

Sept. 25, 1945.

E. T. PLATZ

2,385,727

SWITCH

Filed Aug. 15, 1942

4 Sheets-Sheet 1

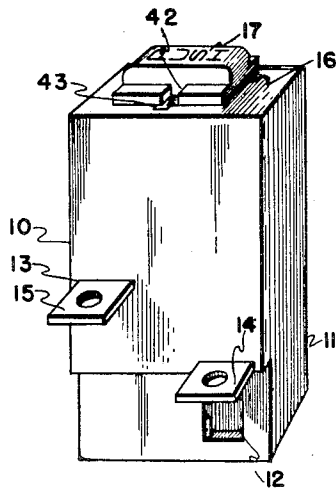


Fig. 1

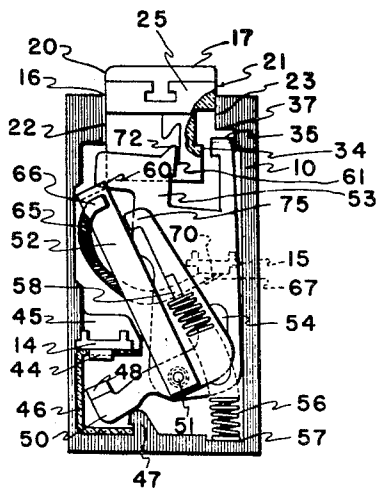


Fig. 2

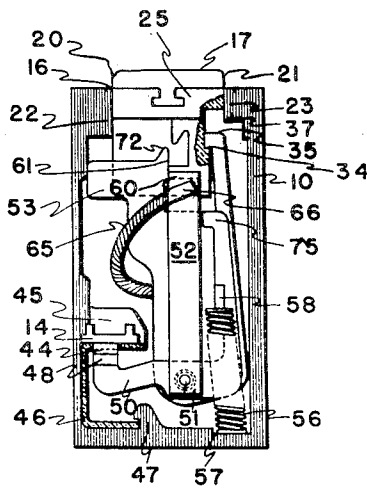


Fig. 3

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4 Sheets-Sheet 2

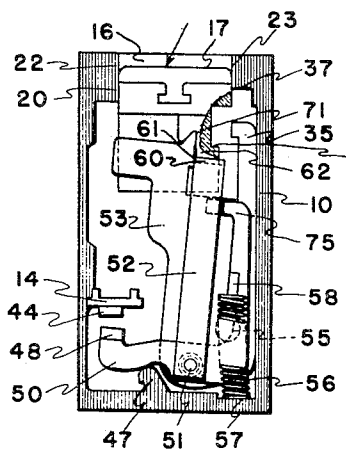


Fig. 4

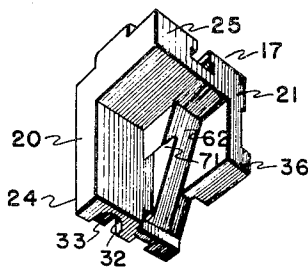


Fig. 5

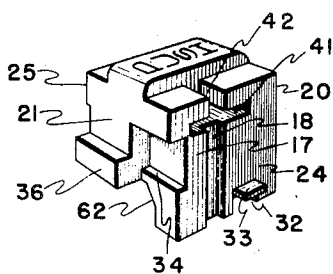


Fig. 6

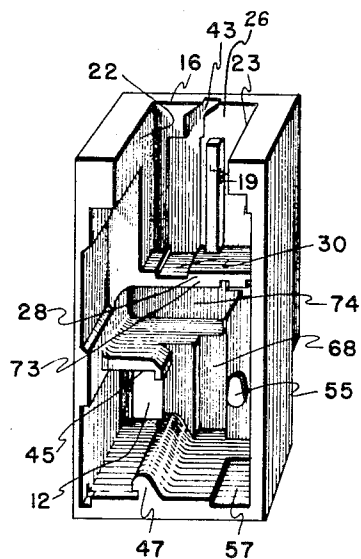


Fig. 7

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4 Sheets-Sheet 3

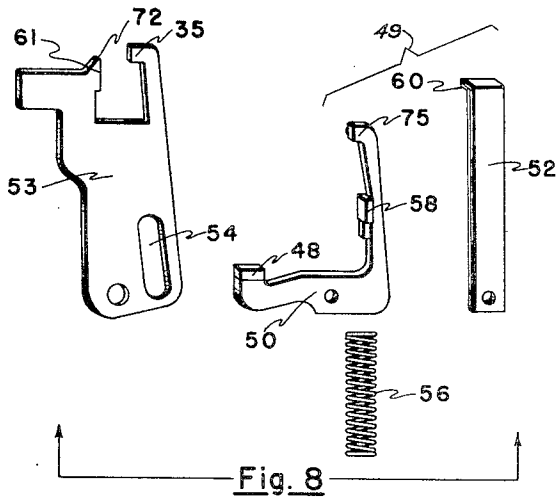


Fig. 8

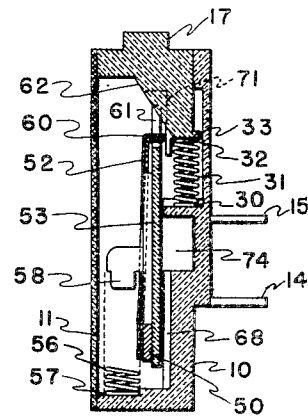


Fig. 9

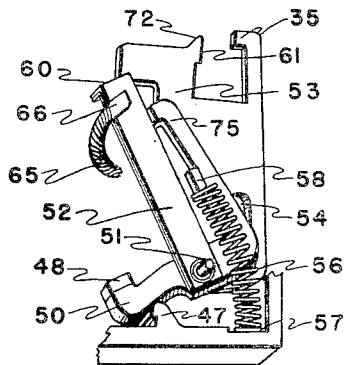


Fig. 10

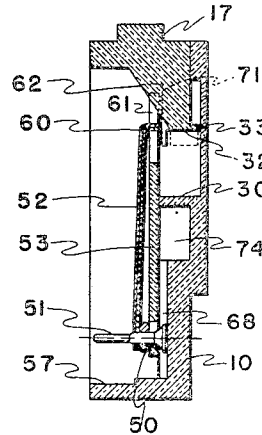


Fig. 11

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4 Sheets-Sheet 4

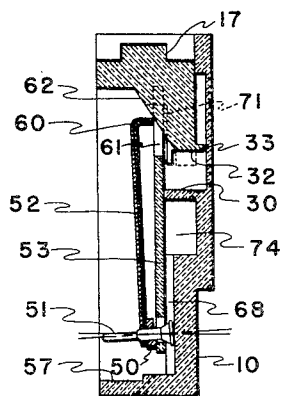


Fig. 12

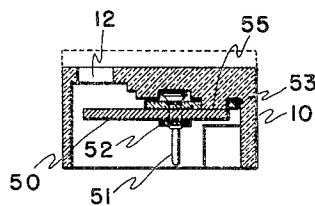


Fig. 13

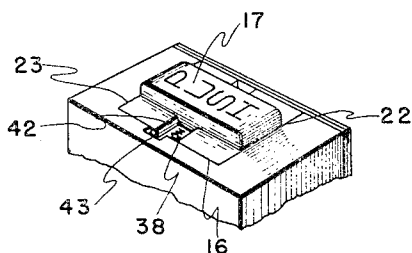


Fig. 14

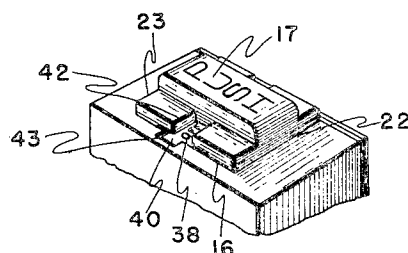


Fig. 15

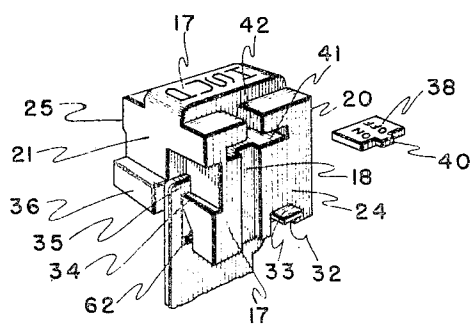


Fig. 16

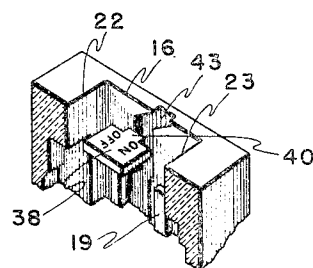


Fig. 17

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UNITED STATES PATENT OFFICE

2,385,727

SWITCH

Elwood T. Platz, Detroit, Mich., assignor to Bulldog Electric Products Company, Detroit, Mich., a corporation of West Virginia

Application August 15, 1942, Serial No. 454,937

30 Claims. (Cl. 200—116)

This application relates to switches.

In a prior application, Serial No. 451,431, filed July 18, 1942, there is disclosed a switch having an exposed push button actuator or handle 17; switch parts are moved to occupy one position when the circuit is closed and another when the circuit is open. It is suggested there that the position of a part within the switch can be relied upon for indicating the condition of the contactor of that device, circuit open or circuit closed, with that part viewed through a window or transparent portion.

