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2,450,705

SWITCH MECHANISM

Filed Sept. 7, 1944

2 Sheets-Sheet 1

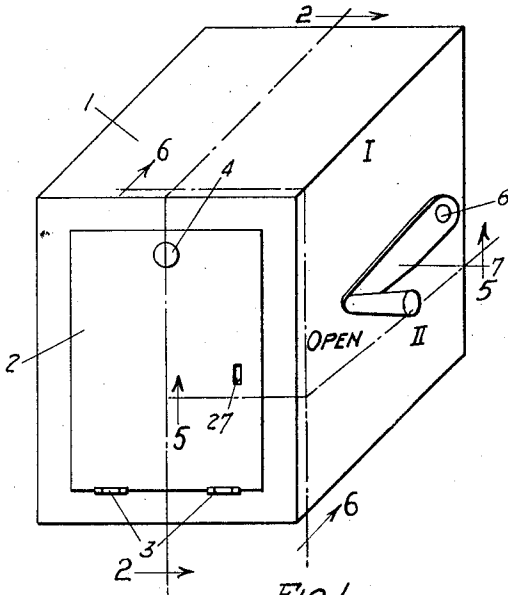
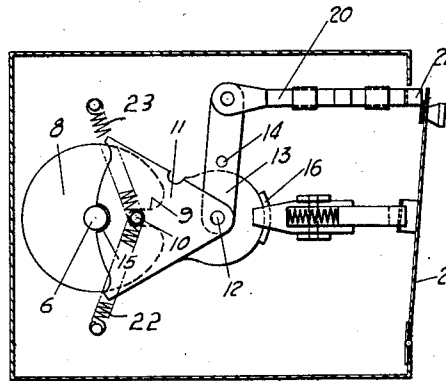


