(No Model.)

2 Sheets—Sheet 1.

C. HEISLER.

CUT-OUT FOR ELECTRIC LAMPS.

No. 394,180. Patented Dec. 11, 1888.

Fig. 1.

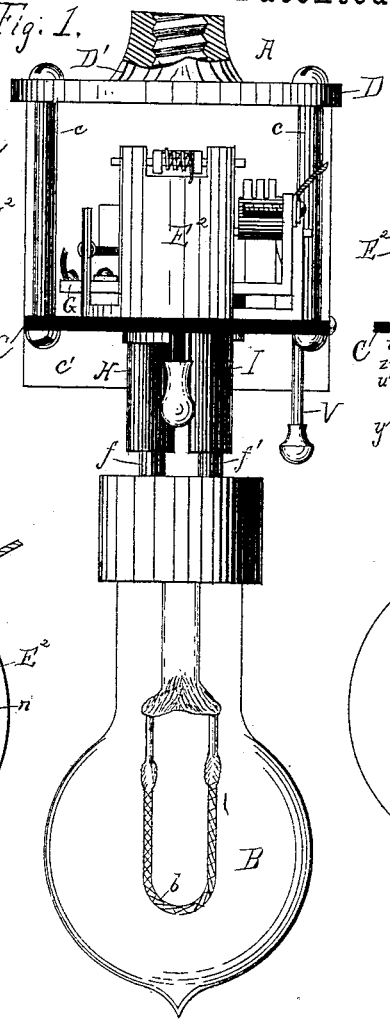


Fig. 2.

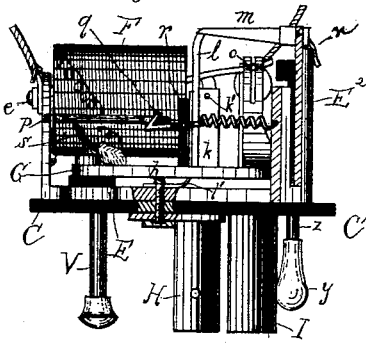


Fig. 3.

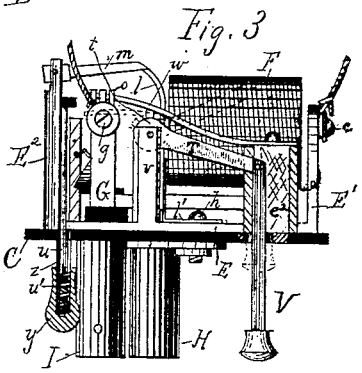


Fig. 4.

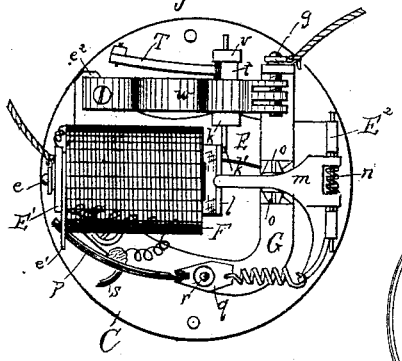


Fig. 5.

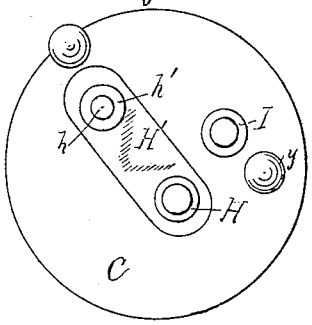
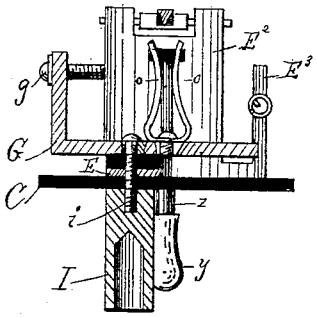


Fig. 6.



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Inventor:
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G. H. Strobridge.