I disclose here a pawl which holds the button in an intermediate rest-out position when the circuit is closed, but which moves when the circuit is opened so that it does not hold the button, but frees it to move to an extreme rest-out position. Thus, the button has two rest-out positions, an extreme rest-out position for open circuit, and an intermediate rest-out position for closed circuit. The different portions of the exposed button will indicate the condition of the contactor, open or closed circuit.

The provision of the pawl does not alter the movement of the button which is still pushed in manually from a rest-out position, and then released to be moved to a rest-out position by a spring, for any and all of its operations. The pawl merely determines the extent of outward travel of the button, when released to be moved by the handle spring. The pawl determines the starting position of the button for the next stroke or inward push of the button manually.

The indication is provided by the difference in the two rest-out positions of the button. If the button is in the extreme rest-out position, then the indicator will indicate that the circuit is open. If the button is in the intermediate rest-out position, then the indicator will indicate that the circuit is closed.

I also disclose here an indicator to be actuated by the button. The indicator is a plate movably mounted in the button and exposed through a window or slot in the front of the button. The indicator marking that is exposed through that window is determined by the button rest-out position. Movement of the indicator is accomplished by the movement of the button. The indicator constantly engages a stationary part of the device and is constantly engaged by the movable button. Therefore, it moves relative to, as well as by and with the button.

The switch above described is shown in the appended drawings.

