Sept. 15, 1925. 1,553,446

B. D. HORTON

ELECTRIC SWITCH

Filed April 15, 1919 2 Sheets-Sheet 1

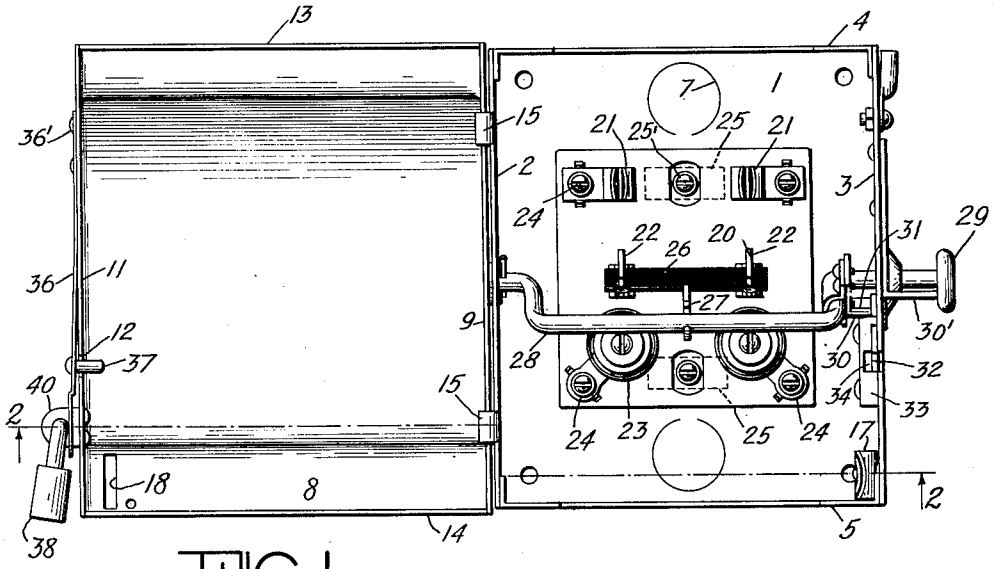


FIG. 1

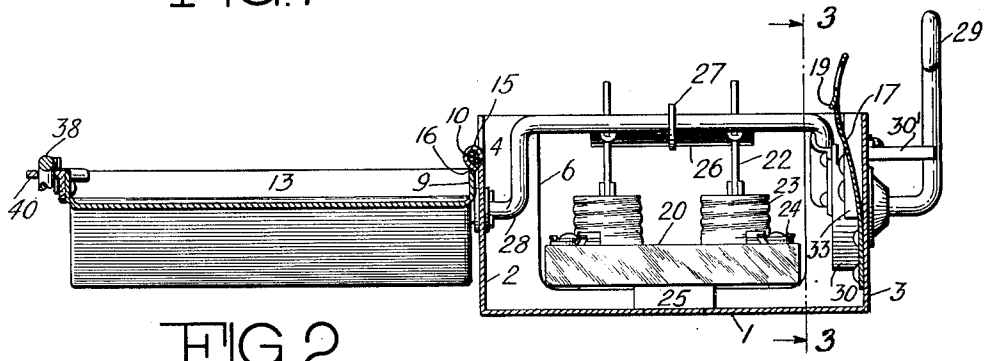


FIG. 2

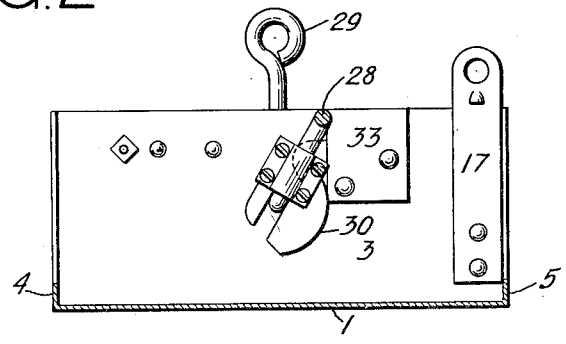


FIG. 3

Inventor
Bryson D. Horton,
By his Attorneys
Dunn & Goodlett

Sept. 15, 1925. 1,553,446

B. D. HORTON

ELECTRIC SWITCH

Filed April 15, 1919 2 Sheets-Sheet 2

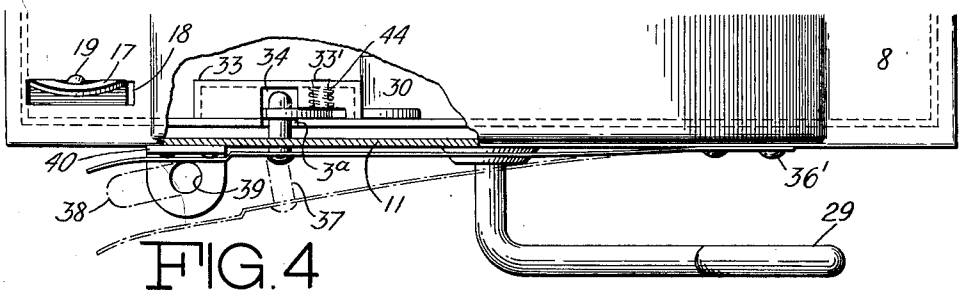


FIG. 4

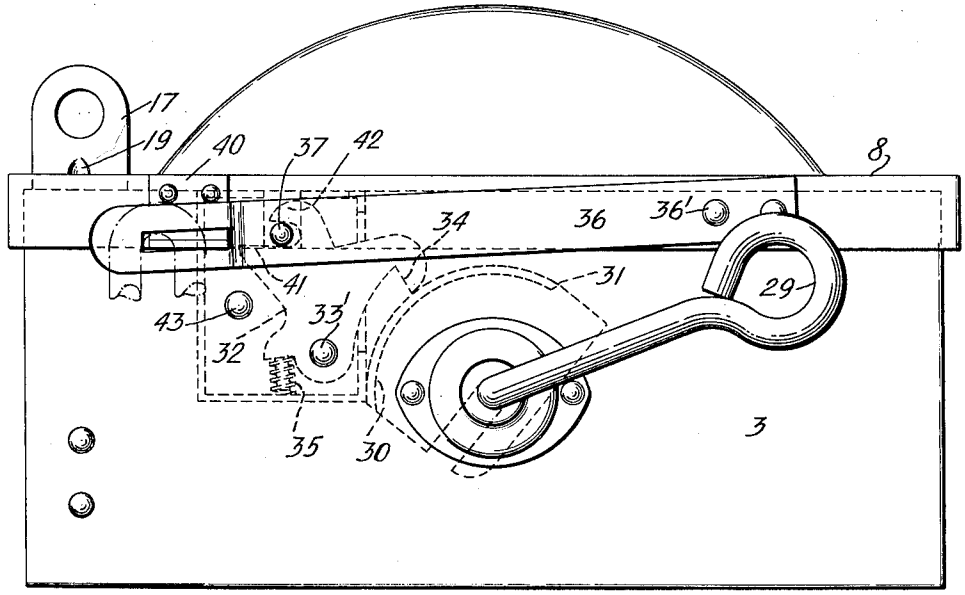


FIG. 5

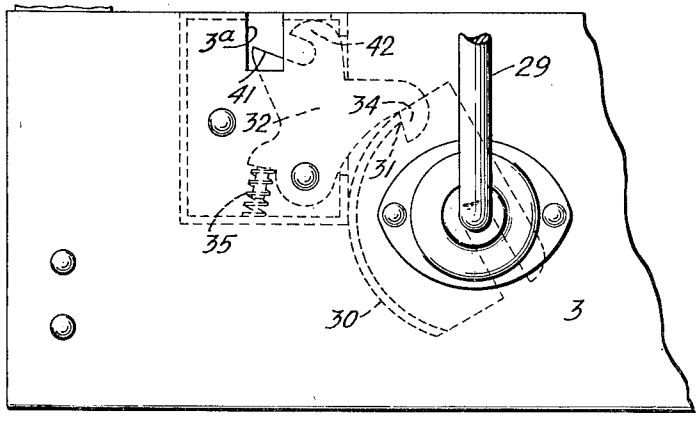


FIG. 6

Inventor
Bryson D. Horton,
By his Attorneys
Lyon & Goodlett

Patented Sept. 15, 1925. 1,553,446

UNITED STATES PATENT OFFICE.

BRYSON D. HORTON, OF DETROIT, MICHIGAN, ASSIGNOR TO SQUARE D COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

ELECTRIC SWITCH.

Application filed April 15, 1919. Serial No. 290,314.

To all whom it may concern:

Be it known that I, BRYSON D. HORTON, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Electric Switches, of which the following specification is a clear and exact description thereof.

