

J. H. HALLBERG.
 AUTOMATIC ELECTRIC CUT-OUT.
 APPLICATION FILED JULY 27, 1911.

1,049,708.

Patented Jan. 7, 1913.

Fig. 1.

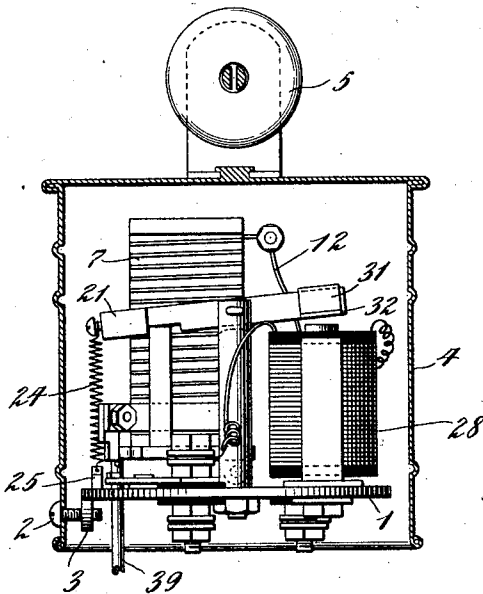


Fig. 2.

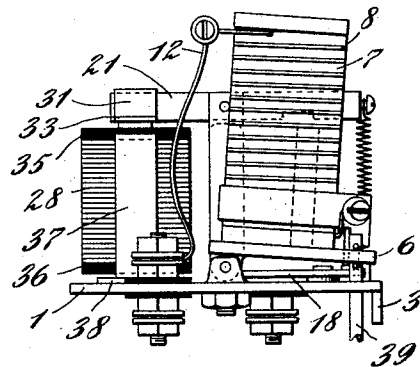
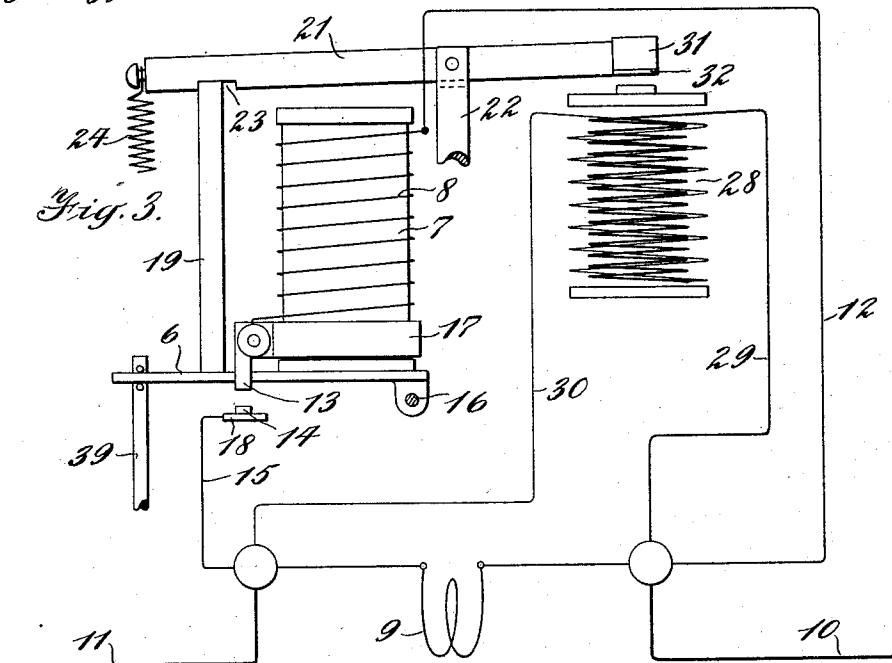


Fig. 3.



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UNITED STATES PATENT OFFICE.

JOSEF HENRIK HALLBERG, OF NEW YORK, N. Y.

AUTOMATIC ELECTRIC CUT-OUT.

1,049,708.

Specification of Letters Patent.

Patented Jan. 7, 1913.

Application filed July 27, 1911. Serial No. 640,745.

To all whom it may concern:

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

This invention relates to an automatic electric cut-out device for use in lighting circuits, particularly in circuits when the lamps are connected in series.

The object of the invention is to provide an efficient and economical device, which renders it safe and practicable to operate incandescent electric lamps of low voltage in series from constant potential mains without having recourse to constant current regulators and transformers, or other expensive accessories.

The value of small lamp units is now well understood and appreciated for outdoor as well as for indoor lighting and with voltages under 2200 it is desirable to operate these small lamps in series without a regulator, provided each lamp is protected by a reliable, automatic cut-out which introduces a compensating element in case the lamp should fail.