Fig 2

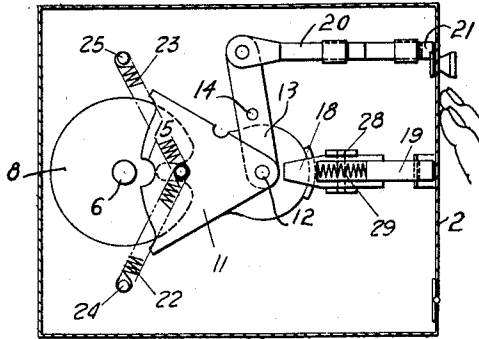


Fig 3

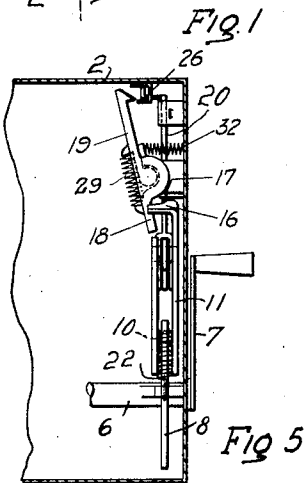


Fig 5

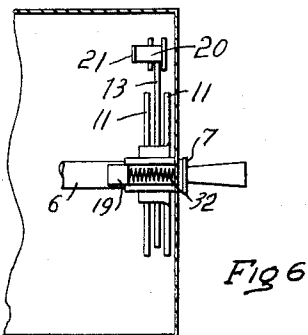


Fig 6

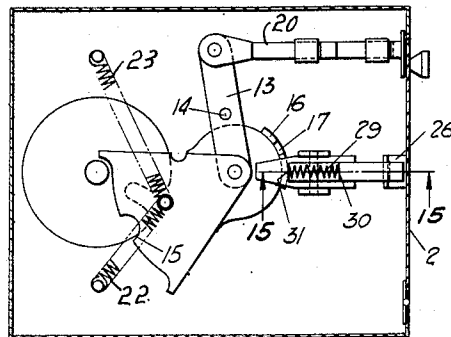


Fig 4

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SWITCH MECHANISM

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2 Sheets-Sheet 2

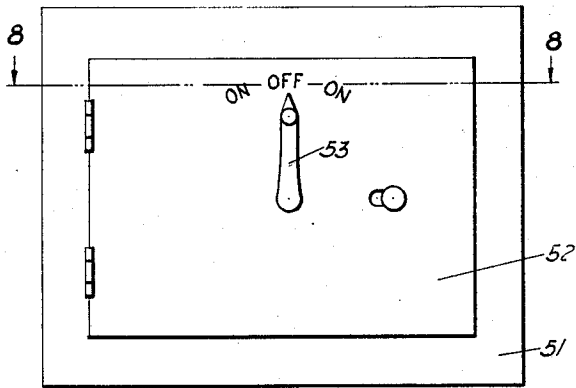


Fig. 7

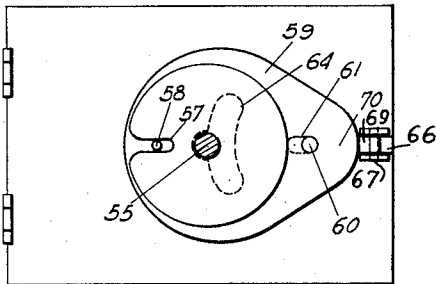


Fig. 9

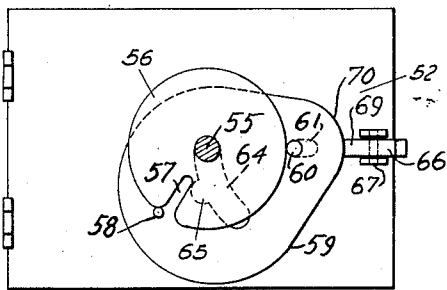


Fig. 10

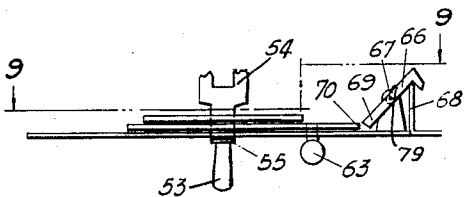


Fig. 8

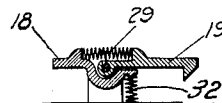


Fig. 11

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SWITCH MECHANISM

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2 Claims. (Cl. 200—50)

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This invention relates to interlocking devices for use upon enclosed switching mechanisms wherein an access door is provided.

Heretofore, a variety of forms of interlocking mechanism have been provided in association with enclosed switches for preventing the opening of an access door to the switch enclosure save when the switch is in open circuit position. Frequently however it is desirable, for inspection and testing purposes, to manipulate such switches with the door open. While in the interlocking mechanisms which have heretofore been provided it has been possible to trip the interlocking mechanism so as to permit manipulation of the switch with the enclosure door open, such mechanisms have been so designed that the door may not then be reclosed without first throwing the switch to open circuit position. Any effort to close the door of the switch enclosure with the switch in closed circuit position would result in jamming the interlocking mechanism as heretofore constructed unless the interlocking mechanism were constructed of such heavy material that it could not be jammed; in the latter case, the door could not even be closed.

Furthermore, such interlocking mechanisms as have heretofore been provided between a switch handle and an access door for the switch enclosure have not been adapted to be used upon double throw switches.

The object of the present invention, generally stated, is to provide an improved interlock between the switching mechanism and the access door of the switch enclosure so constructed and arranged that the interlocking mechanism may be formed of relatively light material but which will permit slamming of the door even with the switch in closed circuit position without damaging any of the parts.

Another object of the present invention is to provide an interlocking mechanism adapted for use with double throw switches.

A further object of the invention is to provide an interlocking mechanism provided with a part accessible to permit manipulation of the switch even with the door open.

A still further object of the invention is to provide an interlocking mechanism wherein the door must be pressed to fully closed position before the switch mechanism will be released for operation.

Other objects will become apparent to those skilled in the art when the following description is read in connection with the accompanying drawings, in which:

Figure 1 is a perspective view of an enclosed

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switch constructed in accordance with the present invention;

Fig. 2 is an interior view of the side wall of the switch enclosure shown in Fig. 1, being a sectional view taken along the plane indicated by the lines 2—2 and illustrating the interlocking mechanism of the present invention with the access door ajar;

Fig. 3 is a view corresponding to Fig. 2 but showing the relation of the parts with the access door fully closed and the switch handle in open circuit position;

Fig. 4 is a view corresponding to Fig. 3 but showing the parts in closed circuit position;

Fig. 5 is a sectional view taken along the plane indicated by the lines 5—5 in Fig. 1 and showing the parts illustrated in Fig. 2 from the bottom elevation;

Fig. 6 is a sectional view taken along the plane indicated by the lines 6—6 in Fig. 1 and showing the parts illustrated in Fig. 2 from the right end;

Fig. 7 is a view in front elevation of a switch enclosure having an access door with the switch handle mounted on the access door;

Fig. 8 is a sectional view taken along line 8—8 of Fig. 7 showing the interlock parts;

Fig. 9 is an interior view of the access door shown in Fig. 7 illustrating the interlock parts in open circuit position with the latch tripped position;

Fig. 10 is a view corresponding to Fig. 9 but showing the parts in closed circuit position;

Fig. 11 is a detail view of the latch shown in Figs. 1—5.