In these drawings:

Fig. 1 is an outside view.

Figs. 2 and 3 show "off" and "on" positions, respectively.

Fig. 4 shows the parts at the end of an inward stroke of the handle, after the parts were in the "off" position.

Figs. 5 and 6 show the handle.

Fig. 7 shows the casing.

Fig. 8 shows parts in detail.

Fig. 9 is a section view.

Fig. 10 shows parts in "off" position.

Figs. 11 and 12 show the manual latch releasing action.

Fig. 13 is a transverse section view.

Figs. 14-15 show the indicator in two different positions.

Figs. 16-17 are detailed views.

The drawings show the switch as comprising a cup shaped casing 10 having an open front closed by a plate or cover 11 secured thereto, as by screws (not shown). The back of the case is formed with two openings, 12 and 13, for line and load terminals 14-15.

In an opening 16 reciprocates a handle or actuator 17 formed as a push button. A groove 18 of the handle receives a tongue 19 of the casing, with operating clearances provided between the side walls 20-21 of the handle and the left and right side surfaces 22 and 23 of the casing interior; the back and front surfaces 24-25 of the handle slidably engage the back surface 26 of the casing and the surface of the cover.

A cross ledge 28 of the casing has at 30, a seat for a coiled compression spring 31 which biases the handle outwardly, the upper end of the spring seating in a socket 32 of the handle back, and against a lug 33 thereof, which lug is adapted to cooperate with the upper end of a spring receiving socket in the back of the casing to limit outward motion of the handle; another limitation or stop for handle movement is provided by a handle lug 34 formed for cooperation with a pawl 35; still another limitation or stop for handle movement is provided by a handle lug 36 formed to cooperate with a casing lug 37.

The pawl 35, later to be described in detail, restrains outward travel of the handle, but only during the closed circuit position, merely holding the handle in an intermediate or "on" position, and preventing the handle from going all the way out to its open circuit or "off" position.

Handle position is relied upon to indicate the position of the circuit closing parts within the casing. The handle is furthest out in the open

circuit or "off" position; it is held by the pawl 35, not so far out in its circuit closed or "on" position; when the handle is pressed down from the closed circuit position for opening the circuit, it travels into the case a slight distance so as to release itself from the pawl 35 above mentioned, whereupon the spring 31 moves the handle well out of the casing to the "off" position, movement being stopped by parts 36—37.

Movement of the handle is utilized to operate an indicator in the form of a plate 38 having an actuating lug 40 and having "on" and "off" markings. The plate is disposed within an undercut portion 41 of the handle so that only one of the two markings of the plate is visible at any time through a window slot 42 of the handle. The lug 40 rides in a camming groove 43 formed in the upper portion of the back of the casing.

As the handle moves up and down, the plate 38 moves back and forth alternately in the undercut 41 to expose its "on" and "off" markings alternately to view through the slot 42. When the handle is full out or in the "off" position, the lug 40 of the indicator plate 38 is in the upper or back part of the groove 43 and the "off" marking is exposed through slot 42. As the handle is moved down, plate 38 slides down with the handle and forward of the slot 42 to present its "on" marking to slot 42. In the "on" position of the handle, lug 40 of plate 38 is in that part of groove 43 which causes plate 38 to have its "on" marking exposed at slot 42; and only when the handle is in the extreme out or "off" position will the lug 40 be in the upper or rear-most part of groove 43 so that the "off" marking of plate 38 is exposed to slot 42.

Since the handle occupies but one circuit open position, whether the circuit be opened manually or by automatic overload release, the handle has but two rest positions, "on" and "off," and these two positions indicate the condition of the circuit controlling parts of the breaker.

The circuit controlling parts of the switch include a stationary contact 44 disposed under and against a ledge 45 of the casing and formed integral with line terminal 14. A U-shaped fibre arc shield 46 engages a hooked stop lug 47 of the casing. Adapted to make butt contact with the stationary contact 44 is the contact portion 48 of a movable contactor 49 having an L-shaped contact arm 50 which is riveted at 51 to a bimetal strip 52, with rivet 51 being formed as a pin to provide a loose pivotal connection between the contactor 49, comprising parts 50—52, and a plate 53 of insulation, the latter having an elongated slot 54 receiving a stop lug 55 formed on the back of the casing. Pawl 35 is an integral part of plate 53.

An operating spring 56 has its lower end 57 in a seat of the casing and its upper end surrounding a spring lug 58 formed from the contact arm 50. Spring 56 functions to rotate arm 50 counter-clockwise for circuit opening on the axis of pivot pin 51 when the latching hook 60 forming the free end of the bimetal strip 52 is released from engagement with the holding abutment, i. e., the latching edge 61 of the plate 53. Such release of latch 60 from the holding means 61 is effected either automatically, by the warping of the bimetal 52 on overload, or manually, by the camming action provided by a sloping cam 62 of and integral with the handle. When this cam is pushed down it cams latch hook 60 off the abutment or holding means 61, to permit the contact arm to be rocked counter-clockwise

relative to the plate 53 by the spring 56, for circuit opening.

Spring 56 also biases contactor 50 and plate 53 upwardly, and when the latch holds, provides the force to move contact 48 towards and press contact 48 against contact 44.

