

Jan. 10, 1933.

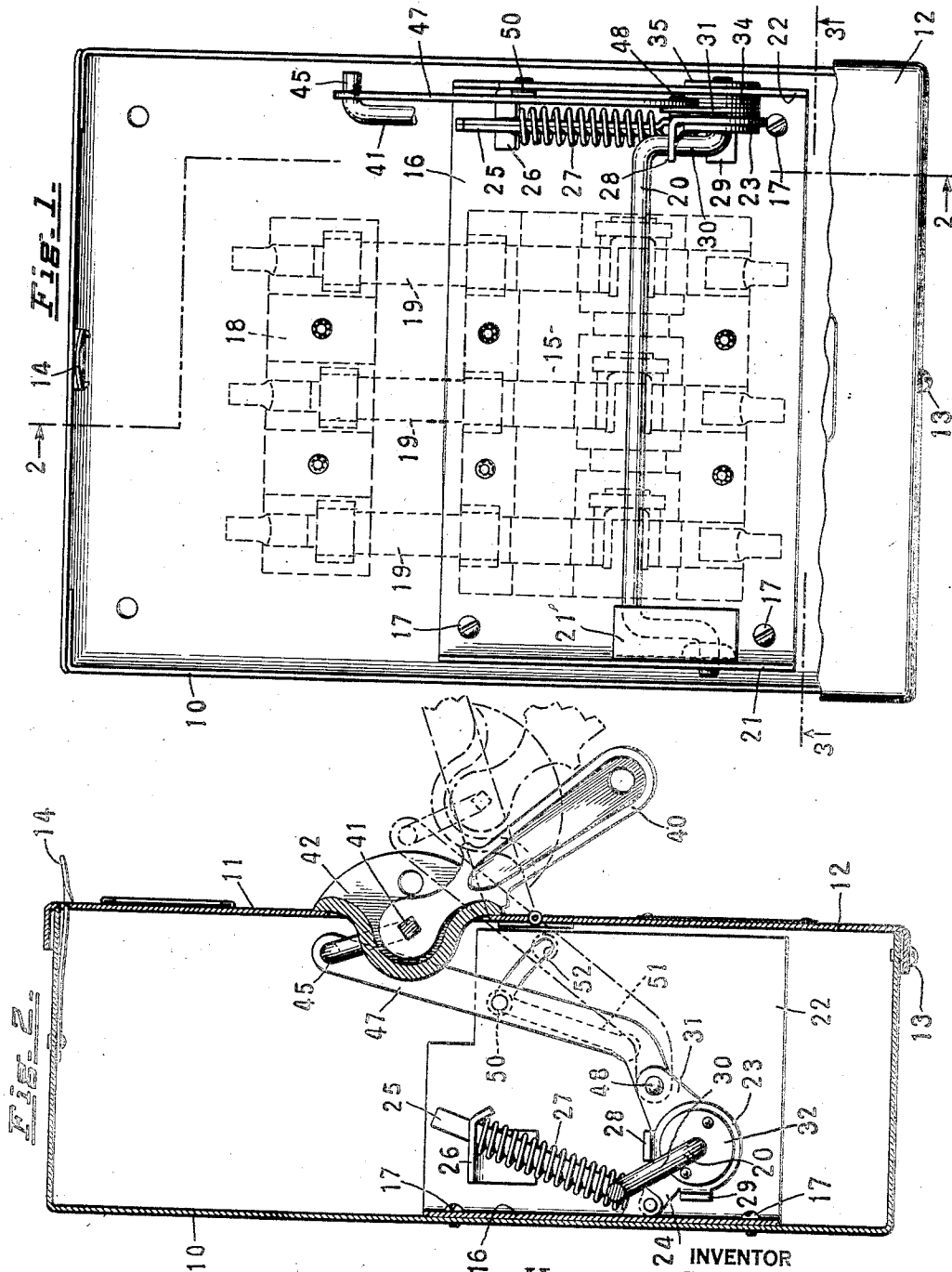
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1,893,829

INCLOSED SWITCH

Filed March 2, 1931

3 Sheets-Sheet 1



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Fig. 3.