In accordance with the present invention an interlocking mechanism is provided between the operating handle of an enclosed switch and the latch, or part associated with the latch, of an access door for the switch enclosure. The present invention especially contemplates an interlock of the character wherein either during the final closing operation of the access door (i. e., between ajar position and fully closed position) or after the door is fully closed a part of the interlocking mechanism is moved to release the operating handle for operation, but in the event that the operating handle is in closed circuit position when the door is closed no parts will foul one against the other. In the embodiments wherein the interlock is released during the final closing movement of the door it is desirable to position the interlock release at a point conveniently accessible when the access door is open. In the several embodiments of this invention the

interlock release is positioned adjacent the frame of the access door so that, when it is desired to manipulate the switch with the door open, the interlock release may be actuated by hand exactly as it would be actuated were the door to be moved fully closed.

Another important aspect of the invention herein disclosed is the adaptability of the interlocking mechanism to double throw switches. This aspect of the invention is characterized by an arrangement which maintains an interlocking part in position where it cannot be moved to actuate the latch while the switch handle is in either of the closed circuit positions, there being an intermediate position whereat the latch may be opened, such intermediate position corresponding to the open circuit position of the switch handle.

Referring now to Figs. 1 to 6, inclusive, for an illustrative embodiment of the present invention, a switch enclosure 1 is provided with an access door 2 which is hinged to the enclosure as shown at 3. The door is also provided with a knob 4 which may, in accordance with common practice, be provided with a manually movable latch. In lieu of providing a manually movable latch associated with the knob 4 any suitable spring detent unassociated with the interlocking mechanism hereinafter to be described may be provided.

Extending through one of the walls of the enclosure 1 is a switch operating shaft 6 provided with a handle 7 which, in the embodiment shown, is adapted to be moved to three positions, to wit, the open circuit position as shown and either of two closed circuit positions illustrated diagrammatically at I and II. It will be understood that the shaft 6 extends to a contact carrier, not shown, which may be of any desired form.

On the interior of the enclosure 1 a cam 8 is mounted upon shaft 6 for movement therewith. In the form shown the cam 8 constitutes a disk having a slot 9 cut therein to accommodate a pin 10. The pin 10 is mounted upon a lever 11 which is pivoted at 12 upon another lever 13 pivoted to the wall of the enclosure at 14. The arrangement just described permits a translatory or floating movement of the lever 11 crosswise between the positions thereof indicated in Figs. 2 and 3.

The lever 11 has its end adjacent shaft 6 configured to provide a recess 15 adapted to engage and interlock with the shaft 6 when the lever 11 is in the position shown in Fig. 2, thus to prevent, in that position, rotation of the lever 11 about its pivot 12.

On the opposite end of the lever 11 a cam 16 is provided. The cam 16 has an intermediate depression 17 to accommodate the tail 18 of latch 19 when the latch is in door releasing position as shown in Fig. 5. At either side of the intermediate depression 17, however, the cam 16 is provided with parts which elevate the tail 18 of the latch 19 to positively move the latch into door engaging position as shown in Fig. 4.

The upper end of lever 13 is provided with a pivotally connected push rod 20 the end of which extends into a position as shown at 21 where it will engage the access door 2 or part carried thereby when the door is ajar. Further counterclockwise movement of the door 2 from the position shown in Fig. 2 will effect a movement of the push rod 20 toward the left, swinging lever 13 about its pivot 14 and translating lever 11 rightwardly to the position shown in Fig. 3. This movement of the lever 11 is against the restraint of a pair of springs 22 and 23 extending between

pin 10 and suitable anchorages 24 and 25 on the interior side wall of the enclosure 1.

When the parts have assumed the position shown in Fig. 3 the switch handle 7 may be turned to either of the circuit closing positions. If turned to position II, the parts will assume the relation shown in Fig. 4 of the drawings. In this position it will be seen that the cam 16 maintains the tail 18 of latch 19 elevated and the latch engaged with its co-operating abutment 26 on door 2.

In the embodiment illustrated the latch itself is organized so that if it becomes necessary to open the door 2 while the switch parts remain in circuit closing position such can be accomplished by the insertion of an instrument such as a screwdriver or key through a small aperture 27 arranged in the door 2 opposite abutment 26. The construction of the latch is such that release may thus be accomplished notwithstanding the engagement between cam 16 and tail 18. In the embodiment illustrated the tailpiece 18 as well as latch 19 are pivoted upon a pin 28 and a spring 29 is inserted between shoulder 30 on latch 19 and shoulder 31 on tailpiece 18, the spring compression tending to rotate the latch 19 and tailpiece 18 in opposite directions around pivot pin 28. Abutments are, however, provided to prevent the latch 19 from moving in a clockwise direction (as shown in Fig. 5) relative to tailpiece 18 beyond the position shown in Fig. 5 and a spring 32 is provided to bias the assembly in a counterclockwise direction toward the position shown in Fig. 5, it being understood that the latch 19 and tailpiece 18 assume the position shown in Fig. 5 only when the depression 17 in cam 16 is aligned with the tailpiece 18.