This invention relates to an interlock for enclosed electrical switches and a disabling device associated with the interlock, and to switch casings in general. Electrical switches have been heretofore enclosed in protective casings for the purpose of increasing the safety factor, in order that unskilled workmen may not come in contact with live wires, and also to reduce the fire hazard.

Among the objects of my invention are to provide an externally operated and enclosed switch with an improved form of interlocking device and parts associated therewith which will, first, normally insure that the switch contacts be locked open whenever the cover is open; second, that the cover be locked closed whenever the switch contacts are closed, and, third, that the cover be releasably latched in a completely closed position at all times, thereby preventing its being accidentally opened when the switch is open. This structure is eminently satisfactory for the protection of the unskilled workman who should not be allowed to come in contact with live parts.

Another object of my invention is to associate with and incorporate in such a device a means whereby the competent and properly authorized person may temporarily disable the interlocking device and gain access into the interior of the casing for purposes of inspection and test.

As he is able, therefore, to disable the interlock and obtain access to the interior of the casing, he can make inspection of the switch, contacts, fuses and wiring, etc., without in any way interrupting the flow of current to the load which is being controlled by this box. He will not interfere with whatever work is being done in the factory. Inspection may be made more frequent and under actual running conditions.

Another object of my invention is to provide a hinge device and casing which can be assembled at a minimum of expense and which is, however, entirely satisfactory for the purpose to which it is put.

Another object of my invention is to provide a larger gutter space to accommodate wiring within the interior of the switch enclosure.

Other objects of my invention will become evident as the description proceeds, and I would have it understood that all objects and advantages are within the scope of my invention, and that I reserve all rights thereto and to the structural equivalents and uses to which the same may be put.

In the accompanying drawings, I have shown one complete embodiment of my invention, but I desire to distinctly state that this showing is for illustrative purposes only, and is not to be considered in a limited sense, as the scope of my invention is to be limited solely by the claims which follow this specification.

In the drawings:

Fig. 1 is a plan view showing my improved structure with the cover completely opened and showing the switch mechanism in the "off" position, and the interlock normally functioning.

Fig. 2 is a section on line 2—2 of Fig. 1 taken in the direction of the arrows.

Fig. 3 is a section on the line 3—3 of Fig. 2 taken in the direction of the arrows.

Fig. 4 is a plan view partly broken away showing the switch in the closed position and the cover closed, and also showing in dash and dot the disabling device in the position in which the cover may be opened, even though the switch is closed.

Fig. 5 is a side elevation of the switch shown in Fig. 4; and

Fig. 6 is a side elevation of the switch as shown in Fig. 2, wherein the switch mechanism is locked "open" while the cover is open.

Like reference characters refer to like parts through the several views.

The housing for the switch comprises a box like enclosure having a bottom 1, a side wall 2, to which there is hinged a cover, an opposite side wall 3 provided with an open

slot 3ª, and carrying interlocking mechanism and switch operating means, opposite end walls 4 and 5 which may be slotted as shown at 6 for the reception of suitable end plates, not shown, for the connection of conductors, meter adapters and the like. The bottom 1 of the casing may be provided with suitable knock-outs 7 for admitting conductors through the rear or bottom of the box. A cover member 8 having a flange 9 provided with a plurality of apertures 10, an opposite flange 11 provided with an open notch 12, and opposite end flanges 13 and 14 is adapted to close the casing and to be opened to afford access to the interior thereof. The hinge device between the cover flange 9 and the casing wall 2 is preferably made by severing a portion 15 of the metal wall 2 and rolling the same outwardly, passing the free end 16 thereof through aperture 10, and then bringing the free end 16 closely adjacent the outer side of the wall 2. This hinge device is very satisfactory and may be constructed by labor saving machinery. The casing wall 3 also supports a spring catch 17 which is adapted to hold the cover securely closed, this catch being passed through an aperture 18 in the cover. The catch 17 is provided with a projecting prong 19 which will engage with the upper surface of the cover when the cover is completely closed. This is brought out clearly in Fig. 5.

