June 27, 1933. H. P. PINKHAM 1,915,951

SWITCH OPERATING MECHANISM

Filed Sept. 4, 1931

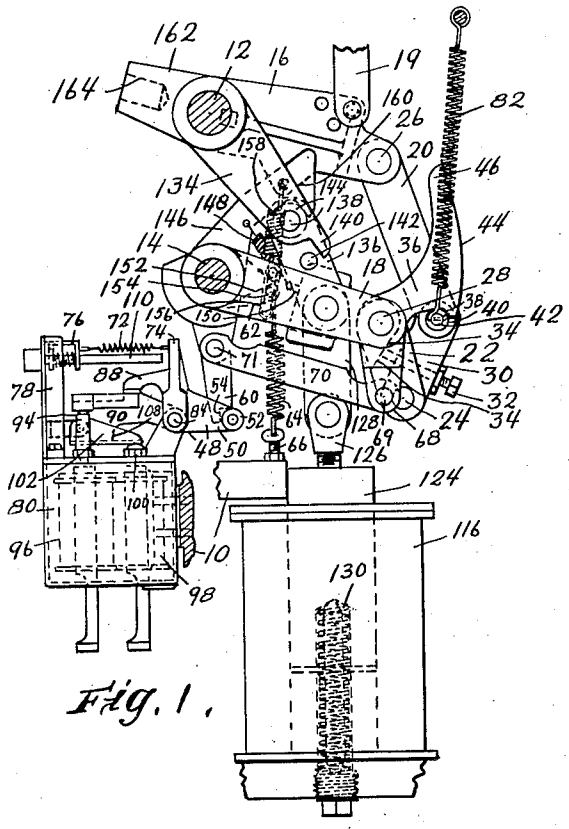


Fig. 1.

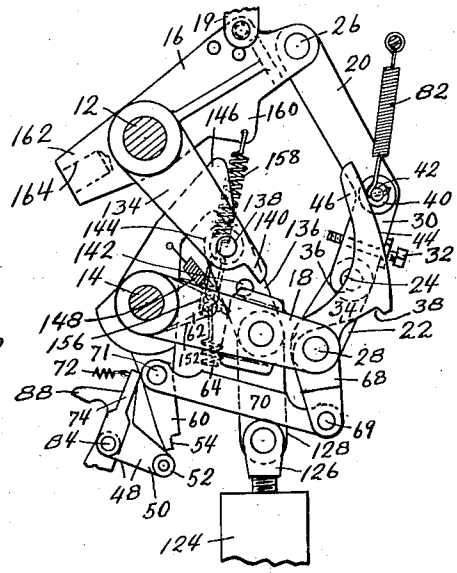


Fig. 2.

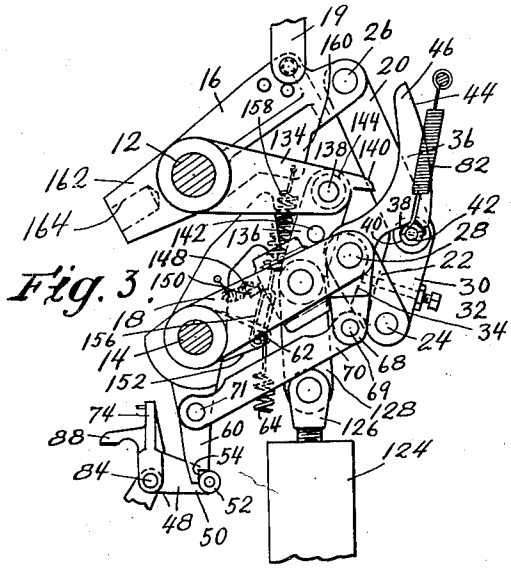


Fig. 3

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Patented June 27, 1933

1,915,951

UNITED STATES PATENT OFFICE

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SWITCH OPERATING MECHANISM

Application filed September 4, 1931. Serial No. 561,164.

This invention relates to mechanism for effecting the closing, either manually or electrically, of one or several interconnected switches, and also for tripping the switch open free from a corresponding movement of the closing components of the mechanism, and has for its principal object the provision of an improved mechanism of this type by which the switches can be tripped open rapidly with very much less energy than has hitherto been required with mechanisms of this type.

