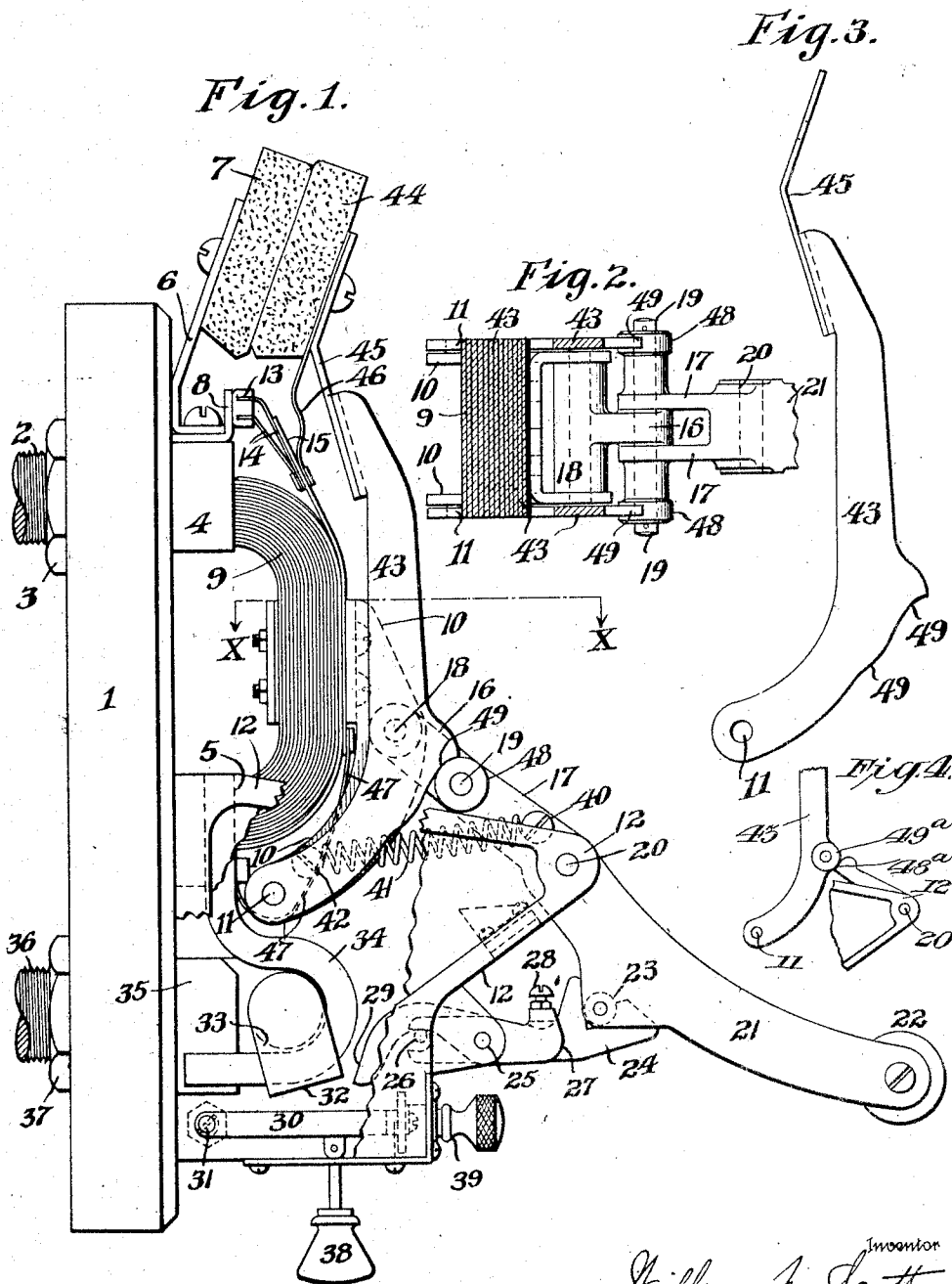


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ELECTRIC SWITCH.
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974,528.

Patented Nov. 1, 1910.



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ELECTRIC SWITCH.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM M. SCOTT, a citizen of the United States, residing in the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Electric Switch, of which the following is a specification.