Referring now to Figs. 7 to 10, inclusive, for a further embodiment of the invention wherein the switch operating handle and the interlocking parts are shown mounted upon the door of the switch enclosure, a suitable enclosure 51 having a door 52 hinged thereto contains any suitable switching mechanism having a contact carrier adapted to become coupled with the shaft of a switch operating handle 53 when the door 52 is closed. On the interior of the door the shaft of handle 53 is provided with a coupling 54, shown in Figure 8, adapted to engage a companion coupling on the switch mechanism and to transmit motion from handle 53 thereto.

Fixedly mounted upon shaft 55 of handle 53 is a crank 56 shown in the form of a disk having a slot 57 to receive a crank pin 58. The crank pin 58 is mounted upon an eccentric lever 59 which is, in turn, mounted to float and pivot about a pin 60. To enable the lever 59 to float, i. e., move transversely relative to pin 60 a slot 61 is provided in the door 52. The pin 60 extends through such slot and terminates on the exterior of the door in a knob 63.

The lever 59 is also provided with an arcuate slot 64 concentric with pin 60. The slot 64 accommodates shaft 55 and permits lever 59 to rotate about pin 60 when pin 60 is at the left end of slot 61. The arcuate slot 64 is also provided with a recession 65 shaped to conform to shaft 55 so as to embrace the same and prevent pivotal movement of lever 59 about pin 60 when pin 60 is at the right end of slot 61, as shown in Fig. 9.

A latch 66 is pivoted at 67 upon the door 52 and is adapted to engage an abutment 68 on the enclosure in order to hold the door closed. The tail 69 of latch 66 extends into a position whereat it may be engaged by nose 70 of lever 59 when

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said lever is moved rightwardly to the position shown in Fig. 9. The rightward movement of lever 59 turns latch 66 in a counterclockwise direction, as shown in Fig. 8, to release the same from its abutment 68. A suitable spring 79 may be provided for biasing latch 66 into the position shown in Fig. 8.

With this arrangement of parts it is evident that the lever 59 may not be translated so as to release latch 66 save when the handle 53 is in the open circuit position. Furthermore, when the lever 59 has been translated to the position shown in Fig. 9 wherein latch 66 is open, handle 53 may not be moved from its open circuit position due to the engagement of depression 65 about shaft 55.

From the foregoing description it is apparent that those skilled in the art will understand the structure, function, and mode of operation of the several embodiments of the invention herein disclosed and appreciate the advantages thereof. While three embodiments have been disclosed in detail it is to be understood that the invention is not limited thereto but the drawings and description thereof are to be understood as being merely illustrative. It is realized that many modifications and variations will present themselves to those skilled in the art without departing from the spirit of this invention or the scope thereof, as set forth in the appended claims.

I claim:

1. An interlock for an enclosure having a door for housing an operating apparatus having an operating handle movable to active and inactive positions, comprising a control member pivoted to move with said handle, a locking member for said handle pivoted independently of said control member, means connecting said members whereby pivotal movement of one causes pivotal movement of the other, means engageable by said door when closed operating to shift the pivot of said locking member to move the same to unlocking position, a door latch self-biased to latching position, means adapted to bias said latch to unlatching position, and means connected with said locking

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member operating to overcome the latter bias of said latch when said handle is in active position.

2. In an electric switching apparatus having an enclosure, a door, a latch to hold the door closed, a switch-operating handle on the exterior of the enclosure movable between "on" and "off" positions and a shaft within the enclosure arranged to be rocked by the handle; a pair fixed to the shaft and extending radially therefrom, a lever pivoted for movement about an axis parallel to said shaft, said lever and its pivot being translatable toward and away from said shaft, a loose eccentric connection between said part and said lever to transmit rotary motion therebetween but to permit relative translatable motion, said lever having a notch interengaging said shaft when the lever is at one extreme of its translatable movement, such interengagement locking said lever, said part and said shaft against rotational movement, said notch being interengageable with said shaft only when the handle is in "off" position, and said lever having a portion arranged to move the latch into position whereat the door is locked closed when the handle is out of "off" position and to release the latch to unlock the door when the notch and shaft are interengaged.

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Certificate of Correction

Patent No. 2,450,705.

October 5, 1948.

FLOYD C. WILLIAMS

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 6, line 8, claim 2, for the word "pair" read *part*;
and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of December, A. D. 1948.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.

Certificate of Correction

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