In carrying out this object of the invention an underset trip free toggle is provided having a holding latch which has its latch face so inclined that the reaction of the switches tends constantly to move the toggle free from the latch and permit its collapse in a switch opening direction, and a second latch which is responsive to the tripping means for the switch for holding the toggle holding latch against release of the toggle.

It is desirable to use the same mechanism for the control of a variable number of switches and also to control the operation of switches which, due to brushes of different current carrying capacity, exert widely different forces on the mechanism in a switch opening direction. In either case the mechanism, and particularly the tripping mechanism, must be designed to operate satisfactorily under conditions which exert a wide range of pressure on the latching mechanism.

It is a further object of the invention to provide mechanism including a toggle holding latch which is constantly biased by the switch reaction for release of the toggle, and a second latch which is governed by the switch tripping means for releasably holding said toggle holding latch, and adjustable means which acts on said second latch with a variable force in opposition to the switch opening pressure exerted on the latch due to the reaction of the switches. As thus arranged a very low energy tripping solenoid is adequate to trip the mechanism.

A further object of the invention is the provision with a latch on a latch construction for releasably holding the mechanism locked, of a trip-free switch mechanism wherein one latch is carried by and is movable with the mechanism and the other latch is carried by a fixed support, and parallel linkage means operatively connecting said latches together whereby to maintain a constant relation between said latches during switch closing movement of the mechanism.

A yet further object of the invention is the provision of a toggle holding latch which is movable with the switch mechanism and a stationarily supported latch which holds the movable latch in toggle holding condition in all parts of the travel of the mechanism from switch open to switch closed position and is so arranged that it can release the movable latch in any position in which it may be located because of the position of the switch mechanism, whereby to trip open the switch anywhere between open and closed positions.

Another object of the invention is the provision of switch operating mechanism including a trip-free toggle, a latch which normally holds the toggle against breaking, and a latch-controlling member for holding the latch in engagement with the toggle, the latch moving with the toggle between switch open and closed positions while the latch-controlling member remains in one position, where it is held by a second latch.

A still further object of the invention is generally to improve the construction and performance of switch operating mechanisms.

Fig. 1 is a side elevation of the switch operating mechanism embodying the invention, the parts being shown in the switch closed position.

Fig. 2 is a detail side elevation showing the linkage of the mechanism in the switch tripped position just prior to the resetting of the mechanism.

Fig. 3 is a view similar to Fig. 2 with the parts in reset position ready for switch closing movement.

The switch operating mechanism herein illustrated is adapted to provide for the manual opening and closing of one or more electric switches connected thereto, and also for the opening and closing of the switches by electrically controlled means. The switch

operating mechanism includes a rigid mechanism supporting frame 10, fragments of which are shown in Fig. 1, in which are journalled an upper horizontal operating shaft 12 and a lower and parallel actuating shaft 14. The operating shaft 12 in some instances may constitute the operating shaft of a circuit interrupter but it is not so shown in the present embodiment of the invention. The mechanism includes a generally horizontal rearwardly extended operating crank arm 16 which is fixed to the operating shaft 12 and a substantially parallel rearwardly extended actuating arm 18 which is pivotally supported at its forward end on the actuating shaft 14. The operating crank arm 16 is operatively connected to the switches to be controlled by means of a switch rod 19, and said crank arm is constantly biased for movement in a counterclockwise direction by the operating mechanism of said switches.

Said operating and actuating arms 16 and 18 are adapted normally to be releasably connected together for conjoint operation. To this end the similar free ends of said arms are connected by an inverted trip free toggle comprising the upper bent link 20 and the lower link, or block, 22 which have a common pivotal connection on the pin 24. Said toggle links 20 and 22 are pivotally connected at their free ends by pivot pins 26 and 28 respectively to the free ends of said operating and actuating arms. The upper toggle link 20 is formed with a lower forwardly-directed reflexed end portion 30, whereby in the on-center position of the toggle links the common pivotal point 24 can lie below and in direct line with the pivot points 26 and 28. Means are provided in the present instance, however, definitely to maintain the toggle normally in an underset position in which the pivot point 24 is disposed slightly to the rear of the line including the pivot points 26 and 28, in which position of the links the toggle is biased for collapse by the connected switch mechanisms. Said means includes an abutment screw 32 which is screw-threaded into the lower portion 30 of the toggle link 20 and engages an abutment face 34 of the lower toggle link 22 by which the angular divergence of toggle links 22 and 20 can be adjusted in an obvious manner.

