(No Model.) 2 Sheets—Sheet 1.

F. P. LITTLE & W. H. McDONALD.

CUT-OUT INSTRUMENT FOR INCANDESCENT LAMPS.

No. 340,448. Patented Apr. 20, 1886.

Fig. 1.

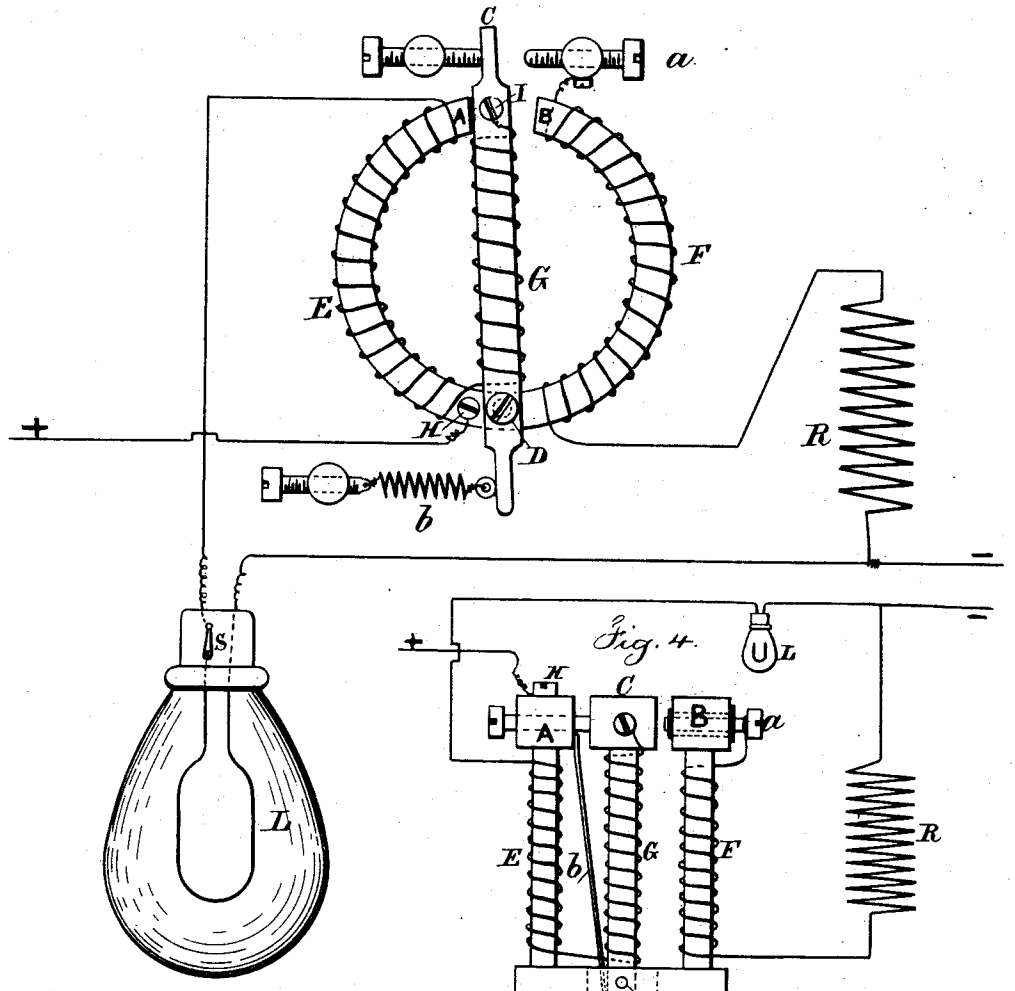


Fig. 4.

Witnesses
Chas. H. Smith
J. Stahl

Inventors
Franklin P. Little
William H. McDonald
per Samuel W. Ferrell
atty

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

F. P. LITTLE & W. H. McDONALD.

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Fig. 2.

