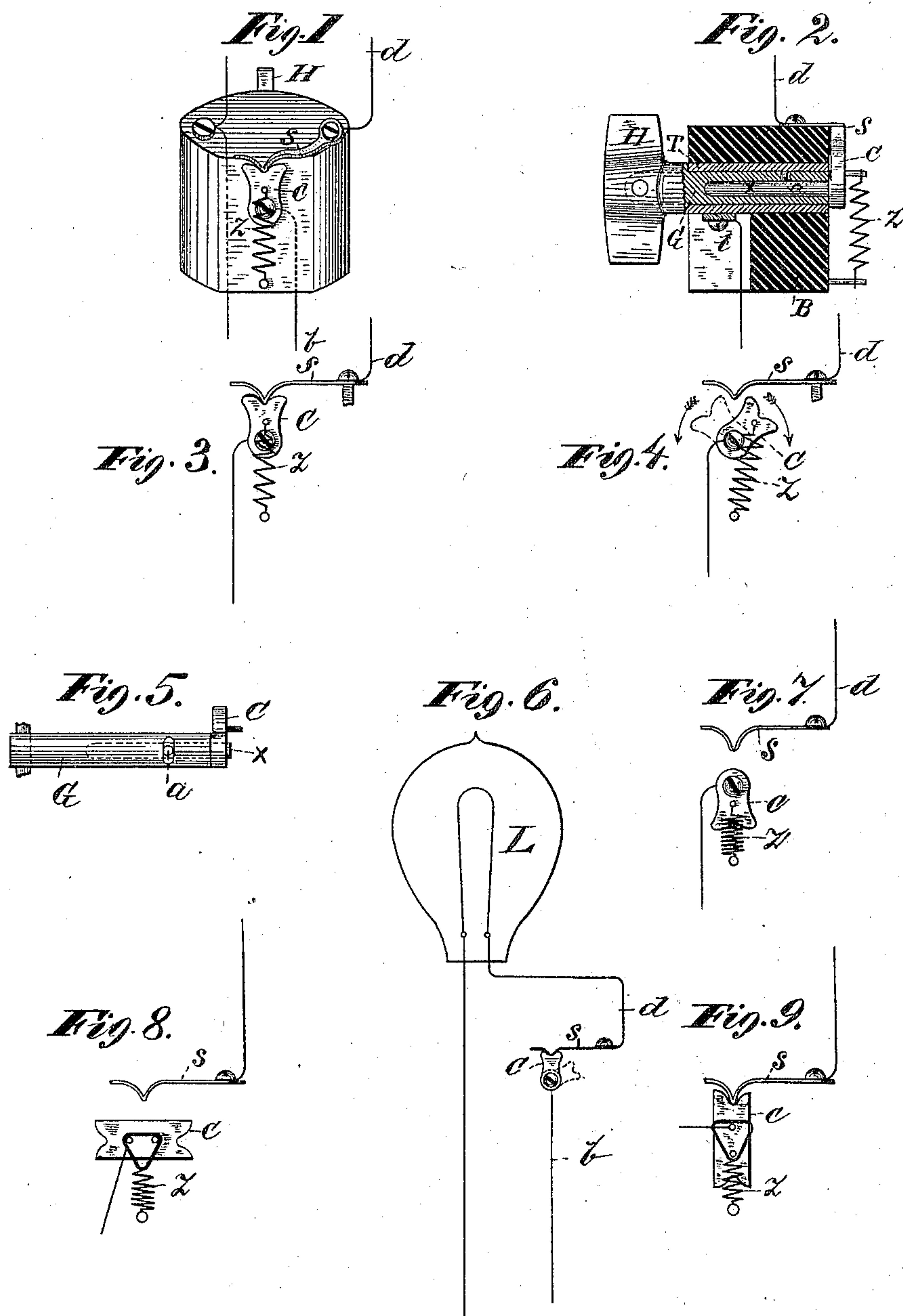


(No Model.)

E. THOMSON.
ELECTRIC SWITCH.

No. 363,183.

Patented May 17, 1887.



WITNESSES:

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ELIHU THOMSON, OF LYNN, MASSACHUSETTS.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 363,183, dated May 17, 1887.

Application filed November 27, 1885. Serial No. 184,018. (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 certain new and useful Electric Switches, of which the following is a specification.

My present invention relates to the construction of electric switches designed to open or close or otherwise change the connections of an electric circuit, and is designed more particularly to improve the construction and operation of switches adapted for use with incandescent electric lamps.

The object of my invention is to attain simplicity of construction, while at the same time securing the benefits arising from the opening of the switch-contacts with a quick or sudden motion or snap, so as to prevent burning of the same and rendering it impossible to leave the switch in a half closed or half-open condition.

The object, further, is to so construct the switch that it shall be held in closed condition by a positive means, requiring the exertion of a positive force in order to open the switch.