The present invention renders it feasible to employ tungsten-filament lamps in their most rugged state, that is, when made for low voltages ranging from 6 to 50. The invention is especially designed for the utilization in the most advantageous manner, of these and other lamps noted for the brilliancy of the light which they emit and for moderate amount of electrical energy consumed.

Referring to the accompanying drawing, in which the same numerals of reference designate corresponding elements throughout; Figure 1 is a side elevation of the cut-out, with the casing thereof in section, showing the device in a normal operative position, but out of action. Fig. 2 is a similar elevation of the working parts of the cut-out removed from their case and as seen from the side opposite to Fig. 1, the parts here being shown in action, that is, in the positions respectively occupied by them at the instant the lamp for which the cut-out is provided breaks or fails on the circuit. Fig. 3 is an enlarged diagrammatic view, illustrating the active elements of the cut-out, the lamp which it is intended to replace on the electric circuit, and connections.

The several parts of the cut-out are supported upon or from a base 1, which may be a circular plate held by a number of screws and lugs 2 and 3, within a case 4, having a suitable hanger 5. The case and its hanger are of known construction, not claimed herein. Upon the plate 1 is mounted an oscillatable support 6, carrying a spool 7, of porcelain or other suitable insulating material, around which is wound an electric wire coil 8, having a resistance equal to that of the lamp which it may eventually replace in the electric current.

One lamp is indicated at 9 in Fig. 3, the same being connected in series with a number of other lamps (not shown) on the main line, represented by the incoming and outgoing wires 10 and 11. The resistance-coil 8 is in a branch circuit similarly connected with the main line, including a wire 12 leading from the incoming wire 10 to the upper end of the coil 8, a pair of contact makers 13, 14, and a wire 15 connecting the latter with the outgoing wire 11. The branch circuit is intended, of course, to remain open when the lamp is burning under normal conditions, the said contact-makers being then separated, as shown in Figs. 1 and 3.

The aforesaid resistance-coil is preferably arranged to fall when released into operative position by the action of gravity, in the manner exemplified in Fig. 2. This may be effected by mounting the support 6 pivotally at one end, as at 16, and standing the spool endwise on this support, to one side of the pivot or hinge. Now, by locating the contact-piece 13, with the lower end of the coiled wire 8 thereto attached, on the base of the spool 7, at the side thereof remote from the pivot, and placing the contact-piece 14 directly thereunder upon the base 1, it is manifest that the contact between 13 and 14 will be made whenever the spool and resistance-coil are released and allowed to fall or swing about their pivotally-mounted support, as Fig. 2 shows. It is also obvious that the contact will be broken when the spool and coil stand vertically, with the underlying support in a horizontal position, as represented in Fig. 1 and Fig. 3. The contact-piece 13 may be a depending portion or downwardly-projecting end of a metallic strap 17 encircling the spool 7 at its base, while the contact-piece 14 may form part of a metallic

tongue 18 fastened to the upper side of the plate 1 but insulated therefrom.

An arm 19, secured to and projecting upwardly from the support 6, is provided to hold the latter raised or horizontal, normally, with the spool and resistance-coil vertically supported thereon, thus separating the contact-pieces and leaving the branch circuit open.

A lever 21, fulcrumed somewhat at one side of its center on the upper end of a post 22, and having an under notch 23 in its long end adapted to engage the upright member 19, operates to hold the support 6 in its raised or horizontal position. As shown, the post 22 is centrally mounted upon the base 1. A spiral spring 24, attached to a stud 25 on the base and to the long end of the lever 21 normally holds this lever in engagement with vertical member 19 of the support.

The short end of above-described lever 21 forms the armature of an electro-magnet 28, which, in order to provide the necessary ampere-turns with a sufficient capacity and resistance in the least space, is composed of a large number of turns of low resistance winding in series with a less number of turns of extremely high resistance winding, as indicated in Fig. 3. This winding is calculated to divert less than one-fiftieth of an ampere from the lamp and is connected in a shunt therewith by the wires 29 and 30. The electro-magnet, which is positioned under the short arm of the lever 21, will not normally be capable of overcoming the tension of the spring 24 to swing the lever 21 so as to release the arm 19 and parts controlled thereby, but in the event of breakage or failure of the lamp, it is apparent that the electro-magnet will immediately receive the additional current necessary to counteract the action of the spring and weight of the long end of the lever 21, raising the latter and releasing the arm 19, tripping the resistance-coil 8 with its spool 7 and oscillatable support 6, permitting the contact-pieces 13 and 14 to come together, and thus connecting the cut-out coil 8 into the circuit as a compensating unit from which the broken or failing lamp has been eliminated. A thin metallic strip 31, straddling the short end of the lever armature 21, and having lateral projections or wings 32, 33, affords a wide contact for the electro-magnet, which exerts a powerful pull on said wings in drawing down said armature. The strip 31 may be suitably secured to the armature lever 21 and it is designed so as to extend on both sides over a fixed core of the magnet 28. In addition to this core and the before-mentioned double winding, the electro-magnet 28 comprises end-disks 35, 36, of insulating material, a strip of metal 37, passing from under the lower disk up-

