

(No Model.)

2 Sheets—Sheet 1.

W. HOCHHAUSEN.

AUTOMATIC CUT-OUT FOR ELECTRIC LAMPS.

No. 311,072.

Patented Jan. 20, 1885.

Fig. 1.

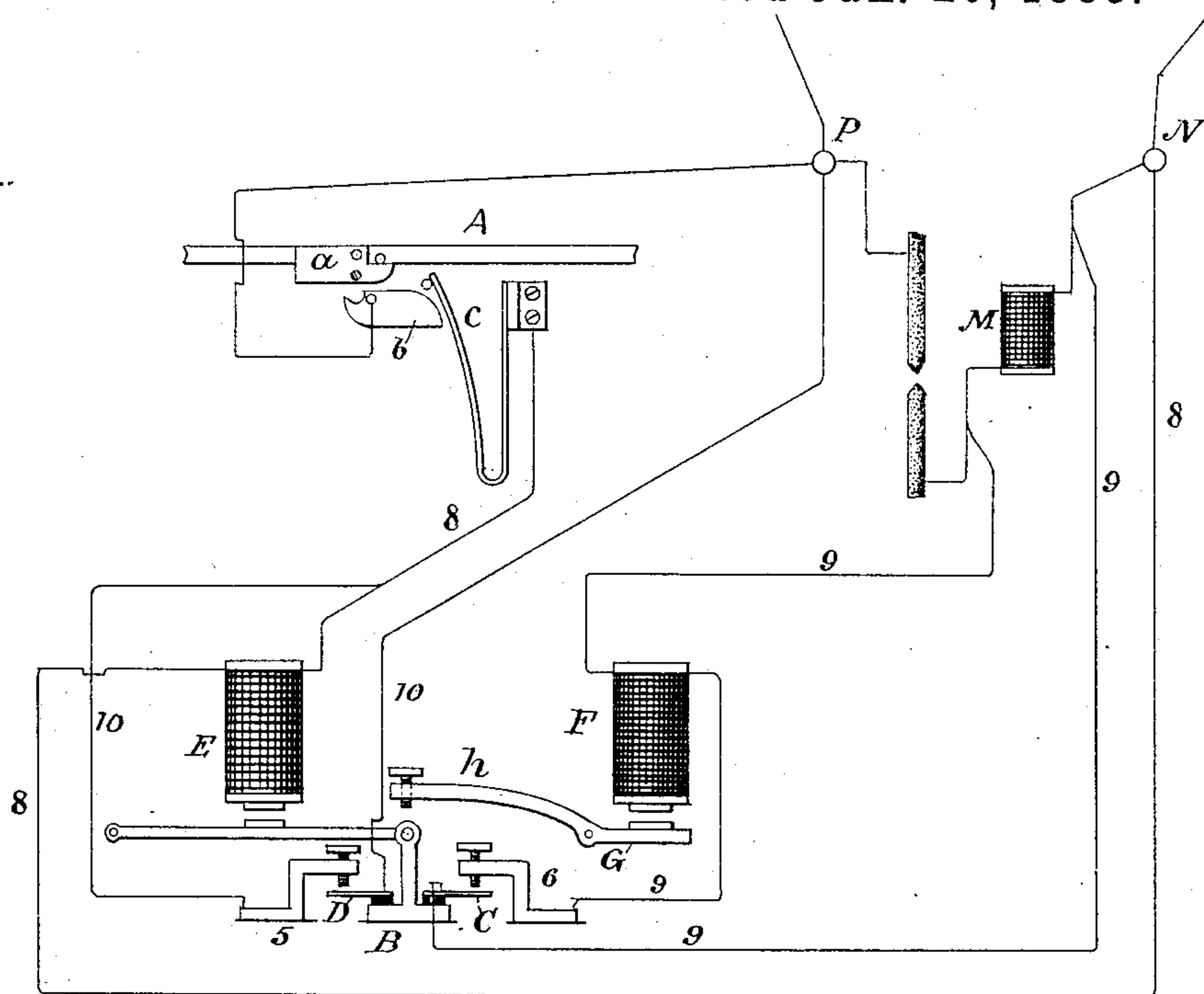
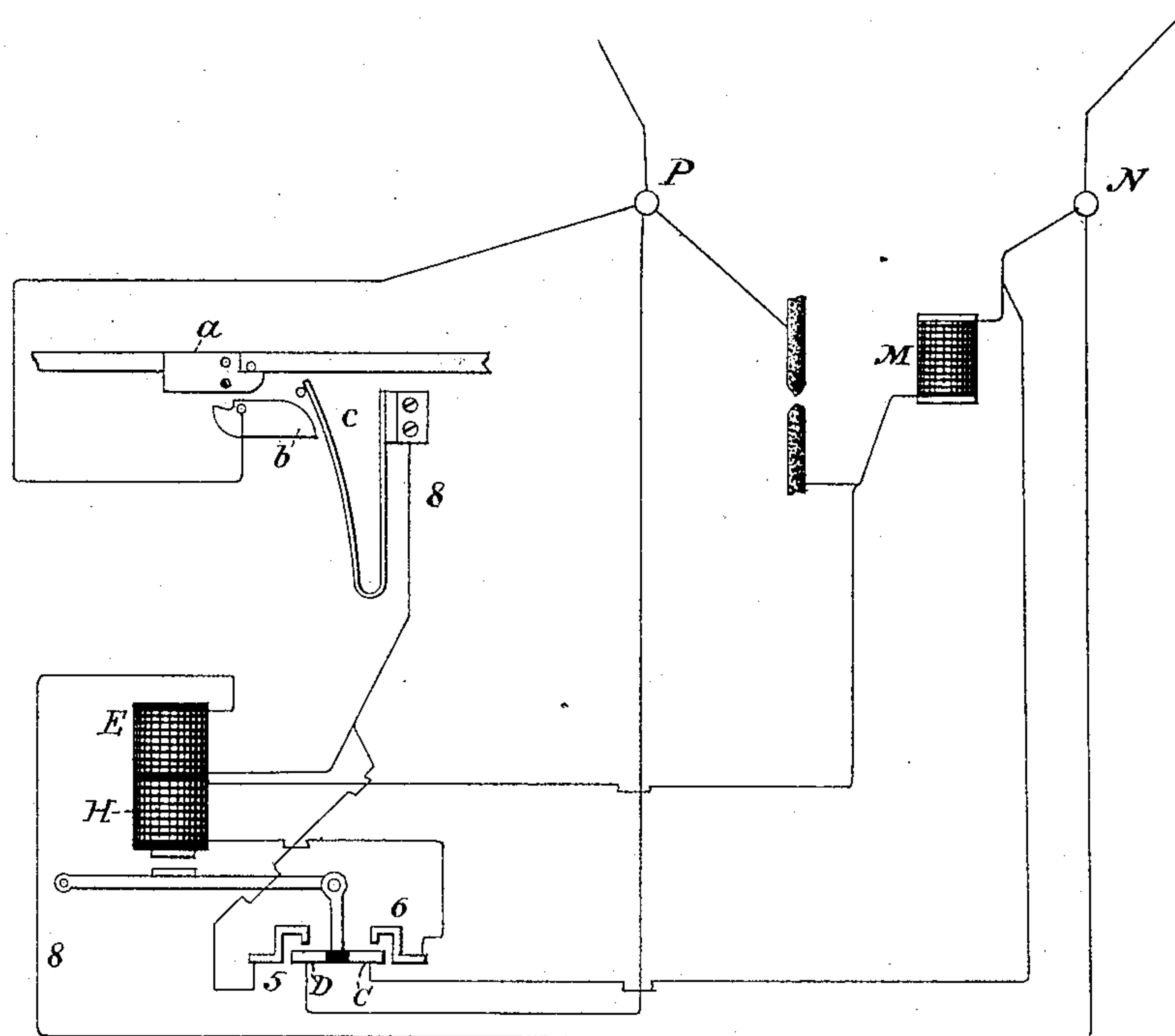