My invention consists in the novel combinations and features of improvement more specifically designated in the claims at the end of this specification.

In the accompanying drawings, Figure 1 is a perspective view of a switch embodying my invention. Fig. 2 is a vertical central section taken at right angles to the line of view of Fig. 1. Figs. 3 and 4 illustrate the electrodes of the switch in closed and in partially-open position. Fig. 5 is a plan of the devices employed for communicating a movement from the thumb-piece or handle of the switch to the movable electrode. Fig. 6 is a diagram illustrating the connections of the switch to an incandescent electric lamp. Fig. 7 shows the parts of the switch when the same is fully open. Figs. 8 and 9 show the parts of a modified form of the switch in open and closed position, respectively.

B indicates a block of insulating or other material of any desired form, which constitutes a support, on which the various parts of the device are mounted. Secured to one side or end of said block is an electric contact-

spring, S, forming one electrode of the switch, and whose free end projects over the side of said block, or is located over an opening or depression in the same in proper position to engage with a rotary or swinging contact plate, arm, or piece, C, which forms the other electrode, and is adapted to be brought into and out of contact with the spring by turning or swinging, so that its contact portion shall move at angle to the line of pressure of the spring when the same is under tension. At their engaging portions the two electrodes are adapted to interlock with a considerable degree of firmness by being formed one with a slight depression and the other with a corresponding projection adapted to enter the depression when the switch is closed. This construction is conveniently attained by forming a depression or notch in the swinging plate or cam and bending the spring so as to form a projection that can enter the notch and be held in engagement with the same by the elasticity of the spring.

Motion may be given to the electrode C by means of a spindle or rod which is provided with an actuating-handle or thumb-piece, H, of insulating material, and turns in a bearing or seat formed of a tube or sleeve, T, of any suitable conducting material, such as brass, and set in a bore or opening extending through the block transversely, as shown.

The operating thumb-piece H and the cam-plate or electrode that is turned by the action of the thumb-piece are so connected with one another through the pin or spindle just mentioned that the plate is capable of a slight free or lost rotary motion with relation to the thumb-piece. A mechanical connection that will permit of a slight independent motion of the character, while at the same time giving the capacity of turning the plate or electrode C to the extent necessary for producing the desired movement, is readily obtained in various ways. A simple way of securing this end consists in making the spindle or stem that turns in sleeve T in two parts, one of which consists of the metal pin G, carrying the handle H at one end and bored out or hollow at its opposite end to receive the other part, consisting of pin or stud X, carrying the cam or electrode C. Connection between the two parts is made by means of a pin, a, that is secured

to the part X and projects through a slot in the hollow portion of the part G. The width of the slot at the point where the pin engages with its sides is made somewhat greater than the diameter of the pin, so to give the lost motion required.

The slot is preferably made short in the direction of the axis of the spindle, and the pin *a* is set into the stud X after the latter is inserted. After the shaft or spindle thus constructed has been placed in the tube T the handle H may be attached, and the spindle or shaft is then prevented from slipping out in either direction by the handle H and cam or plate C. If desired, the attachment of the plate C to the stud X might be reserved until after the compound shaft or spindle, with handle H previously attached, is slipped into place. It may, however, be found desirable to cast the plate C and pin X in one piece, in which case the former procedure would be adopted.

The parts described are made of some conducting material like brass, and electrical connection to the electrode C from the conductor *b* is made through a clamp-screw and washer, setting against the side of the sleeve T in a cavity in the block, or through other suitable means of connection with said sleeve, and from thence through the said sleeve and conducting-shaft, composed of parts G X, to the plate or electrode C.

Electrical connection between spring or electrode S and a conductor, *d*, forming the other pole of the circuit, and leading, for instance, from one terminal of an incandescent lamp, is made in any desired manner—as, for instance, by clamping the end of the conductor to the fixed end of the spring S.

Applied to the swinging or turning electrode C is a spring, Z, connected at one end to the electrode C and at the other to the block B, or other suitable support. This spring is so applied that it will push or pull, as the case may be, nearly in the line of the center about which the electrode turns and the point at which said electrode and its opposite electrode S engages—that is to say, the spring pulls nearly on a dead-center when the parts are in the position shown in Fig. 3, and the influence of said spring has practically no effect or tendency to disengage the parts so long as they retain this position. If, however, the electrode C be turned slightly in either direction, so as to bring the direction of application of the spring force of Z to one side of the center, said spring will obviously become an active agent in pulling the electrode around still farther.