In a circuit opening action (Figs. 2-3), spring 56, through pivot axis 51, will slide the plate 53 upwardly, with the latter guided by the casing; the engagement of the lower edge of plate slot 54 with casing stop 55 will limit such movement of the plate. That stop 55 will at that time function as a pivot for the plate 53 and since the line of action of spring 56, through axis 51, is to the left of that pivot, plate 53 will rock clockwise about stop 55, under the spring biasing force (Fig. 2). Pawl portion 35 of plate 53, which normally holds handle 17 against extreme outward movement, will thereupon be caused to release its hold on lug 34 of handle 17 to release that handle and permit it to travel to the full "off" position, under the bias of spring 31.

In the "on" position, however, the plate 53 is so positioned by the spring 56 and by the casing walls that pawl 35 engages handle lug 34 to hold the handle against full outward travel to "off" position.

A flexible connector 65, looped around the bimetal strip 52, has one end 66 secured to the free end of that bimetal strip and has its other end 67 secured to that part of the load terminal 15 that was thrust into the casing through the load terminal hole 13. This connector completes the circuit between the two terminals 14—15, employing only that part of the contact arm 50 extending from contact 48 to pivot pin 51 for carrying current.

The end of pivot pin 51 near the back of the casing is seated within a casing pocket 68, elongated to permit the pin 51 to slide up and down.

A lug 70 bent down from terminal 15, is the part to which the end 67 of connector 65 is secured.

To restore the parts to the circuit closing position (Fig. 3), the handle 17 is pushed down as far as it will go and it will go down far enough, first to cause the notch 71 of a cam part thereof to engage a resetting lug 72 of the plate 53, and second, to cause the pin 51 to slide downwardly. That part of plate 53 connecting lug 72 and pin 51 acts as a translator. The contactor 49 will move downwardly with pin 51 until arm 50 reaches a resetting stop 47 of the casing, although in many instances that stop will have been engaged by the arm 50 at the end of the circuit opening movement of the arm. Continued downward movement of the handle and continued downward movement of the lug 72, and pin 51, will cause the contactor to engage stop 47 and rock clockwise, on axis 51, far enough to cause latch 60 to slide over or overtravel beyond holding edge 61 (Fig. 4), for relatching. The release of the handle by the operator at that time will free the handle to be moved to its outward position by the spring 31 (Fig. 3), and as the handle moves outwardly, the spring 56 will act on the contactor.

The contactor will rock slightly counter-clockwise and assume its final "on" position, with latch 60 engaging holding edge 61, and with contact 48 abutting contact 44 under pressure of spring 56. Plate 53 will rock counter-clockwise to place lug 72 out of the path of cam 71.

The space 74 between ledge 28 and the line terminal ledge 45 provides a pocket for the flexible

connector 55, which, thus being pocketed, is restrained from fouling the moving parts of the device to impede their operation.

At 75 is illustrated a calibrating tip of the contactor, engaging the plate 53, and determining the position of the latch tip 60 relative to the latch surface 61.

When the contactor is manufactured, the position of the flexible tip 60 relative to rigid tip 75 may not be as desired, and, therefore, the bi-metal may be moved for calibration and to obtain an accurate positioning of tip 60 with respect to tip 75; since the position of rigid tip 75, formed to engage the edge of plate 53, is not variable, calibration of the position of tip 60 relative to tip 75 automatically insures calibration of the position of tip 60 relative to plate 53 and automatically insures calibration of the amount of overlap of tip 60 on edge 61 of plate 53 and automatically insures calibration of the amount of warping of tip 60 from edge 61 of plate 53 that is required to unlatch the breaker.

Now having described the device herein disclosed, reference is had to the following claims.

I claim:

1. In a switch, a handle arranged to be advanced manually and returned automatically, means for automatically returning the handle, a stop for limiting the return movement of and defining an extreme position of the handle, a movable pawl for limiting return movement of the handle to an intermediate position, the pawl moving into and out of a handle stopping position, means connecting the handle and pawl responsive to advance of the handle from its intermediate position for shifting the pawl, which at that time is in handle stopping position, out of handle stopping position, and responsive to advance of the handle from its extreme position for shifting the pawl, which at that time is out of handle stopping position, into handle stopping position.

2. In a switch, a handle arranged to be advanced manually and returned automatically, means for automatically returning the handle, a stop for limiting the return movement of and defining an extreme position of the handle, a movable pawl for limiting return movement of the handle to an intermediate position, the pawl moving into and out of a handle stopping position, means responsive to advance of the handle from its intermediate position for shifting the pawl, which at that time is in handle stopping position, out of handle stopping position, and responsive to advance of the handle from its extreme position for shifting the pawl, which at that time is out of handle stopping position, into handle stopping position, said means including a contactor movable to and from circuit opening and closing positions, and operatively connected to the pawl, whereby the pawl has definite circuit opening and closing positions corresponding to similar positions of the contactor.

3. A switch comprising a stationary contact, a movable contactor for engaging it, latch means for the contactor, spring means for moving the unlatched contactor from the contact and for urging the latched contactor against the contact, a handle for engaging the latch directly and unlatching it so that the contactor leaves the contact, the handle being movable for relatching the released latch so that the contactor returns to conduct engaging position, there to be held by the spring, the handle being formed to have an advance stroke and a return stroke, two strokes in each cycle of movement, and so ar-

5 ranged with respect to the latch means and the contactor that in the normal operation of the handle it goes through a complete cycle for latch releasing and a complete cycle for relatching and circuit closing, the handle being formed to be advanced manually and returned automatically unless held, a return spring for automatically returning the handle, a stop for limiting the outward movement of the handle caused by the return spring to an extreme position, a pawl for limiting outward movement of the handle, when it is engaged by the pawl to an intermediate position, the pawl being movable into and out of a handle stopping position, and means connecting the handle and the pawl whereby the pawl shifts from handle stopping position in response to advance of the handle from its intermediate position and shifts into handle stopping position in response to advance of the handle from its extreme position.

