(No Model.)

E. THOMSON.

INCANDESCENT ELECTRIC LAMP.

No. 444,929. Patented Jan. 20, 1891.

Fig. 2.

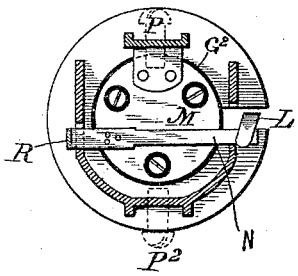


Fig. 1.

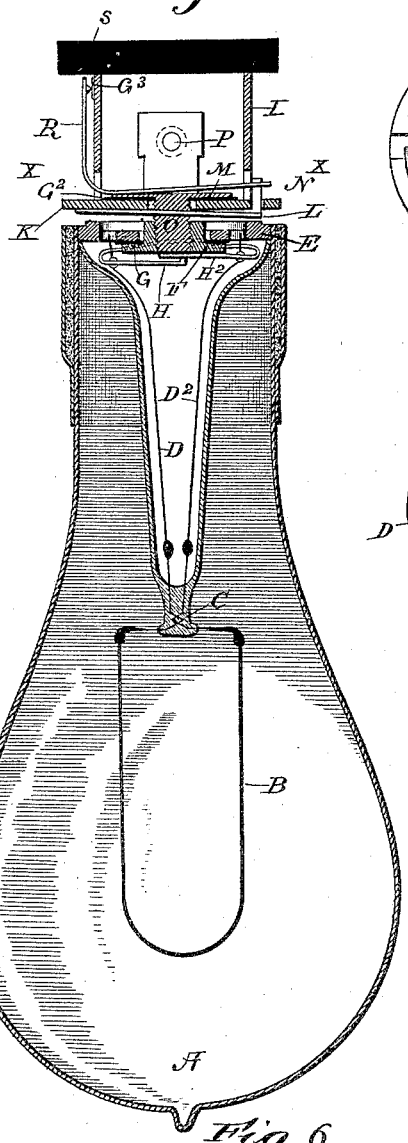


Fig. 3.

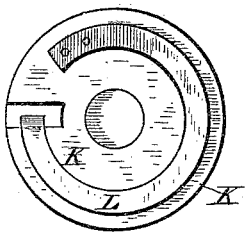


Fig. 4.

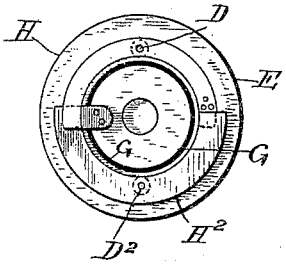


Fig. 5.

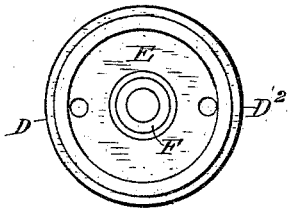
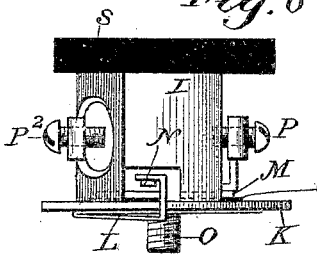


Fig. 6



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UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF CONNECTICUT.

INCANDESCENT ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 444,929, dated January 20, 1891.

Original application filed December 27, 1886, Serial No. 222,547. Divided and this application filed August 4, 1890. Serial No. 360,940. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Swampscott, in the county of Essex and State of Massachusetts, have invented a certain new and useful Incandescent Electric Lamp, of which the following is a specification.

My invention relates to incandescent lamps designed for use in series with one another or with arc lamps on circuits carrying currents of high tension.

The object of the invention is to provide means whereby the circuit shall be automatically completed in case of the rupture of the incandescing strip or conductor of the lamp, so as to preserve the circuit for other lamps or devices of the series.

My invention relates, further, to certain improvements in the devices for supporting the lamp and making electric connection with the lamp-electrodes, and also to a means for completing the circuit when the lamp is withdrawn from its support.

My invention consists in the novel combinations of devices and details of construction that will be described in connection with the accompanying drawings, and then more particularly specified in the claims.

In the accompanying drawings, Figure 1 is a vertical section of an incandescent lamp and support therefor constructed in accordance with my invention. Fig. 2 is a horizontal cross-section on the line X X, Fig. 1, showing a part of the automatic switch devices in plan. Fig. 3 is a view of the lamp-support, looking upward. Fig. 4 is a plan of the devices located at the base of the lamp, looking upward. Fig. 5 is a plan of the same devices, looking downward from the outside. Fig. 6 is a side elevation of the supporting devices of the lamp-socket.

In the drawings the usual casing surrounding the supporting parts is omitted.

