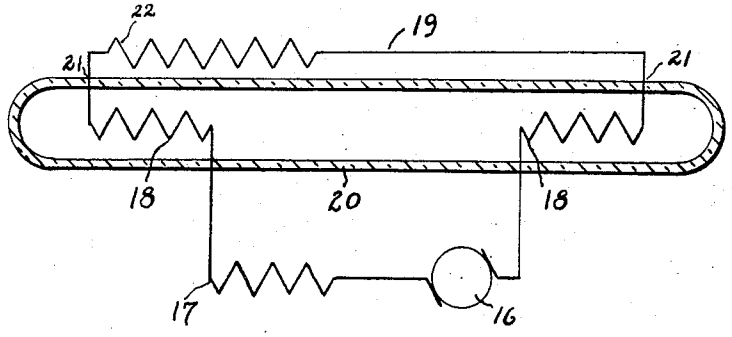


Fig. 3.



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GASEOUS CONDUCTION LAMP

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Application January 27, 1931, Serial No. 511,516

3 Claims. (Cl. 176—122)

My invention concerns a lamp in which luminescence is brought about by an electric discharge or arc through a gaseous medium.

One object of my invention is to provide in a device of that kind means heating the electrodes in order to condition the lamp for the arc discharge.

Another object of my invention is to provide electric resistance means heating the electrodes to a point at which the electronic emission of the electrodes is sufficient to carry an electric discharge or arc, for the purpose of starting the operation of that lamp or whenever the heat developed in such electrodes by an arc or discharge falls short of sustaining such a discharge or arc.

Another object of my invention is electrically to coordinate in a gaseous conduction lamp the electrode heating means with the electrodes so that the lamp may be started as well as be kept in operation from a suitable source of current supply, without the use of auxiliary mechanism or electrical devices.

Another object of this invention is to provide a gaseous conduction lamp which lends itself to a construction in a large range of sizes, and particularly of very small intensities.

A further object of my invention is to provide a vapor lamp which may be operated from a transformer of simple design and of a capacity which does not have to be in excess of the normal current requirements of the lamp.

Still another object of this invention provides for a layout, in which the electrodes are heated to bring about a discharge, but are not heated to a point of disintegration at which disintegrated parts of an electrode distort the spectrum of the luminescent gases.

A further object is to supply a vapor lamp which may be constructed to be connected to a standard current supply, the auxiliary electric equipment being limited to a resistance or choke device.

Another object of my invention is to provide a gaseous conduction lamp which may be adapted to any shape of bulb and which may be used in any position of operation.

Other objects of my invention will become apparent from a perusal of the following description and the appended drawing, in which.

Fig. 1 shows a sectioned, schematic view of a lamp of my invention.

Fig. 2 shows a modification of my improvements in a similar view.

Fig. 3 shows a similar view of another modification of my invention.

From a constant current transformer 6 two leads 7 sealedly extend into an enclosure 8, where they connect to the two electrodes 9. The electrodes are exemplarily given the shape of extended cups and are made of a material which emits electrons when heat is supplied thereto, such as tungsten, or a material which is coated with a compound of a metal which increases electronic emission under heat such as an oxide of a metal of the alkaline earths. The gaseous charge of the enclosure may consist of any gas which will be inert with respect to the electrodes during operation; the charge may also comprise solids or liquids which are gasified under the heat of operation of the lamp and which confer particular characteristics upon the radiation of the lamp.

Through the length of the electrodes 9 extend electric resistors 10 which are mounted upon the bases of the electrodes and which thus connect to the source of electric current supply. The free ends of the resistors 10 are connected to each other by way of another resistor 11, by means of which a suitable potential drop is brought about between the resistors 10.

The electric current supplied to the lamp heats the resistor 10, which in turn heats the electrodes 9 until the temperature of the electrodes has been raised to a point where the electronic emission of the electrodes permits a discharge or arc from one electrode to the other. (When direct current is used, I may confine myself to heating the cathode; or only one electrode may be heated when the lamp is to serve as a rectifier.) At or below the potential at which the current is supplied to the electrodes and to the resistors 10, the discharge or arc together with the heat supplied by resistors 10 further increases the electronic emission of the electrodes so that the current supplied from the transformer 6 will ultimately be substantially completely consumed in the arc or discharge, the current passing through the three resistors 10 and 11 dropping to a low value. When at any point of the operation the heat of the arc discharge is insufficient for sustaining said discharge or when there is a temporary interruption in the current supply, causing a drop in the heat of the electrode, the current will again flow through the resistors and reestablish the necessary electron emitting heat of the electrodes. The potential drop across the three resistors is of such magnitude as to bring about a discharge between the electrodes, after they have been sufficiently heated. The resistors 10 may therefore be directly connected by a conductor 12

when their combined resistance equals the potential necessary to strike the arc between the electrodes.

