

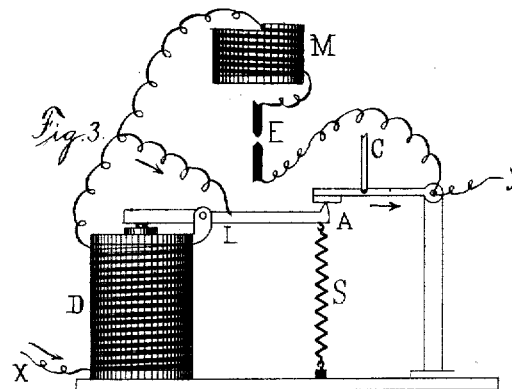
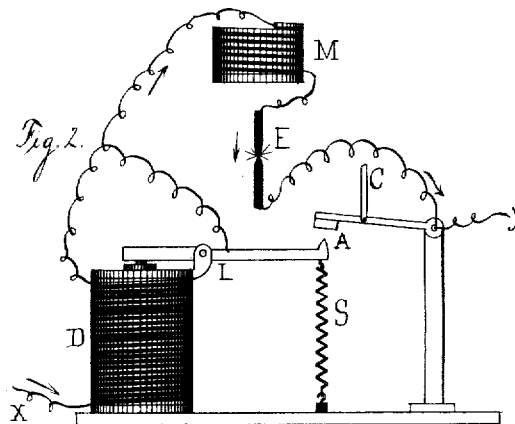
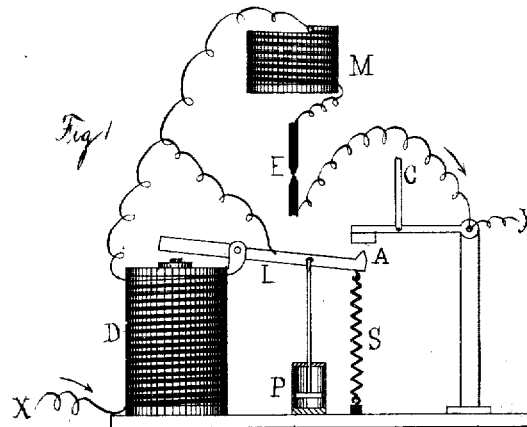
(No Model.)

2 Sheets—Sheet 1.

E. THOMSON.  
ELECTRIC ARC LAMP.

No. 261,067.

Patented July 11, 1882.



Witnesses  
W. B. Thomson  
Harry Dearborn

Inventor  
Elihu Thomson  
by H. B. Townsend  
his Att'y.

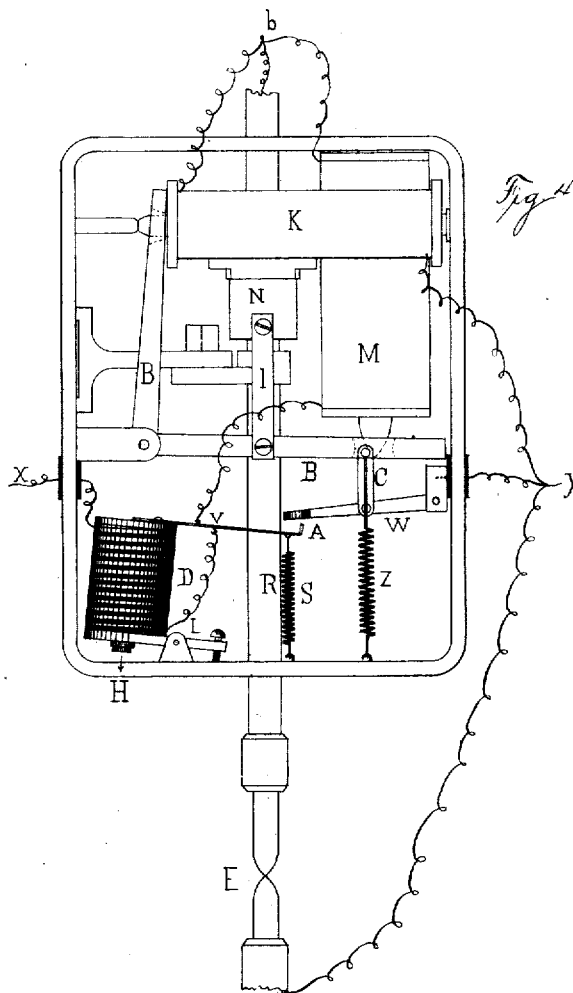
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# UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR TO THE  
AMERICAN ELECTRIC COMPANY, OF SAME PLACE.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 261,067, dated July 11, 1882.

Application filed July 9, 1881. (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 New Britain, county of Hartford, State of Connecticut, have invented a certain new and useful Automatic Safety Cut-Out for Electric-Arc Lamps, by means of which an electric lamp is shunted and the continuity of the circuit preserved when said lamp is burning abnormally—as, for instance, with a very great arc-length—of which the following is a specification.

It is well known that where a considerable number of electric-arc lights are placed in the same circuit an arc of abnormal length may eventually cause an open circuit, and various circuit-closing devices are used to shunt the current around the defective lamp or lamps.

My invention consists of an electro-magnet placed and always maintained in the main circuit of the lamp, which operates when the current first passes to set a contact-piece in position, so that on a release of the electro-magnet which governs the electric-lamp mechanism a second contact-piece may come into contact with the former, and thereby short-circuit the lamp. The release referred to is due to the weakening of a governing-magnet or a differential magnet, or other carbon-adjusting device.