A indicates the inclosing globe of the lamp, and B the incandescing conductor therefor, connected with wires or conductors which lead to suitable plates, studs, or strips forming the lamp-electrodes for making connection or contact with suitable electrodes on the lamp-support, the latter being connected with the circuit, so that when the lamp is in place the incandescing conductor B shall be supplied with current from such circuit.

One of the lamp-electrodes consists of a plate E, of conducting material, properly supported on the base of the lamp, while the other electrode consists of the plate F, having a screw-threaded boss or projection at its center and insulated from the plate or electrode E by a thin film of mica or other insulating material, (indicated at G.) The electrode or plate F is adapted to make connection with a screw O, carried by the support in the socket for the lamp and projecting from a plate or support M, which is carried by but insulated from another plate K by a thin film of insulating material, such as mica, (indicated at G^2.) Plate M carries a binding-screw P for connection with the exterior circuit, while plate K is in connection with the other pole of the circuit through a binding-screw P^2, which is carried by the frame or support I. Plate K also carries a spring L, which forms the other electrode of the lamp support or socket. When the lamp is screwed upon the conducting-screw O, the plate E comes into contact with the spring L, thus connecting one pole of the exterior circuit with the lamp-electrode E at the same time that the other pole is connected with the lamp-electrode F through the screw O and plate M. The spring L has a bias, which tends to cause its hooked free end to make connection with a contact-stop consisting of a spring N, carried by the plate M, so that when the lamp is removed from its support and the spring L is free to act the two poles of the exterior circuit are automatically connected together directly from one binding-screw P through plate M and spring N, spring L, plate K, and support I to the other binding-screw P^2. When, however, the lamp is screwed to its support, the circuit just described is broken at the stop N through the pressure of the electrode E upon spring L, such interruption of circuit not occurring, however, until circuit has been established through the lamp by contact of the lamp-electrodes, respectively, with the two electrodes O of the lamp-support. At the point

C, where the entering conductors D D^2 or the extensions thereof are embedded or sealed in the glass or other sealing material, they are brought near together, as indicated, and given a twist around one another. The glass normally insulates them from one another; but should the incandescent conductor B break the electric arc forming on rupture of such conductor and following down to the point where the conductors are separated will cause a short circuit to be made between the conductors, and thus form a path for the current around the broken filament. This short-circuiting action takes place sometimes by softening or melting of the glass, so that the strain put upon one of the wires by a spring-contact connected to one of them may bring them into contact, or such connection of the wires may take place by their melting together or by, in some cases, electrolytic action which carries the metallic particles across from one to the other and forms a conducting-film over the glass. The pressure of the external air upon the softened metal assists, also, in displacing the glass or moving the melted or softened portion, so as to tend to bring the conductors into contact. The switching of the lamp may also take place by the union of two springs H H^2, which are normally held out of contact with one another by material adapted to be fused, melted, or softened by the electric arc which may follow down the conductors D D^2 beyond the point of sealing such material, forming in effect a fastening which is practically destroyed by the arc. The spring H, as more clearly shown in Fig. 4, is fixed at one end to the under side of the plate or electrode E, while its free end is located over the end of spring H^2 or a part connected to or formed on the plate or electrode F. Spring H^2 is attached to plate or electrode F, while its free end is located over the fixed end of spring H or electrode E. The result of this arrangement is obviously that if the springs are either of them released the two lamp-electrodes will be connected directly and independently of the incandescing-conductor B. The springs are normally held from making contact by the lamp-conductors D D^2, which are soldered, as indicated, near their lower ends to the springs H H^2.

The plate E is perforated, as shown, to permit the insertion of an instrument for lifting the springs H H^2 away from contact and soldering or otherwise connecting the lamp-conductors to them. The springs H H^2 are normally sustained by the lamp-conductors D D^2; but if the electric arc should fail to form the short circuit at the point C one or both of the conductors D D^2 will be melted at the joint just outside the lamp-globe and one or both of the springs H H^2 will be released and complete the required short circuit, so as to preserve the general circuit.

The cut-out devices so far described will ordinarily act in case the rupture of the filament takes place, while the globe A remains intact, since in such case the arc may readily be established. If, however, the lamp-globe A should break and the filament B should be ruptured at the same time, there would be danger of an arc not forming, so that no short circuit would be established either at C or at the springs H H^2. To provide for such a contingency, I combine with the lamp suitable cut-out devices, which may be operated by the disruptive action of the current on the circuit. Such a device consists of a spring R, carried by the plate M, connected with one pole of the circuit and having its free end normally pressing toward a part connected with the other pole of the circuit—such, for instance, as the frame I.

Interposed between the free end of the spring R and the frame I is a thin layer G^3 of insulating material—such, for instance, as paper. If the circuit be interrupted at any portion thereof contained between the two poles of the lamp-support, the electric current will force its way through the insulating-film G^3 and establish a direct connection, after the manner described in a prior patent granted to me, No. 305,413, September 16, 1884.

