July 13, 1943. N. INSLEY 2,324,212

ELECTRIC LAMP

Filed May 1, 1941

FIG. 1

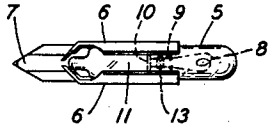
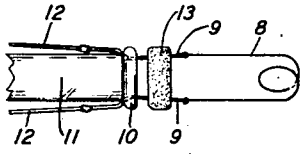


FIG. 2



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Patented July 13, 1943

2,324,212

UNITED STATES PATENT OFFICE

2,324,212

ELECTRIC LAMP

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Application May 1, 1941, Serial No. 391,316

6 Claims. (Cl. 176—24)

This invention relates in general to electric lamps and more particularly to such lamps which are required to operate satisfactorily over a wide voltage range.

In certain telephone circuits the subscriber's line lamp at the central office or at a private branch exchange board, instead of being operated by a line relay, is operated from the central office battery through the subscriber's loop. Under these conditions considering the extreme variations in the resistance of different subscriber's loops and the extreme variations in battery voltage, the line lamp is sometimes required to give a satisfactory signal on an impressed voltage as low as 16 volts and at other times it is required to have a reasonably satisfactory life at a maximum potential of 56 volts.

It is the object of the present invention to meet these varying conditions by providing a signal lamp which will operate satisfactorily under the different service conditions to provide a satisfactory signal under the minimum voltage condition and yet have a reasonably satisfactory life under the maximum voltage conditions.

To accomplish this and other objects and in accordance with the features of the invention, there is provided a lamp in which a resistor having a high negative temperature coefficient is mounted within the lamp bulb and bridged across the filament or mount wires so that it will be responsive to both the temperature variation within the bulb and the varying temperature of the filament and its supports.

In accordance with another feature of the invention a small mass or bead of the resistor material is formed directly about the mount wires of the lamp to provide a direct shunt on the lamp filament. This resistor bead is preferably formed from a paste containing nickel and manganese oxides, uranium oxide, silver sulphide or similar material having a high negative coefficient.

The invention may be more clearly understood by reference to the accompanying drawing in which:

Fig. 1 discloses a typical type of telephone switchboard lamp embodying the features of the invention; and

Fig. 2 is an enlarged view of the inner structure of the lamp of Fig. 1.

Referring to the drawing, the resistor is disclosed in connection with a switchboard lamp comprising an evacuated bulb 5, terminals 6—6 and base 7. The filament 8 is attached at the ends of two straight mount wires 9—9 which are supported by the inner end 10 of the glass stem 11. The other ends of these mount wires are in turn welded to seal wires 12—12 which extend through the glass bulb and are soldered or welded to the inner sides of terminals 6—6. In accordance with the present invention, a small mass or bead 13 of a material having a high negative temperature coefficient is impressed about the mount wires 9—9 to serve as a shunt circuit for the filament 8. This bead is preferably composed of a paste containing nickel and manganese oxides mixed with water to form a thick paste of the desired consistency. The resistance characteristics will vary with the proportions of the oxides used, the amount of nickel oxide preferably being not greater than 50 per cent. A bead of this material and of suitable size is pressed about the mount wires which are preferably of platinum or platinum sheath wire. After drying, the paste becomes set and the bead with its associated mount wires is placed in a furnace and subjected in air to a temperature of from 1000° C. to 1450° C. After being thus heat treated the bead may be adjusted to a predetermined resistance by placing it directly in a gas and air flame and heating it to approximately 1300° C. If the bead is placed in the reducing portion of the flame its resistance is decreased and if it is placed in the oxidizing portion of the flame its resistance is increased.

Due to its location within the lamp bulb the resistor bead is responsive to the temperature within the bulb and due to its being positioned on the mount wires in close proximity to the filament, it is responsive to the temperature of the filament which, in turn, is controlled by the current passing therethrough. The heating effect of the current passing through the resistor also aids in controlling its action and renders it more rapid in response. Using a resistor made of nickel and manganese oxides as described above, it is possible to provide a lamp of otherwise conventional design which will give a satisfactory signal when a potential of 16 volts is impressed across its terminals and which will have a reasonably satisfactory life when subjected to a potential as high as 56 volts through the lowest resistance subscriber loops. At the lower voltage, the heat generated in the lamp and filament is not sufficient to appreciably lower the resistance of the resistor which is made sufficiently high to offer a negligible shunt to the current passing through the filament. However, at the higher voltages, the heat generated is sufficient to cause a large decrease in the resistance of the resistor and thereby shunt an appreciable portion of the

current available through the lower resistance loops and limit the current passing through the filament.

Although a resistor element of a paste containing nickel and manganese oxides is preferred, satisfactory results may be obtained with similar elements composed of other materials having a high negative temperature coefficient such, for example, as uranium oxide and silver sulphide.

What is claimed is:

1. An electric lamp comprising an evacuated bulb, a single filament therein, mount wires for supporting said filament, and additional means within said bulb operable on changes of temperature to control materially the variation in intensity of the current flow through said filament upon variations in operating voltage thereacross.

2. An electric lamp comprising an evacuated bulb, a single filament therein, mount wires for supporting said filament, and a resistor element having a high negative temperature coefficient of resistance connected between said mount wires in shunt with said filament and adapted to receive heat therefrom to control materially the variation in intensity of the current flow through said filament upon variations in operating voltage thereacross.

3. An electric lamp comprising an evacuated bulb, a filament therein, mount wires for supporting said filament, and a bead of paste material having a high negative temperature coefficient of resistance supported by said mount wires and in shunt with said filament said bead of paste material being operable upon heat received from said filament to control the current flow therethrough.

4. An electric lamp comprising an evacuated bulb, a filament therein, mount wires for supporting said filament, and a bead of paste material containing nickel and magnesium oxides supported by said mount wires and in shunt with said filament said bead of paste material being operable upon heat received from said filament to control the current flow therethrough.

5. An electric lamp comprising an evacuated bulb, a filament therein, mount wires for supporting said filament, and a bead of paste material comprising nickel oxide and a smaller amount of magnesium oxide supported by said mount wires and in shunt with said filament said bead of paste material being operable upon heat received from said filament to control the current flow therethrough.

6. An electric lamp comprising an evacuated bulb, a filament therein, mount wires for supporting said filament, and a bead of paste material containing a metallic oxide having a high negative temperature coefficient of resistance supported by said mount wires and in shunt with said filament, said bead of paste material being operable upon heat received from said filament to materially control the variation in intensity of the current flow therethrough.

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