(No Model.)

T. A. EDISON & J. F. OTT.

CUT-OUT FOR INCANDESCENT LAMPS.

No. 466,400. Patented Jan. 5, 1892.

Fig. 1.

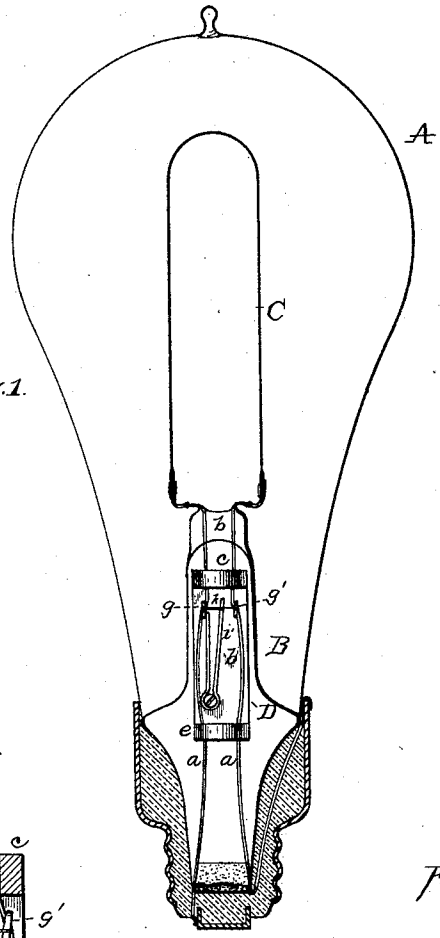


Fig. 2.

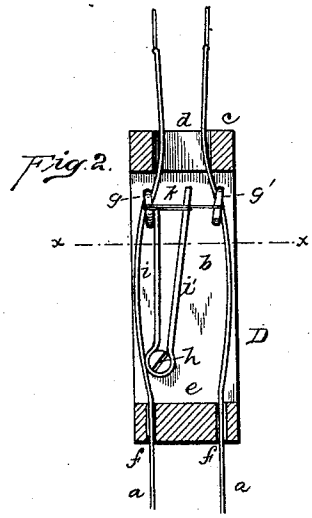
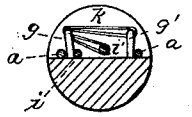


Fig. 3.



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UNITED STATES PATENT OFFICE.

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CUT-OUT FOR INCANDESCENT LAMPS.

SPECIFICATION forming part of Letters Patent No. 466,400, dated January 5, 1892.

Application filed October 27, 1886. Serial No. 217,314. (No model.)

To all whom it may concern:

Be it known that we, THOMAS A. EDISON, of Llewellyn Park, and JOHN F. OTT, of Newark, in the county of Essex and State of New Jersey, have jointly invented a certain new and useful Improvement in Incandescent Electric Lamps, (Case No. 681,) of which the following is a specification.

Our invention relates to incandescent electric lamps designed to be used in series with one another with currents of high electromotive force. In the use of lamps in this way difficulty arises from the breaking of the carbon filaments, because when the filament of a lamp breaks either the circuit is thereby interrupted and all the other lamps in the series are at once extinguished or an arc forms across the filament, which continues down the leading-in wires and into the stem of the lamp, and if it is not stopped or broken will penetrate down into the socket and destroy the same, and ultimately also destroy, of course, the continuity of the circuit.

The object of our invention is to provide within the lamp a simple and convenient cut-out arrangement whereby both these difficulties will be obviated; and our invention consists in the novel devices and combinations of devices employed by us in accomplishing this object, as hereinafter set forth and claimed.

Our invention is illustrated in the accompanying drawings, in which—

Figure 1 is a view in elevation of an incandescent electric lamp embodying said invention; Fig. 2, a vertical section of the cut-out device in the stem of the lamp, and Fig. 3 a cross-section on the line *x x* of Fig. 2.

A is the inclosing globe of the lamp, and B the inner stem, through which pass the leading-in wires *a a*, sealed in the stem at *b* and attached within the globe to the carbon filament C.