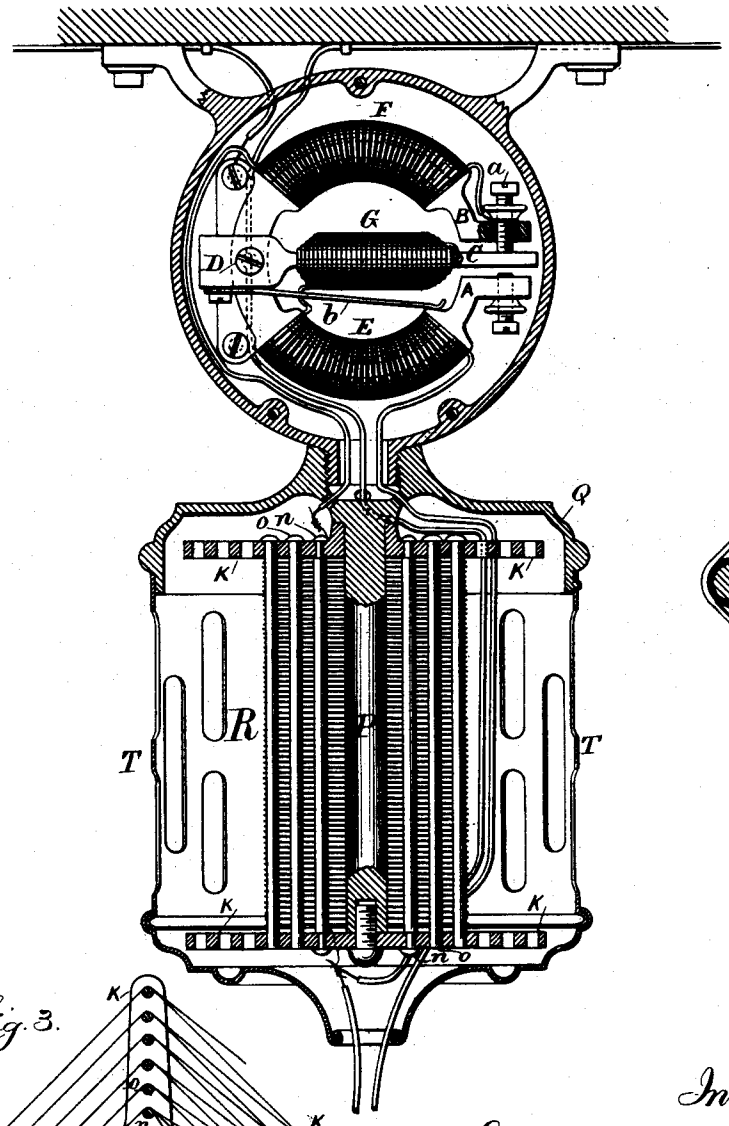


Fig. 5

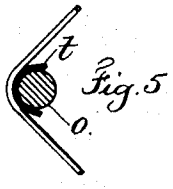
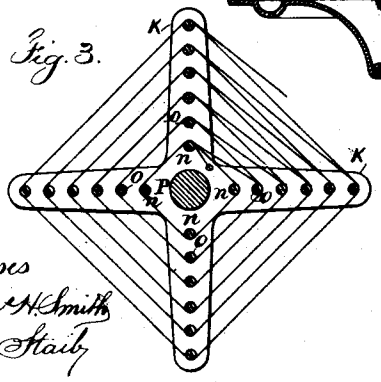


Fig. 3.



Witnesses
Chas. H. Smith
J. Staib

Inventors
Franklin P. Little
William H. McDonald
per Samuel W. Ferrell
atty

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

FRANKLIN P. LITTLE AND WILLIAM H. McDONALD, OF ALBANY, ASSIGNORS TO JOSEPH A. POWERS, OF TROY, NEW YORK.

CUT-OUT INSTRUMENT FOR INCANDESCENT LAMPS.