4. A switch comprising a stationary contact, a movable contactor for engaging it, latch means for the contactor, spring means for moving the unlatched contactor from the contact and for urging the latched contactor against the contact, a handle for engaging the latch directly and unlatching it so that the contactor leaves the contact, the handle being movable for relatching the released latch so that the contactor returns to contact engaging position, there to be held by the spring, the handle being formed to have an advance stroke and a return stroke, two strokes in each cycle of movement, and so arranged with respect to the latch means and the contactor that in the normal operation of the handle it goes through a complete cycle for latch releasing and a complete cycle for relatching and circuit closing, the handle being formed to be advanced manually and returned automatically unless held, a return spring for automatically returning the handle, a stop for limiting the outward movement of the handle caused by the return spring to an extreme position, a pawl for limiting outward movement of the handle, when it is engaged by the pawl to an intermediate position, said spring biasing the pawl to a handle stopping position when the contactor is latched and biasing the pawl out of that position when the contactor is unlatched, said spring operating in response to advance of the handle from its intermediate position for shifting the pawl, which at that time is in handle stopping position, out of handle stopping position, and in response to advance of the handle from its extreme position for shifting the pawl, which at that time is out of handle stopping position, into handle stopping position.

5. In a switch, latch means, and a handle separate from the latch means for unlatching it, and spring means for moving the latch means well away from latching position when it is unlatched, the handle being operable for returning the latch means to the latching position after it is moved away therefrom by the spring, a pawl for engaging the handle to limit its movement, the handle, in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion limiting position.

6. In a switch, latch means, and a handle separate from the latch means for unlatching it, and spring means for moving the latch means well away from latching position when it is unlatched, the handle being operable for returning the latch

means to the latching position after it is moved away therefrom by the spring, a pawl for engaging the handle to limit its movement, the handle, in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion limiting position, and an indicator connected to and moved by the handle for indicating handle position and responsive to the relation of the pawl and handle, in turn responsive to the position of the latch means, whereby the latter position is indicated by the indicator.

7. In a switch, latch means, and a handle separate from the latch means for unlatching it, and spring means for moving the latch means well away from latching position when it is unlatched, the handle being operable for returning the latch means to the latching position after it is moved away therefrom by the spring, a pawl for engaging the handle to limit its movement, the handle, in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion limiting position, a contact, and a contactor controlled by the latch means and adapted to move with it, the spring biasing the contactor when latched against the contact, and biasing the latch means well away from its latching position and the contactor well away from the contact on unlatching of the contactor.

8. In a switch, latch means, and a handle separate from the latch means for unlatching it, and spring means for moving the latch means well away from latching position when it is unlatched, the handle being operable for returning the latch means to the latching position after it is moved away therefrom by the spring, a pawl for engaging the handle to limit its movement, the handle, in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion limiting position, a contact, and a contactor controlled by the latch means and adapted to move with it, the spring biasing the contactor when latched against the contact, and biasing the latch means well away from its latching position and the contactor well away from the contact on unlatching of the contactor, and an indicator actuated by the handle for indicating the relation of the pawl and handle, and the position of the latch, and in turn indicating the relation of the contactor with respect to the contact.

9. In a switch, latch means, and a handle separate from the latch means for unlatching it, and spring means for moving the latch means well away from latching position when it is unlatched, the handle being operable for returning the latch means to the latching position after it is moved away therefrom by the spring, a pawl for engaging the handle to limit its movement, the handle, in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion limiting position, the pawl, when engaging the handle, defining an outward position of the handle intermediate its extreme outward and inward positions.

10. In a switch, latch means, and a handle separate from the latch means for unlatching it, and spring means for moving the latch means well away from latching position when it is unlatched, the handle being operable for returning the latch means to the latching position after it is moved away therefrom by the spring, a pawl

for engaging the handle to limit its movement, the handle, in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion

11. In a switch, latch means, and a handle separate from the latch means for unlatching it, and spring means for moving the latch means well away from latching position when it is unlatched, the handle being operable for returning the latch means to the latching position after it is moved away therefrom by the spring, a pawl for engaging the handle to limit its movement, the handle in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion limiting position, the handle being in the form of a sliding push button biased outwardly by a spring and pushed inwardly manually, and means for limiting extreme outward motion of the handle.

12. In a switch, a movable contactor, latch means therefor, spring means operating on the contactor for moving it towards and into circuit closing position when it is latched and for moving it to circuit opening position when it is unlatched, manually manipulable means for relatching the contactor whereupon the contactor moves to circuit closing position, and manually manipulable means for unlatching the latch means whereupon the contactor moves to circuit open position, the two manual means being integral and formed as parts of a handle having an exposed manually accessible part, and a pawl for engaging the handle to limit its movement, the handle, in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion limiting position.