D is a piece of vulcanized fiber or other suitable insulating material placed within the stem of the lamp. It has a recess *b*, and the heads formed at the ends of the piece by such recess have—the upper one *c* an aperture *d* and the lower one *e* two small holes *f f* through it. The wires *a a* pass through the small holes *f f*, are bent out upon the flat recessed portion *b*, so that the insulating-piece is held upon the wires, and pass together through the aperture *d*. Fixed within the recessed part *b* are two small bent-wire staples *g g'*, through each of which a wire *a* passes, so that such wires are respectively in electrical contact with the staples. Bent around a screw or pin *h* and held under the head thereof is a spring-wire *i i'*, the part *i* of which rests in close contact with the staple *g*, while the part *i'* is held midway between the two staples. The wire *i'* is thus held by a piece of thread or similar inflammable material *k*. This thread is in the form of a loop knotted around the staple *g'*, passing around the staple *g*, and knotted again around spring-wire *i'*. The thread *k* is coated or impregnated with a material of high resistance or low electrical conductivity. We prefer to employ a mixture of powdered lamp-black with shellac, mucilage, or other adhesive material. Such a degree of conductivity is thereby given to the thread that in the ordinary operation of the lamp practically no current will pass across the thread from staple *g* to *g'*, or, in other words, across the wires *a a*, but on the cessation of current through the lamp in consequence of the breaking of the circuit within the lamp the increased difference of potential between the wires *a a* at this point will permit current to pass across. We prefer to employ the cotton thread used ordinarily in needle-work and with its strands twisted rather loosely. The mixture of lamp-black and adhesive material is preferably rubbed in with the fingers.

The operation of the devices is as follows: When the filament C breaks, if no arc forms across the filament the cessation of current through the lamp causes current to pass in the conducting-thread *k* so much as to at once burn and destroy the thread, and this releases the spring-wire *i'*, which at once flies back against the staple *g'*, thereby connecting wires *a a* together and completing a short circuit around the filament, so that the continuity of the series circuit is maintained. If, however, when the filament breaks an arc forms across it from below the point of break-

age to the opposite terminal, (which is usually the case,) such arc continues down the wires *a a*, through the heated glass at *b*, and into the stem; but as soon as it reaches the thread *k* the thread is at once burned and the spring *i'* is released and completes the circuit, as already explained. By this arrangement we avoid the necessity of placing the wires in soldering proximity, which has heretofore been done, and also do away with the use of electro-magnetic cut-outs for the lamps.

What we claim is—

1. In an incandescent electric lamp, the combination, with the leading-in wires between the external contacts of the lamp and their place of sealing into the glass, of a spring adapted to bridge said wires and an inflammable fastening device normally holding such spring out of bridging contact, substantially as set forth.

2. In an incandescent electric lamp, the combination, with the leading-in wires within the stem of the lamp, of a spring adapted to bridge said wires, and an inflammable fastening device normally holding said spring out of bridging contact, substantially as set forth.

3. The combination, with the wires leading to the carbon filament of an incandescent electric lamp, of a spring adapted to bridge said wires, and a fastening device normally holding said spring out of contact and also bridging said wires and being of such electrical conductivity that practically no current will pass through it during the normal operation of the lamp, but that when circuit within the lamp is broken sufficient current will pass to destroy it, substantially as set forth.

4. The combination, with the wires leading to the carbon filament of an incandescent electric lamp, of a spring adapted to bridge said wires, and a thread secured to said wires and spring so as to hold said spring normally out of contact, said thread being of such electrical conductivity that practically no current will pass through it during the normal operation of the lamp, but that when circuit within the lamp is broken sufficient current will pass to destroy it, substantially as set forth.

5. The combination, in an incandescent electric lamp, of the insulating-piece within its stem, the V-shaped spring carried thereby, one end of which is connected with one of said wires, and the thread secured to the other end of said spring and to said wires, so as to normally hold said spring out of contact with the other wire, said thread being of such electrical conductivity that practically no current will pass through it during the normal operation of the lamp, but that when circuit through the lamp is broken sufficient current will pass to destroy it, substantially as set forth.

6. The combination, in an incandescent electric lamp, of the recessed insulating-piece within its stem, the wires passing through the heads of said piece, the staples in said recess through which said wires pass, the V-shaped spring having one end in contact with one of said staples, and the thread having electrical conductivity substantially such as specified and secured to said staples and normally holding the other end of said spring out of contact with the other staple, substantially as set forth.

7. The combination, in an incandescent electric lamp, of the wires, the spring adapted to bridge said wires, and the thread normally holding said spring out of contact and also bridging said wires, said thread being coated or impregnated with a conducting material, substantially as set forth.

This specification signed and witnessed this 26th day of October, 1886.

THOS. A. EDISON.
JOHN F. OTT.

Witnesses:
WM. PELZER,
E. C. ROWLAND.