June 17, 1941. T. J. BEREGH 2,246,339

GAS ARC LAMP

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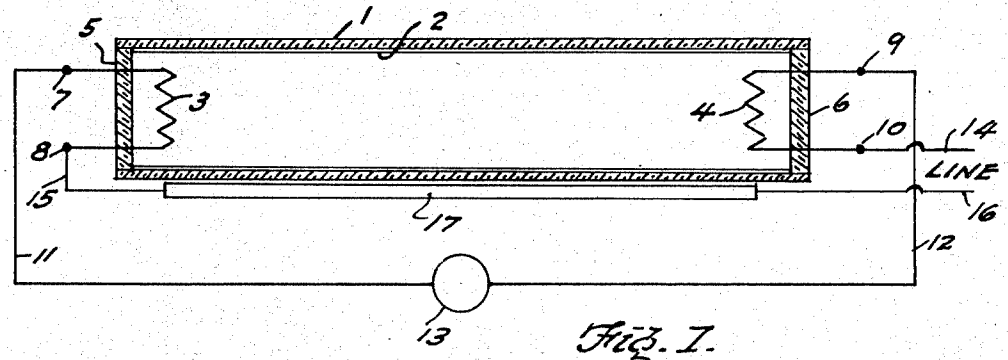


Fig. 1.

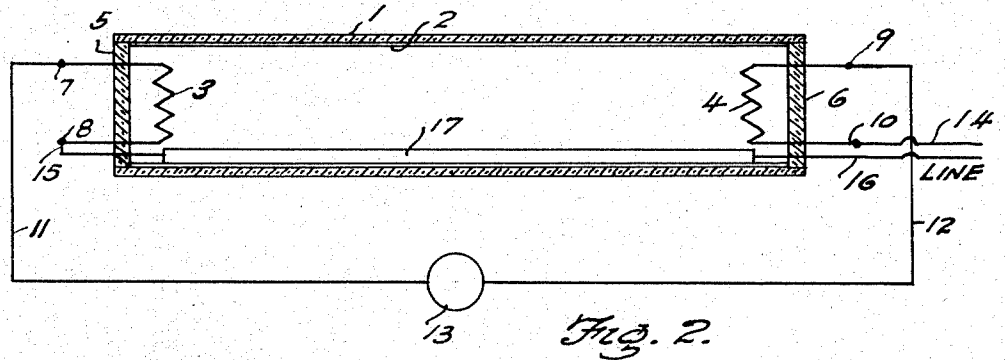


Fig. 2.

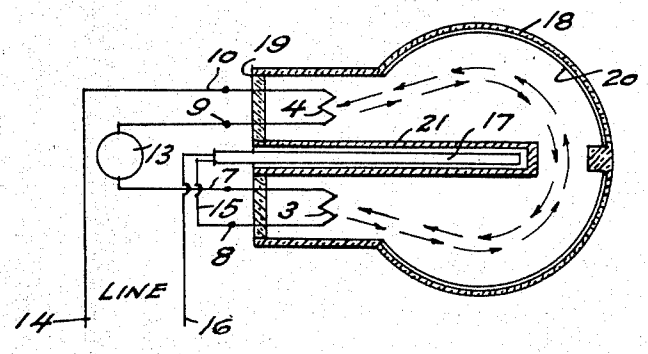


Fig. 3.

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GAS ARC LAMP

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5 Claims. (Cl. 176—124)

This invention relates to discharge devices and particularly to gas or vapor discharge devices which operate with thermionic electrodes. It is particularly concerned with the heating of the electrodes in fluorescent or closed type arc lamps.

It is well known in the art that gas arc lamps or the new fluorescent lamps which are essentially arc lamps, that it is necessary to provide an electrode at each end of the lamp tube and that these electrodes must be heated to a sufficient extent in order to start a sufficient flow of electrons within the lamp tube to set up and constitute the lighting arc.

In order to create this arc path within the lamp tube, a number of arrangements have been devised which tend to change the characteristics of the electric circuit long enough to build up the necessary flow of electrons within the arc path.

It is the principal purpose of my invention to eliminate this control apparatus and thereby simplify the construction of the lamp and materially reduce the cost. There have been many attempts to produce a satisfactory starting device for lamps of this type, but apparently all of the art shows attempts made by the introduction of certain electrical elements within the circuit in order to produce either a tuning or automatic switch action, all of which add materially to the cost of the device, and generally complicate the tube construction. The present art is fairly well represented by the following United States patents: Buttolph, 1,930,083; Wels, 1,951,112; Kirsten, 2,018,856, Young, 2,087,747.

