

UNITED STATES PATENT OFFICE.

GEORGE SWEETSER, OF UPPER NORWOOD, ENGLAND, ASSIGNOR TO
E. C. L. SYNDICATE, LIMITED, OF LONDON, ENGLAND.

INCANDESCENT ELECTRIC LAMP AND SWITCH.

SPECIFICATION forming part of Letters Patent No. 778,155, dated December 20, 1904.

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To all whom it may concern:

Be it known that I, GEORGE SWEETSER, a subject of the King of Great Britain, residing at Upper Norwood, England, have invented
5 certain new and useful Improvements in and Relating to Incandescent Electric Lamps and Switches, of which the following is a specification.

My invention relates to incandescent electric lamps of the kind in which the light-emitting body consists of a substance—for example, a refractory metallic oxid—which is a non-conductor of electricity when cold or at ordinary atmospheric temperatures, but
15 whose electrical resistance decreases rapidly as it is heated, so that it becomes a conductor when raised to a high temperature. In lamps of this kind as heretofore constructed a separate heater is used for heating the light-emitting body to such a temperature that its resistance will be sufficiently low to permit the passage through it of enough current to bring it to and maintain it in a state of incandescence.

One object of my invention is to construct a filament of this kind that shall be self-heating. In other words, I provide a compound filament part of which is the light-emitting body proper, which is a non-conductor when
30 cold and a conductor when hot, and the other part of which is the heater, the electrical connections of said compound filament being so arranged that any desired proportion of the heater can be thrown out of circuit when the light-emitting body is sufficiently hot, the remaining portion of the heater remaining in circuit in series with the light-emitting body, so as to act as a steadying resistance.

My said invention also comprises an improved construction of switch for starting and, if desired, for stopping the lamp by a longitudinal movement of the lamp in its holder.

Referring to the accompanying drawings, which illustrate arrangements in which one-half of the heater is thrown out, Figure 1 is an elevation of the lamp and central longitudinal section of the holder. Fig. 2 is a

transverse section of the holder on the line *xx*, Fig. 1, showing the contacts; and Fig. 3
50 is a diagram of the switch connections. Fig. 4 shows a modified shape of filament.

For the purposes of my invention I make the filament in two portions, one portion, A, the low resistance, being composed of any
55 suitable material which possesses the necessary temperature coefficient and electrical resistance to cause it to be heated to a red heat by the electric current passing through it. This may be a coil of wire wound on a porcelain stick. The other portion, B, of the filament, the high-resistance or light-emitting body, is a refractory metallic oxid—for example, magnesia—and is connected to the
60 aforesaid low-resistance portion A, which may consist of two parallel legs connected by a bridge-piece or of a single leg bent to bring the two limbs thereof parallel with the high-resistance portion, so forming a three-legged filament, as shown in Fig. 1, the high-resistance leg being in the center. The legs are
70 close together, but are kept by a refractory insulator R from touching each other. The said legs are connected by wires C D E to the terminals of a switch and are so arranged that
75 the light-emitting body B is permanently in series with one of the low-resistance legs and in parallel with the other low-resistance leg, which latter can be cut out of circuit by operating the switch.

When starting the lamp, the current first passes in through one of the low-resistance legs and out through the other low-resistance leg, heating the same, and thereby heating the glower-leg, which is between them. The
85 heating of the glower-leg is effected both by conduction and by radiation. When the glower-leg becomes sufficiently conductive and begins to take current, the switch is operated to cut out of circuit in the example
90 shown one half of the low resistance, and the current then continues to pass through the other half and the glower-leg without any break in the circuit through the latter. By connecting the leading-in wire of the low-resistance leg left in circuit at a suitable posi-

tion along the length of said leg any desired amount of steadying resistance can be left in series with the glower-leg.

I may use any suitable construction of switch for throwing the parallel low-resistance leg in and out of circuit. The switch illustrated in the drawings is one in which the changes of circuit are made by moving the lamp longitudinally in its holder. The lamp is suspended from a spring F and can move up and down in the holder G.

H J K are spring-contacts connected, respectively, to the wires C D E and adapted to bear, respectively, against stationary contact-pieces L M, connected to the leading-in wires and a third strip N. The strip N is shown divided into two parts, the lower one of which is electrically connected to the contact-piece M. The connections are shown diagrammatically in Fig. 3.

When the lamp is in its normal position, as shown in Fig. 1, the circuit is complete through one of the low-resistance legs and the glower-leg, as can be seen from Fig. 3, but no current passes, because of the non-conductivity of the glower-leg. When, however, the lamp is pulled down, the second low-resistance leg is brought into circuit, but without breaking the circuit through the glower-leg, and current then passes through the two low-resistance legs and causes them to become heated. The heat passes by conduction and radiation to the glower-leg and raises the temperature thereof until it becomes a conductor and begins to take current. As soon as the glower-leg becomes incandescent the lamp is released and is drawn up by the spring F, thus cutting out the low-resistance leg in parallel with the glower-leg, whereupon the current continues

to pass through the glower-leg and the low-resistance leg in series therewith. Said low-resistance leg acts as the steadying resistance required in this type of lamp. The lamp is stopped by an independent switch.

The above-described lamp is very suitable as a pendent lamp, and in such cases is worked by means of a string P, attached to the globe.

What I claim is—

In an electric lamp, a light-emitting member which is a non-conductor when cold and a heat-emitting member which is a conductor at ordinary atmospheric temperatures and which is in circuit and electrically connected intermediate of its ends to one end of said light-emitting member, electric supply-mains, and a switch comprising a part bearing three contacts electrically connected respectively to the free ends of the light and heat emitting members, and another part movable longitudinally relatively to the former part and bearing three corresponding contacts, one of which contacts is connected with one of the electric supply-mains, and the other two contacts are connected with the other supply-main, one of the last two mentioned contacts which is connected to the heat-emitting member being made shorter than the other contacts so as to enable a portion of said heat-emitting member to be cut out of circuit when the parts of the switch are moved relatively to each other.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE SWEETSER.

Witnesses:

GEORGE HARRISON,
HERBERT A. BEESTON.