Any other device adapted to work through the power of the current to force its way across an insulating-space so as to establish a continued connection without initial contact, such as is ordinarily required to form an electric arc, will answer the purposes of this portion of the combination forming my invention. The purpose of this portion of my invention is also attained through the provision of the thin sheets G G^2 of insulating material interposed between the two lamp-electrodes and the two support-electrodes, inasmuch as such sheets of material are sufficiently thin to allow an electric arc to form and metallically unite the parts which they hold separate. It will appear, also, that in case the thermostatic cut-out formed by the springs H H^2, normally held in position by the supporting-wires, should fail to act or should be entirely destroyed by the electric arc the electrodes E F may still act to preserve the circuit by being united through the fusing action of the electric arc.

I do not claim herein the automatic cut-out formed by the wires twisted together at the point of sealing or by the cut-out springs H H^2, normally held apart, but allowed to come into contact by the fusing action of the arc upon the wire or device sustaining one of them, as these devices are the subject of broad claims in my application for patent, filed December 27, 1886, Serial No. 222,547, of which the present application constitutes a division.

What I claim as my invention is—

1. The combination, with an incandescent lamp, of one or more cut-outs adapted to be operated by the electric arc or continuation of the electric arc formed within the lamp on breakage of the incandescent conductor, and

a second cut-out consisting, essentially, of two electrodes connected, respectively, to opposite poles of the circuit and separated by a thin layer of an insulating medium, through which the current may take a path by disruptive action on interruption of the current flow at other points in the lamp or its cut-out devices, as and for the purpose described.

2. The combination, with an electric lamp, of a lamp-support having connecting terminals or electrodes adapted to form connection with the lamp-terminals and separated by a thin insulating-film adapted to permit the electric current to force its way across from one electrode or support for the same to the other on interruption of the portion of normal path leading from one electrode to the other through the light-giving portion of the lamp, as and for the purpose described.

3. The combination, with an incandescent electric lamp, of a screw-socket or support therefor and a cut-out or short-circuiting spring mounted on said support in position where it will be engaged by the lower face of the lamp-base, so as to be moved away from its position of contact as the lamp is screwed into place, as and for the purpose described.

4. The combination, with an incandescent electric lamp, of a screw-support with which one electrode of the lamp makes connection, a spring placed in the path of a plate or contact forming the other electrode of the lamp, and a contact-stop with which the spring makes contact when the lamp is removed, said spring and stop forming opposite poles of the circuit, as and for the purpose described.

5. In an incandescent electric lamp, connecting terminals or electrodes formed on or attached to supporting-plates separated from one another by a sheet of mica or other insulating material made sufficiently thin to permit the electric current used in operating the lamp to force its way across from one plate to the other through the insulation on rupture of the conducting-path through the incandescent conductor.

6. In a socket or support for an incandescent electric lamp, a conducting-plate M, carrying a screw for connection with a screw-threaded plate or block connected to a lamp-terminal, and a plate K, carrying a contact-spring L and separated from plate M by a thin sheet of mica or other non-conducting material, as and for the purpose described.

7. The combination, with the support or socket for an incandescent lamp, of a cut-out switch whose two electrodes, normally tending to make contact with one another, are insulated by an interposed non-conducting film and are respectively mounted upon or attached to portions of said support or socket connecting with opposite poles or electrodes of the lamp.

8. The combination, with the plate secured to the lamp-base, of a second plate or block mounted on the first, but insulated therefrom by a mica or other film, springs mounted on said plates and each having its free end over the other spring or the plate supporting the same, and lamp-conductors soldered to and supporting said springs, as and for the purpose described.

9. In a socket or support for an electric lamp, a conducting supporting-frame carrying a spring connected with said frame, in combination with a plate provided with a stop for said spring and insulated from the frame by a thin film of mica, as and for the purpose described.

10. In a socket or support for an electric lamp, a film or plate of mica interposed as an insulator between the parts of said socket forming or connected to opposite poles of the circuit and made sufficiently thin to permit the electric current to force its way from one part to the other through the insulation in case of rupture of the electric path through the lamp.

11. The combination, with an incandescent lamp having cut-out devices operated by the electric arc or continuation of the electric arc formed within the lamp through rupture of the filament, of a supplemental cut-out consisting, essentially, of electrodes separated from one another by a thin layer of insulation, over which the current may force its way disruptively in case the breakage of the lamp-globe should result in a failure of the arc to form through the rupture of the incandescing conductor.

12. The combination, with an incandescent electric lamp having cut-out devices adapted to be operated by the electric arc or continuation of the electric arc formed within the lamp on rupture of the incandescing conductor, of a supplemental cut-out adapted to be operated by the disruptive action of the electric current on failure of the arc to form on sudden interruption of the current in the lamp by breakage of the filament or incandescing conductor.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 30th day of July, A. D. 1890.

ELIHU THOMSON.

Witnesses:
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ALBERT L. ROHRER.