

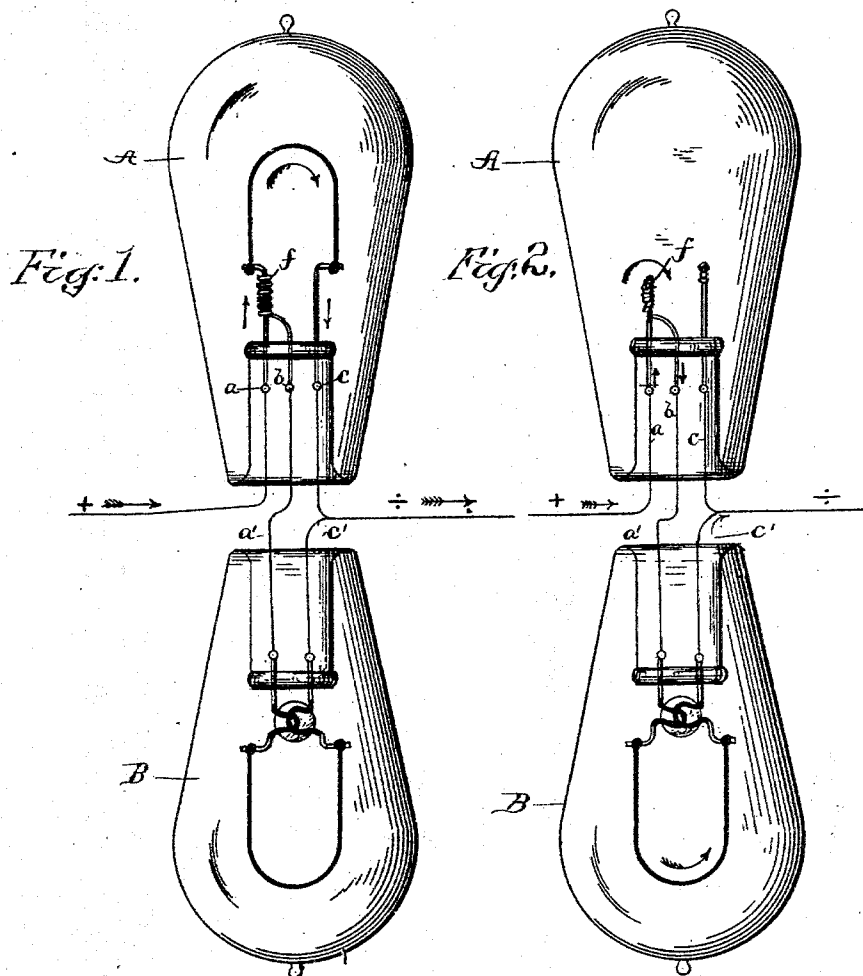
(No Model.)

4 Sheets—Sheet 1.

H. LEMP.
OUT-OUT.

No. 514,480.

Patented Feb. 13, 1894.