13. In a switch, a movable contactor, latch means therefor, spring means operating on the contactor for moving it towards and into circuit closing position when it is latched and for moving it to circuit opening position when it is unlatched, manually manipulable means for relatching the contactor whereupon the contactor moves to circuit closing position, and manually manipulable means for unlatching the latch means whereupon the contactor moves to circuit open position, the two manual means being integral and formed as parts of a handle having an exposed manually accessible part, and a pawl for engaging the handle to limit its movement, the handle, in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion limiting position.

14. In a switch, latch means, and a handle separate from the latch means for unlatching it, and spring means for moving the latch means well away from latching position when it is unlatched, the handle being operable for returning the latch means to the latching position after it is moved away therefrom by the spring, a pawl for engaging the handle to limit its movement, the handle, in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion limiting position, a contact, and a contactor controlled by the latch means and adapted to move with it, the spring biasing the contactor when latched against the contact, and biasing the latch means well away from its latching position and the contactor well away from the contact on unlatching of the contactor, and an indicator actuated by the handle for indicating the relation of the pawl and handle, and the position of the latch, and in turn indicating the relation of the contactor with respect to the contact.

14. In a switch, a movable contactor, latch means therefor, spring means operating on the contactor for moving it towards and into circuit closing position when it is latched and for moving it to circuit opening position when it is unlatched, manually manipulable means for relatching the contactor whereupon the contactor moves to circuit closing position, and manually manipulable means for unlatching the latch means whereupon the contact moves to circuit open position, the two manually manipulable means moving at all times in unison, and a translator for operatively connecting the relatching means and the latch means but only when the latch means is unlatched and movable in response to contactor movement whereby contactor movement following unlatching positions the translator into operative connection position for relatching and relatching positions the translator out of operative connection position for relatching, and a pawl for engaging the handle to limit its movement, the handle, in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion limiting position.

15. In a switch, a movable contactor, latch means therefor, spring means operating on the contactor for moving it towards and into circuit closing position when it is latched and for moving it to circuit opening position when it is unlatched, manually manipulable means for relatching the contactor whereupon the spring moves the contactor to circuit closing position, and manually manipulable means for unlatching the contactor whereupon the spring moves contactor to circuit open position, the two manual means being integral and formed as parts of a handle having an exposed manually accessible part, and a pawl for engaging the handle to limit its movement, the handle, in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion limiting position.

16. In a switch, a movable contactor, latch means therefor, spring means operating on the contactor for moving it towards and into circuit closing position when it is latched and for moving it to circuit opening position when it is unlatched, manually manipulable means for relatching the contactor whereupon the spring moves the contactor to circuit closing position, and manually manipulable means for unlatching the contactor whereupon the spring moves contactor to circuit open position, the two manual means being integral and formed as parts of a handle having an exposed manually accessible part, and a pawl for engaging the handle to limit its movement, the handle, in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion limiting position, and an indicator actuated by the handle for indicating the relation of the pawl and handle, and the position of the latch, and in turn indicating the relation of the contactor with respect to the contact.

17. In a switch, a movable contactor, latch means therefor, spring means operating on the contactor for moving it towards and into circuit closing position when it is latched and for moving it to circuit opening position when it is unlatched, manually manipulable means for relatching the contactor whereupon the spring moves the contactor to circuit closing position, and manually manipulable means for unlatching the contactor whereupon the spring moves contactor to circuit

open position, the two manually manipulable means moving at all times in unison, and a translator for operatively connecting the relatching means and the contactor but only after the contactor has moved in response to unlatching, or before the contactor has moved in response to relatching, whereby unlatching positions the translator into operative connection position for relatching, and relatching positions the translator out of operative connection position for relatching, and a pawl for engaging the handle to limit its movement, the handle, in its unlatching movement also releasing the pawl from it, and in its relatching movement resetting the pawl to handle motion limiting position.

18. In combination, a casing, a multiple position push button actuator arranged to slide in an aperture of said casing, and having a front exposed face, means for stopping the button in either of two stopped positions, and a movable indicator carried by the button and exposed on its front face and movable relative thereto and arranged to be controlled selectively thereby for selectively indicating which of the two stopped positions is then occupied by the button, the indicator comprising a plate mounted on the button to slide across the button and engaging a formation of the casing whereby its movement across the button is determined by the sliding of the button in the casing aperture.

19. A switch having a movable contactor, an automatically and manually releasable latch therefor, automatic latch release means, a spring for moving said contactor out of circuit closing position when the latch releases, and for returning it to circuit closing position when the latch is reset, a single means successively manually operable in identical manner for unlatching the latch if it is latched, and for relatching the latch if it has been unlatched, means establishing an unlatching connection between the latch and the manual means, and a movable translator for establishing an operative relatching connection between the manual means and the latch, only when the latch is unlatched, the translator position being determined by the latch position, a pawl forming part of the translator for engaging the manually operable means to limit its movement, the manually operable means, in its unlatching movement, also releasing the pawl from it, and in its relatching movement resetting the pawl to a position where it limits movement of the manually operable means.

20. In a switch, a contactor, automatically and manually releasable latch means therefor, automatic latch releasing means, spring means for moving the contactor from circuit closing position when it is unlatched, and a manually accessible and manually actuated means having a portion for releasing the latch means, and a translator for operatively connecting the latch means and the manual means but only when the latch means is unlatched, for enabling the manual means to relatch the latch means, the latch means and translator being interconnected so that unlatching positions the translator into a manual means engaging path, and relatching moves it out of that path, a pawl forming part of the translator for engaging the manually actuated means to limit its movement, the manually actuated means, in its latch releasing movement, also releasing the pawl from it, and in its relatching movement resetting the pawl to a position where it limits movement of the manually actuated means.

