(No Model.)

E. THOMSON.

SAFETY SELF CLOSING SHUNT SWITCH FOR ELECTRIC LIGHT CIRCUITS.

No. 275,289. Patented Apr. 3, 1883.

Fig. 1.

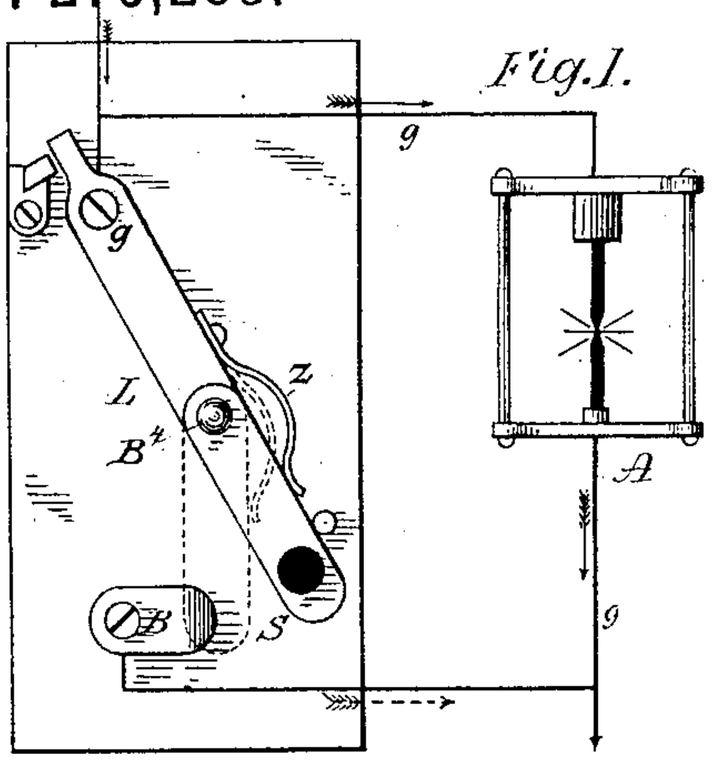


Fig. 2.

