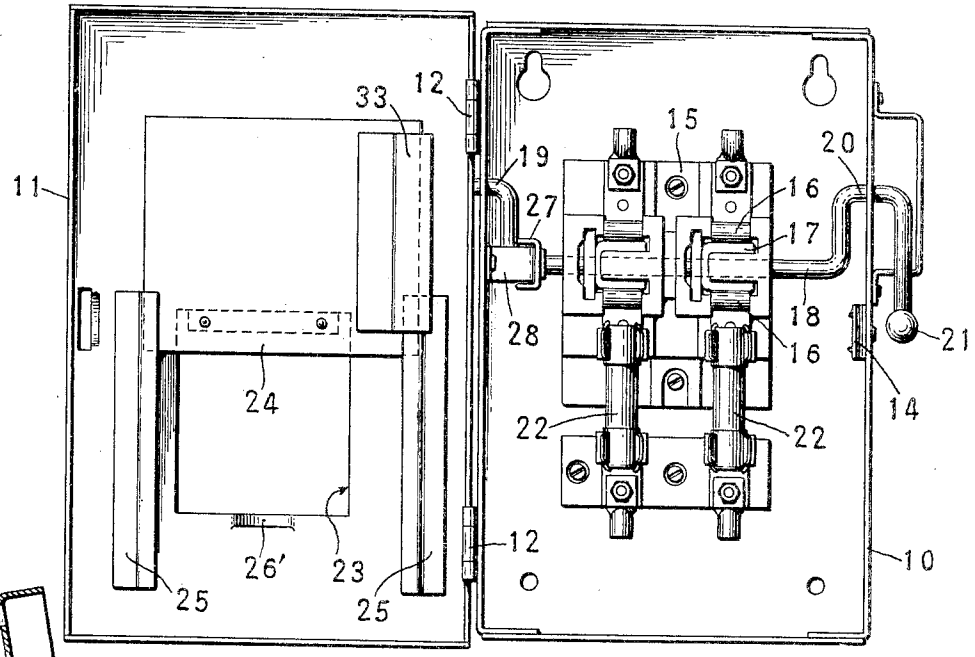
May 22, 1934. L. P. CASSIDY 1,959,903

ENCLOSED SWITCH

Filed Nov. 7, 1931 2 Sheets-Sheet 1

Fig. 1.



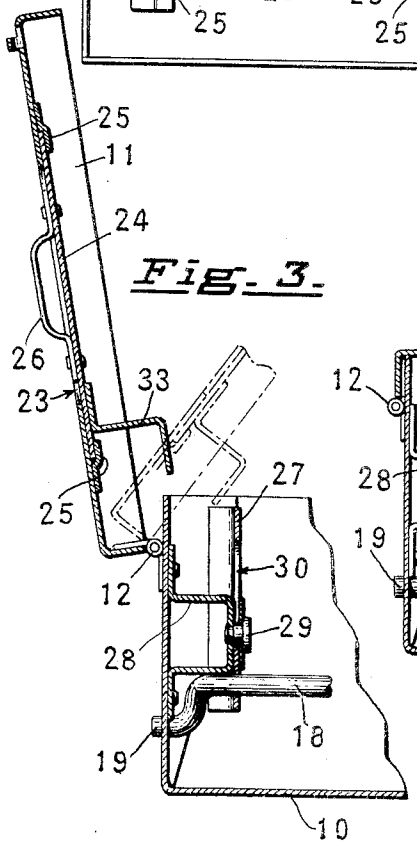
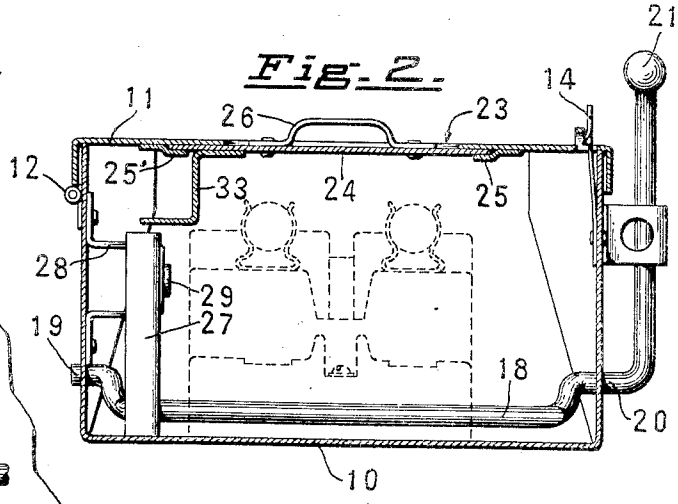