Witnesses
Geo. R. Steward.
H. A. Capel

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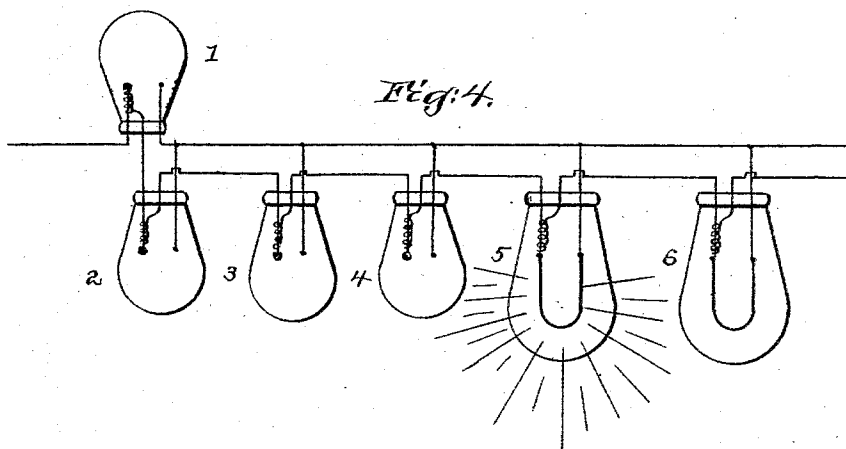
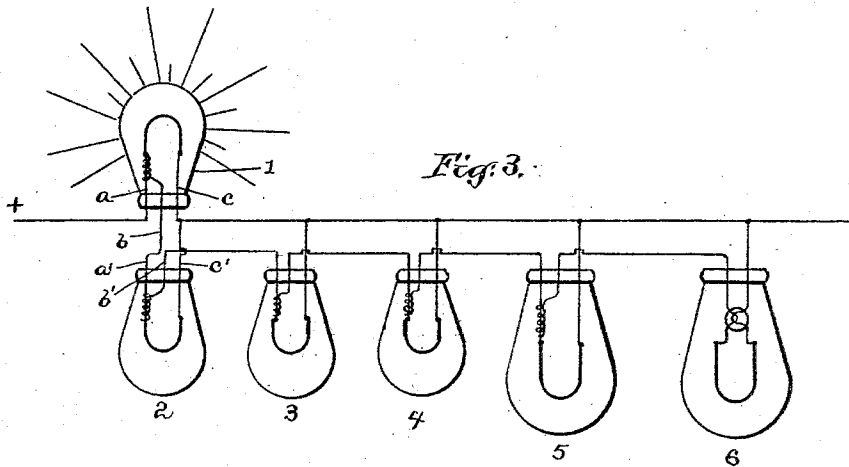
(No Model.)

4 Sheets—Sheet 2.

H. LEMP.
CUT-OUT.

No. 514,480.

Patented Feb. 13, 1894.



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Fig. 5.

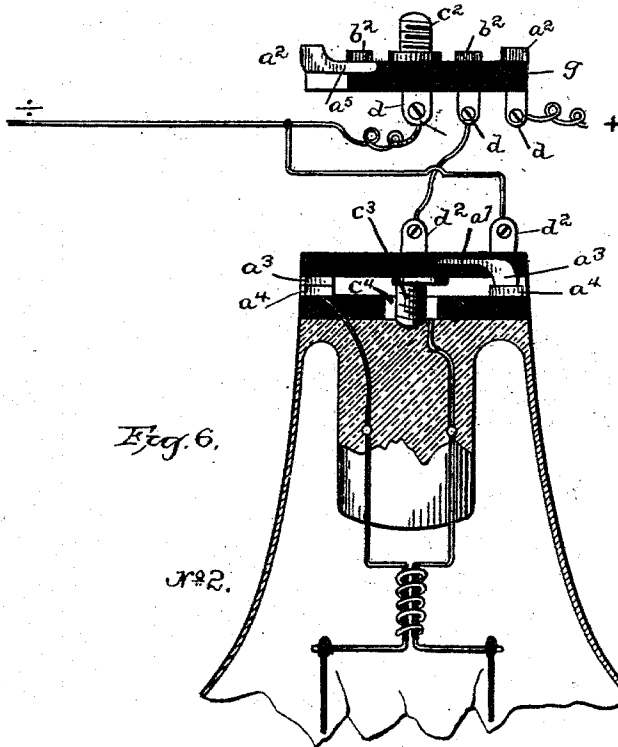
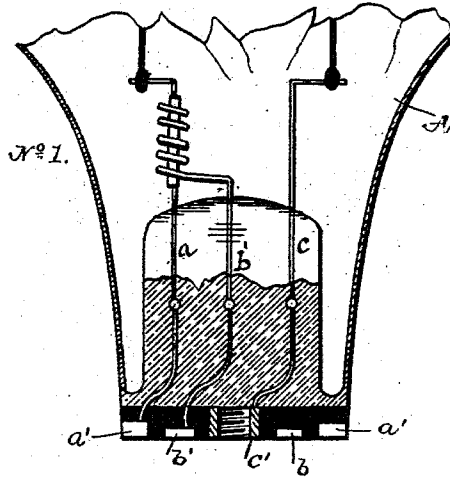
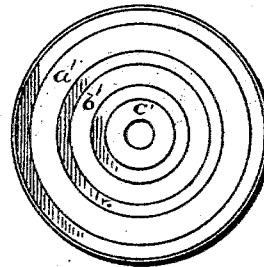


Fig. 6.