I have found that the complicated apparatus shown in these patents can be dispensed with entirely by using my arrangement disclosed herein.

It is my purpose to use the commercial form of fluorescent lamp tube of the type wherein a glass tube or other container is coated on the interior with an ionizing material, such as the lamps described in the catalogue of the General Electric Company, Bridgeport, Connecticut, titled "Daylight fluorescent Mazda lamps." It is to be understood, however, that any similar type of gas lamp would be applicable to my invention.

I have found that with an ordinary light circuit of 110 volts, A. C. or D. C., impressed across the electrodes of such a lamp, that a wonderful arc is produced with a very low consumption of current. In order to start the lamps I use an electrode heating switch, which, when operated, closes the electric circuit so as to directly lead the current through the electrode elements and to bring them to incandescence, and to hold the current supply upon the electrodes long enough to heat the lamp and to start the necessary ionization of the fluorescent material within the lamp. The electrode heating switch is therefore preferably a form of time switch which will, when operated, maintain the current through the electrode elements for a fixed interval, after which the switch opens and leaves the electrode elements to form a continuation of the circuit, the current jumping through the tube in the form of an arc. In other words, my invention contemplates the complete control of the necessary elements to operate the fluorescent tube within the electrode heating switch which is of the delayed type.

The principal advantage of this arrangement, is, first that the auxiliary apparatus now used in connection with the starting of the fluorescent lamps is dispensed with, thereby reducing the cost of the unit and also eliminate a hazardous piece of apparatus, which produces heat within itself and which is difficult to inclose properly with the correct amount of ventilation to avoid temperatures in excess of those approved by the underwriters laboratories. It is a usual practice to conceal these auxiliary elements within the frame mounting which holds the lamp, and this on account of the size of the auxiliary equipment, limits the design of the holding mountings, and furthermore, inasmuch as these mountings are usually fastened adjacent the walls or ceilings, the heat produced within the casing holding the auxiliary apparatus often spoils the finish on the walls.

With my device, the control is entirely within the switch which may be at any convenient position within the building. This permits the lamps to be designed in many ways, as there is no auxiliary unit to conceal, and furthermore, the lamp at all times is entirely cool and produces none of the heat now so objectionable to the underwriters laboratories.

My principle likewise would be applicable to a fluorescent lamp made in the usual pear shape bulb type, or any of the usual commercial shaped filament lamps. On account of the efficiency of the fluorescent type of lamp as against the ordinary incandescent filament type of lamp, I have designed a pear shaped bulb lamp, utilizing my principle of control.

In order to more clearly set forth the invention, reference is made to the accompanying drawing, in which:

Figure 1 is a diagrammatic view, showing the arrangement for the operation of a fluorescent type of lamp.

Figure 2 is a diagrammatic view similar to Fig.

1, but showing the resistor mounted within the lamp tube.

Figure 3 is a diagrammatic view, showing the arrangement of the elements and the control of a fluorescent type of pear shaped bulb.

Similar reference numerals refer to similar parts throughout the drawing.

In Figure 1, 1 is a glass tube. 2 is a fluorescent material mounted on the inner wall of the tube 1. 3 is an electrode element, consisting of a fine wire adapted to be heated. 4 is a similar element mounted in the opposite end of the tube. 5 and 6 are the end walls of the tube. 7 and 8 are the contacts attached to element 3. 9 and 10 are the contacts attached to element 4. Contacts 7 and 9 are connected through conductors 11 and 12 to any form of time switch 13, which will make a contact, hold it for a specified time, and then open. Contact 10 is connected to conductor 14 which is the line supply wire of any ordinary lighting system. Contact 8 is connected to conductor 15 which leads to the other wire 16 of any lighting system. Inasmuch as the electrode elements 3 and 4 are usually of a fine wire which would not withstand the voltage and current of the lighting circuit, it is the usual practice to introduce a resistor in series with these elements 3 and 4. I prefer to introduce a resistor 17 in series with the elements 3 and 4, and to position this parallel to and in close proximity to the tube 1 of the lamp.