The toggle is held releasably in its normal underset condition by a novel latching means with which this invention is especially concerned. Said means includes a pair of toggle holding latches 36, one being behind the other in the drawing, which are pivotally supported on the pivot pin 28 at the end of the actuating arm, one on each side thereof. Said latches 36 extend rearwardly on opposite sides of the toggle link 20 and are provided with inclined latch faces 38 which engage a pair of latch rolls 40 which are carried one on each side of link 20 by a stud 42 which extends transversely through and is fixed in the toggle link 20. Due to the inclination of the latch face 38, however, the engagement of the latches 36 with rolls 40 is not self-locking and consequently the switch opening bias of the switches connected with the mechanism exists a definite latch-releasing pressure on the latches. The rolls 40 when released from the latches can travel over the arcuate or cam faces 44 of the latch tails 46 into a switch open and collapsed position of the toggle.

A tripping latch 48 is provided for holding the latches 36 whereby to control the release of the latches. Said tripping latch comprises a pivoted bell crank including the generally horizontal arm 50 having a latch roll 52 at its free end that engages the vertical latch face 54 of the depending arm 60 of a latch crank which is pivotally supported on the actuating shaft 14. Said latch crank also has a rearwardly extended shorter arm 62 in the free end of which is hooked a tensile spring 64. Said spring 64 has its bottom end hooked into a stud 66 which is vertically adjustably screw-threaded into a horizontal portion of the frame 10 whereby constantly to bias the latch crank for clockwise rotation.

The toggle holding latches 36 are each provided with a similar depending arm 68 which arms are parallel with and are separately connected with the arm 60 of the latch crank intermediate its ends by two similar horizontally offset links 70. Said links 70 are pivotally connected with said arms 68 and 60 at pivot points 69 and 71 which are equidistant from the pivot points 28 and 14 so that the links 70 occupy constantly a parallel relation with the actuating arm 18 regardless of the position of said arm, and thus hold the latches in a definite position with respect to said arm, where said crank arm 60 is held latched. The arrangement is such that, with the toggle holding latches in engaging position with the rolls 40, in either switch open or switch closed, or intermediate, positions of the mechanism, the latch crank due to its parallel connection with latches, will be in position to have the latch face 54 thereof engaged by the roll 52 of the tripping latch 48. Said tripping latch is held releasably in latching engagement by means of a tensile spring 72 which is connected at one end with a vertical arm 74 which comprises the other arm of the latch 48 and at its other end with an inverted U-shaped bracket 76 of a panel supporting frame 78. Said frame 78 is supported by a box, or magnet frame, 80 which in turn is carried by the frame 10 of the mechanism.

In some cases where the reaction of the contact members and the weight of the mechanism of the connected switches is insufficient to secure rapid opening of the mechanism, accelerating springs 82 are provided which

are connected at their upper ends to the mechanism frame 10 and at their lower ends to the extended ends of the stud 42 which is fixed in the toggle link 20.

It will be evident from the above description of the latching means that the latches 36 are constantly biased for release of the trip free toggles 20, 22, but that such release is prevented by the engagement of the stationarily supported tripping latch 48 with the latch arm 60.

The latch construction above described is arranged so that the toggle holding latches 36 and the stationarily supported tripping latch 48 maintain a constant relation with each other and with the trip free toggle during the travel of the switch mechanism from switch open to switch closed position. Thus when the mechanism is moved from the switch open, mechanism reset position of Fig. 1, the actuating arm 18 and the parallel links 70 move in a clockwise direction about their pivotal supports 14 and 71. The latch crank, and consequently the pivot point 71, remain fixed during this movement and, due to the parallel linkage including the depending arms 68 or latches 36 which are pivotally supported concentrically with one end of the toggle, these latches maintain a constant relation with the toggle during this movement and hold it locked.