Fig. 3.

Fig. 2.



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Fig. 5.

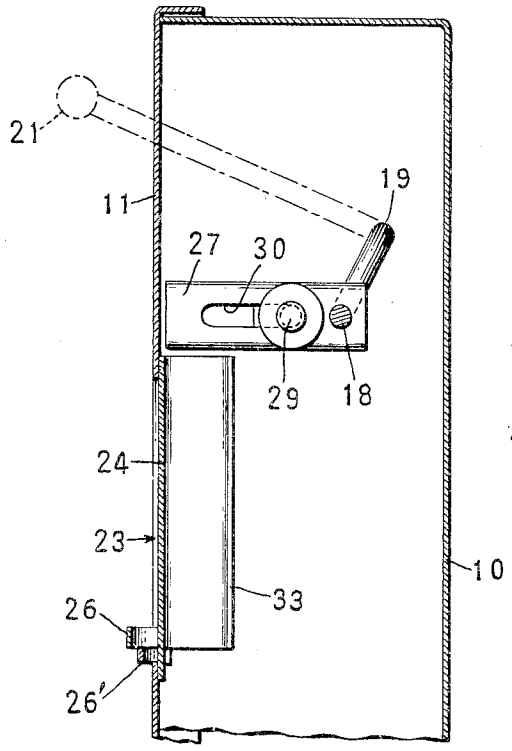


Fig. 4.

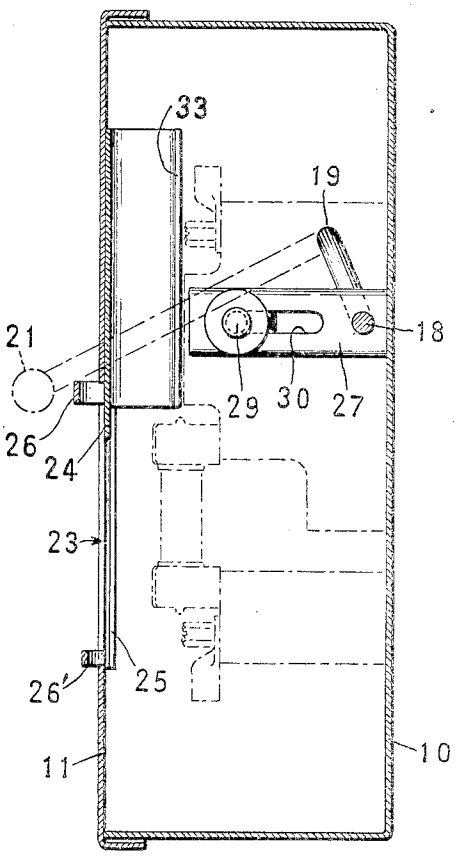
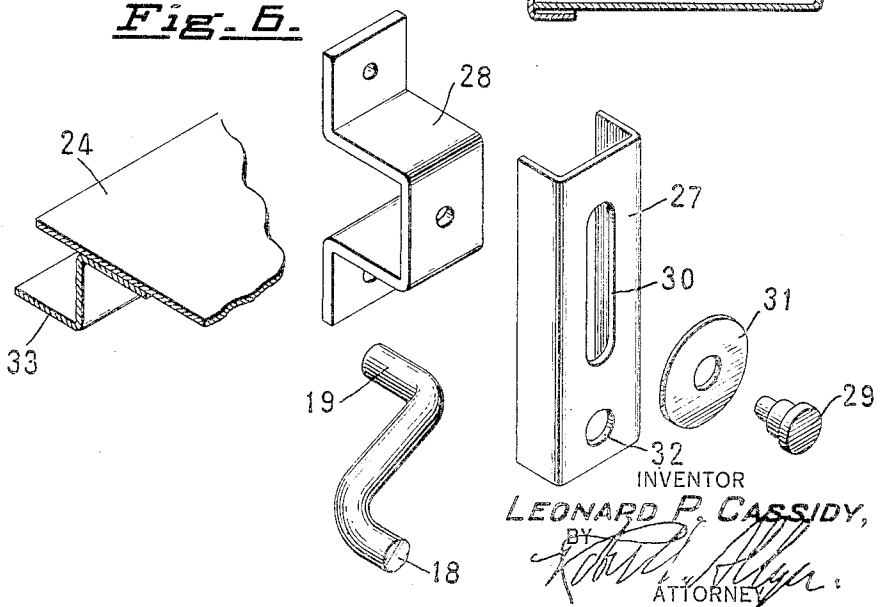