SPECIFICATION forming part of Letters Patent No 340,448, dated April 20, 1886.

Application filed November 16, 1885. Serial No. 182,945. (No model.)

To all whom it may concern:

Be it known that we, FRANKLIN P. LITTLE and WILLIAM H. McDONALD, of the city of Albany, and State of New York, have invented an Improvement in Cut-Out Instruments for Incandescent Electric Lamps and other Articles, of which the following is a specification.

In our improvement the cut-out is rendered automatic by the action of magnetism, and the said magnetism insures an intimate contact of the metallic surfaces through which the current passes. When the lamp is not in operation, the current is shunted or diverted from the same.

This improvement relates to an automatic magnetic switch and rheostat whereby a resistance equal to the electric lamp or similar article is placed into the circuit instead of a lamp, or the reverse.

In the drawings, Figure 1 is a diagram illustrating the circuit-connections and the mode of operation. Fig. 2 is an elevation of the instrument, partially in section. Fig. 3 is a sectional plan of the rheostat. Fig. 4 is a diagram showing the circuit-connection and a modification of the double magnet. Fig. 5 is a section illustrating the manner of insulating the conductor of the rheostat.

L represents an incandescent electric lamp of any desired character, and S illustrates the switch of any ordinary character usually applied with such incandescent lamp for turning the current on or off.

R is a resistance or rheostat properly proportioned, as hereinafter described, so that when the lamp is turned out and this resistance brought into the circuit the total resistance will be about the same as the resistance of the incandescent lamp when in operation.

We make use of a double magnet, A B, with an armature, C, pivoted to the middle of the same at D and there are helices E F around the respective cores A B, and a helix, G, around the armature-core C. The circuit-connections are to be made substantially as represented in Fig. 1. The + wire of the line is connected to the core A or base at H, and the current passes through the core or base and pivot D and through the armature C to the connection I of the helix G, and thence through the helices G and E to the lamp L and to the — line wire. It is remarked, however, that the line-connections might be the reverse of that shown, the — wire being connected at H, instead of the + wire. When the lamp is cut out, the current passes through the + line-wire, connection H, and armature-core C to a stop, *a*, and from thence through the helix F and resistance R to the — line-wire. The helices are wound in such a direction that the pole A and armature C are of different polarity and attract each other when the current is passing through the lamps; but if the lamp L is burned up or turned out the current ceases to pass through the helices E G. The pole B is slightly magnetized by induction with the same polarity on the armature C. The helix F is wound so as to produce a strong pole at B of the same polarity as the free end of the armature C, and there is a spring, *b*, that tends to swing the armature into contact with the stop *a*, and of such strength that when the lamp is in circuit the repulsion of B and C and the attraction of A and C insure the movement of the armature and the breaking of the circuit through the stop *a*, helix F, and resistance R. Should the lamp-circuit be broken, the coils in the lamp-circuit cease to magnetize A and C, and the spring *b* swings the armature instantly into contact with the stop *a*, and the current passing through the helix F magnetizes the pole B and insures intimacy of contact between the armature C and the stop *a*, and a good electric connection.

Having stated the general principles upon which our automatic cut-out operates, we remark that we prefer to make the cores A B in one piece in the form of a split ring, as shown in Figs. 1 and 4, and to hinge or pivot the armature core C directly upon the center of such split ring, and these parts are of soft iron, and preferably covered with a thin coating of copper, so as to increase the electric conductivity and insure a better metallic contact between the pivot-screw at D and the surface of the respective cores. Besides this, the copper prevents the surfaces adhering through magnetism should the armature-core come into contact with either pole A or B.

It will be apparent that the cores A B may be straight, as shown in Fig. 4, the armature-core C being pivoted at D to the base or back

bar uniting the cores A B. In this case the stop-screw *a* may pass through an insulating-block in the pole of the core B.