The action is as follows, it being assumed, first, that the electrodes of the switch are engaged and in the position shown in Fig. 3, where the two electrodes are interlocked by reason of the spring action of S and the conformation of the contact parts: If the handle H be turned in either direction, the plate or arm C will be forcibly disengaged from the

spring by the manual power applied to the handle. The moment, however, that the plate is turned so far that it can escape the detaining action of the spring S the spring Z, whose point of attachment has been at the same time moved off the dead-center, will act upon the electrode C and will (owing to the limited independent movement permitted to the latter with respect to the handle H) quickly and suddenly move the same out of contact with opposite electrode S, despite the fact that the handle H may be held or may be allowed to move only with such tardiness that, without such capacity for independent movement, the contact parts of the electrodes would be injuriously burned.

By the means described arcing and burning due to slow rupture of contact at the electrode or false contact are effectually avoided, and the objections that would be incident to a rigid connection of the handle and the electrode C are effectually prevented. If such rigid connection existed, it is evident that the velocity of motion of the electrode at the time of breaking contact would be limited to the velocity of motion permitted to the handle H by the hand of the operator, and a burning of the contacts would ensue. When, however, the part G is turned, the force required to disengage the locked electrodes brings the pin into contact with one side of the slot; but as soon as the electrode is disengaged and can move freely the spring Z moves it quickly, until the pin *a* is brought to the other side of the slot in G, the movement of the pin in the slot thus produced being the gage of the limited free or independent movement permitted to the electrode with respect to its operating thumb-piece or handle.

In Fig. 4 the parts of the switch are shown at an intermediate stage of movement after disengagement of the electrodes has been effected.

Fig. 7 shows the position which the parts assume after the handle H is released from the finger of the operator. The handle H may be used in an obvious manner to restore the parts to the position shown in Fig. 3, when it is desired to complete the circuit.

Without changing the manner of action of the switch, it may be made to make contact and open contact twice in a revolution of the handle H by the modification shown in Figs. 8 and 9.

The plate C is made with its two ends alike, with notches for the reception of the spring S, and the spring Z is made with a small open triangle or other shape, permitting the inclosure of two pins or projections on the plate C, and so formed that the tendency of the spring Z will be to throw it into the position shown in Fig. 8 when relieved from the retaining action of the spring S; (the position indicated in Fig. 9.) In this case the switch will be open when the piece C is in the position shown in Fig. 8, and will be held in that position by the action of the spring Z, holding one side of the triangular piece against two pins, as shown.

What I claim as my invention is—

1. The combination, in an electric switch or turn-off, of two electrodes having one a depression and the other a corresponding projection by which they may be normally locked by spring action, and an operating knob or handle connected with one electrode through devices permitting a limited free movement of the electrode with relation to the operating knob or handle.

2. The combination, in an electric switch or turn-off, of electrodes, one having a depression and the other a projection normally interlocked by spring-pressure, an operating knob or handle for unlocking the parts against the action of the spring-pressure, a connecting mechanism between a movable electrode and the operating knob or handle, permitting a limited free movement of the electrode, and a spring applied to said electrode, as and for the purpose described.

3. The combination, in an electric switch or turn-off, of a spring-electrode, a turning or swinging plate electrode, a projection on one electrode adapted to rest normally in a depression upon the other, and an actuating-spring for the turning electrode normally pulling on a dead-center and connected with the same, so as to be moved off the center when the electrode is turned to disconnect it from the opposite electrode.

4. The combination, in an electric switch or turn-off, of a spring connected to the contact-closing arm and normally acting on the same on a dead-center, said spring being connected to the circuit-closing arm, as described, so that it is moved off the dead-center when the switch is operated to break the circuit.

5. The combination, in an electric switch, of two electrodes whose contact-surfaces are formed one with a depression and the other with an interlocking projection, and an operating knob or handle connected with the mov-

able electrode through mechanism having a lost motion, as and for the purpose described.

6. The combination, in an electric switch, of a swinging plate or block connected with a spindle and forming one electrode, a spring forming the other electrode, a depression in the contact-surface of one and a projection in the contact-surface of the other adapted to interlock, and a spring connected with said swinging plate or block and pulling, when the electrodes are engaged, on a substantially dead-center.

7. The combination, in an electric switch, of a swinging or turning electrode normally held from disconnection with its opposite electrode by spring-pressure, an operating-spindle and thumb-piece, mechanism between the thumb-piece and the electrode operated thereby, whereby said electrode may have a limited free movement, and a spring exerting its force upon the swinging electrode normally on a dead-center, as and for the purpose described.

8. The combination, with a contact plate or cam, C, moving in the arc of a circle, of an elastic spring, S, engaging with and closing circuit upon the same and tending to hold said plate from disconnecting or breaking circuit, and a spring, Z, for throwing said cam from contact position when said spring is moved from its dead-point.

9. The combination, with the spring S, bent as described, and the notched plate or cam turning with a spindle or axis, of a handle, H, connected to the cam through parts having a lost motion, as described, and a circuit-opening spring connected to the plate or cam.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 24th day of November, A. D. 1885.

ELIHU THOMSON.

Witnesses:

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WILLIAM F. NOONAN.