Figures 1, 2, and 3 are comparative figures showing the essential parts in various stages of operation. Fig. 4 shows a front view of an electric lamp in which my present device is used.

In Fig. 1, M is a differential or otherwise-constructed magnet, which adjusts by any suitable mechanism the arc between the electrodes E. C is a link or bar connecting the upper contact at A to the movable armature of the adjusting device or magnet, whereby said contact is made to rise or fall with changes in the power of the magnet. As shown in Fig. 1, C is lowered and the carbons are in contact, the magnet M is unexcited, no current passing. This is the case when the lamp is not in use. Placed in the main circuit is an electro-magnet, D, which attracts an armature-lever, L, the extremity at A bearing a contact-point. A spring, S, holds the armature L away from the

magnet D when the current is not passing, as in Fig. 1. Preferably a check-motion or dash-pot, P, is provided to prevent too sudden movement of the lever L. The circuit is as follows: passing from X through the magnet D, thence through the magnet M, with a branch to the lever L and lower contact at A, as shown, from the magnet M to the electrodes E of carbon, thence to the exit at Y. The upper contact at A is likewise in connection with Y. When the current is allowed to circulate the positions of the parts are as shown in Fig. 2. The magnet D attracts its armature L, raising its contact-piece at A. The magnet M is energized and opens the arc at E, and at the same time raises the rod C, so that contact-piece at A preserves an open circuit at A, as in Fig. 1. The current then continues to circulate through the arc at E. The adjustments are such that the contact at A will remain open unless the arc at E attains an abnormal length and causes the rod C, by the changed magnetic effect upon the governing-magnet M, to be lowered to such an extent that the position of normal working is passed and the piece C brings the contact-pieces at A together. During this action the armature L remains in position, as it is so adjusted as not to be released unless there be almost total cessation of the current in the main circuit. When the contact at A is closed the lamp is cut out or shunted. The action just described is shown in Fig. 3 as having taken place, the arc at E has ceased, the magnet M has no current passing through it, and the whole current is traversing the contact A, its path being from X through the magnet D to the lever L, contacts A, and out at Y.

The application of the foregoing device is shown in Fig. 4, in connection with lamp mechanism described in a separate application for Letters Patent. B B is a bent lever acted upon by two magnets, M and K, the former, M, being in the circuit with the carbon electrodes and the magnet K in a shunt or derived circuit around them of high resistance. N is a lifting-clamp, of any desired construction, engaging upon the rod R and regulating the arc at E. The clamp is supported in a piece, 1, attached to lever B. The magnet D corresponds to D in the preceding figures, except

that it is movable upon a pivot at L, and, when the current circulates, is drawn to the iron inclosing-box at H. In its position, as shown, no current is circulating, and the contact at A at the extremity of a metal bar, V, attached to the movable magnet D, is held open by the spring S, as shown. The main armature B is connected by a link, C, with a movable piece, W, insulated from the clamp, one end of which is the upper contact-piece at A, and the other end of which is connected to Y. The spring Z is a spring acting to oppose the upward movement of the armature B toward M. The current enters at X, passes through the magnet D, thence to V, to the magnet M, to the rod R, through the arc at E, and out at Y. The circuit through K branches from b to Y, as indicated.

The foregoing description of the action of Figs. 1, 2, and 3 applies without change to the devices, Fig. 4, and is briefly as follows: The magnet D, being always in circuit, is attracted to the box-side H, of iron, when the current passes and elevates the rod V and the open contact at A simultaneously. At the same time, also, the magnet M attracts its armature B, raising the link C and the piece W, preserving an open contact at A. The clamp N at the same time seizes the rod R and lifts it so as to form an arc at E. During normal operation the armature B moves only so as to open and close the clamp N and feed the carbons; but if the arc becomes excessive in length the armature descends so far as to close the contact at A, and so divert the current from the arc, as in Fig. 3. This descent of the armature B is due to an increase in the power of the shunt K or to a decrease of the power of the magnet M, or, as is more frequently the case, to both the actions together.

What I claim as my invention is—

1. The combination, with an electric lamp, of a shunt-circuit closer or cut-out constructed in two parts movable with relation to one another, as described, an electro-magnet in the

general circuit of the lamp for actuating one of said parts, and means connected with the regulating mechanism of the lamp for actuating the other.

2. The combination, with an electro-magnet in the general circuit of the lamp, a contact-piece movable by said electro-magnet and adapted to be set and held in position for electrical contact by the current which forms the arc, a second contact-piece adapted to make contact with the first when in position, and attached to or supported by the armature-lever, of the regulating mechanism and circuit-connections to said contacts, substantially as described, whereby when the armature-lever of the regulating mechanism is retracted to an abnormal extent a shunt or safety circuit is closed around the lamp.

3. The combination, substantially as described, with an electric lamp, of a shunt-circuit closer constructed in two parts movable with relation to one another, an electro-magnet in the general circuit of the lamp for actuating one of said parts, retracting devices applied to the latter and adjusted below the tension of the currents used in operating the lamp, and an electro magnet or magnets for actuating the other part of the shunt-circuit closer, provided with retracting devices adjusted to such a tension that on an abnormal length of arc and a consequent diminution of current strength the shunt or safety circuit will be closed.

4. The combination, substantially as described, of the two movable contacts A, movable to and from one another, electro-magnet D, in the direct circuit at all times for actuating one of said contacts, and connecting devices between the regulating devices of the lamp and the other circuit-closer, as and for the purpose described.

ELIHU THOMSON.

Witnesses:

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