The tripping latch 48 is pivotally supported on a pin 84 of the magnet frame 80 and has a forwardly extended arm 88, the free end of which is engaged by a generally horizontal tripping frame 90. Said tripping frame 90, in plan view, is generally Y-shape and has its trunk portion pivoted on the pin 84 with the branch portions thereof forwardly extended and overlying each a tripping pin 94 of the two foremost tripping solenoids 96, one of which is shown in Fig. 1. A third tripping coil 98 is provided between and at the rear of coils 96 which has a tripping pin 100 that acts upwardly on a horizontal arm 102 that is pivoted at its forward end and, upon being raised by the pin 100, engages a downwardly projecting boss 108 of the tripping frame 90, thus to rotate the frame in a clockwise direction to actuate the tripping latch.

Manual means for actuating the tripping latch are also provided and include a spring-reset tripping rod 110 which can be depressed to engage the vertical arm 74 of the tripping bell crank and rotate the tripping latch in a clockwise direction to trip the mechanism.

It is apparent, with the above construction and arrangement of the latches, that the switch can be tripped open at any position of the mechanism between switch open and closed positions.

Electrically actuated closing means is provided including the closing solenoid 116 having a plunger 124 which is operatively connected with the actuating arm 18, intermediate the ends thereof, by means of a link 128 and a pair of screw-threaded eyebolts 126. Means including a compression spring 130 constantly urges the plunger and the actuating arm 18 into the elevated switch open position of Fig. 3 in which the trip free toggle latches and the tripping latch are reset and the actuating and operating arms are locked together for conjoint switch closing movement.

Means are also provided for holding the actuating arm 18 and consequently the operating mechanism releasably in a switch closed position. Said means includes an underset toggle comprising the upper link 134 and the lower link 136 which have a common pivotal connection on the pin 138. The free end of the upper toggle link 134 is pivoted on the operating shaft 12 and the lower toggle link 136 is pivotally connected at its free end to the actuating arm concentrically with the pivotal connection of the link 128. The upper toggle link is provided with an extension 140 which engages with a pin 142 located midway between the pivot points of the lower toggle link in a slightly underset position of the toggle and consequently prevents the toggle from moving into a set and locked position. The upper toggle link 134 carries a latch roll 144 on the pin 138 that is engaged by a holding latch 146 which is pivoted on the actuating shaft 14. A spring 148 is connected with said latch intermediate its ends and with an ear 150 of the actuating arm and consequently biases the latch in a clockwise direction into engagement with the latch roll 144.

Means are provided to release the holding latch 146 only when the trip free components of the mechanism have been tripped and have reached very nearly the switch open position thereof. The latch is consequently provided with a rearwardly extended ear 152 which carries a horizontally extended stud 154. Said stud is slidably received in the lower looped end 156 of a spring 158 which constitutes a tripping link between the latch 146 and the operating crank arm 16. The crank arm 16 is provided with a depending ear 160 into which the upper end of the spring is hooked. The lower extremity of the loop is adapted to engage the stud 154 just before the crank arm 16 reaches its fully switch open position thus to release the holding latch 146 and permit the toggle associated therewith to collapse, and allow the closing components of the mechanism under the action of spring 130 to move to the switch open and mechanism resetting position thereof.

Provision is also made for closing the switch manually. For this purpose the upper toggle link 134 of the holding toggle is provided with an angularly related forwardly extended boss 162 which is provided with

a socket 164 for an operating handle, not shown. In closing the switch manually the holding toggle 134, 136 becomes an actuating toggle which moves the mechanism by its straightening movement into the switch closed position thereof and by means of the latch 146 holds it releasably in closed position as before.

The operation of the mechanism is as follows:

With the mechanism in the switch closed position thereof shown in Fig. 1, the trip free components of the mechanism are biased for switch opening movement by the reaction of the connected switches, during which movement the operating crank arm 16 rotates in a counter-clockwise direction. Said components are held against switch opening movement, however, by the toggle holding latches 36 which hold the trip free toggle 22, 20 releasably in its underset position and by the stationarily supported tripping latch 48 which in turn holds the toggle holding latch. The operating arm 16 and actuating arm 18 are thus operatively connected and are both held against switch opening movement by the latched holding toggle 134, 136 against the action of spring 130 which acts upwardly on the actuating arm 18.