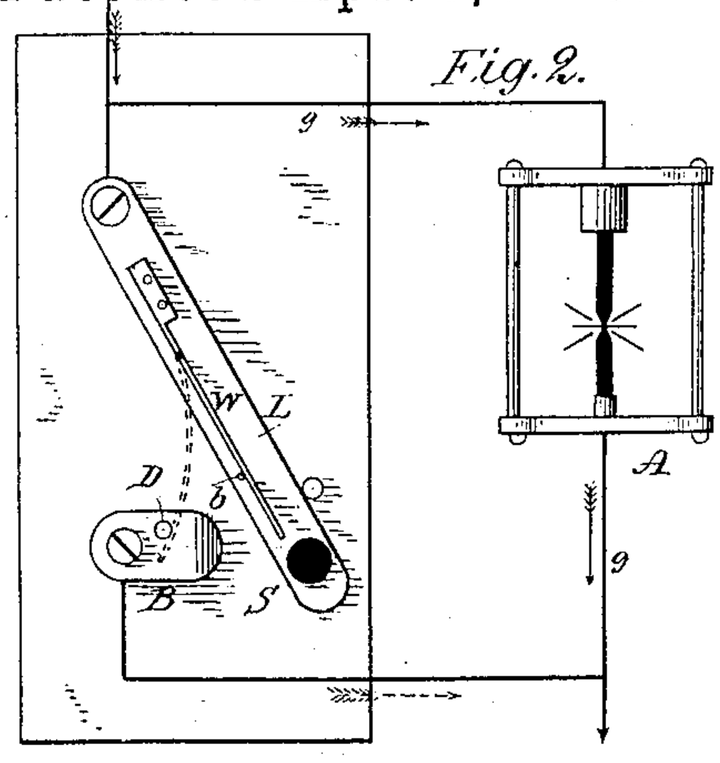


Fig. 3,

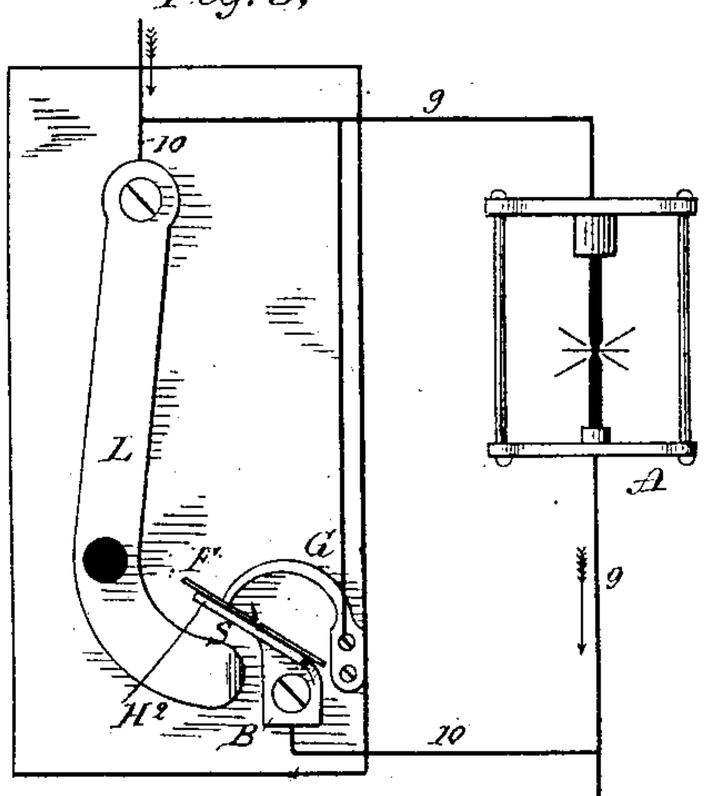


Fig. 4,

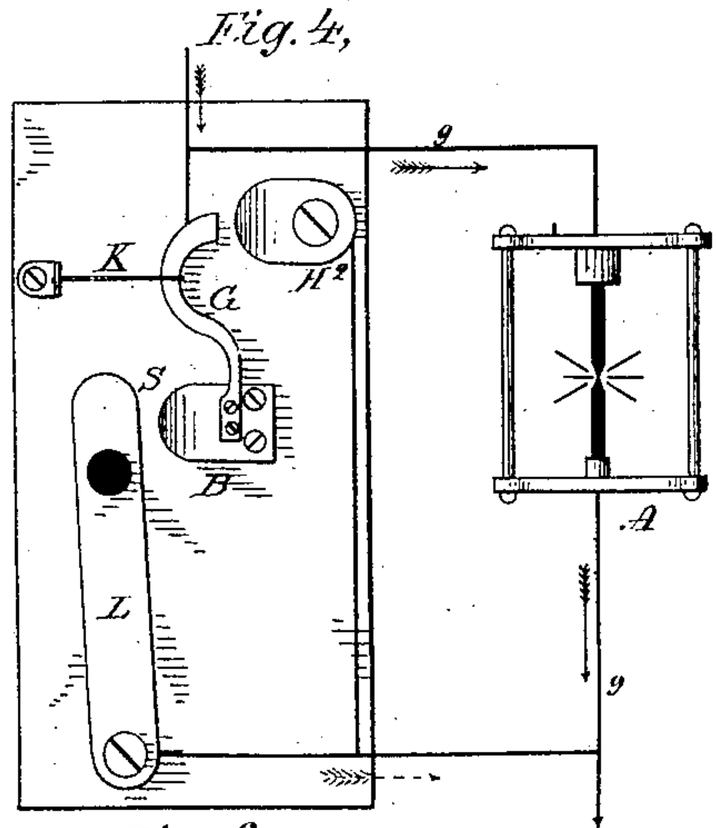


Fig. 5,