My invention relates to electrical switches suitable for making and breaking or controlling an electric circuit carrying currents of great volume and of considerable potential, and my invention relates more particularly to the relation between the main and shunt contacts, the latter to relieve the main contacts of the effects of arcing, and to the means for operating the main and shunt contacts.

My invention resides in an electrical switch or circuit breaker comprising main and shunt members, the main and shunt members being pivotally mounted and movable independently of each other, the main contact being operated by any suitable means, such as a toggle, while the member or arm supporting the shunt contact is cam operated, the cam being preferably operated by one of the toggle members.

My invention resides in the features hereinafter described and claimed.

For an illustration of one of the forms my invention may take, reference is to be had to the accompanying drawing, in which:

Figure 1 is a side elevational view of an automatic circuit breaker involving my invention. Fig. 2 is a horizontal sectional view of the main and shunt members and their operating means taken on the line X—X in Fig. 1 and looking in the direction of the arrows, some parts being shown in plan. Fig. 3 is a side elevational view of the shunt contact carrying arm or lever. Fig. 4 is a fragmentary view illustrating a modified form of construction for operating the shunt carrying arm.

In the drawing, 1 represents a base of any suitable insulating material, such as marble, upon which is secured by stud 2 and nut 3 the upper main contact block or terminal 4. Below the terminal or contact 4 is secured the other main terminal or contact 5. Secured upon and in electrical communication with the upper terminal block 4 is the metallic bracket 6 upon which is secured the

stationary carbon shunt piece 7. Between the bracket 6 and the contact block 4 is secured the intermediate stationary metallic shunt contact 8.

Adapted to engage and bridge the main terminals 4 and 5, and thereby close the circuit, is the laminated bridging member 9, constituting a main movable contact. The contact member 9 is secured to, but preferably insulated from, the pivoted arm or lever 10 supported upon the pivot 11 supported in the housing or bracket 12, shown broken away for the sake of clearness. Supported with or carried by the main movable contact 9 is the intermediate metallic shunt contact 13 secured upon the conducting springs 14 which, in turn, are secured upon the member 15, the latter serving also as a shunt circuit connector. The intermediate shunt contact 13 is adapted to engage the intermediate stationary shunt contact 8.

For actuating the movable member 9 to cramp the same into engagement with the terminal blocks 4 and 5, there is provided a toggle comprising the links 16 and 17, the former pivoted at 18 to the arm or lever 10 and at 19 to the link 17, the link 17 being pivoted in the housing or bracket 12 at 20 and extending outwardly beyond the housing to form an operating lever 21 provided with the hand grip 22. In the position shown in Fig. 1, the center of pivot 19 falls a little short of a straight line drawn through the centers of pivots 18 and 20. Carried by the lever 21 is a roller 23 with which is adapted to engage the latch 24 pivoted to the housing 12 at 25. A pin 26 carried by the housing is disposed between two rearward extensions of the latch 24 to limit its pivotal movement. Pivoted concentrically with the latch 24 on the member 25 is the latch actuating member 27 carrying the adjustable screw 28 which engages upon the top of the latch 24 to actuate it. The latch actuator 27 has a rearwardly extending tail 29 extending into the path of travel of the armature 30, pivoted at 31, and adapted to be attracted by the pole pieces 32 attached to the core 33 of an electromagnet whose energizing coil or winding is the conducting bar 34 having one end in communication with the main terminal 5 and, if desired, forming the active contact face thereof; the other end is

in electrical communication with the block 35 secured by stud 36 and nut 37 to the base 1. The main path of the current through the instrument is then from stud 5 2 to main terminal 4, through the bridge 9, the lower terminal 5, through winding or bar 34, to block 35, and out by stud 36. A handle 38 is attached to the armature 30 for manually tripping the switch or breaker, and the adjuster 39 is provided for determining the position of the armature 30 with respect to the pole pieces 32, so that the breaker may be set to open at different current loads.

At 40, upon the link 17, is secured one end of a helical tension spring 41, whose other end is secured at 42 to the arm or lever 10. The arm or lever 43 carries the movable shunt carbon piece 44, adapted to engage the stationary carbon 7, and is secured to the arm or lever 43 by the conducting bracket or member 45. The arm 43 is pivoted, preferably concentrically with arm 10, upon the pivot 11. The shunt carbon 44 is supported on, but insulated from, the arm 43, electrical connection being made from the carbon 44 by the flexible connector 46 with the member 15 which also supports the intermediate shunt contact 13, the conductor 15 being extended by a flexible conductor 47 below and around the pivot 11, and connects permanently to the lower main terminal 5.