When one or another of the solenoids 96, 98 is energized, as by an overload, the tripping frame 90 is rotated in a clockwise direction as previously described, thus in turn to rotate the tripping latch 48 clockwise into a position below and out of engagement with the latch face 54. Upon the release of the latch crank, under the action of the switch opening bias, the toggle 20, 22 will break to the right and the rolls 40 will travel over the inclined latch faces 38 of the toggle holding latches and then will ride upwardly along the cam faces 44 of the latches, the spring 64 holding the cam faces against the latch rolls 40 as illustrated in Fig. 2. In this figure the trip free components of the mechanism have nearly reached their fully switch open position in which the holding latch 146 is released. The tail pieces 46 of latches 36 are of such length that the rolls 44 always remain behind and in engagement with the cam faces 44 thereof. Upon the release of the holding toggle 134, 136 the actuating arm 18 and its connected solenoid move upwardly into the position shown in Fig. 3 in which the mechanism is reset. During the resetting movement the inverted tripping toggle 20, 22 is moved to its normally set position as shown in Figs. 1 and 3. During the resetting movement of the tripping toggle the latches 36 and the connected tripping mechanism are biased for rotation in a clockwise direction under the action of spring 64. Consequently, the cam faces 44 are held in engagement with the rolls 40 during such resetting movement of the mechanism and due to the parallel linkage comprising the generally horizontal arms 18 and 70 and the vertical arms 68 and 60 the latch crank is caused to rotate in a counterclockwise direction into its normal position in which the latch face 54 thereof is again engaged by the latch roll 52. In this position of the mechanism, which is illustrated in Fig. 3, the operating and actuating arms 16 and 18 are again locked together ready for subsequent conjoint switch closing movement. The holding toggle 134, 136 is collapsed. In the unlatched position of the holding latch 146 as shown in Fig. 3 the stud 154 thereof is located at the bottom extremity of the loop 156 of spring 158 and is thereby prevented from undue rotation in a clockwise direction in the early switch closing movement of the mechanism and before the latch roll 144 is moved behind the latch.

It will be evident from the above description that by suitably designing the latch faces 38 of the toggle holding latches 36, the pressure acting on the tripping latch 48 at the latch face 54 can be greatly reduced and consequently the tripping solenoids 96, 98 can be much smaller than would be necessary if the whole force due to the reaction of the connected switches were exerted against the tripping latch. It is found in practice that where formerly the power consumption of a solenoid for tripping the single latch mechanism associated with a certain switch was one thousand watts that with the latch construction of the present invention the power consumption of the solenoid can be reduced to thirty-five watts.

By adjusting the pull of spring 64 and the diameter of latch roll 40 the remaining thrust which is imparted to the tripping latch can be adjusted to compensate for a considerable variation in the reaction of different switches on the mechanism while maintaining a suitably light pressure against the tripping latch face.

Various changes may be made in the construction and arrangement of the parts without departing from the scope of the invention.

I claim:

1. Switch operating mechanism including an operating member which is biased for switch opening movement, an actuating member, a collapsible connection between said members releasably connecting them for conjoint switch closing movement, a latch carried by said actuating member for holding said connection against collapse, a stationarily supported tripping latch arranged to hold said holding latch against release of said connection, and tripping means for actuating said tripping latch.

2. Switch operating mechanism including a pivoted operating member which is biased for switch opening movement, a pivoted actuating member also biased for switch

opening movement, a normally under-set toggle connecting the free ends of said members, a toggle holding latch movable with the switch mechanism, a stationarily-supported latch having means which holds the movable latch in toggle holding condition in all parts of the travel of the mechanism, and means for tripping the stationary latch to effect the tripping of the movable latch.

3. Switch operating mechanism including a pivoted operating member which is biased for switch opening movement, a pivoted actuating member also biased for switch opening movement, a normally under-set toggle releasably connecting the free ends of said operating and actuating members, a toggle holding latch carried by and movable with said actuating member, a stationary latch which holds the movable latch in toggle holding condition whereby to lock said operating and actuating members releasably together in all parts of the travel of the mechanism, and means for tripping said stationary latch to effect the tripping of the movable latch.

4. Switch operating mechanism including a pivoted operating member which is biased for switch opening movement, a pivoted actuating member also biased for switch opening movement, a normally under-set toggle releasably connecting the free ends of said operating and actuating members, a toggle holding latch carried by and movable with said actuating member, a stationary latch which holds the movable latch in toggle holding condition whereby to lock said operating and actuating members releasably together in all parts of the travel of the mechanism, means to hold said actuating member releasably in switch closed position, means to trip said stationary latch to effect the tripping of said movable latch and the switch opening movement of said operating member free from said actuating member, and means responsive to the switch opening movement of said operating member to release said actuating member and reset said movable and stationary latches.