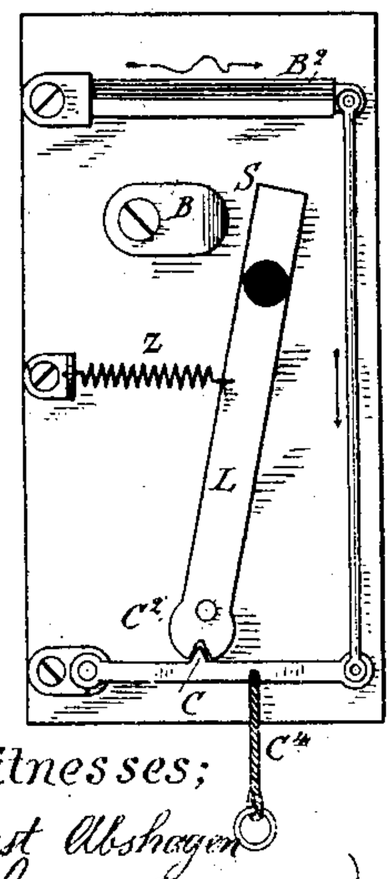
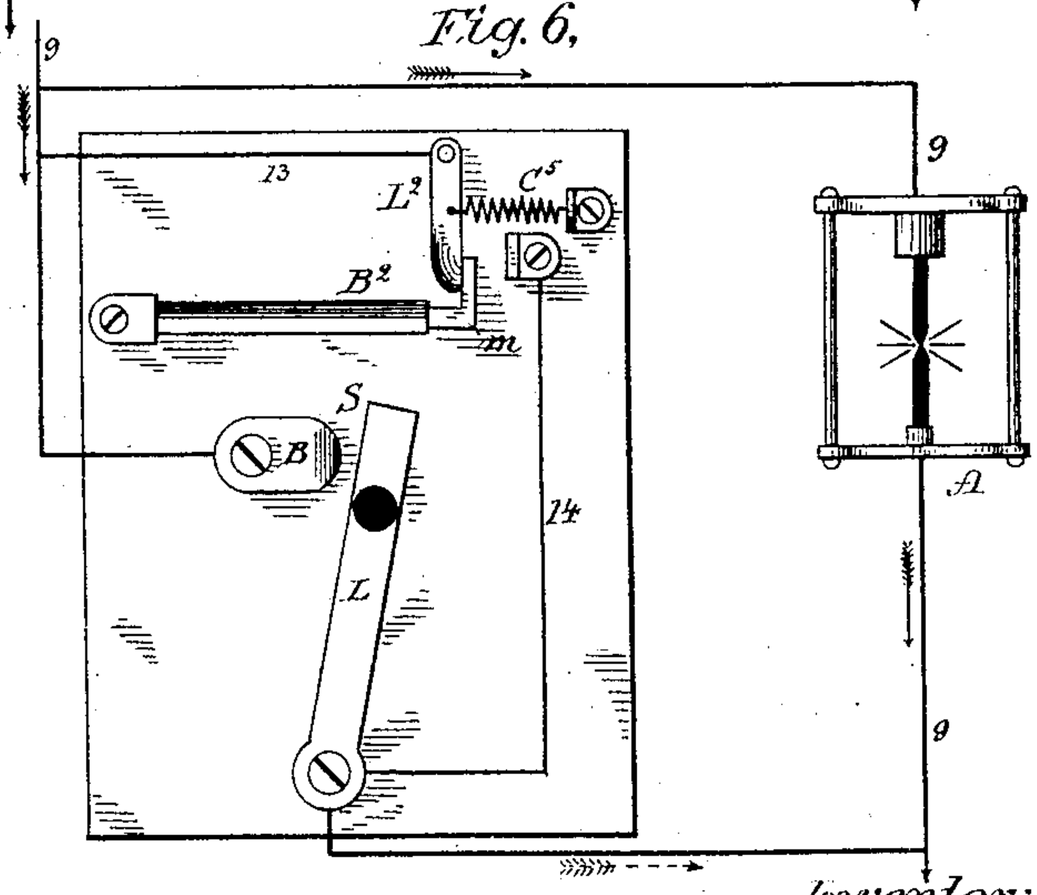


Fig. 6,



Witnesses;
Ernest Abshagen
Thos. Toomey

Inventor:
Elihu Thomson.
By his Attorney: H. B. Townsend.