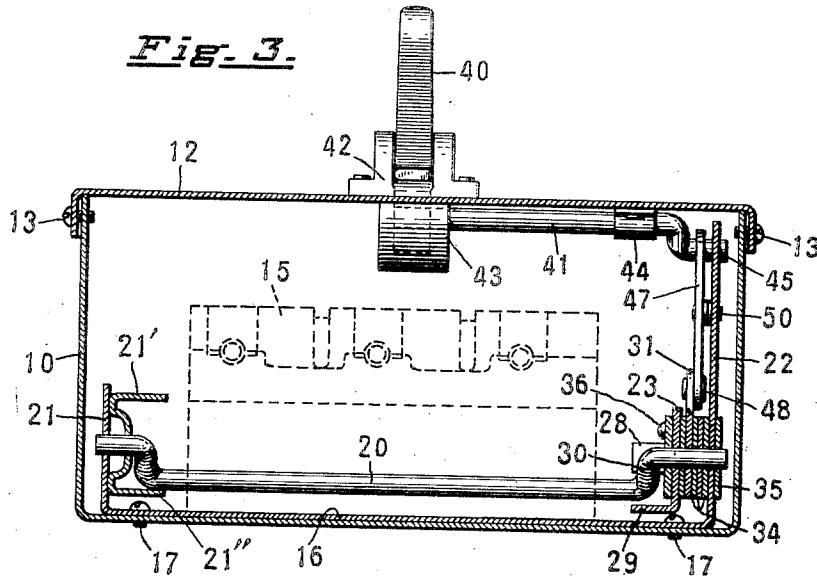
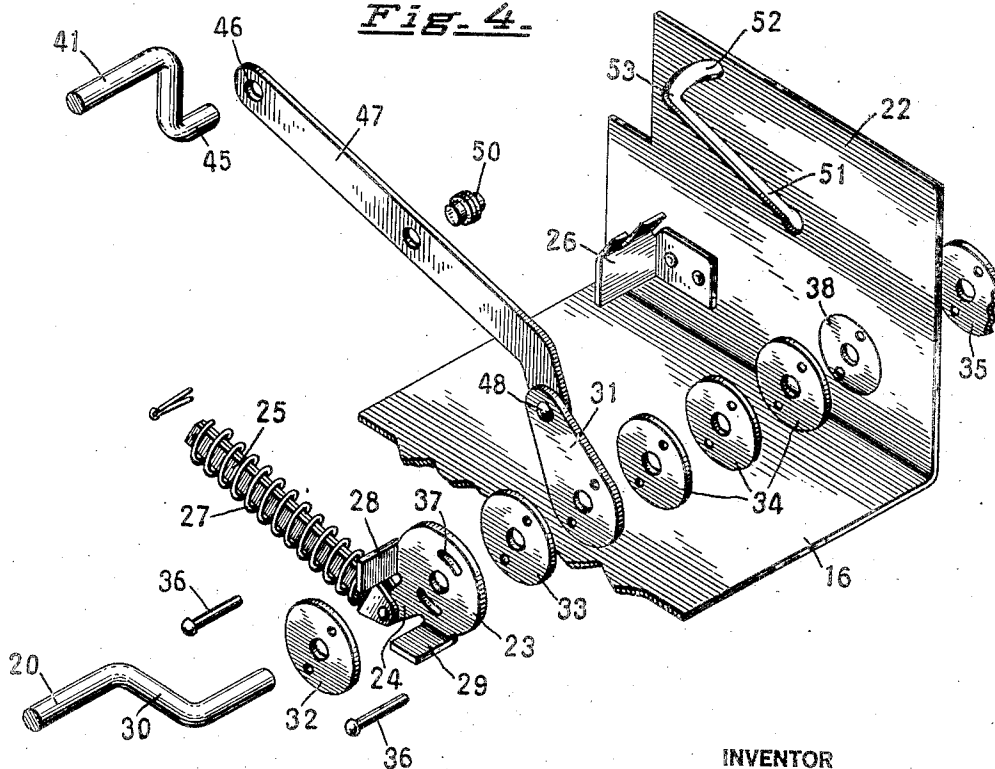


Fig. 4.



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Fig. 5.