Upon the toggle pivot pin 19, or upon a pivot pin carried by link 17 or other member, is mounted a roller 48 which engages the cam surface 49 formed upon the arm or lever 43. The arm or lever 43 is movable independently of the arm 10. And the cam surface 49 is of such length and curvature that the toggle 16, 17 may collapse a considerable distance and yet the roller 48 will continue upon the surface 49 holding the lever 43 in the position shown in Fig. 1, until the main movable contact 9 and the intermediate contact 13 have become well separated from their cooperating stationary contacts.

The operation is as follows: When the armature 30 is lifted, either by handle 38, or by magnetic attraction, it strikes the under side of the tail 29 of the latch actuating member 27, causing the screw 28 to strike upon the top of the latch 24 and to depress the same, and release the roller 23 to unlock the breaker. The spring 41 is then free to contract, and in doing so knees or collapses the toggle 16, 17 downwardly and pulls outwardly on the arm 10 carrying the laminated contact 9. The laminated contact 9 then separates from the main terminals 4 and 5, and later the intermediate shunt contact 13 separates from its companion 8. During this movement the lever 43 is held in the position shown in Fig. 1 by the roller

48 continuing its engagement on the upper part of cam surface 49 maintaining that surface at the same distance from the pivot 20. As the collapse of the toggle progresses, however, the roller 48 rolls down the surface 49 and the arm 43 is then free to move outwardly away from the base. The arm 10 in its further movement (after roller 48 has passed off that part of the surface 49 having 20 as a center) carries arm 43 with it away from the base, causing carbon 44 to separate from carbon 7, thus finally breaking the circuit, the final arc taking place between the carbons 44 and 7. The movement continues until the full open circuit position is reached by which time the circuit is completely and safely interrupted.

To close the switch, the lever 21, which has been raised in the opening movement, is depressed by an operator, extending the toggle 16, 17 and moving the contact 9 toward the terminals 4 and 5. As the movement progresses the roller 48 rolls upon the cam surface on the member 43, proceeding up its back, and forces the same inwardly toward the base, the carbon 44 engaging the carbon 7 before the intermediate shunt contact 13 engages its companion 8, and before the contact 9 engages terminals 4 and 5. As the movement progresses the carbon 44 is pressed firmly against carbon 7 and after they are in firm engagement the roller continues along the surface 49 without further inward movement of the lever 43. But during this continued movement of the toggle, while the lever 43 is stationary, the intermediate shunt contact 13 engages its companion 8, and shortly thereafter the contact 9 engages terminals 4 and 5 and is cramped firmly against them, the parts being again in the positions shown in Fig. 1, with the toggle just short of full extension.

While I have shown my invention as applied to an overload circuit breaker, it is to be understood that it is of general application in the art of electric switches, and that it may be applied to circuit breakers which are tripped upon any predetermined electrical condition other than overload.

While I have shown the cam surface upon the arm 43 and the member for engaging the cam surface as carried by the toggle, it is to be understood that their relations may be reversed and that the cam surface may be carried by the toggle. This is illustrated in Fig. 4 where the roller 49^a is carried by the shunt arm 43 while the cam surface 48^a is carried by or movable with the toggle link 17, (not shown for the sake of clearness) which is pivoted at 20 to the housing 12.

What I claim is:

1. In an electric switch, movable main and shunt contacts, an arm carrying a shunt contact independently of said main contact,

members pivoted to each other for operating said main contact, a cam surface on said shunt carrying arm, and a cam engaging member carried at the pivotal connection of said members for operating said shunt carrying arm.

2. In an electric switch, movable main and shunt contacts, an arm carrying a shunt contact independently of said main contact, links pivoted to each other to form a toggle for operating said main contact, a cam surface on said shunt carrying arm, and a cam engaging member carried by the pivot joining said toggle links for operating said shunt carrying arm.