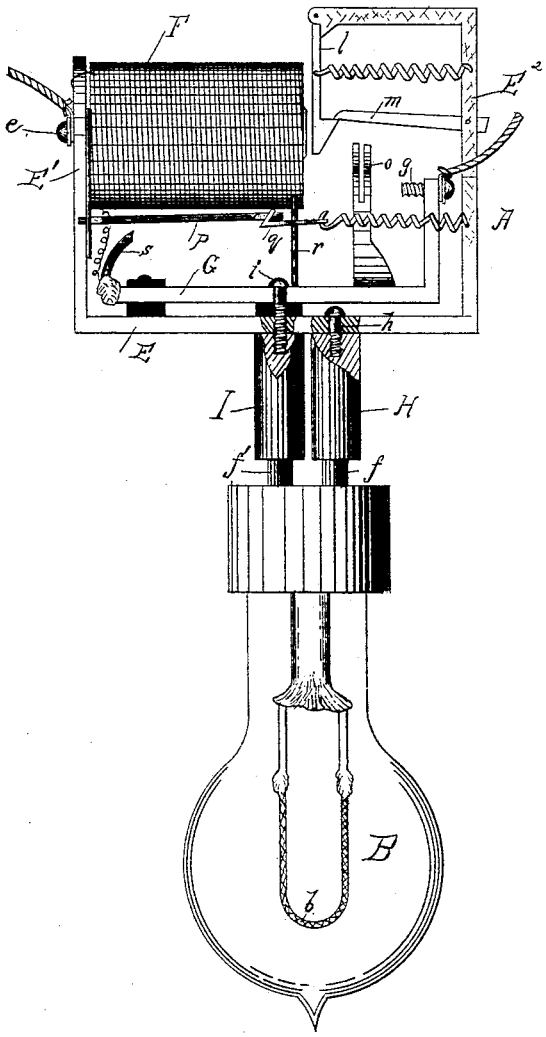
(No Model.) 2 Sheets—Sheet 2.

C. HEISLER.

CUT-OUT FOR ELECTRIC LAMPS.

No. 394,180. Patented Dec. 11, 1888.

Fig. 7.



Witnesses,
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Inventor,
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By his Attorney
G. H. Strobridge

UNITED STATES PATENT OFFICE.

CHARLES HEISLER, OF ST. LOUIS, MISSOURI.

CUT-OUT FOR ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 394,180, dated December 11, 1888.

Application filed May 17, 1886. Renewed March 9, 1888. Serial No. 266,704. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HEISLER, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Cut-Outs for Electric Lamps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to means for short-circuiting an electric lamp when the lamp fails to operate normally; and it consists in providing electro-magnetic and thermal devices which mutually co-operate in assuring the continuity of the line and thereby promote the efficiency of an electric-lighting system.

The particular form in which I have embodied my invention is illustrated in the accompanying drawings, in which—

Figure 1 is a view of my cut-out with a single incandescent lamp attached thereto. Fig. 2 is a view taken from the left of Fig. 1, the lamp and a part of the frame of the cut-out being removed. Fig. 3 is a similar view taken from the right of Fig. 1. Fig. 4 is a plan of the cut-out with the cap removed. Fig. 5 is a bottom view of the cut-out. Fig. 6 is a section through line $x\,x$, Fig. 3, looking to the right; and Fig. 7 is an enlarged view of the cut-out with a lamp attached, modified as to some of its details and designed especially to show the circuits.

The same letters of reference indicate the same parts throughout.

Referring to the drawings by letter, A is a cut-out, and B an electric incandescent lamp attached to the bottom thereof. The cut-out is attached directly to an insulating-base, C, which base also supports the screw-posts $c\,c$, to which a cap, D, is attached. The cap D has a screw-threaded socket, D′, by means of which it may be secured to a fixture or support. Upon the base C is mounted a frame, E, which is formed at one end into a post or standard, E′, which supports an electro-magnet, F. The frame extends thence across the upper surface of the base under the electro-magnet, and is formed at the other end into a broad standard, E^2, as shown most clearly in Fig. 6. Within the frame formed by the parts E, E′, and E^2, but insulated therefrom, is a frame or bar, G, which extends alongside the electro-magnet and between the standard E^2 and the armature l of the magnet. The frame E is connected at binding-screw e on the post E′ to one end of the line-circuit, and the frame or bar G is connected at binding-screw g with the other end of the line. It is evident, therefore, that the circuit of the cut-out will be complete whenever there is electrical connection between the frames E and G.

In the normal condition of the apparatus connection is made between the frames by two paths—one through the electro-magnet F, the terminals of which are connected, respectively, to the post or standard E′ and the frame G, (see Fig. 4,) and the other through the lamp B by a course presently to be described.

The magnet F is of very high resistance, so that the greater portion of the current shall normally pass through the lamp and render it incandescent.

The lamp-connections which admit of the passage of the current through the lamp itself will now be set forth.