Fig. 6.



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Patented May 22, 1934

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UNITED STATES PATENT OFFICE

1,959,903

ENCLOSED SWITCH

Leonard P. Cassidy, Plainville, Conn., assignor to The Trumbull Electric Manufacturing Company, Plainville, Conn., a corporation of Connecticut

Application November 7, 1931, Serial No. 573,668

5 Claims. (Cl. 200—50)

My invention relates particularly to what are commonly termed safety switches which usually include contact making and breaking members with protective fuses all enclosed in a box having a cover with an opening to permit access to the fuses and a shutter normally closing this opening. Such switches are provided with external handles for operating the switch and sometimes with snap action mechanism to open and close the circuit. It is intended that the cover of the box shall normally remain closed but that the shutter may be readily opened for the purpose of replacing fuses. For safety sake it is desirable that the circuit be open whenever the panel is open in order to prevent contact by the operator with live parts of the circuit.

The main object of my invention is to provide a simple, inexpensive but rugged construction for preventing the opening of the shutter when the circuit is closed.

Another object is to provide simple and reliable mechanism which will prevent the closing of the circuit when the shutter is open.

Another object is to provide a simple but positive acting mechanism which will compel the opening of the circuit when the main cover is closed before the fuse shutter can be opened.

Another object is to provide mechanism that is essentially tamper proof in that it cannot be injured by careless operation.

Another object is to provide mechanism of this character in which the contacts must be widely separated before the fuse panel or shutter can be opened.

In carrying out the invention in the form shown, I provide a slide or plunger which is guided at one side of the box and operated by the usual switch operating crank. A panel or shutter is slidably carried by the cover of the box and provided with a projection which engages with the slide to prevent the opening of the shutter when the switch is closed, to prevent the closing of the switch when the shutter is open and to automatically ensure opening of the circuit if an attempt is made to close the cover while the shutter is open.

Fig. 1 is a front view of a construction embodying my invention the parts of the switch being shown in the off or open circuit position and the cover of the box being open and the shutter for the fuse opening being partially open.

Fig. 2 is a transverse sectional view showing the invention, the switch block and fuses being shown dotted and the cover closed.

Fig. 3 is a fragmentary view showing the switch operating and shutter interlocking members in the position which they occupy when the switch is closed and the cover open. This figure also shows in dotted lines the intermediate position of the cover in the act of closing.

Fig. 4 is a longitudinal sectional view showing the switch operating and interlocking parts in the open circuit or off position, the cover of the box being closed and the shutter open.

Fig. 5 is a similar view showing the switch operating and interlocking parts in the position they occupy when the switch is closed.

Fig. 6 is a perspective view showing fragments of the switch crank and the interlocking parts.