wardly by the sides of said winding, and metallic retainers, as 38, for the bottom portion of said last-named metal strip. The lever-armature 21 is released by the magnet 28, owing to the high resistance of the latter, as soon as the coil 8 is connected into circuit in the manner previously set forth, in which case the weighted and spring-drawn end of the lever 21 rests upon the upper end of the upright arm 19, which then is inclined outwardly with relation to the notch 23, substantially as shown in Fig. 2. After the broken or failing lamp has been replaced the mechanism of the cut-out is re-set by hand by means of a pin 39, loosely attached to and depending from the free end of the oscillatable support 6. The support 6 is thus raised with its attached parts, opening the contacts 13-14 and causing the member 19 to enter the slot 23 in the lever 21, thus restoring the parts and circuits to their original and normal positions. The pin 39 passes through a suitable guide hole provided in the circular base plate 1, at the corresponding side thereof, and is reached through the open bottom of the case 4.

This improved cut-out has been thoroughly tested and found to work as well on 100 as on 2400 volt circuits, either direct or alternating current, and for tungsten-filament lamps up to and including 100 watts, six to fifty volts.

The invention disclosed herein has been rather minutely described, that the nature thereof may be fully comprehended and its exploitation facilitated. At the same time, let it be understood that no limitation is thereby meant to be placed upon the scope of the invention, which the following claims are intended to cover broadly in its variant forms, with all conceivable modifications.

Having described my invention, what I claim and desire to secure by Letters Patent of the United States, is:

1. A cut-out adapted for use in a lamp circuit, comprising a movable support, a resistance coil equal to the lamp mounted upon said support, a contact member carried by said support and adapted to close the circuit through said resistance coil, means for holding said support and contact member in an open position, and means operative in conjunction with said last named means for automatically releasing said support and permitting said contact member to connect said resistance into the lamp circuit when the lamp is broken.

2. A cut-out adapted for use in a lamp circuit, comprising a movable support, a resistance coil equal to the lamp mounted upon said support, a contact member connected into the lamp circuit through said resistance coil when said support is moved to its operative position, means for holding

said support and contact member in an open position, and means operative in conjunction with said last named means for automatically releasing said support and permitting said contact member to connect said resistance into the lamp circuit when the lamp is broken.

3. A device of the kind described comprising a pivotally mounted movable support, a resistance carried thereon, contact members adapted to connect said resistance in circuit when said support is moved, means for moving said support to operative position, and means for holding said support and contact members in open position, including a lever-armature controlling the movement of said support and an electromagnet adapted to operate said lever-armature and to release said support to permit said contacts to close the resistance circuit.

4. A device of the kind described, comprising a movable resistance, a contact member movable with said resistance, means for moving said resistance permitting said contact member to connect said resistance into the lamp circuit when the lamp is broken, a holding arm for the resistance, a lever pivoted beyond its center having its longer portion in engagement with said arm, and automatic means operating upon the shorter portion of said lever to disengage said holding arm.

5. A device of the kind described comprising a movable resistance arranged and adapted to be connected in circuit when moved, an arm movable with the resistance, a lever engaging said arm normally holding said resistance out of circuit, a spring normally operating to maintain the arm in engagement with said lever, and automatic means adapted to swing the lever against the pull of said spring, thereby disengaging the arm and permitting the resistance to be connected in circuit.

6. A device of the kind described comprising a movable resistance arranged and adapted to be connected in circuit when moved, an arm movable with said resistance, a lever having a notch wherein the arm is retained, normally holding said resistance in inoperative position out of circuit, and electrically-controlled means for swinging said lever to disengage the arm therefrom.

7. A device of the kind described comprising a movable resistance arranged and adapted to be connected in circuit when moved, an arm for holding the same normally out of circuit, a lever engaging said arm, automatic means adapted to swing said lever so as to release said arm and permit the resistance to move to its operative position connected in circuit, and means for returning the resistance to its inoperative position and permitting also the reengagement of said arm and lever.

8. A device of the kind described comprising an oscillatable support, a resistance carried thereon, an arm connected to said support and extending upwardly adjacent said resistance, a post positioned in proximity to said arm, a weighted lever fulcrumed on said post, the upper end of the arm being engaged by the weighted end of said lever, a spring attached to the weighted end of the lever and cooperating therewith to maintain the engagement between it and said arm, electrically-controlled means operating upon the opposite end of said lever adapted to disengage the arm and thereby release the support and resistance, and hand operated means adapted to reset the mechanism in its inoperative position.

Signed in the city, county and State of New York, this 15th day of July, 1911.

JOSEF HENRIK HALLBERG.

Witnesses:

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