In making the connection, the resistor 17 is connected between conductor 15 and line conductor 16. This resistor is preferably inclosed within a tube. I prefer to position this resistor as closely to the lamp tube as possible, as the heat produced by the resistor is an aid to the starting of the circuit in the lamp. Obviously, the resistor 17 could be run directly through the lamp and made a part thereof, but for commercial reasons, I find that it is just as satisfactory to mount the resistor adjacent the lamp, but exteriorly thereof. The lamps are now made in quantity without the resistor, and this is my principal reason for mounting them exteriorly in using the tube type.

It will be seen from the arrangement in Figure 1 that the operation consists of the following action. An E. M. F. is impressed upon the lines 14 and 16 and upon starting the lamp, the switch 13 is closed. This permits the current to flow from line 14 to contact 10 through filament 4, thence to contact 9, and into switch 13, through switch 13 into conductor 11 to contact 7, through element 3 into contact 8, thence into conductor 15, thence through resistor 17 back to line 16. This completes the circuit which causes the electrodes 3 and 4 to become incandescent and to produce an ionization within the tube 1. This arrangement is retained by the switch 13 for a set interval, at the expiration of which switch 13 opens either automatically or manually, which leaves the following circuit; current flowing from line 14 reaches contact 10 and charges electrode 4, and thence jumps through the arc path from electrode 4 to electrode 3, travelling along the ionized path within the glass tube 1. From electrode 3 the current passes through contact 8 into conductor 15, thence through resistor 17, and thence to line 16. In other words, the time switch 13 acts as a shunt for heating the electrodes 3 and 4, and when disconnected, the E. M. F. applied to lines 14 and 16 becomes directly impressed upon the electrodes 3 and 4, and forms the electric circuit directly through the ionized path in the tube.

Referring to Figure 3, the same circuit arrangement has been used as in Figure 1, but I have used a bulbous shaped lamp shell 18 which has a rear cap 19 sealed thereto, and which is coated on interior with a fluorescent coating 20. Projecting upward and centrally from the cap 19 is a separating wall 21 which is preferably made from glass, but may be of any insulating material. This partition 21 is hollow and receives the resistor 17. The partition 21 however, does not extend to the extreme end of the bulb, and therefore leaves an opening for the ionized path. The stream of electrons through the arc would travel from the electrode 3 in a U shape form around to the electrode 4. All of the connections for this circuit are similar to those described in connection with Figure 1, and are similarly numbered.

I contemplate the use of this type of lamp with an adaptor which would make it possible to insert it into the usual screw type or bayonet type of projection now used in the filament type incandescent lamps.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A circuit for starting and operating a gaseous lamp or the like, with substantial equal facility on either alternating or direct current, the gaseous lamp comprising two electrodes, at least one of which is filamentary, disposed in opposite relation to each other, the circuit consisting of the two electrodes, a resistor extending continuously from the locality of one electrode, to which it is connected to a point adjacent the other electrode, and a time switch, all in series with a source of electric power; the resistor being connected intermediate one of said electrodes and one terminal of the source of power, the switch being intermediate the electrodes; and the other terminal of the source of power being connected to the other of said electrodes.

2. A circuit substantially as described in claim 1, wherein the resistor is positioned in close proximity to the lamp.

3. A gaseous lamp for operation with equal facility on either alternating or direct current, comprising two electrodes, at least one of which is filamentary, disposed in opposite relation to each other, a resistor extending continuously from the locality of one electrode, to which it is connected to a point adjacent the other electrode, and a time switch, all connected in series with a source of electric power; the resistor being connected intermediate one of said electrodes and one terminal of the source of power, the switch being intermediate the electrodes; and the other terminal of the source of power being connected to the other of said electrodes.

4. A fluorescent lamp for operation with equal facility on either alternating or direct current, comprising two electrodes, at least one of which is filamentary, disposed in opposite relation to each other, a resistor extending continuously from the locality of one electrode, to which it is connected to a point adjacent the other electrode, and a time switch, all connected in series with a source of electric power; the resistor being connected intermediate one of said electrodes and one terminal of the source of power, the switch being intermediate the electrodes; and the other terminal of the source of power being connected to the other of said electrodes.

5. A gaseous lamp of bulbous shape for operation with equal facility on either alternating or direct current, comprising two electrodes, at

least one of which is filamentary, disposed in opposite relation to each other, a resistor extending continuously from the locality of one electrode, to which it is connected to a point adjacent the other electrode, and a time switch, all connected in series with a source of electric power; the resistor being connected intermediate one of said electrodes and one terminal of the source of power, the switch being intermediate the electrodes; and the other terminal of the source of power being connected to the other of said electrodes.

THEODORE JOHN BEREGH.