5. Switch operating mechanism including pivoted switch operating and actuating members having means for biasing them separately in a switch opening direction, means connecting said members releasably together for conjoint switch closing movement including a normally under-set toggle which connects the free ends of said members, and latching means including a movable latch carried by said actuating member having a holding connection with said toggle, and a stationary latch for holding the movable latch in toggle holding condition, the connection between said stationary and movable latches being such that said latches remain in the aforesaid holding relation in all parts of the switch closing movement of said mechanism, and means for tripping said stationary latch to effect the release of said toggle.

6. Switch operating mechanism including pivoted switch operating and actuating members having means for biasing them separately in a switch opening direction, means connecting said members releasably together for conjoint switch closing movement including a normally under-set toggle which connects the free ends of said members, and latching means including a movable latch carried by said actuating member having a holding connection with said toggle, and a stationary latch for holding the movable latch in toggle holding condition, the connection between said stationary and movable latches being such that said latches remain in the aforesaid holding relation in all parts of the switch closing movement of said mechanism, a second toggle releasably holding said actuating member in switch closed position against its bias, a latch controlling the collapse of said toggle, means to trip said mechanism including means acting on said stationary latch to trip it and effect the tripping of said movable latch, whereby to permit opening movement of said operating member free from said actuating member, and means which acts only in the latter part of the switch opening movement of said operating member to release the latch on said second toggle, whereby to permit said actuating member to move to switch open and mechanism resetting position.

7. Switch operating mechanism including pivoted switch operating and switch actuating arms, a normally under-set inverted toggle releasably connecting the free ends of said arms, a pivoted latch carried by said actuating arm for holding said toggle releasably in the aforesaid position, a stationary latch for holding said movable latch in toggle holding condition, said stationary and movable latches having a parallel motion connection whereby they maintain holding relation with said toggle in all parts of the switch closing travel of said mechanism, and means to trip said stationary latch to effect the tripping of the movable latch and the release of said operating arm.

8. Switch operating mechanism including pivoted switch operating and switch actuating arms, means operatively connecting said arms including a normally underset inverted toggle, means biasing said mechanism for switch opening movement, means for holding said toggle releasably in the aforesaid underset position including movable and stationary holding latches, said movable latch being carried by said actuating arm and having a holding engagement with said toggle and said stationary latch being carried by a fixed support and having an operative holding connection with said movable latch, and means for tripping said stationary

latch and consequently for tripping said movable latch to effect the collapse of said toggle.

9. Switch operating mechanism including a generally horizontal pivoted switch operating arm which is biased for switch opening movement, a generally horizontal pivoted actuating arm which is separately biased for switch opening movement, a normally underset inverted toggle for releasably connecting the free ends of said arms together for conjoint switch closing movement thereof, a latch pivoted to the free end of said actuating arm having an inclined latch face which engages an intermediate point of said toggle in the underset straightened position thereof, said latch having a depending arm which extends below said actuating arm, a latch crank pivoted concentrically with said actuating arm having a depending arm which is parallel with the depending arm of said latch, a link which is parallel with said actuating arm pivotally connecting the depending arms of said latch and latch crank, a stationarily-supported latch engaging said latch crank arranged to hold said latch crank and consequently through said connecting link to hold said toggle holding latch in toggle locking position, and means to trip said stationary latch and effect the collapse of said toggle.

10. Switch operating mechanism including a pivoted switch operating arm, a pivoted switch actuating arm, means including a normally underset tripping toggle releasably connecting the free ends of said arms together for conjoint switch closing movement, switch closing means operatively connected with said actuating arm, said arms being biased for movement into a switch open position thereof, means including a latch for normally holding said tripping toggle in set position, whereby to permit switch closing movement of said operating arm by a corresponding movement of said actuating arm, means releasably holding said latch in toggle engaging position including a second latch having a fixed pivotal support, and means operatively connecting said latches, the support for said latches and the connecting means therefor being such that the position of said latches relative to each other and relative to said toggle remains unchanged during the movement of the mechanism between switch open and switch closed positions.