UNITED STATES PATENT OFFICE.

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

SAFETY SELF-CLOSING SHUNT-SWITCH FOR ELECTRIC-LIGHT CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 275,289, dated April 3, 1883.

Application filed January 22, 1883. (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, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Safety Self-Closing Shunt-Switches for Electric Lamps, Motors, &c., of which the following is a specification.

My invention relates to shunting-switches for electric lamps or other apparatus in circuit with and operated by the electric current derived from a generator of electricity—such as a dynamo-machine—or from other source of supply.

The object of my invention is to prevent any interruption of the main circuit and damage to the switch which might result from the opening of said switch when the circuit through the lamp or other apparatus is defective or inadequate to furnish a path for the current, and from the leaving of the switch in an open position.

It very often happens, in the practical operation of electric-lighting systems, that the shunting-switch contacts are out of sight, or that the apparatus is operated by ignorant persons. Under such circumstances the switch may be opened and left open while the lamp-circuit proper is broken, with the result of destruction to the switch-contacts by the arc formed between them, and final interruption to the general circuit.

My invention aims to avoid accidents of this nature; and the invention consists in combining with the shunting-switch means for automatically reclosing the shunt when the shunt-switch is opened under such conditions as to cause an arc to form across the switch-contacts, said means consisting of suitable thermal devices arranged in suitable proximity to the switch-contacts, so as to be heated by the arc forming between said contacts, and combined with proper circuit-closing devices, so as when heated by the arc to cause or allow said circuit-closing devices to automatically close and preserve the shunt-circuit, and thus prevent any interruption to the general circuit which might result from the opening of the shunting-switch when that portion of the general circuit containing the lamp or other device is broken or defective.

My invention consists, also, of certain specific combinations of devices that will be set forth in detail in the claims.

In carrying my invention into practice I may employ for a thermal controlling device of the combination, either a fusible or combustible material—such as an alloy, wax, or paper combined in the manner described—with the circuit-closing devices, which latter shall act at the proper time to preserve or reclose the shunt-circuit under the conditions mentioned; or I may employ a compound metal bar such as is used for thermostats, or any other suitable thermo-mechanical device; or I may utilize the effects of the arc through other suitable thermal devices that will be affected by the increase of temperature at the shunting-switch contacts when an arc forms between them.

For the circuit-closing devices which preserve or reclose the shunt, I may utilize the contacts of the shunting-switch itself, as will be hereinafter described; or I may use an auxiliary circuit-closer suitably connected, so as to close the shunt when released or actuated or allowed to act by the thermal devices which are affected by the heat of the arc formed between the shunting-switch contacts.

In the accompanying drawings, Figure 1 illustrates one of the many combinations that may be employed for carrying out my invention, and shows how a fusible stop may be made to control the shunting-switch proper, so that said switch-contacts shall be immediately reclosed if the opening of the switch is accompanied by the formation of an arc at the switch-contacts. Fig. 2 shows a modification in which an auxiliary circuit-closing device is employed for closing the shunt. Fig. 3 illustrates the manner of employing an insulating combustible or fusible film. Fig. 4 is a modification in which is an auxiliary switch held out of action by a fusible or combustible cord or wire until such time as an arc may form at the shunting-switch contacts. Figs. 5 and 6 show combinations in which a thermo-dynamic device is used for controlling the action of the shunting-switch or of an auxiliary shunt-closing switch.