Fig. 2.



ATTEST:

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INVENTOR:

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*by H. E. Townsend,*  
*Att'y.*

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Fig. 3.

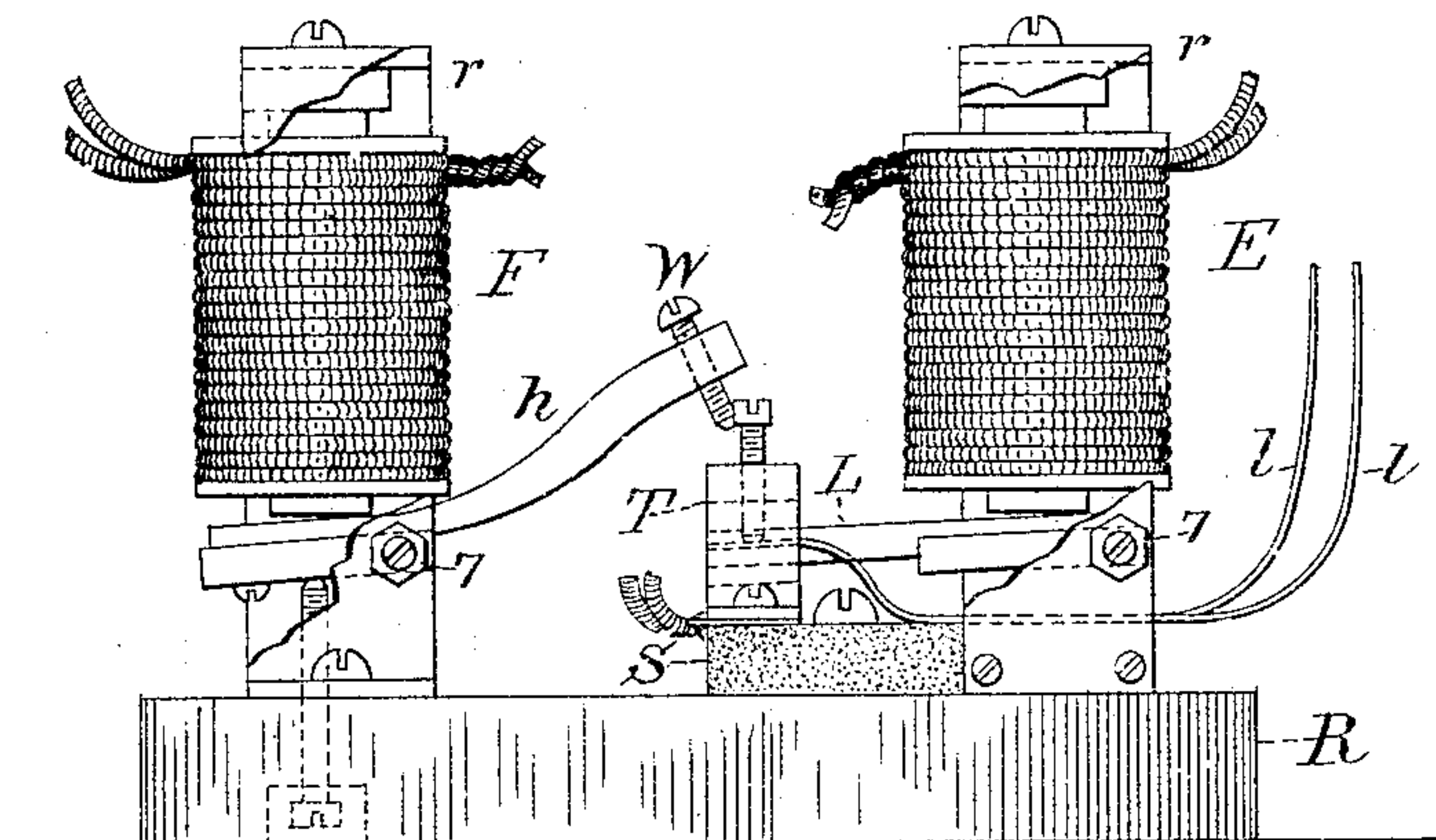
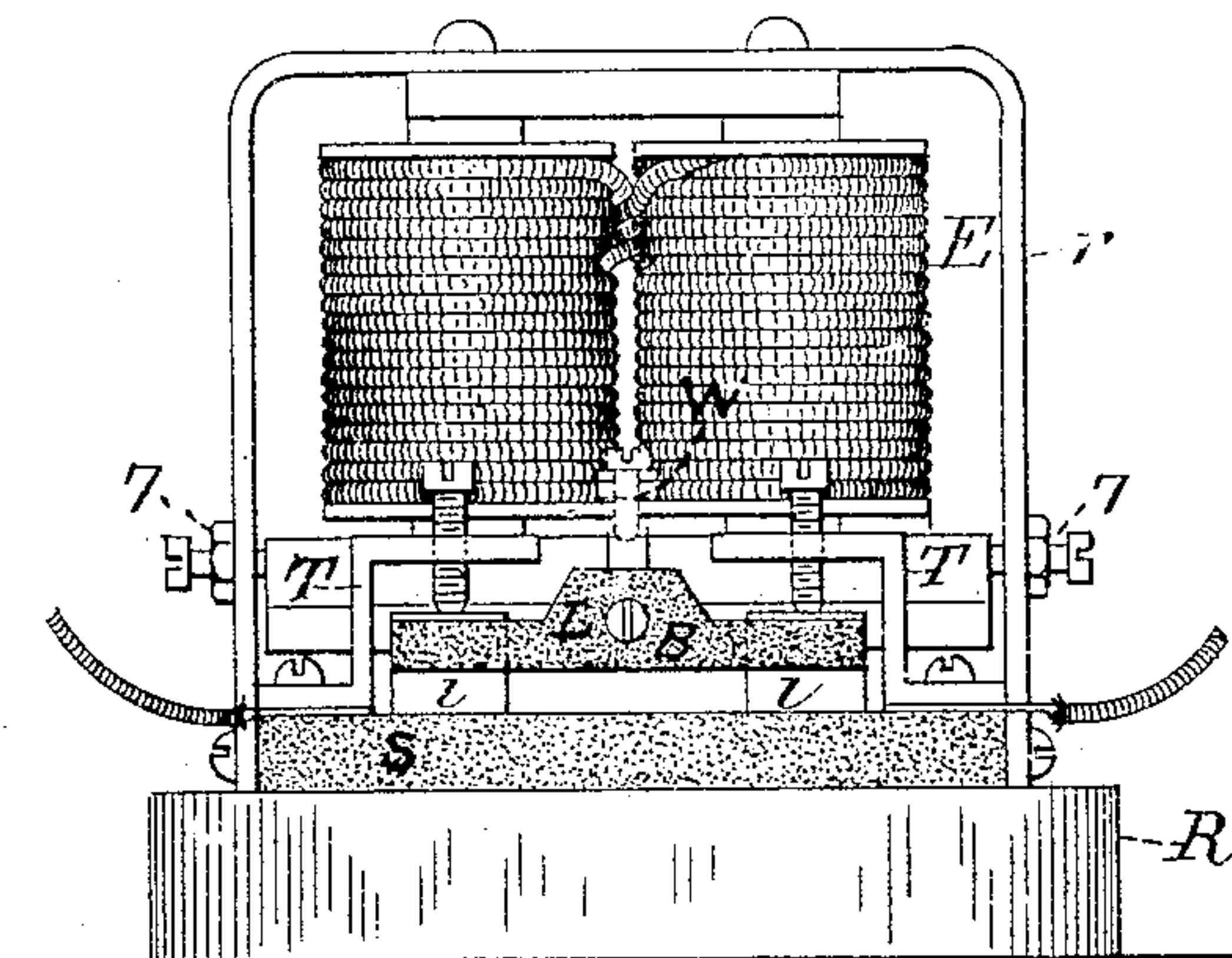


