(No Model.)

E. THOMSON.

CUT-OUT FOR INCANDESCENT LAMPS.

No. 421,207. Patented Feb. 11, 1890.

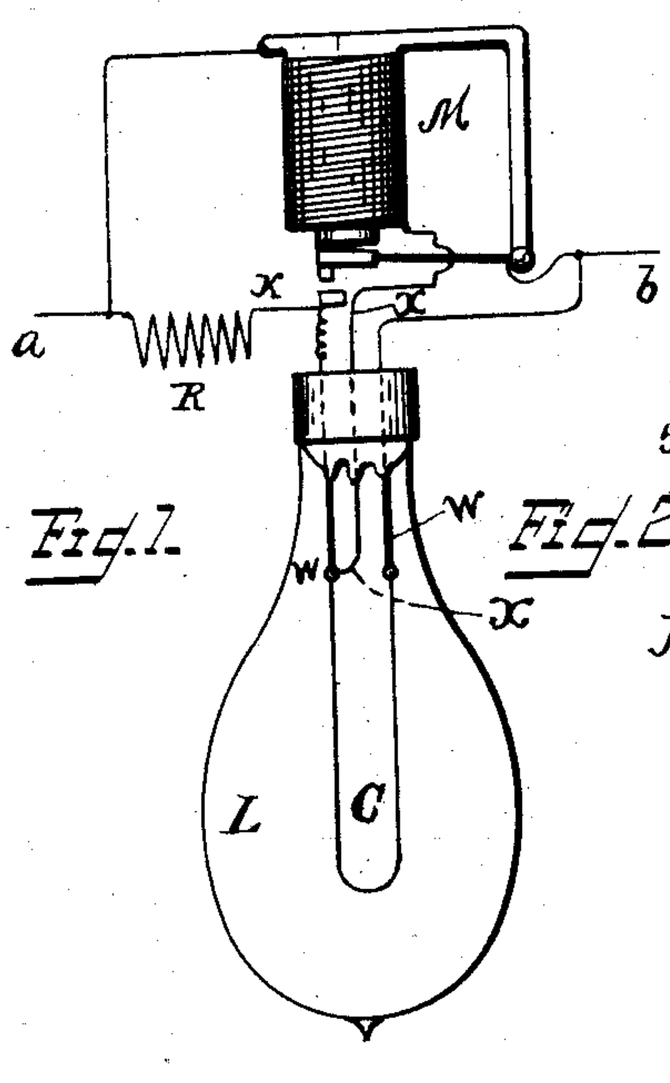

Fig. 1.

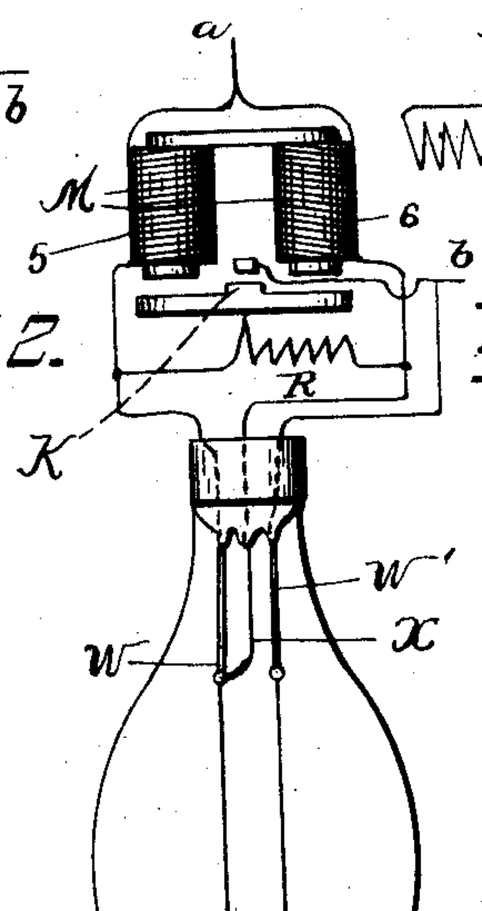

Fig. 2.