The lamp may be of any ordinary construction and have terminals of any desired shape. I have represented a lamp having a braided filament, b, and post-terminals $f\,f'$. Corresponding to the post-terminals on the bottom of the cut-out are socketed posts H and I for the reception of the post-terminals f and f'. The post I is secured in a fixed position by a screw, i, which connects it mechanically and electrically with the frame or bar G. The screw i is insulated from the frame E where it passes through. The post H is adjustably connected with the frame E through the bar H′, nut h', and screw h. (See Figs. 2 and 5.) By loosening the nut the post H may be moved into any desired position. The object of this is to allow for variations in the construction of lamps having post-terminals. The post H being connected to the frame E and the post I to the frame or bar G, it is evident that a circuit will normally be complete through the cut-out and lamp, unless the parts are for some reason out of order. The current entering at binding-post e will divide, part of it passing through the high-resistance electro-

magnet F, and part through the frame E, screw *h*, bar H′, socketed post H, lamp-terminal *f*, filament *b*, lamp-terminal *f′*, socketed post I, screw *i*, frame or bar G, and binding-post *g* to line.

The armature *l* of the electro-magnet F is attached to a spring, *l′*, which is secured to the frame E by the same screw which connects the latter with the post H. The spring tends to keep the armature away from the magnet-core. The back-stop *k′* extends behind the armature from a post, *k*, formed on frame E. The armature is bent back a little at the top, and on the bent-back portion of it rests the end of an arm, *m*, which is pivoted in uprights on the standard E². The spring *n* tends to throw the outer end of the arm *m* downward in an obvious manner. Directly below the arm *m*, and secured to the frame or bar G, is a part of spring contact-arms *o o*. Whenever the end of the armature is removed from under the arm *m*, the latter is pressed downward into contact with the spring-arms *o o*, and thereby makes a short circuit between the frames G and E, with which, respectively, the spring-arms and the arm M are connected. This happens whenever for any reason the lamp becomes inoperative. The current is then forced to pass through the magnet, causing it to attract its armature and to release the spring-actuated arm, as above described. By the completion of the short circuit the line is kept in order and no other lamps are disturbed.

Besides the short-circuiting device operated by electro-magnetism, I provide a thermal cut-out which will operate in case the electro-magnet device fails to act properly from accidental causes. To an arm, *e′*, running out from the standard E′, I attach a rod, *p*, made of a fusible alloy, and I run it along beside the coils of the magnet. I attach a link, *q*, to the free end of this rod, and connect the link by a spiral metallic spring to a post, E³, formed in one piece with the standard E². When in position, the link *q* surrounds a rod or pin, *r*, without, however, touching it. The rod or pin is fixed in the frame or bar G. I also attach, by solder or other means, a pointed metallic piece, *s*, to the bar G, and run it up so that the pointed end shall rest close to the fusible rod *p*.

The cut-out here described is brought into operation whenever the rod *p* is melted. In that event the link *q* falls or is drawn by the metallic spring into contact with the pin *r*, thus completing electrical connection between the two frames. Supposing, now, that the lamp should fail to operate and the electro-magnet for any reason fail to attract its armature at once, as by reason of the latter becoming accidentally caught, the magnet-coils will become heated, and by fusing the alloy close the short circuit, as above indicated. In case of a total interruption of the magnet-circuit, (in which case the coils would not become heated,) a spark will cross between the point of the piece *s* and the rod *p*, fusing the latter and closing the short circuit, as before.

It is of course necessary in all apparatus of this kind to provide, in addition to automatic short-circuiting devices, means whereby the lamp can be cut out at will from the main circuit. The means which I employ are shown most clearly in Figs. 2, 3, and 4. Referring to those figures, it will be seen that an arm, T, is pivoted on an extension of the back-stop *k′*, between the posts *k* and *v*. On the top of the lever T is a projection, *t*, upon which presses normally a spring, *w*, mounted on a post, *e²*, formed on the frame E. The free end of the spring rests over the inner end of the binding-screw *g*, but is kept out of contact with it by the projection *t*. The lever T has pivoted to it a handle, V, which extends down through a hole in the base C into a position where it can be easily reached by the hand. When it is desired to cut out the lamp, the handle is raised, carrying with it the lever T, and removing the projection *t* from under the spring *w*. In consequence of this the spring comes into contact with the screw *g*, and thus closes at once a short circuit around the lamp and the electro-magnet. The position of the parts when the manual cut-out has been operated is shown in dotted lines in Fig. 3. A special advantage of this form and arrangement of cut-out is that the operating parts thereof are situated below the point of attachment for the lamp-shade, and can be reached without difficulty.

In Fig. 3 I show the details of a restoring device for the arm *m*. It consists of a rod, *u*, which is capable of being moved up and down in perforations in the base C and the frame E. A cap, *y*, is attached to the lower end of the rod, and a spring, *u′*, located within the cap and pressing against the end of a sleeve, *z*, which surrounds the rod, and extends for a short distance into the cap, tends to keep the rod down out of the way of the arm *m*. The arm is raised by pushing up on the cap *y*, and the actuating-rod is returned automatically by the spring. This restoring mechanism also can be operated from beneath the lamp-shade.