Fig. 4.



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# UNITED STATES PATENT OFFICE.

WILLIAM HOCHHAUSEN, OF NEW YORK, N. Y.

## AUTOMATIC CUT-OUT FOR ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 311,072, dated January 20, 1885.

Application filed May 31, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, WM. HOCHHAUSEN, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Automatic Cut-Outs for Electric Lamps, of which the following is a specification.

My invention is designed to remove a defect in the operation of automatic cut-outs, and to make a cut-out that shall be perfectly reliable and positive in action in every phase of its operation. Under the present methods of constructing automatic cut-outs the restoration of the cut-out devices to their normal position, so as to break the cut-out circuit and put the lamp into operative condition again after being shunted, is dependent upon the shunting or short-circuiting of the current around the cut-out when the carbons come into contact. Under this plan the cut-out, although it may be certain in its action in forming a cut-out circuit, is not perfectly reliable in restoring the circuits to their normal condition. I aim to make the action of the cut-out device positive and certain by causing its restoration to a normal condition by a positively-acting device energized by the closing of the circuit through the carbons.

My invention consists in employing a supplemental coil or magnet the circuit through which is closed by contact of the carbons, and which acts in any suitable manner, either mechanically or electrically, to cause the cut-out device to break the cut-out circuit, so that the lamp may resume its operation. My invention may be applied to any form of cut-out, although I have shown it as applied to the cut-out arrangement claimed in Letters Patent granted to me August 23, 1881, No. 246,137, in which arrangement the cut-out circuit is closed by the recession of the regulating devices of the lamp, and is maintained by the action of an electro-magnet in the cut-out circuit. I wish it to be distinctly understood, however, that I do not limit myself to this particular kind of a cut-out, my invention being applicable to any automatic cut-out device which acts to close a safety-circuit when the arc is extinguished from any cause, the

design being to cause the carbons when they come together to close the circuit of a positively-acting device for restoring the cut-out devices to their normal condition.

In the accompanying drawings, Figure 1 is a diagram of circuits and apparatus embodying my invention. Fig. 2 is a diagram illustrating a modified plan of carrying the invention into practice. Fig. 3 is a side view showing the details of construction of a portion of the cut-out device, and the mechanism for restoring it to a normal condition. Fig. 4 is an end view of the electro-magnetic switch that acts to keep the cut-out closed, and that also acts, when set, to close the circuit for the unsetting magnet or coil, so that when the carbons come together a current shall flow through said unsetting-coils.

Referring to Fig. 1, A represents a portion of the lever for the regulating mechanism of the lamp, which lever serves, when retracted to an abnormal extent, to close a shunt or safety circuit, in the manner explained in the patent mentioned, by means of a double pivoted latch device, *a b*, consisting of a swinging piece, *a*, pivoted on the lever, and a second piece, *b*, pivoted on a stationary support, and adapted, when actuated by a pin on *a*, to be thrown into contact with a spring, *c*.

P N represent the positive and negative binding-posts of the lamp, the circuit from one to the other of which is through the carbons, as indicated, in the ordinary way.

The electro-magnets for the regulating mechanism are omitted for the sake of simplicity.

E represents the switch electro-magnet, which acts to keep the safety cut-out circuit closed, although contact may be broken at *b c*. The armature-lever of this electro-magnet carries a double circuit-closing device consisting of a pivoted block, B, hung from the lever in such a way that it may be turned to one side or the other, but will retain the position it may take, which block carries two circuit-closers, C D, adapted to make contact, respectively, with two contact-stops, 5 6, one connected to the switch-magnet E and the other to the releasing or unsetting coil F. The purpose of thus mounting the block B will be presently explained. G represents the



armature-lever of the unsetting-magnet F, provided with an extension, *h*, extending over armature-lever of electro-magnet E, so that when G is attracted the extension *h* will strike sharply against said armature-lever and restore it or assist in restoring it to a normal position.

M is a small artificial resistance, placed in the main circuit with the carbons at some point between the points at which the cut-out circuit is connected, the purpose of the resistance being only to cause the diversion of some current into the circuit which contains the releasing coil or magnet, and which forms a derived circuit around the resistance when said circuit is closed and the main current flows through the carbons.

It is obvious that the resistance M might be the resistance of the main-circuit coil or magnet for the feed-regulating devices of the lamp.

The circuits and the operation are as follows: In the normal condition of the parts—that is, when the lamp is acting properly—the shunt or safety circuit is open, and the armature-lever of E being unattracted, the contacts at C 6 and D 5 are broken. As the contacts C 6 serve to complete the circuit of coil F through wires 9 9, &c., said coil is under the above conditions unaffected, and its armature is retracted, as indicated. When the arc for any reason is unduly lengthened or becomes extinguished, the cut-out circuit S S, &c., including the electro-magnet E, is completed at *c* in the well-known manner, causing the armature-lever of E to be attracted and to close both contacts C 6 D 5, the effect of which is to complete a new connection for electro-magnet E, and the cut-out circuit through wires 10 10, leading from the positive binding-post P, and circuit-closer D 5 through wires S S to post N, so that said magnet continues to hold the armature-lever in the proper position to keep the safety-circuit closed, although contact may be broken at *c*. The closing of the contacts C 6 also completes the circuit for magnet F through wires 9 9, spring C, and stop, but the latter is as yet unaffected, no current flowing through the carbons. In this operation, if the two circuit-closers carried by the block B should happen not to be in proper position or adjustment to make good contact with both stops, the block will turn upon its support and adjust itself to the inequality, so that both contacts will be fully made, and so that, further, when the armature-lever recedes or is forced back both circuits will be broken simultaneously. The latter function is quite important in the proper operation of the device, since, as will be readily understood, it is desirable that the unsetting electro-magnet F should not break its own circuit and be de-energized before it breaks the cut-out circuit at D 5. When the carbons are restored to contact, so that the lamp is ready to resume its operation, the cut-out circuit should be broken.