I have illustrated the invention as applied to a well known type of box or enclosure with switch actuating mechanism also of conventional type. It will be understood however that the invention resides in the interlocking parts and their relation to the switch actuating mechanism.

A box 10 is provided with a cover 11 hinged at 12 along one edge. The cover will usually be provided with some form of latch or locking device for retaining the cover in the closed position. I have illustrated a spring catch 14 as typical of such devices.

The switch mechanism proper will usually have an insulating base 15 with a stationary contact or contacts such as 16, and a movable switch member such as 17.

The switch actuating mechanism may be of any suitable type such for instance as the crank shaft 18 having the bearing members or supporting portions 19 and 20 which may be supported in the opposite sides of the box. An operating handle 21 on the outside of the box may be an integral part of the crank or of any suitable construction and suitably connected to the crank shaft so that when the handle 21 is operated, the crank shaft 18 moves correspondingly, either through a direct connection with the handle or through any suitable form of intermediate quick make and break mechanism (not shown).

Each line or unit of the switch will be protected by some suitable form of device such as the fuse 22. In the form shown the switch is arranged to have the line connections at the top and the load connections at the bottom but this arrangement may be reversed as is sometimes done in such switches. In any event the cover will be provided with an opening 23 through which access may be had to the fuses. A shutter or panel 24 is provided to close this opening. This shutter is preferably supported by guide tracks 25 secured to the inside of the cover along

opposite edges of the opening 23. This shutter is preferably provided with a handle member 26 secured to it in any suitable manner to facilitate manual operation. The edge of the cover may also be provided with a looped portion 26' so that a sealing wire may be looped around the parts 26 and 26' to prevent opening of the shutter.

The interlocking mechanism includes a slide or plunger like member 27 which is connected at one end to the crank shaft 18 and guided near one side of the box, for instance, through the instrumentality of a bracket 28 and stud 29 which extends through the slot 30. A washer 31 may be interposed between the head of the stud and the slide. The slide may be of channel-like cross section so as to strengthen it. The side flanges may loosely fit on opposite sides of the bracket 28 so as to be guided thereby and to ensure the holding of the slide in position.

The lower end of the slide is provided with an opening 32 in which the crank shaft 18 loosely fits so that as the crank shaft is actuated from the open circuit position of the switch shown in Figs. 1 and 4 to the closed circuit position, the slide is moved from the position shown in Fig. 4 to the position shown in Fig. 5. The shutter or panel 24 is provided with a projection 33 adjacent the hinged edge of the cover forming an abutment. When the cover is closed and the shutter is closed and the switch is closed, the parts 27 and 33 of the interlocking mechanism are in the position shown in Fig. 5. It will thus be seen that the slide or plunger 27 stands in the path of movement of the projection 33 so that the shutter can not be opened. Similarly when the shutter is in the open position shown in Fig. 4, the projection 33 stands in the path of movement of the slide 27 so that the switch cannot be closed. This arrangement insures that the fused end of the switch shall be dead when the shutter is opened and that the fuses can then be safely handled. If the switch is operated to close the circuit for any reason while the cover of the box is open as shown in Fig. 3, it will be seen that the act of closing of the cover will open the switch since the projection 33 will engage the outer end of the slide 27 and turn the switch actuating crank 18 to the off position. When the cover is closed it will be necessary to close the shutter before the switch can be closed thus making it impossible to leave the switch in the on position with the shutter open and the fuses exposed.

From Figs. 2 and 4 it will be seen that the bottom of the box acts as an abutment for the slide 27 in its inward movement. The strains due to the operation of the switch are thus taken up by the rugged parts of the slide and the box and injury to the switch per se is avoided.

It will be noted that the slide 27 has a direct pivotal connection with the switch crank 18 and, in this respect, differs radically from former constructions in which a portion of the crank shaft or a co-related member has been arranged to operate or move a slide or a like member with a cam like movement such as would be caused, for instance, by arranging a portion of the crank to move in an angled or cam-like slot in a sliding member. This direct pivotal connection of the slide with the switch crank provides for a long and positive movement of the slide and makes it possible to insure a wide separation of the switch contacts before the slide has moved far enough out of the path of the shutter to allow the shutter to be opened.