21. A switch having a movable contactor, an automatically and manually releasable latch therefor, automatic latch release means, a spring arranged to move said contactor out of circuit closing position when the latch releases, and to return it to circuit closing position when the latch is reset, and a single push button arranged to be pushed in to release the latch, if it holds, and to be pushed in to reset the latch, if it is released, means establishing a latch releasing connection between the push button and the latch, and a movable translator for establishing an operative resetting connection between the push button and the latch, only when the latch is released, the translator position being determined by the latch position, a pawl forming part of the translator for engaging the push button to limit its movement, the push button, in its unlatching movement, also releasing the pawl from it, and in its relatching movement resetting the pawl to a position where it limits movement of the push button.

22. In a switch, a manual means constructed and guided to have successive identical movements, automatically and manually releasable latch means, automatic latch releasing means, a cam forming an operative unlatching connection between the manual means and the latch means, and a translator for forming an operative relatching connection between the manual means and the latch means, the parts being so constructed that the translator is in a position to connect the manual means and latch means operatively, but only when the latch means is unlatched, being out of that position when the latch means is latched, the latch means and translator being so operatively connected that when the latch means is unlatched it moves the translator into manual means engaging position, and when the latch means is moved to latch, it moves the translator out of manual means engaging position, and when the translator is in manual means engaging position and is moved by the manual means, it translates manual means movement into relatching movement of the latch means, a pawl forming part of the translator for engaging the manual means to limit its movement, the manual means, in its unlatching movement, also releasing the pawl from it, and in its relatching movement resetting the pawl to a position where it limits movement of the means.

23. In a switch, a stationary contact, a movable contactor, automatically and manually releasable latch means for the contactor, automatic latch releasing means, spring means operating on the contactor for biasing it towards and against the contact, when it is latched, and for moving it from the contact, when it is unlatched, a single manually manipulable means successively operable for relatching the contactor so that the contactor may thereupon be moved to and against the contact, and for unlatching the latch means so that the spring means may thereupon move the contactor from the contact, a cam forming an unlatching connection between the latch means and the manual means, and a translator forming a relatching connection between the manual means and the latch means, but only when the latch means is unlatched, being movable in response to latch movement whereby unlatching movement positions the translator into operative connection position for relatching, and relatching movement positions the translator out of operative connection position for relatching, a pawl forming part of the translator for engaging the manually operable means to limit its movement,

the manually operable means, in its unlatching movement, also releasing the pawl from it, and in its relatching movement resetting the pawl to a position where it limits movement of the manually operable means.

24. In a switch, a stationary contact, a movably mounted translator, a movably mounted contactor, overload responsive latch means on the contactor interlatching it to the translator, spring means for moving the contactor towards and for urging it against the stationary contact when the latch holds, and for moving the contactor from the stationary contact when the latch releases, a push button having an unlatching portion for acting directly on the latch for unlatching the contactor from the translator, and a relatching portion for acting directly on the translator to move it and thus move the contactor and latch for relatching the contactor to the translator, the push button being arranged to operate for unlatching or relatching only when it is pushed in, and not when it is released to return, means for returning the push button when it is released, the contactor spring means being arranged to operate on the translator to move it into the path of the push button relatching portion when the latch releases, whereby the translator forms an operative connection between the push button relatching portion and the contactor only when the latch has released, and also to move the latch out of the path of the push button unlatching portion, with push button relatching movement operating not only to move the translator and the contactor for relatching them relatively, but also to move the translator out of the path of the push button relatching portion, and to move the contactor latch into the path of the push button unlatching portion, a pawl forming part of the translator for engaging the push button to limit its movement, the push button, in its unlatching movement, also releasing the pawl from it, and in its relatching movement resetting the pawl to a position where it limits movement of the push button.

25. A switch having a movable contactor, an automatically and manually releasable latch therefor, automatic latch release means, a spring for moving said contactor out of circuit closing position when the latch releases, and for returning it to circuit closing position when the latch is reset, a single means successively manually operable in identical manner for unlatching the latch if it is latched, and for relatching the latch if it has been unlatched, means establishing an unlatching connection between the latch and manual means, and a movable translator for establishing an operative relatching connection between the manual means and the latch, only when the latch is unlatched, the translator position being determined by the latch position, a pawl forming part of the translator for engaging the manually operable means to limit its movement, the manually operable means, in its unlatching movement, also releasing the pawl from it, and in its relatching movement resetting the pawl to a position where it limits movement of the manually operable means, the pawl and the manually operable means being so formed that the position in which the pawl holds the manually operable means is an intermediate position of the manually operable means, different from the position it occupies when the pawl does not hold the manually operable means, whereby the position of the manually operable

means indicates the position of the pawl, the translator, the latch, and the contactor.