In previous forms of cut-out the contact of the carbons, by establishing a short circuit around the cut-out magnet, causes it to be de-energized, and to thus release the cut-out mechanism and break the cut-out circuit. In my invention the restoration of the cut-out circuit is brought about by the positive action of the electro-magnet F, the circuit to which has been closed at C 6 simultaneously with the formation of the cut-out circuit, and which is energized by the current flowing through the carbons, a portion of which current is diverted by the resistance M into said electro-magnet. In the present instance the energizing of the magnet by the coming together of the carbons causes, through the intervention of mechanical devices, the restoration of the cut-out mechanism to its normal position, the device here shown consisting of the tail *h* to the armature-lever, which, when the armature is attracted, strikes sharply against the end of the lever carrying the circuit-closer, by which the cut-out circuit is maintained so as to break said circuit. In so doing it breaks its own circuit by disconnecting the circuit-closer C from the stop 6, so that no portion of the lighting-current can any longer flow through it.

In the modification shown in Fig. 2 the coming together of the carbons closes the circuit of a depolarizing coil applied to the core of the electro-magnet E, so as to neutralize the effects of the cut-out current flowing through said electro-magnet.

The arrangement of the parts and the construction is substantially the same as in Fig. 1, with the exception that in place of the electro-magnet F a supplemental coil, H, wound reversely to the coils E of the cut-out electro-magnet is employed, the circuit of which coil is closed in the same way as the circuit of magnet F by means of the circuit-closer C 6.

The diagram clearly shows the arrangement. When the current is caused to flow through coil H by the coming together of the carbons, said coils act to depolarize the core of electro-magnet E, so that the switch-lever will be unattracted, and will return to a normal position breaking the cut-out circuit, as also the circuit of coil H.

It is obvious that the depolarizing influence of the coil H might be used in other ways familiar to those versed in the applications of electricity for accomplishing the desired object.

It is obvious that the electro-magnet or coil which is energized by the current conveyed to it by the contact of the carbons, may act in other ways besides those shown, either directly or indirectly, to restore the cut-out devices to their normal position, and I do not limit myself to the particular methods described, as my invention consists, broadly, in employing the positive action of a coil or magnet energized by the coming together of the carbons for restoring the cut-out devices, instead of depending merely upon the diversion



of the current from the cut-out device by the closing of the circuit through the carbons.

It is also to be understood that I do not limit my invention to the particular kind of a cut-out shown, as it is within the scope of it to use the unsetting or releasing coil or magnet with other forms.

One construction of the switch-magnet E and the unsetting magnet F that may be adopted in practice, is shown in Figs. 3 and 4.

R represents a base-block of any suitable material, carrying standards or galleys-frames *r r*, to the cross-beams of which are bolted the horseshoe electro-magnets E and F. The armatures for said electro-magnets are pivoted in the uprights at the points 7, as shown, and each is retracted by its own weight, being pivoted to one side of its center of gravity.

Connected to the armature of E is a horizontal pin or stem, L, upon the cylindrical end of which is pivoted, in such a way as to swing with slight friction, a block, B, of insulating material, to the upper side of which on either end are secured the ends of conducting-strips *l*, of copper, to which are secured the proper connecting-wires.

S is a block of insulating material, upon which are mounted the standards T T, bent over at their top and carrying adjustable contact-screws, as shown, with the ends of which the strips *l* make contact when the armature-lever of E is attracted.

To the standards T are attached in any suitable manner the connecting-wires, for the unsetting coil or magnet and for the cut-out circuit, respectively, after the manner already described.

The armature-lever of the unsetting-magnet F is provided with an extension, *h*, through the end of which projects an adjustable screw, W, which, when the armature of F is attracted, comes into contact with the block B immediately over the point where the stem L supports it.

The construction shown in Figs. 3 and 4 is but one of many that may be adopted in practice.

I do not limit myself to the particular arrangement of connections, and the particular circuit-closer herein described for introducing the unsetting electro-magnet into circuit with the carbons. Other circuit-closers or switches operating with the cut-out may be employed, provided they be so arranged and connected as to introduce the unsetting-coil into proper electrical relation with the carbons, so that when a current flows through them said electro-magnet will be energized.