This pivotal connection is of such a sturdy character that no appreciable wear would occur in the lifetime of a switch.

It will also be noted that the slide 27 is made in a channel like form which adds greatly to the strength of the slide and prevents any bending of the slide through any normal operation of the switch.

It will be seen from the foregoing that the construction is extremely simple and can be manufactured very economically. It is also unusually sturdy and rugged and capable of withstanding very rough treatment without damage. It is also positive and effective in its operation. In a sense the mechanism is tamper proof in that there is but little likelihood of injury no matter how carelessly the mechanism is operated. Even the slamming of the cover to the closed position will have no injurious effect on the mechanism or the switch. The sturdy character and the effective co-relation of the parts ensures long life and continuous positive and proper operation of the interlocking mechanisms.

I claim:

1. Mechanism of the character described including a box having a movable cover with an opening therein, switch mechanism mounted in said box, a shutter carried by the cover for closing the opening in said cover, a support secured to the inner wall of the box, a slide mounted on on said support and having a slot therein, a stud carried by the support and coacting with the slot in the slide whereby the slide is limited to a movement substantially at right angles to the general plane of the cover and a crank shaft pivoted in the box and pivotally connected to the inner end of the slide in line with the stud whereby the slide is moved to block the opening movement of the shutter under closed circuit conditions and whereby, when the slide projects outwardly, the closing of the cover will actuate the slide and crank to open the switch.

2. An enclosed switch construction including a box having a cover, switch mechanism mounted in the box and including fuses, a switch actuating crank pivoted in the box, an elongated slide pivotally connected at its inner end with said crank and actuated by said crank and having a longitudinal slot between the crank and the outer end of the slide, a guide stud carried by the box and extending into the slot in the slide, whereby the slide is lengthwise movable in a direction substantially perpendicular to the bottom of the box, said cover having an opening for access to the fuses, a shutter for said opening having a projection movable in a direction substantially at right angles to the direction of movement of the slide, whereby the outer end of the slide will prevent the opening of the shutter when the switch is closed, said crank, said slide, said cover and said shutter being arranged in such relative positions as to permit closing of the cover when the switch is open regardless of the position of the shutter.

3. An enclosed switch construction including a box having a cover hinged thereto, switch mechanism mounted in the box, a switch actuating crank pivoted in the box, an elongated slide having projecting guide flanges along each of its opposite sides, said slide being actuated by said crank and slidably supported in the box to move in its lengthwise direction and having a relatively permanent connection with said crank, said cover having an opening, a shutter for said opening and having a projection movable in a direction substantially at right angles to the direction of movement of

the slide whereby the projection may engage the slide to open the switch when the cover is being closed with the shutter in the open position.

4. Mechanism of the character described including a box having a hinged cover with an opening, a relatively movable shutter for closing said opening, a crank shaft pivoted in the box, an inwardly projecting guide secured to an inner wall of the box, a channel-like slide having its inner end permanently pivoted to said crank shaft in line with the guide, said slide having side flanges overlapping opposite edges of the guide and movable in its lengthwise direction at substantially right angles to the plane of the cover, whereby the slide may be actuated in one direction by the closing of the cover and whereby the slide may block the movement of the shutter when the cover is closed.

5. Mechanism of the character described including a box having a movable cover with an opening, a shutter carried by the cover for closing the opening, a guide secured to an inner wall of the box, a slide having a flange overlapping one edge of the guide, a stud carried by the guide and coacting with the slide whereby the slide is limited to a movement substantially at right angles to the general plane of the cover and a crank shaft pivoted in the box and relatively permanent pivotally connected to the inner end of the slide in line with the guide, whereby the slide is moved to block the opening movement of the shutter under closed circuit conditions and whereby when the slide projects outwardly the closing of the cover will actuate the slide and crank shaft to open the circuit.

LEONARD P. CASSIDY.