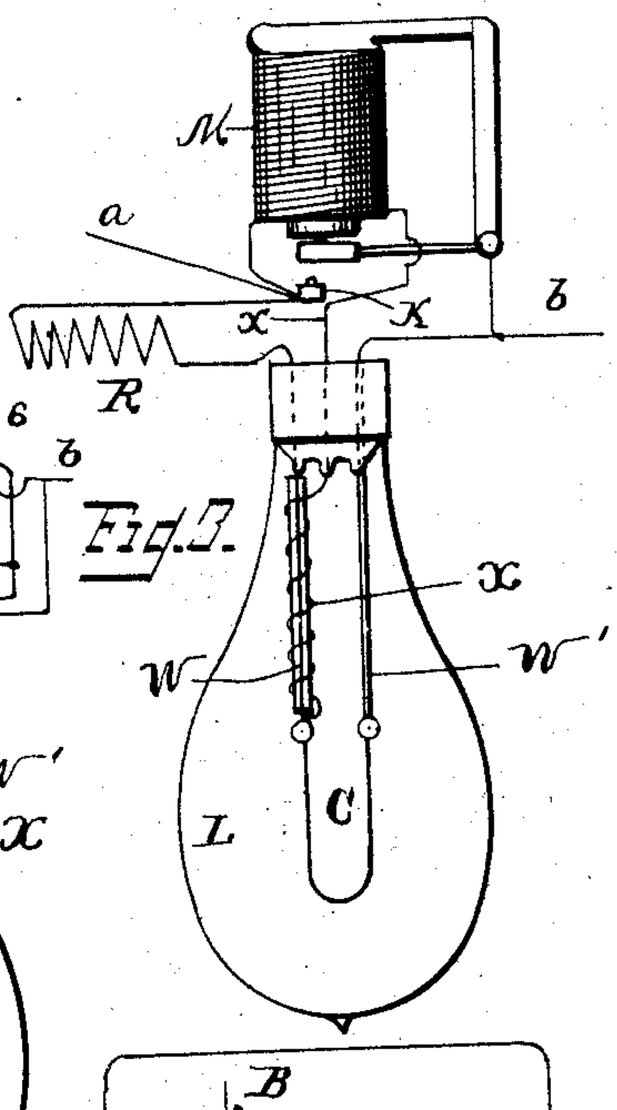

Fig. 3.

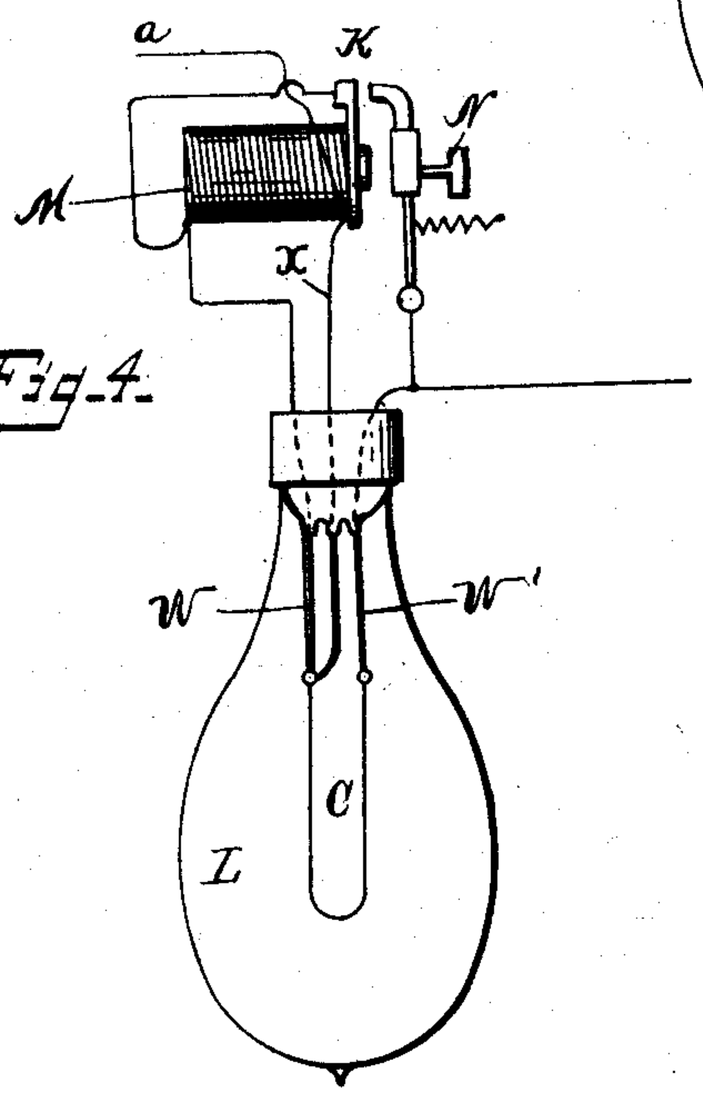

Fig. 4.