In order to secure the necessary attractive power, and also the necessary resistance for my magnet, I wind it partly with copper and partly with German-silver wire. In the present instance the German-silver wire (which I wind on the outside of the coil) serves not only as a magnetic medium and a rheostat, but also as a means of fusing the rod *p* in case the electro-magnet fails to operate with sufficient rapidity. It will thus be seen that the devices in question do not simply operate alternatively, but co-operate to the same end.

I have shown my cut-out as applied to a single incandescent lamp; but I may with equal advantage apply it to two or more lamps, or to a lamp having two or more filaments. My manner of successively short-circuiting such a group of lamps or filaments by

electro-magnetic means has, however, been fully set forth in Letters Patent Nos. 327,795 and 327,796, granted October 6, 1885, to Charles Heisler, the present applicant. It is not thought necessary to illustrate the use of my cut-out with more than a single lamp, although I do not desire to be confined to such use alone. In fitting the cut-out for application to two lamps, a socketed screw-post similar to I would be substituted for the nut *h'*, and a fourth socketed post would be added, capable of adjustment, for reasons stated above. The posts would also be set at an angle, to allow the lamps sufficient room.

I prefer to make all the metallic parts of my cut-out, not already described otherwise, of brass, except, of course, the magnet-core and armature, which are of soft iron. The contact-arms may be of copper, and the pivots may be of steel or any preferred metal. With this construction there is the smallest possible danger of the derangement of the device from corrosion. In general a cylindrical casing, as *c'*, will surround the parts fitting into the cap D at one end, and secured to the base C by a screw.

My device might be applied to an arc lamp or a group of arc lamps without departing from the spirit of my invention.

The lamp-shade (not shown) will be applied above or to the body of the cut-out by any suitable means.

While I prefer to employ a rod, *p*, made of some easily-fusible alloy, yet I may employ any fusible substance not metallic, and may give it any suitable shape other than that of a rod. In that case the lightning-arrester would be dispensed with, or it would be so arranged that the spark should pass near enough the non-metallic substance to fuse it.

In Fig. 7 both the binding-posts at the bottom of the cut-out are represented as stationary. Moreover, the armature of the magnet is shown as attached to a forward extension of the standard E^2, and as being held away from the magnet by a retractile spiral spring. These and other minor alterations are made, so that the parts can be arranged to show the circuits more clearly.

I show and describe but do not claim in the present application an adjustable circuit-terminal or binding-post and means accessible beneath the lamp-shade for short-circuiting the lamp. I reserve the right to claim the same in future applications.

I do not broadly claim a shunt or cut-out consisting of a lever or its equivalent, combined with a coil adapted to be heated by the excessive current with the interposed thermal devices, or the interposed fusible or softening device between the lever and the coil, and I limit my claims to the elements in combination, as below specified.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, in a single device, of a thermal and an electro-magnetic cut-out in operative proximity to each other, the thermal cut-out being brought into operation by the overheating of the coils of the electro-magnet resulting from the imperfect action of the said magnet or its total failure to act, substantially as described.

2. The combination, with an electric lamp, of an electro-magnetic cut-out and a thermal cut-out, consisting of electrical connections between the terminals of the line through the frame, and a fusible rod or equivalent connection arranged by the side of the coil of the electro-magnet and holding the said connections out of contact, and a metallic point located near the rod and connected to the opposite pole of the line, whereby both coils and lamps are short-circuited, substantially as described.

3. The combination, in an automatic cut-out for electric lamps, with an electro-magnet and means operated by its action for short-circuiting the lamp, of a fusible rod or piece located near the magnet-coils, short-circuiting devices released by the fusing of the rod or piece, and a metallic point located near the rod and connected to the opposite pole of the lamp, whereby on the failure of the electro-magnet to act a short circuit will be formed by the fusing of the rod or piece, either by the heating of the magnet-coils or by a spark from the metallic point, substantially as described.

4. In combination with an electric lamp, an electro-magnet and connections with the line, substantially as described, whereby the electro-magnet short-circuits the lamp when said lamp fails to operate, an easily-fusible piece or rod, a second short circuit for the lamp held open by the easily-fusible piece or rod, and a conducting-point located near the easily-fusible piece or rod and connected to the opposite pole of the lamp, whereby on failure of the magnet-switch a second short circuit may be closed by the spark from the point melting the piece or rod, all substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHAS. HEISLER.

Witnesses:

WALTER AUFDERHEIDE,

WM. WURDACK.