Fig. 7.



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(No Model.)

4 Sheets—Sheet 4.

H. LEMP.
CUT-OUT.

No. 514,480.

Patented Feb. 13, 1894.

Fig. 8.

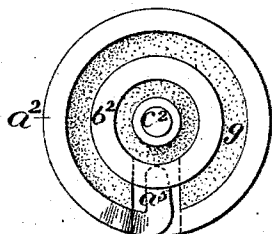
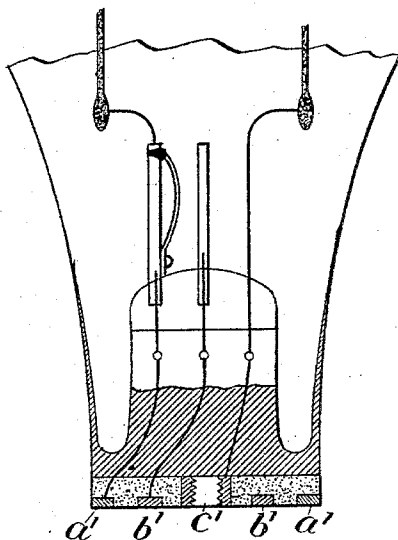


Fig. 9.

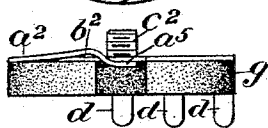


Fig. 10.

ATTEST:

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UNITED STATES PATENT OFFICE.

HERMANN LEMP, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF CONNECTICUT.

CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 514,480, dated February 13, 1894.

Application filed October 5, 1888. Serial No. 287,312. (No model.)

To all whom it may concern:

Be it known that I, HERMANN LEMP, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Cut-Out, of which the following is a specification.

My invention relates to electric lighting systems employing incandescent series lamps, for municipal street, or other lighting. In constant potential systems it is customary to have a certain number of lamps in reserve at the central station and an ammeter in the circuit indicating whenever a lamp is broken. Thereupon the equilibrium is established again by inserting as many of the reserved lamps as there are lamps broken along the line. This arrangement has two disadvantages: First it requires a patrol-man to hunt up a broken lamp upon the breaking of one in the circuit to replace it again and, second, it requires close attention at the central station and prompt action upon the breaking of one lamp in order to prevent the breaking of others by increase of current. When a series of lamps are run on a constant arc circuit the regulator of the machine will take care of such fluctuations but the regulator will not replace the broken lamp by a good one. For common purposes this is not always necessary but there are occasions when it is of vital importance to never have the light go out as for instance in lighting transparent clocks, tower clocks, railway signals or position lights of steamers.

The object of my invention is to provide a simple, cheap and effective arrangement of lamps and devices whereby on extinction of a lamp another lamp may be automatically substituted for the same, such substitution extending if necessary to a series of lamps which may automatically come into use in turn if the breakages or extinctions should extend to a number of lamps.

My invention consists essentially in an incandescent lamp having a suitable automatic cut-out or shunting device mounted upon or in the lamp itself and connected by a third wire or conductor with a lamp contact or terminal attached to the lamp base, in combination with a substitute or reserve lamp con-

nected in any suitable way with the contacts of a holder or support with which contacts of the first named lamp are adapted to engage. The cut-out device employed by me is, preferably, one constructed in accordance with the principles set forth in a patent granted to M. J. Wightman and myself, No. 386,099, though it may be of any other suitable description adapted to operate by the arc or otherwise on the rupture of the incandescent conductor in the lamp.