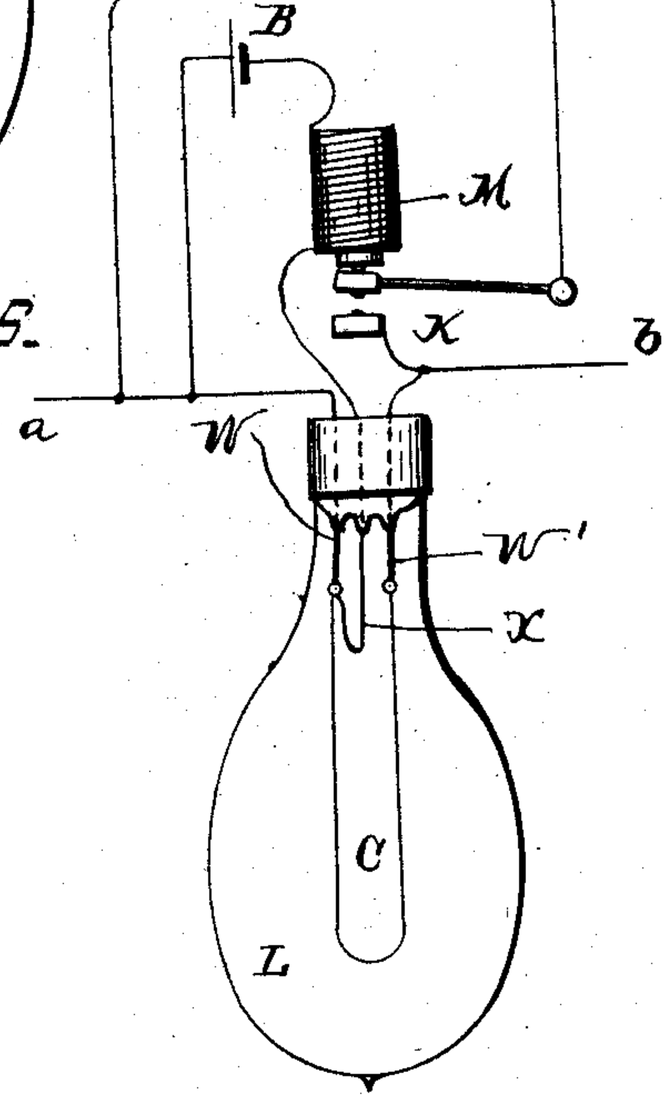

Fig. 5.

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CUT-OUT FOR INCANDESCENT LAMPS.

SPECIFICATION forming part of Letters Patent No. 421,207, dated February 11, 1890.

Application filed January 27, 1888. Serial No. 262,189. (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 Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Cut-Out for Series Incandescent Lamps, of which the following is a specification.

My invention relates to a means whereby an incandescent electric lamp or other device may be shunted or cut out of circuit in case the incandescent conductor or similar portion of the apparatus liable to rupture and through which the current normally flows continuously should accidentally break.

My invention consists in controlling the shunting or cut-out switch by means of an electro-magnet having a coil connected to a normally-closed supplemental circuit or portion of circuit in the shape of a conductor, which is located within the lamp or in suitable proximity to the incandescing conductor or portion of the apparatus liable to breakage, so that the electric arc or continuation of the electric arc formed on rupture of the continuous incandescing or other conductor may by its heat rupture the supplemental conductor, and thereby bring the switch into action.

My invention is intended principally for application to incandescent electric lamps, and I have herein illustrated it as so applied. It will be readily understood, however, that the invention is applicable in a similar manner to any other electric device in which there is a portion of a continuous circuit liable to accidental rupture, followed by the development of an electric arc at the point of rupture. In my claims, therefore, although I specify an electric lamp, it is to be understood that I include any similar apparatus to which the devices of my invention are similarly applicable.

The supplemental conductor may be of any form and may normally carry current from any source; but for the sake of simplicity I prefer to make it a branch from one or each of the conductors through which electricity is supplied to the incandescing conductor of the lamp.

It is of course to be understood that the lamp or other device to which the invention is applied is to be used on a circuit carrying a current of comparatively high tension—such, for instance, as a circuit carrying a number of incandescent lamps interspersed with arc lamps.

In the accompanying drawings I have illustrated diagrammatically in Figs. 1 to 5, inclusive, a number of arrangements of circuits and apparatus embodying my invention.