In Fig. 1, L indicates a shunting-switch lever, of any suitable construction, made in two parts, hinged together at B^4, and soldered or cemented at the hinge or joint, so that the two parts will act as one lever in the ordinary operation of the switch. In other respects the construction and the functions of the switch are the ordinary ones, said switch being pivoted at *g*, so that it may be turned on its pivot by a button or other means, and may be made to make and break a shunt-circuit when the contact-surface S of the switch comes into contact with or leaves a contact-plate. (Indicated at B.) The electric light or other apparatus, which is in a main or general circuit indicated by the figure 9, and is shunted or cut out by the operation of the switch, is indicated at A. The connections are the ordinary and well-known ones, and are indicated in the drawings by the lines connecting the parts. The lever L is supposed to work on its pivot, so as to ordinarily retain the position in which it is placed. A spring, Z, fixed to one of the portions of the lever, and, bearing at its free end against the other, tends to work the latter on the hinge at B^4, but is prevented from so doing by the solder or cement at that point. Any suitable solder or cement—such as a readily-fusible alloy—is employed, and the joint B^4 is sufficiently near the contacts B S to be fused quickly by an arc forming between the contacts. In its normal operations the shunting-switch is used in the ordinary and well-known way. If, however, when the switch is opened to throw the light or other apparatus at A into circuit, an arc forms at B S, owing to the interruption or imperfection of the circuit in A, the cement or solder B^4 will be immediately softened or fused, and the spring Z will then throw the parts S B into contact, so as to preserve the general circuit and prevent destruction of the switch-contacts. By this arrangement the failure of the person operating the switch to restore the same to its closed position when an arc forms, either because of ignorance or by his inability to see the switch-contacts B S, can work no injury to the switch and cannot affect the general circuit.

In Fig. 2 an auxiliary circuit-closing device is shown, consisting of a strained spring, wire, or plate, W, in electrical connection with the lever L, and fixed at one end to the same, and restrained at the other end by a fusible or combustible stop, *b*, placed near the contact-surfaces of the switch, and consisting of readily-fusible alloy, or of any other suitable material. The lever L is of the ordinary construction and is used in the ordinary way. If an arc form across the contacts S B, the stop *b* is melted or fused, thus releasing the spring W, which then comes into contact with B, or with a stud, D, as indicated by the curved dotted lines, and thus closes the shunt.

In Fig. 3, H^2 indicates a metal plate, mounted on or in suitable proximity to contact B and in electrical connection with shunt-wire 10. A film or sheet, F, of an insulating combustible or fusible material—such as wax or paper—prevents a spring circuit-closer, G, from making contact with H^2, so as to close a shunt-circuit similar to that closed by switch-lever L. If, however, an arc form between B and S, the film is charred, melted, or softened, so that the spring-contact can penetrate to the plate or contact H^2, and thus reclose and preserve the shunt-circuit.

In Fig. 4 the spring circuit-closer G is held or restrained from contact with its contact-plate H^2 by a combustible or fusible cord, K, arranged near and over the switch-contacts B S, so as to be fused or destroyed when, owing to an interruption in A, an arc forms between them, and thus allow the resiliency of the spring G to force its contact-point against H^2 and close the shunt-circuit through the wires indicated, so as to prevent the destruction or injury of the switch-contacts by the arc and consequent interruption of the general circuit.

Instead of a fusible or combustible material, I may use a compound bar or other thermal or thermo-mechanical device arranged in suitable proximity to the contacts B S, and serving to govern by suitable means the action of the shunting-switch, or of an auxiliary switch, so as to accomplish the same results already described.

In Fig. 5, B^2 indicates a compound bar of dissimilar metals, made in the usual manner of a compound torsion-bar for a thermostat. Said bar is fixed at one end to a suitable bracket or support, and at its free end is connected by a link, *l*, with a lever carrying a catch or detent, C, which latter serves, by engagement with a notch or shoulder, C^2, on L, to prevent the restoration of the switch-lever L to closed position when the bar B^2 is of the normal or ordinary temperature. A spring, Z, tends to pull the switch over, so as to close the contacts B S, but is prevented from so doing by the catch C, unless the bar B^2 be heated by an arc formed between the contacts B S, so as to lower the catch C away from the point at which it will engage with C^2 when the switch is opened. The bar B^2 is so set as to tend, when cool, to pull the catch C into the notch C^2, when the lever L is pulled back to open the switch, but to lower said catch away from the engaging-point when it is heated by an arc. Under the latter condition the lever L will obviously immediately return to the position in which the shunt is closed, when the hand of the operator is removed. Under the former conditions—that is, when the circuit in A is normal—the lever will be retained by the catch when it is thrown to put the lamp at A into action, but may be released at any time to cut the lamp out by means of the cord or chain C^4 or other device for disengaging the catch.