An insulating block 20 carrying suitable fixed contacts 21, movable switch blade contacts 22, fuse receptacles 23 and binding post terminals 24 is supported from the bottom 1 of the casing by blocks 25, which will place the insulating base 20 away from the wall of the casing, thereby providing space for carrying wires through the housing, suitable screws 25′ being employed as a fastening means. The movable switch contacts 22 are interconnected by suitable insulating cross bar 26, provided with an upstanding member 27 for operating the crossbar. Pivoted in the walls 2 and 3 of the casing is a switch operating member of U-shaped or bail configuration 28, which is suitably attached to the member 27. The switch operating member 28 is extended through the wall 3 and provided with a suitable operating handle 29 exterior of the casing. By the manipulation of the handle 29, the switch may be opened and closed. An exterior stop 30′ is provided to limit the movement of the handle to the open position.

The switch operating member 28 carries, by any suitable fastening means a sector or arcuate shaped member 30 having a stopping shoulder 31 which is adapted to cooperate with a movable hook-shaped locking plate 32. The wall 3 also carries a housing 33 fastened thereto, this housing supporting the locking plate. This locking plate 32 is pivotally mounted on one of the rivets 33′, which is used for fastening the housing 33 to the side wall 3. This locking plate is provided with a shoulder 34 adapted to cooperate with the stopping shoulder 31 to arrest movement of the switch operating mechanism toward the closed position. A spring 35 biases the plate 32 against the arcuate member 30 and holds the parts 32 and 34 in engagement, as shown in Fig. 6. The housing 33 is open at the top as shown at 34 to permit access to the locking plate 32, this opening being in alinement with the slot 3ª in the side wall 3.

The flange 11 on the cover carries a flat flexible spring member 36 riveted thereto, as shown at 36′. This resilient member 36 is provided with a pin 37 adapted to project inwardly through the slot 12, and to be held in such position by a suitable lock 38, cooperating with the hole 39 in the ear 40 riveted to the flange 11 on the outer side. The pin 37 is carried by the cover in such position that it will readily enter the opening 34 in the housing 33 and the slot 3ª, when the cover is moved toward the closed position. The locking plate 32 is also provided with a portion 41 which is adapted to lie in the path of the pin 37 as the cover is closed, and when the pin 37 engages with the portion 41, it oscillates the plate 32 counter clockwise from the position shown in Fig. 6, to that shown in Fig. 5 thereby disengaging the locking shoulder 34 from the stop shoulder 31. At the same time, however, another part 42 of the locking plate 32 has passed above the pin 37, as shown in Fig. 5 so that the pin 37 cannot be raised or the cover opened without oscillating the plate 32 in a clockwise direction. Such oscillation, however, is prevented by the tip of the locking shoulder 34 as it is in engagement with the arcuate member 30. The housing 33 is further secured to the wall 3 by another rivet 43 and the plate 32 is held in place by a spring 44 on the pivot rivet 33′.

By the construction so far described, it is impossible to open the cover while the switch is in closed position, and further, it is impossible to close the switch while the cover is in open position. In the position of the cover and locking plate 32 as shown in Fig. 5 and with the switch open with the arcuate plate 30, as shown in Fig. 6, it will be clear that the spring 35 will bias the plate 32 in a clockwise direction, whereby the portion 41 will tend to raise the pin 37, thereby raising the cover to a slight extent. The spring catch 17 and 19, as before described prevents movement of the cover. This operation is of importance for, were the spring 35 to be permitted to move the cover 8, the hook 34 would be moved sufficiently to engage the stop shoulder 31, thereby preventing the closing of the switch unless the cover were manually moved to its full closed position.

The cooperation of the interlock and the spring catch as above described, is of special value when the switch is mounted on a wall, and therefore the weight of the cover has no tendency to retain the cover closed.

As I have pointed out above, these interlocking devices do not permit inspection of the switch and associated fuses even by persons who are competent to deal with the apparatus when carrying current. This interlock however may be readily disabled by such an authorized person, as follows:

By the removal of the lock 38 from cooperation with the ear 40, which normally holds the pin 37 in the position shown in full lines in Figs. 4 and 5, when the switch is closed, I am enabled to move the pin to the dotted position shown in Fig. 4. When the pin 37 is then moved downwardly as shown in this view, there is nothing to interfere with opening the cover, as soon as the latch 17 is moved to release the cover from the catch 19. The cover may then be opened irrespective of the position of the switch operating means, the switch inspected and the cover subsequently closed, the pin 37 returned to its normal position and the lock replaced. All this may be accomplished without in any way interfering with the load which is being normally carried by the switch.

It is, of course, to be understood that the embodiment above described and illustrated in the drawings could be changed in many ways without departing from the scope of the following claims; and therefore such matter is intended to be interpreted as illustrative only and not in the limiting sense.