My invention consists further in the combination with an incandescent electric lamp, of an auxiliary lamp wire connected to a cut-out within or upon the lamp itself said cut-out being adapted to operate by the arc forming on rupture of the incandescing conductor, and a reserve lamp connected with said auxiliary lamp wire as hereinafter described.

My invention consists also in the special construction of lamp base and socket or holder permitting lamps combined after the manner of my invention to be removed and replaced without affecting the general circuit and without having the light go out.

In the accompanying drawings:—Figure 1, shows in side elevation two lamps and a cut-out for one of them all combined in accordance with my invention. Fig. 2, shows the same two lamps, the first extinguished and the second or reserve lamp substituted. Fig. 3, illustrates the extension of the principle to a lamp with five reserve lamps each of the latter being adapted to throw in its successor in the series in case of its own extinction by rupture of the filament or incandescent. Fig. 4, shows the same lamps with Nos. 1, 2, 3 and 4, burned out and their cut-outs closed, while 5 and 6, are still in good order and 5, carries the current and is ready to substitute 6. Fig. 5, is a vertical section through the lamp base and holder or socket, of a primary or normally burning lamp. Fig. 6, is a vertical section through the socket and holder of the connected reserve or substitute lamp. Fig. 7, is a plan of the bottom surface of the base of lamp A. Fig. 8, shows a modified construction of a lamp showing a destructible fastening secured between one of the principal wires and the auxiliary wire. Figs. 9 and 10, are a plan and side-elevation respectively

of a lamp base showing the normally closed switch hereinafter referred to.

In Fig. 1, which may be considered as showing a type embodying the invention, A, is the first burning lamp and B, a substitute or reserve lamp.

Three leading in wires marked *a*, *b*, and *c*, are indicated for lamp A, *a* and *c*, being the wires which conduct the current through and from the filament in the normal state. Wire *b*, is an auxiliary or third wire and is brought in very close proximity to, or otherwise electrically related to, wire *a*, in one of the ways well known in the art and described by me in a former application, being normally insulated from wire *a*, but in such close proximity that *a* and *b*, will be fused or otherwise connected together through the effect of the arc following upon rupture of the filament. The same effect might be obtained by interposing between the wires or connections *a* and *b*, a mass of material which is normally an insulator and which by the effect of the arc following the rupture of the filament is thus formed into a conductor thus electrically connecting the two wires, as described in another application for patent filed by M. J. Wightman and myself, Serial No. 209,656, or as shown best in Fig. 8, the wires *a* and *b*, or connections to the same, might be kept out of contact or electrical connection by means of a destructible fastening destroyed by the arc as set out in still another application for patent filed by the said Wightman and myself, Serial No. 211,990.

I do not limit myself to any particular construction of the cut-out as long as connection is effected between these two wires by the effect of the arc following upon the rupture of the filament. As stated before the reserve lamp may be another similar lamp or may be an ordinary lamp with short circuiting devices across its terminals *a*, *c*. The reserve lamp B, has one of its terminals *a'*, connected to the third wire in lamp A, connected to the cut-out device while its other terminal *c'*, leads to the continuation of the supply circuit. The current entering at *a*, Fig. 1, leaves the lamp at *c*. On breaking of the filament an arc will take place between the two terminals mentioned before which will work gradually down until it reaches the point *f*. The very moment that it reaches that point the terminals *a* and *b*, will become short circuited or electrically connected and fused together. The current has now a new path through the third conductor *b*, to the terminal *a'*, of the reserve lamp connected therewith through the filament of the latter, and out by wire *c'*, joining lamp B, to the circuit with which terminal *c*, of lamp A, is connected. This shunt will cause the arc between *a*, and *b*, to be extinguished and the current will follow its new path through lamp B, causing the same to glow. In the same manner the substitution of a new for a broken lamp may take place through a number of lamps *seri-*

atim if each lamp of the series be provided with the connection *b*, joining the arc operated cut-out in the same to the terminal *a'*, of a succeeding lamp.