Referring to Fig. 1, C indicates the incandescent conductor of an incandescent lamp; L, the glass globe or inclosure for the same, and W W′ the supporting wires or conductors which are ordinarily sealed into the glass of the globe. X indicates the supplemental conductor of my invention, which is connected, as shown, to a leading-wire *a*, and is carried within the lamp, as indicated, and connected with the wire W. The part of the conductor X within the lamp is placed near to the wire W or between it and wire W′, so that it may be attacked by the electric arc forming on rupture of the conductor C. The wire or conductor X at the part thereof within the lamp, or where it is to be attacked by the electric arc, is preferably of smaller gage or of more fusible material than the wires W W′. In the branch X are included the coils of an electro-magnet M, which governs a shunting-switch the contacts of which are indicated at K. While the electro-magnet M is excited, its armature holds the switch-contacts K open; but when the circuit through X is interrupted the armature falls away and closes the contacts K, thus completing a short circuit or branch around the lamp from *a* to *b* in obvious manner. A resistance R of small amount is included in the branch with wire W, and serves to force a part of the current to normally flow through the branch containing the coils of magnet M. When the carbon C breaks, the arc formed passes across from wire W to W′ and soon melts wire X, thus interrupting the circuit containing the coils of magnet M, thereby allowing the switch-contacts K to be closed.

In the modification indicated in Fig. 2 the electro-magnet has two coils—one in the branch of circuit X and the other in the branch or circuit with W—these coils being wound to normally oppose one another's effects, so that during normal condition of the lamp the armature for the magnet will be un-

attracted and the contacts of the cut-out or shunting-switch will be open at K. Should either the wire W or wire X be melted, the balance of the two coils would be destroyed and the coil remaining in circuit would exercise its influence and draw up the armature, thus closing the switch-contacts and cutting out the lamp. One of the contacts of the switch, as shown, is connected directly with the wire *b*, and the other contact is connected with the two branches leading to wires W and X. One of the connections includes an artificial resistance R, the purpose of which is to destroy the balance which would otherwise exist when the contacts at K are closed. In this instance the switch is normally held open by any suitable retractor and the current in the coil of the supplemental conductor opposes and neutralizes (normally) the influence of the coil in the main circuit with conductor W. The interruption of the branch circuit by the operation of the arc destroys the opposing influence in obvious manner and allows the current in the coil 5 of the magnet to draw up the armature and close the circuit. Current would then flow also through coil 6; but as it has to pass through resistance R its influence is not enough to neutralize the effect of coil 5. Should the wire W become severed alone, the current in coil 6 would act, drawing up the armature and closing the contacts K. Under the arrangement shown current would now flow through both coils 5 6; but as less would flow through 6 the coil 5 would act as the coil to hold the armature up.

Fig. 3 illustrates the same arrangement as Fig. 1, with the exception that the part of the conductor X within the lamp is coiled loosely around the wire W, and preferably separated therefrom by a thin glass tube slipped over the wire W to prevent accidental contact between said wire and conductor X. The lower of the contacts K is connected directly with the conductor *a* instead of through the resistance R. The operation is substantially the same as in the case of Fig. 1.

In Fig. 4 the wire or conductor *a* connects directly with the supplemental conductor X, and the coils of the electro-magnet M are in the circuit with the wire W. The latter wire also connects with one of the contacts K, as indicated, which contacts are normally open, because most of the current passes through wire X instead of through the coils of electro-magnet M and wire W. When the thin wire X is melted by the arc, the shunt around the magnet M is interrupted and the current passes momentarily in its magnet-coils, thus attracting the armature and closing the contacts at K. The contact is preserved by the passage of the current from *a* through the electro-magnet coils M and the contacts to *b*.

In the modification shown in Fig. 5 the supplemental conductor carries a current from a separate source, (indicated by an electric battery B,) and the wire W is utilized as a part of the conductor for said supplemental circuit. The circuit of wire X is carried within the lamp, as before, and in suitable proximity or relation to the parts of the continuous circuit, so as to be ruptured by the heat of the arc forming on rupture of the the main circuit. In the circuit with wire X is included the electro-magnet M, as before. When the wire X is melted, the magnet M loses its power, owing to the fact that the circuit of the battery B is interrupted, and the contacts of the shunting-switch K are allowed to close.

What I claim as my invention is—

1. The combination, with an incandescent electric lamp, of a fusible or destructible electric conductor placed in the path of any arc or continuation of arc forming on rupture of the incandescent conductor, and a cut-out magnet in a circuit normally closed through such destructible conductor, as and for the purpose described.

2. The combination, with an incandescent electric lamp, of a cut-out switch, a controlling-magnet therefor, and a supplemental conductor extending into the lamp between the lamp wire or conductors, and forming a portion of a normally-closed electric circuit connected to the controlling-magnet.

3. The combination, with an electric translating device having a part liable to rupture in the electric circuit, of a supplemental destructible conductor on a normally-closed circuit and placed in proximity to such part, so as to be engaged by any electric arc following a rupture, an electric switch for closing a circuit around the translating device, and a switch-controlling magnet or other electro-responsive device in the normally-closed circuit including said destructible conductor.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 23d day of January, A. D. 1888.

ELIHU THOMSON.

Witnesses:
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J. W. GIBBONEY.