Such an arrangement is shown in Fig. 2 where the electrodes have the shape of longitudinal shields 13. The shields 13 are connected to the lead-in wires by conductors 14. The enclosure 15 has in this modification a fancy, arbitrarily semi-circular shape. An A. C. generator 16 is indicated as a standard source of current supply. The resistor 17 is connected in series with that source across the tube, said resistor determining the maximum current consumption possible in the lamp.

The lamp of the modification of Fig. 3 is excited and controlled by apparatus similar to that used in Fig. 2 for that purpose. The electrodes have in this instance the form of electric heating elements 18, said electrodes being directly heated by the current passing therethrough. The conductor 19 extends upon the outside of the enclosure 20 and connects to the electrodes 18 at two lead-in points 21 in the enclosure. The resistor 22 is comprised in the conductor 19 and has such an electric resistance, that the potential across its terminals during the operation of the lamp is of the order necessary to maintain a gaseous arc discharge between the electrodes 19. The resistance of elements 18 is of an order to produce sufficient electronic emission for the striking of an arc therebetween.

If the resistance of elements 18 is such as not only to heat said elements to the point of the necessary electronic discharge, but is of such order that the sum of the potential drops across said elements equals or exceeds the voltage necessary to maintain a gaseous arc discharge therebetween, the resistor 22 may be omitted, and the arrangement then becomes similar to that of Fig. 2.

An example of the arrangement of the lamp of the type shown in Fig. 1 will illustrate that such a lamp can be operated from a lowly rated source of constant current: The lamp is filled with argon at 2 mm. pressure and a drop of mercury is contained therein. The containers 9 are made of nickel and are coated with barium oxide. 25 volts are applied to the lamp and heat the two tungsten filaments 10 to an incandescent heat under a potential drop of four volts, respectively, the balance of 17 volts being consumed in resistor 11. An arc across the electrodes is established within a short period of time, due to argon ionization. Subsequently the heat volatilizes mercury and this results in a discharge having the characteristics of a mercury arc. Under these final operating conditions the current is 2 amperes and has a potential drop of 13 volts. Since the pressure of the mercury vapors is comparatively low, the total radiation of the lamp contains a comparatively high percentage of ultraviolet rays.

While I have shown and described my invention with some degree of particularity, it will be realized that other modifications and changes may be resorted to under special conditions. I therefore do not wish to be limited and restricted to the exact details shown and described, but reserve the right to make such changes and modifications as may fairly fall within the scope of the subject matter now being claimed.

I claim:

1. A gaseous conduction lamp comprising a gas container, three electric resistance elements in series, the second of which is arranged outside of said container, whereas the first and third elements are comprised in the electrodes in the lamp and serve to heat the electrodes.

2. An electric discharge lamp comprising an envelope containing an ionizable gas, a pair of electrodes within said envelope, a lead-in for each electrode, a heater for each electrode connected at one end to its respective electrode, a connecting member between the other end of the heaters, and a pair of lead-ins for said connecting member, said connecting member being disposed outside of said envelope.

3. In a gaseous conduction lamp, a sealed envelope, a pair of electrodes in said envelope each comprising electric resistance means for heating said electrode, said electrodes being placed for a gaseous discharge therebetween and being provided with connections outside of said envelope for connection to a source of current, and electrical connecting means extending substantially outside of said envelope and connecting said resistance means of said pair of electrodes in series with each other.

FOCSANEANU ALEXANDER.

DISCLAIMER

2,203,482.—*Focsaneanu Alexander*, New York, N. Y. GASEOUS CONDUCTION LAMP. Patent dated June 4, 1940. Disclaimer filed Aug. 21, 1945, by the assignee, *General Electric Company*.

Hereby disclaims from the scope of claims 1, 2 and 3 of said Letters Patent any gaseous conduction lamp having a starting circuit which includes auxiliary mechanism in said starting circuit to start the lamp in operation or auxiliary mechanism in said starting circuit to start and keep the lamp in operation.

[*Official Gazette October 9, 1945.*]