The construction of the base and holder of lamp A, is shown in Fig. 6. The base or neck of the lamp itself strengthened or supported by any suitable material as well understood in the art is provided with the electrodes *a'*, *c'*, corresponding to the electrodes of an ordinary lamp, and is provided also with a third or supplementary electrode *b'*, of any suitable construction connected with the third lamp wire or connection *b*, leading to the cut-out or shunting device already described. The electrodes *a'*, *b'*, *c'*, may be of any suitable description adapted to make connection with corresponding electrodes *a²*, *b²*, *c²*, mounted on a support *g*, for the lamp and connected respectively with the positive and negative circuit wires and with a wire or connection leading to the reserve lamp. One of the electrodes as *c'*, is conveniently made as a nut adapted to screw upon electrode *c²*, while the electrodes *a'*, *b'*, are in the form of rings with which rings *a²*, *b²*, are adapted to come into sliding contact when the lamp is screwed upon its support. Projections *d*, *d'*, serve for the connection of the circuit wires, and the reserve lamp with electrodes *a²*, *c²*, *b²*, respectively, as clearly shown.

In order that there may be no interruption of illumination when the lamp A, is removed from its support for any purpose, I provide an automatic switch or circuit closer on the lamp base or support normally tending to make connection from the circuit wire to the wire leading from the base to the reserve lamp and normally engaged and held open by the lamp A, when the latter is properly attached to its support. This switch may conveniently be a part of or an attachment to electrodes or plates *a²*, *b²*, on the support *g*, for which purpose it is only necessary to make the plate *a²*, springy, as well understood in the art, and provide it with a toe or contact *a⁵*, normally tending to engage with *b²*, or a part connected to the same. When the lamp is screwed down upon its support the spring is overcome and the switch or circuit closer held open, but on detachment of the lamp the connection is closed and the substitute lamp B, comes into action. The parts are so adjusted and proportioned in obvious manner that the lamp electrodes *a'*, *c'*, shall not break circuit until the switch closes circuit to throw in lamp B; hence there will be no interruption of the general circuit.

When the substitution of reserve lamps beyond lamp B, is not desired the support and base of the same may be made as in Fig. 6. Here two lamp electrodes as in an ordinary lamp are provided at *a⁴*, *c⁴*, similar to *a'*, *c'*, Fig. 1, while the lamp support carries two electrodes *a³*, *c³*, similar to *a²*, *c²*, of Fig. 5. Suitable provision is made by projections *d²*, *d²'*, for the connection of the terminals of the

lamp B, respectively with electrode b^2 , and with the wire or electrode connecting with c^2 . A switch for closing the general circuit when lamp B, is withdrawn from circuit consists of electrode a^3 , made as a spring and normally tending to make connections with a projection of electrode c^3 , but held away from the same when the lamp is attached to its support. When the lamp is removed the switch closes thereby preserving the circuit by forming a path through the cut-out device of the lamp A, if the latter has already been ruptured, or leaving a path ready for the current passing by way of the cut-out in case A, should rupture and the cut-out come into play while the lamp B, is detached.

What I claim as my invention is—

1. The combination, substantially as described, of an electric lamp, a reserve lamp, an automatic cut-out mounted upon or within the first named lamp and connected to a lamp contact or terminal thereof with which the reserve lamp is connected, an automatic switch for the first lamp normally tending to close the connection between its extreme terminals and held open by said lamp when on its sup-

port, connections from said switch to the reserve lamp, and an automatic switch or circuit closer governed by the latter and normally tending to complete connections to the lamp terminal or contact which is mounted upon the first named lamp and is connected to the cut-out device thereon, as and for the purpose described.

2. The combination with the lamp base having a ring electrode a' , upon its bottom face connected to one lamp wire, and an auxiliary electrode connected to the cut-out device in the lamp, of a lamp support having a flat circular spring electrode a^2 and a second electrode b^2 , with which the spring tends to make connection, a screw connection between the lamp and support, and an electrical connection between the screw and the opposite lamp wire, as and for the purpose described.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 25th day of September, A. D. 1888.

HERMANN LEMP.

Witnesses:

A. L. ROHRER,
J. W. GIBBONEY.