26. In a switch, a contactor, automatically and manually releasable latch means therefor, automatic latch releasing means, spring means for moving the contactor from circuit closing position when it is unlatched, and a manually accessible and manually actuated means having a portion for releasing the latch means, and a translator for operatively connecting the latch means and the manual means but only when the latch means is unlatched, for enabling the manual means to relatch the latch means, the latch means and translator being interconnected so that unlatching positions the translator into a manual means engaging path, and relatching moves it out of that path, a pawl forming part of the translator for engaging the manually actuated means to limit its movement, the manually actuated means, in its latch releasing movement, also releasing the pawl from it, and in its relatching movement resetting the pawl to a position where it limits movement, of the manually actuated means, the pawl and the manually actuated means being so formed that the position in which the pawl holds the manually actuated means is an intermediate position of the manually actuated means, different from the position it occupies when the pawl does not hold the manually operable means, whereby the position of the manually actuated means indicates the position of the pawl, the translator, the latch, and the contactor.

27. A switch having a movable contactor, an automatically and manually releasable latch therefor, automatic latch release means, a spring arranged to move said contactor out of circuit closing position when the latch releases, and to return it to circuit closing position when the latch is reset, and a single push button arranged to be pushed in to release the latch, if it holds, and to be pushed in to reset the latch, if it is released, means establishing a latch releasing connection between the push button and the latch, and a movable translator for establishing an operative resetting connection between the push button and the latch, only when the latch is released, the translator position being determined by the latch position, a pawl forming part of the translator for engaging the push button to limit its movement, the push button, in its unlatching movement, also releasing the pawl from it, and in its relatching movement resetting the pawl to position where it limits movement of the push button, the pawl and the push button being so formed that the position in which the pawl holds the push button is an intermediate position of the push button, different from the position it occupies when the pawl does not hold the push button, whereby push button position indicates the position of the pawl, the translator, the latch and the contactor.

28. In a switch, a manual means constructed and guided to have successive identical movements, automatically and manually releasable latch means, automatic latch releasing means, a cam forming an operative unlatching connection between the manual means and the latch means, and a translator for forming an operative relatching connection between the manual means and the latch means, the parts being so constructed that the translator is in a position to connect the manual means and latch means operatively, but only when the latch means is unlatched, being out of that position when the

latch means is latched, the latch means and translator being so operatively connected that when the latch means is unlatched it moves the translator into manual means engaging position, and when the latch means is moved to latch, it moves the translator out of manual means engaging position, and when the translator is in manual means engaging position and is moved by the manual means, it translates manual means movement into relatching movement of the latch means, a pawl forming part of the translator for engaging the manual means to limit its movement, the manual means, in its unlatching movement, also releasing the pawl from it, and in its relatching movement resetting the pawl to a position where it limits movement of the manual means, the pawl and the manual means being so formed that the position in which the pawl holds the manual means is an intermediate position of the manual means, different from the position it occupies when the pawl does not hold the manual operable means, whereby manual means position indicates the position of the pawl, the translator, and the latch.

29. In a switch, a stationary contact, a movable contactor, automatically and manually releasable latch means for the contactor, automatic latch releasing means, spring means operating on the contactor for biasing it towards and against the contact, when it is latched, and for moving it from the contact, when it is unlatched, a single manually manipulable means successively operable for relatching the contactor so that the contactor may thereupon be moved to and against the contact, and for unlatching the latch means so that the spring means may thereupon move the contactor from the contact, a cam forming an unlatching connection between the latch means and the manual means, and a translator forming a relatching connection between the manual means and the latch means, but only when the latch means is unlatched, being movable in response to latch movement whereby unlatching movement positions the translator into operative connection position for relatching, and relatching movement positions the translator out of operative connection position for relatching, a pawl forming part of the translator for engaging the manually operable means to limit its movement, the manually operable means, in its unlatching movement, also releasing the pawl from it, and in its relatching movement resetting the pawl to a position where it limits movement of the manually operable means, the pawl and the manually operable means being so formed that the position in which the pawl holds the manually operable means is an intermediate position of the manually operable means, different from the position it occupies when the pawl does not hold the manually operable means, whereby the position of the manually operable means indicates the position of the pawl, the translator, the latch, and the contactor.

30. In a switch, a stationary contact, a movably mounted translator, a movably mounted contactor or overload responsive latch means on the contactor interlatching it to the translator, spring means for moving the contactor towards and for urging it against the stationary contact when the latch holds, and for moving the contactor from the stationary contact when the latch releases, a push button having an unlatching portion for acting directly on the latch for unlatching the contactor from the translator, and a relatching portion for acting directly on the trans-

lator to move it and thus move the contactor and latch for relatching the contactor to the translator, the push button being arranged to operate for unlatching or relatching only when it is pushed in, and not when it is released to return, means for returning the push button when it is released, the contactor spring means being arranged to operate on the translator to move it into the path of the push button relatching portion when the latch releases, whereby the translator forms an operative connection between the push button relatching portion and the contactor only when the latch has released, and also to move the latch out of the path of the push button unlatching portion, with push button relatching movement operating not only to move the translator and the contactor for relatching them relatively, but also to move the

5 translator out of the path of the push button relatching portion, and to move the contactor latch into the path of the push button unlatching portion, a pawl forming part of the translator for engaging the push button to limit its movement, the push button, in its unlatching movement, also releasing the pawl from it, and in its relatching movement resetting the pawl to a position where it limits movement of the push button, the pawl and the push button being so
10 formed that the position in which the pawl holds the push button is an intermediate position of the push button, different from the position it occupies when the pawl does not hold the push
15 button, whereby push button position indicates the position of the pawl, the translator, the latch, and the contactor.

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