I claim:

1. A lock for the cover of electrical switch casings, comprising a depending flange on the cover, said flange having a notch therein, a resilient member attached to said cover, a pin carried thereby and adapted to pass through said notch, and means within said casing to engage said pin.

2. In a device of the class described, the combination with an enclosure, a switch, external operating means for the switch, and interlocking means to prevent access to the switch, comprising a pin on the cover of said enclosure adapted to project into interlocking engagement with a member pivoted on the casing, of means for disabling said interlocking means comprising a resilient mounting for said pin whereby it may be withdrawn from engagement with said member.

3. In a device of the class described, the combination with a casing provided with a hinged cover, a switch, external operating means for the switch, and interlocking means for preventing access to the switch when closed, comprising a pin mounted on the cover remote from the hinge, of means for disabling said interlock comprising a resilient mounting for said pin on the cover remote from the hinge whereby the pin may be moved from its interlocking relation.

4. In a device of the class described, in combination, an enclosure having a cover, a switch within said enclosure, external operating means for said switch, means for preventing access to said switch when the switch is closed, comprising an arcuate member carried by the operating means, a hook shaped member biased against the arcuate member, connections between the cover and hook shaped member opposing the biasing of the hook shaped member when the cover is closed, and normally disengageable only when the switch is opened thereby allowing the hook shaped member to engage and stop the arcuate member, a lock and means controlled by the removal thereof whereby said connections may be disengaged when the switch is closed.

5. In combination, a switch casing having a cover removable to gain access to the interior thereof, a switch in the casing, operating means for the switch provided with a stop shoulder, a hook pivoted on the casing and arranged to engage the stop shoulder, said hook and wall having coinciding slots, a locking member on the cover adapted to enter said slots as the cover is closed and rock the hook on the pivot to cause the hook to interengage the member on the cover thereby locking the cover closed, and means under the control of a lock whereby the interengagement of the cover carried member and the hook may be disabled.

6. In a device of the class described, the combination with an enclosure, a switch, external operating means for the switch, an interlocking means to prevent access to the switch, of means for disabling said interlocking means, comprising a resiliently mounted device, and a removable lock cooperative with said resiliently mounted device to retain the same in normal position, the removal of said lock permitting said disabling.

7. In a device of the class described, the combination with a casing provided with a hinged cover, a switch, external operating means for the switch, and interlocking means for preventing access to the switch when closed, said means being remote from the hinge, of means for disabling said interlocking means, comprising an element carried by the cover on the side remote from the hinge, and a removable lock for said element.

8. In an enclosed switch, a switch operating mechanism, a cover, means for interlocking said cover and said switch operating mechanism, said means comprising a pin, means for carrying said pin comprising a strip resiliently mounted on the flange of the cover remote from the hinge, and means

whereby said strip is normally held in such position that the pin functions to interlock the cover closed.

9. In an enclosed switch, a switch operating mechanism, a cover, means for interlocking said cover and said switch operating mechanism, said means comprising a pin, a strip extending along the flange of said cover remote from the hinge, the pin being mounted on one end of said strip and the other end thereof being secured to the cover, and locking means for holding the free end of said strip close to the flange to position said pin in operative position, and whereby when said lock is released said free end may be moved and the pin withdrawn to disable said interlock.

10. In an enclosed switch comprising a casing and a cover, fixed and movable contacts, operating means for said switch contacts having a portion thereof exteriorly accessible, and interlocking means whereby said cover cannot be opened while the switch is closed, said last means comprising a member pivotally mounted separately on said casing and a pin mounted on the cover, said pin being resiliently mounted so that it may be moved against the normal bias thereof while the switch is closed to release the interlocking engagement between the cover and casing and thereby permit the cover to be opened although the switch remains closed.

11. In an enclosed switch comprising a casing and a cover, fixed and movable contacts in said casing, means for operating said switch having a portion thereof exteriorly accessible, interlocking means whereby said cover cannot be opened while said switch contacts are closed, said last means comprising a member pivotally mounted separately on said casing and a pin mounted on said cover, and means whereby said pin may be withdrawn from interlocking engagement with said pivoted member and thus release said interlock to permit the cover to be opened while the switch contacts are in closed position.

12. In an enclosed switch comprising a casing and a cover, fixed and movable contacts, switch operating means comprising an exteriorly accessible portion, interlocking means to prevent the opening of the cover when the switch is closed, said interlocking means comprising a pin mounted on the cover and adapted to be moved transversely and substantially perpendicularly to the other elements of the interlocking means, to release the interlocking engagement and allow the cover to be opened while the switch remains closed.