Fig. 6 is a modification of Fig. 5, in which an auxiliary switch or circuit-closer is em-

ployed for closing the shunt when an arc forms at the shunting-switch contacts. In this case a detent, *m*, connected to the thermostatic bar B^2, serves to normally detain the auxiliary circuit-closing lever L^2 and prevent it from closing the shunt-circuit through 13, L^2, contact C^5, and 14. If, however, an arc form at B S, the bar B^2 bends, as before, removes the detent, and allows the spring applied to L^2 to close the shunt. The lever L^2 may be returned to its normal position when it is desired to throw the lamp or other device at A into circuit, and its lower end is beveled, as shown, to assist it in passing the detent *m* when so operated. The general operation and the results are the same as previously explained.

My invention is obviously applicable to other constructions of switch, and may be used in combination with other apparatus besides electric lamps.

I do not limit myself to any particular construction or form of thermal controlling device, the gist of my invention consisting in utilizing the heat effects of any arc that may form between the contacts of the shunting-switch for controlling or rendering operative the device or devices that shall cause the shunt-circuit to be completed and preserved.

I make no broad claim herein to a combination in which the effects—magnetic, thermal, or of any other kind—of the current flowing in the shunt after the shunting-switch is opened are utilized, in combination with circuit-closing devices brought into action at such time, to close a shunt-circuit, as such combination forms the subject of claims in another application filed by me; but I confine myself to such combinations as involve a dependence upon the heating effects of the arc formed between the shunting-switch contacts for effecting or controlling the desired operation.

What I claim as my invention is—

1. The combination, with a shunting-switch, of a thermal controlling device arranged in suitable connection with the shunting-switch contacts, so as to be heated by any arc that may form between, and means for closing the shunt-circuit controlled by said thermal device.

2. The combination, with an electric lamp, of a shunting-switch for shunting said lamp into and out of circuit, means for closing said shunt-circuit, and thermal controlling devices arranged in suitable proximity to the shunting-switch contacts, so as to be operated when an arc forms between said contacts on opening the shunt, thus immediately causing a reclosing of the shunt-connections.

3. The combination, with an electric lamp, of a shunting-switch for making and breaking a shunt around the same, means for completing said shunt, consisting either of the shunting-switch itself or of an auxiliary circuit-closer normally held out of action when the shunt is broken by the switch, and a controlling and releasing thermal device arranged in proximity to the shunting-switch contacts, whereby a switch may be made to immediately reclose the shunt if, when the shunting-switch is opened, an arc forms between its contacts.

4. The combination, with an electric lamp or other electrical apparatus, of a shunting-switch and means for completing the shunt-connections, normally held or detained from action, when the switch is opened, by a thermo-responsive device, and released, so as to complete the shunt-connections, by the heating effects upon said thermo-responsive device of any arc formed between the switch-contacts when said switch is opened.

5. The combination, with an electric lamp, of a shunting-switch, a circuit-closing device completing the shunt-connections, and a fusible or combustible detaining device, which prevents the closing of the shunt-connections, excepting when it is fused or burned by the arc formed between the shunting-switch contacts.

6. The combination, with a shunting-switch, of a spring-actuated circuit-closer for completing the shunt-connections, normally held out of action by a fusible stop or plug in proximity to the contacts of the shunting-switch.

7. The combination of the shunting-switch, the spring circuit-closer mounted thereon, and the restraining fusible stop *b*.

Signed at New Britain, in the county of Hartford and State of Connecticut, this 17th day of January, A. D. 1883.

ELIHU THOMSON.

Witnesses:

E. WILBUR RICE,

W. O. WAKEFIELD.