3. In an electric switch, movable main and shunt contacts, an arm carrying a shunt contact independently of said main contact, links pivoted to each other to form a toggle for operating said main contact, a cam surface on said shunt carrying arm, and a cam engaging member carried at the pivot joining said toggle links, the surface of said cam engaged by said cam engaging member at approximately and full circuit closing position being determined by an arc having a pivot of a link of said toggle as a center.

4. In an electric switch, movable main and shunt contacts, an arm carrying a shunt contact independently of said main contact, members pivoted to each other for operating said main contact, a cam surface on said shunt carrying arm, and a cam engaging member carried by one of said pivoted members intermediate the terminal pivots of said members.

5. In an electric switch, movable main and shunt contacts, an arm carrying a shunt contact independently of said main contact, links pivoted to each other to form a toggle for operating said main contact, a cam surface on said shunt carrying arm, and a cam engaging member carried by said toggle intermediate the terminal pivots of said toggle.

6. In an electric switch, movable main and shunt contacts, a pivoted arm supporting a main contact, a pivoted arm carrying a shunt contact, members pivoted to each other for operating said main contact arm, a cam surface on said shunt carrying arm, and a cam engaging member carried by one of said pivoted members intermediate the terminal pivots of said members.

7. In an electric switch, movable main and shunt contacts, a pivoted arm carrying a main contact, an independently pivoted arm carrying a shunt contact, links pivoted to each other to form a toggle for operating said main contact arm, a cam surface on said shunt carrying arm, and a cam engaging member carried by said toggle intermediate the terminal pivots of said toggle.

8. In an electric switch, movable main and shunt contacts, a vertically extending

pivoted arm supporting a main contact, a vertically extending pivoted arm carrying a shunt contact and movable independently of said main contact arm, a pivoted lever for operating said main contact arm, a cam surface on said shunt contact arm, and a cam engaging member carried by said pivoted operating lever intermediate the pivot of said operating lever and its connection with said main contact arm.

9. In an electric switch, movable main and shunt contacts, a vertically extending pivoted arm supporting a main contact, a vertically extending arm carrying a shunt contact pivoted concentrically with but independently of said main contact arm, a pivoted lever for operating said main contact arm, a cam surface on said shunt contact arm, and a cam engaging member carried by said pivoted operating lever intermediate the pivot of said operating lever and its connection with said main contact arm.

10. In an electric switch, movable main and shunt contacts, a vertically extending pivoted arm carrying a main contact, a vertically extending arm carrying a shunt contact pivoted independently of but concentrically with said main contact arm, members pivoted to each other for operating said main contact arm, a cam surface on said shunt carrying arm, and a cam engaging member carried by one of said pivoted members intermediate the terminal pivots of said members.

11. In an electric switch, movable main and shunt contacts, a vertically extending pivoted arm carrying a main contact, a vertically extending arm carrying a shunt contact pivoted independently of but concentrically with said main contact arm, links pivoted to each other to form a toggle for operating said main contact, a cam surface on said shunt carrying arm, and a cam engaging member carried by said toggle intermediate the terminal pivots of said toggle.

12. In an electric switch, movable main and shunt contacts, an arm carrying a shunt contact independently of said main contact, links pivoted to each other to form a toggle for operating said main contact, a cam surface on said shunt carrying arm, and a cam engaging member supported by said toggle intermediate the terminal pivots of said toggle, the portion of said cam surface engaged by said cam engaging member at approximately and full circuit closing position being determined by an arc having a toggle link pivot for a center.

13. In an electric switch, movable main and shunt contacts, an arm carrying a shunt contact independently of said main contact, links pivoted to each other to form a toggle for operating said main contact, a cam surface on said shunt carrying arm, a roller for

engaging said cam surface carried by said toggle intermediate the terminal pivots of said toggle.

14. In an electric switch, movable main
5 and shunt contacts, a pivoted arm carrying
a main contact, an independently movable
pivoted arm carrying a shunt contact, links
pivoted to each other to form a toggle for
operating said main contact arm, a cam sur-
10 face on said shunt carrying arm, and a cam
engaging member carried by said toggle

intermediate the stationary toggle pivot
and the pivotal connection of a toggle link
with said main contact arm.

In testimony whereof I have hereunto 15
affixed my signature in the presence of the
two subscribing witnesses.

WILLIAM M. SCOTT.

Witnesses:

ELEANOR T. McCALL,
ANNA E. STEINBOCK.