13. In an enclosed switch, switch operating means having a portion thereof exteriorly accessible, a casing, a cover hinged thereto, said cover having a flange on the side, an interlock between the cover and switch operating means whereby said cover cannot be opened when the switch is in closed position, said interlock comprising a pin mounted on said cover and adapted to be moved, from the exterior of said cover, to and from interlocking position in a direction parallel to said cover and substantially perpendicularly to said flange whereby the interlock may be released and said cover opened while the switch remains closed.

14. In an enclosed switch, a casing, a cover hinged thereto, switch operating means in said casing having a portion thereof exteriorly accessible, interlocking means whereby said cover cannot normally be opened while said switch is closed, said interlocking means embodying a pin mounted on said cover and projecting through a portion thereof, said pin being adapted to be moved transversely in a direction substantially parallel to said cover and to and from the side wall of said casing to so release said interlock that the cover can be opened while the switch remains closed.

15. In an enclosed switch, a casing, a cover therefor, switch operating means having an exteriorly accessible portion, interlocking means comprising a member separately pivoted on said casing and a pin mounted on said cover and cooperative therewith, said means normally preventing the opening of the cover while the switch is in closed position, and means whereby said pin can be moved to release the interlock and permit the cover to be opened while the switch is closed, said means being such that said pin thereafter returns automatically to normal interlocking position.

16. In an enclosed switch, a switch casing, a movable cover therefor, a switch element in said casing, a handle for operating said switch element, a latch member in said casing, a cooperating catch carried by said handle for locking the switch in open position, a movable bolt for causing said members to be disengaged when the cover is closed, said bolt and latch member also cooperating to lock the cover closed when the switch element is in closed circuit position, and means for withdrawing said bolt from engagement with said latch member to permit the cover to be opened when the switch is in closed circuit position.

17. In an enclosed switch, a switch casing, a movable cover therefor, a switch element in said casing, a handle for operating said switch element, a latch member carried by said casing, a spring pressed bolt carried by said cover and cooperating with said latch member, a member carried by said handle for causing said latch and bolt to interengage and hold the cover closed when the switch element is moved to closed circuit position, and means for withdrawing said bolt from engagement with said latch

to permit the cover to be opened when the switch is in closed circuit position.

18. In an enclosed switch, a casing, a cover hinged thereto, switch operating means in said casing having a portion thereof exteriorly accessible, interlocking means whereby said cover cannot normally be opened while said cover remains closed, said cover having a flange on the side opposite the hinged side thereof, and said interlocking means comprising a pin mounted on said flange, said pin being so mounted that it is movable, by exterior manipulation, to and from the side wall of said casing to release said interlock and allow the opening of said cover while said switch remains closed.

19. In an enclosed switch, a casing, a cover hinged thereto, switch operating means in said casing having a portion thereof exteriorly accessible, interlocking means whereby said cover cannot normally be opened while said cover remains closed, said cover having a flange on the side opposite the hinged side thereof, and said interlocking means comprising a pin mounted on said flange and projecting therethrough, said pin being so mounted that it may be moved, by exterior manipulation, in a direction away from the side wall of said casing to release it from engagement with the remainder of the interlocking means to disable the latter and allow the cover to be opened while the switch remains closed.

20. In an enclosed switch, a casing, a cover therefor, switch operating means in said casing having a portion thereof exteriorly accessible, interlocking means whereby said cover cannot normally be opened while the switch is closed, a flange on said cover, a pin-like member so mounted on said flange that it may be moved therethrough from the exterior of the casing, said pin functioning when in its innermost position to lock said cover closed when the switch is closed, and means associated with said pin to permit its being retracted outwardly through said flange to release said interlock and allow the cover to be opened although the switch remains closed.

21. In an enclosed switch, a casing, a cover therefor, switch operating means in said casing having a portion thereof exteriorly accessible, interlocking means whereby said cover cannot normally be opened while the switch is closed, a flange on said cover, and a pin-like member so mounted on said flange that it may be moved therethrough from the exterior of the casing, said pin functioning when in its innermost position to lock said cover closed when the switch is closed, said pin being so connected with said flange that it may be retracted therethrough from the exterior of the casing to release said interlock and allow the cover to be opened although the switch remains closed.

BRYSON D. HORTON.