11. Switch operating mechanism including a pivoted operating member, a pivoted actuating member, means operatively connecting the free ends of said members for conjoint switch closing movement, switch closing means for said actuating member, means constantly biasing said actuating member in switch opening direction, a latch carried by the mechanism for holding it closed, a stationary latch having means for holding said first latch against release of said mechanism, and means to release said mechanism including means to trip said stationary latch.

12. Switch operating mechanism including pivoted operating and actuating arms, separate means biasing them for switch opening movement, a normally underset toggle connecting the free ends of said arms, a latch carried by said actuating arm at its free end for holding said toggle against collapse, said latch having an integral arm which depends below said actuating arm, a latch crank pivoted concentrically with said actuating arm having a latch engaging arm which depends below said actuating arm, a thrust link which is parallel with said actuating arm pivotally connecting said movable latch arm with said depending latch crank arm, a stationarily-supported latch releasably engaging said latch crank arm, means constantly biasing said latch crank in a direction to engage said latch, tripping means for said stationarily-supported latch for effecting the release of said latch crank, whereby to permit said movable latch to release said toggle and permit said operating member to move in a switch opening direction, means to hold said actuating arm releasably in switch closed position during the aforesaid opening movement of said operating arm and thereafter to release said actuating arm for switch opening movement, whereby to permit said mechanism to move into a reset position.

13. Switch operating mechanism including pivoted operating and actuating arms, means releasably holding said actuating arm in switch closed position, a breakable toggle connecting said arms and arranged to be set to hold said operating arm in switch closed position and to break to permit movement of said operating arm to switch open position, said actuating arm being movable independently into switch open position to reset said toggle, and means to hold said toggle from breaking in both switch open and closed positions comprising a latch pivoted on and movable with said actuating arm and releasably engageable with said toggle, a stationarily located latch member and a latch engaged therewith for holding said first latch in toggle holding position, and mechanism connecting said latch member and toggle holding latch for maintaining said toggle holding latch in a definite unchanging relation with said latch member during movement of said toggle holding latch between switch open and closed positions of the mechanism.

14. Switch operating mechanism including pivoted operating and actuating arms, means releasably holding said actuating arm in switch closed position, a breakable toggle connecting said arms and arranged to be set to hold said operating arm in switch closed position and to break to permit movement of said operating arm to switch open position,

said actuating arm being movable independently into switch open position to reset said toggle, means to hold said toggle from breaking in both switch open and closed positions comprising a latch pivoted on and movable with said actuating arm and releasably engageable with said toggle, a stationarily-located latch member and a latch engaged therewith for holding said first latch in toggle holding position, mechanism connecting said latch member and toggle holding latch for maintaining said toggle holding latch in a definite unchanging relation with said latch member during movement of said toggle holding latch between switch open and closed positions of the mechanism, said connecting mechanism including a link pivotally connected with said toggle holding latch and latch member, and said toggle holding latch, latch member, link and actuating arm comprising a parallelogram linkage.

15. Switch operating mechanism including the combination of pivoted actuating and operating levers that are parallel in all operative positions thereof, a breakable connection between them, a latch carried by one of said levers for holding said connection releasably against breaking, a pivoted latch-holding member, a link pivotally connecting said latch and latch-holding member and disposed parallel to said latch holding lever in all positions of the latter, and a second latch for releasably holding said latch-holding member.

16. Switch operating mechanism as defined in claim 15 wherein said latch-holding member is pivoted concentrically with said latch-carrying lever.

17. Switch operating mechanism including the combination of pivoted actuating and operating levers that are parallel in all operative positions thereof, a breakable connection between said levers including a latch movable with said connected levers for releasably holding said levers connected, a pivoted latch-holding member, a link that is parallel with said levers in all operative positions thereof pivotally connecting said latch and latch-holding member, and a second latch for releasably holding said latch-holding member.

18. Switch operating mechanism including the combination of pivoted actuating and operating levers that are parallel in all operative positions thereof, a breakable connection between said levers, a pivoted holding member, a link that is parallel with said levers in all operative positions thereof pivotally connecting said holding member and breakable connection, and means for releasably holding said holding member.

In testimony whereof, I have signed my name to this specification.

HENRY P. PINKHAM.