What I claim as my invention is—

1. The combination, substantially as and for the purpose set forth, with an automatic safety cut-out mechanism for an electric-arc lamp, of a releasing or unsetting coil or electro-magnet, and connections, as described, from said coil or electro-magnet to the general circuit, so that when the carbons come to-

gether said coil or electro-magnet will be energized.

2. The combination, substantially as described, with an automatic safety circuit-closer for electric-arc lamps, of an electro-magnet whose armature is arranged so as to impinge upon said circuit-closer when the electro-magnet is energized, and circuit-connections from said electro-magnet to the carbon-circuit, so that it may be energized when the carbons come together.

3. The combination, in an electric-arc lamp, of circuit-closing devices, a derived or branch circuit closed thereby when the current in the main circuit decreases, mechanism arranged to impinge upon said circuit-closing devices, an electro-magnet for actuating said mechanism, and connections from said electro-magnet to the circuit containing the carbons, so that when the latter come together the electro-magnet will be energized.

4. The combination, with a circuit-closer for a derived or safety-circuit of an electric-arc lamp, of a supplemental circuit-closer for closing the circuit of an unsetting-magnet, and mechanism actuated by the unsetting electro-magnet, and arranged to impinge against the circuit-closing mechanism so as to break both circuits.

5. The combination, with a circuit-closer for a safety-shunt or derived circuit for an electric lamp, of an unsetting electro-magnet or coil and circuit-closing devices operating simultaneously with the safety-circuit closer, for including said magnet or coil in a circuit connected with the carbon-circuit, so as to be completed by the coming together of the carbons.

6. The combination, substantially as described, of a general circuit, a safety circuit-closer, an unsetting-coil or electro-magnet connected to the general circuit between the points of connection of the safety-circuit, and a supplemental circuit-closer for closing a break in the circuit of the releasing magnet or coil.

7. The combination, with an automatic cut-out, of a releasing or unsetting magnet in a circuit connected to the general circuit on either side of an artificial resistance, and a circuit-closer in the circuit of said magnet, said circuit-closer being controlled directly or indirectly by the automatic cut-out devices.

8. The combination, substantially as described, of an electro-magnet, E, two circuit-closers operated thereby, and electro-magnet F, having a break in its circuit controlled by one of said circuit-closers, and having also an armature-lever projecting over the support for the circuit-closers, for the purpose set forth.

9. The combination, substantially as described, of a safety cut-out circuit-closer, a supplemental circuit-closer, an unsetting or releasing electro-magnet in circuit with the supplemental circuit-closer, an artificial resistance in the circuit for the carbons at a point between the points of connection of the safety-circuit, and connections from the general cir-



cuit on either side of the resistance to the supplemental circuit-closer and the unsetting electro-magnet.

10. The combination, substantially as described, of an electro-magnet, E, in the cut-out circuit, a circuit-closer operated thereby for preserving the cut-out circuit, a supplemental circuit-closer, also operated by said electro-magnet, and an unsetting or releasing magnet in circuit with the supplemental circuit-closer for unsetting or releasing both circuit-closers, so as to break the circuit of electro-magnet E, as well as its own circuit.

11. The combination, with the two contact-stops, of the two contact-plates or circuit-closers, mounted on a pivoted block whose pivot is carried by a support adapted to move toward and away from the contact-stops, said contact-plates or circuit-closers being arranged on opposite sides of the pivot, as and for the purpose described.

12. The combination, substantially as described, of a safety cut-out circuit-closer, an unsetting electro-magnet, a supplemental circuit-closer in circuit with said electro-magnet, a swinging frame or support to which said circuit-closers are connected on either side of the

pivotal point, and fixed stops ranged in line with the two sides of the swinging frame.

13. The combination of the armature-lever, the pivot or stem L, attached to said lever, the bodily-movable block B, swinging on said pivot and carrying the two circuit-closing points or surfaces on either side of the pivot, and the two fixed stops on the same side of the block, arranged as described, so that when the block B is carried bodily by the armature toward the stops both contacts will be closed, and the block will automatically take position so that both contacts will be broken at the same instant on the reverse movement.

14. The combination, substantially as described, of a safety cut-out circuit-closer, an unsetting electro-magnet, and a supplemental circuit-closer for introducing the electro-magnet into a circuit with the carbons.

Signed at New York, in the county of New York and State of New York, this 29th day of May, A. D. 1882.

WILLIAM HOCHHAUSEN.

Witnesses:

H. C. TOWNSEND,  
THOS. TOOMEY.