In constructing a rheostat or resistance to be employed with this automatic cut-out difficulty has been experienced in preventing injury to the insulation by the heat developed, and also in adapting the same to different lamps. We make use of frame K in the form of crosses, united together by the permanently-riveted wires *n*, that pass from one cross to the other, and through holes in the same, the ends being riveted up. We prefer to use German-silver wires for the coils of the rheostat, and we wind such coils around the range of wires *n*, first, however, applying to each wire *n* a strip of asbestus paper or other fire-proof and electric insulator, as shown at *t*, Fig. 5, the wires being at a slight distance apart and insulated by the asbestus paper, which also is fire proof, and is not injured by the heat developed in the rheostat. After the first layer of resistance-wire is wound around the range of wires *n* and secured we insert through holes in the crosses K the second set of wires, *o*, and apply the asbestus paper to the same, and then wind the second layer of resistance-wires around the same, and proceed until a rheostat of the proper resistance is made up, and this is placed upon a central stem, P, that hangs down from the base Q, upon which the double magnet is attached. The circuit-connections are made substantially as shown in Fig. 1, and the conductors to the electric light may be flexible, so that the same hangs by such conductors, or they may be supported by a rigid electrolier. The case T that surrounds the rheostat is of perforated sheet metal, to allow the air to circulate in cooling the rheostat, and it is fastened by pins or screws upon the edges of the base Q, entering bayonet-slots in the case, so that the case can be removed easily to give access to the rheostat.

This improvement is available with any incandescent electric lamp or similar electric device, whether such devices are placed in multiple arc, in series, in multiple series, in series multiple, or in any of the known or desired arrangements of circuits in which such electric appliances are located.

We do not herein claim the combination of the cross-frames K, having connecting-wires, with fire-proof electric insulating material upon their surfaces and coils of wire wound around the ranges of connecting-wires forming the rheostat hereinbefore described, but reserve the right to make separate application for patent for the same.

We claim as our invention—

1. The electric cut-out formed of the cores A B and their helices, the pivoted armature-core provided with a helix, G, in combination with circuit-connections, substantially as set forth.

2. The cut-out for incandescent electric lamps formed of the electro-magnet cores A B, the armature C, pivoted upon such electro-magnet, the helix G around the armature, the stop *a*, and the circuit-connection through the respective helices, substantially as set forth.

3. In a cut-out for incandescent electric lamps, the combination, with the electro-magnet cores, of an armature and helix adapted to vibrate between the poles of such electro-magnet, a stop to which one of the electro-magnet helices is connected, a spring to move the armature into contact with the said stop, and a resistance in the shunt-circuit passing through said stop, the incandescent lamp being connected in the circuit through the armature-helix, substantially as set forth.

4. In an electric cut-out, a split-ring-shaped core to which one of the circuit-wires is connected, an armature pivoted to the said core and swinging between the poles of the same, helices around the respective portions of the split-ring core, a helix around the armature, a stop for the armature to which one end of one of the magnet-helices is connected, a resistance connected to the other end of said helix, and a spring to swing the armature into contact with the stop, and the circuit-connections for including the incandescent lamp or similar device in the circuit of the armature-helix and one of the ring-magnet helices, substantially as set forth.

5. The combination, with the double magnet formed of the cores A B, armature-core C, and helices around such cores, of the rheostat having coils of wire around metallic bars covered with fire-proof electric insulating material, the rheostat-wires being wound so as not to touch each other, substantially as set forth.

6. The base Q, in combination with the double magnet-cores A B C and their respective helices, the pendent support beneath the base, the cross-frames K, the ranges of connecting-wires *n o*, the fire-proof electric insulating material upon such connecting-wires, the coils of wire wound around such ranges of connecting wires, and the movable perforated case surrounding such wires and frames, substantially as set forth.

Signed by us this 2d day of November, A. D., 1885.

F. P. LITTLE.
WM. H. McDONALD.

Witnesses:
J. A. POWERS,
F. A. CHENEY.