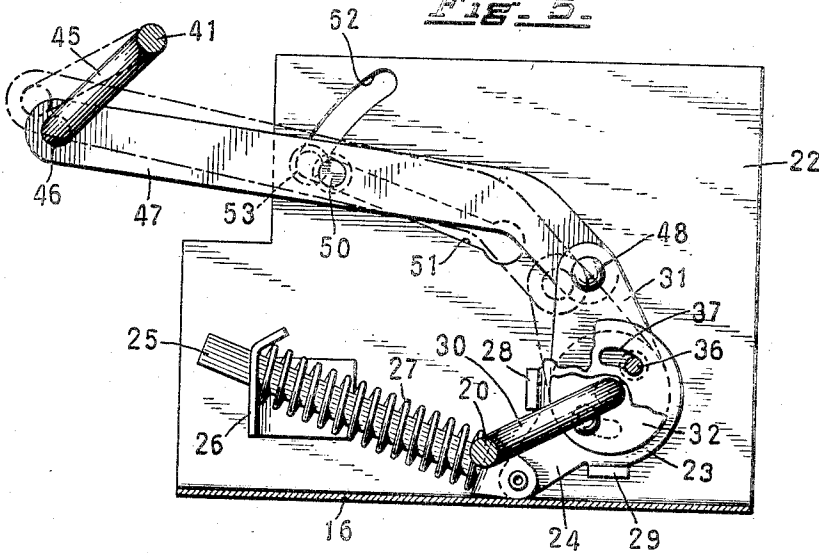


Fig. 6.

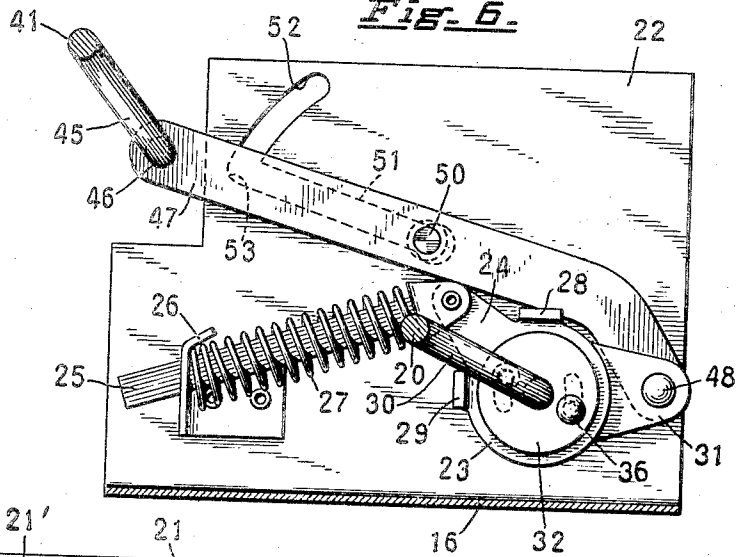
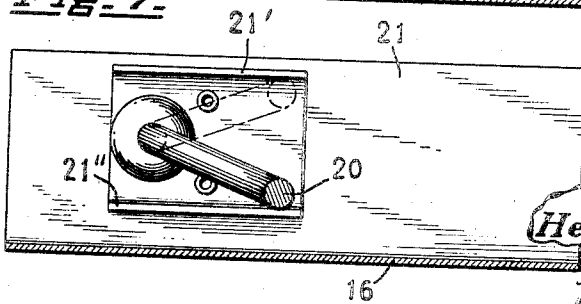


Fig. 7.



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UNITED STATES PATENT OFFICE

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INCLOSED SWITCH

Application filed March 2, 1931. Serial No. 519,328.

My invention relates to externally operated inclosed switches and particularly to that type which includes an operating handle mounted on the front of the cover and so positioned that a number of the switch units may be closely grouped or ganged side by side and each switch may be operated independently of the adjacent switches.

It has been the common practice to provide inclosed switches with external operating handles which projected from the sides of the boxes and this of course necessitated, when the switches were to be ganged side by side in parallel relation, that the boxes be spaced far enough apart to allow room for the operator to reach his hand between the boxes when operating the switch. The side-operated switches thus required much more space than an equal number of front operated switches. The operating handles were comparatively difficult of access and manipulation, and a ganged group of switches was less neat and ship-shape in appearance.

One object of my invention is to provide an effective inclosed switch having an external operating handle mounted on the front of the box.

Another object is to provide a rugged and dependable mechanism for causing a quick-make and quick-break movement of the switch.

Another object is to provide an inclosed front-operated quick-make and quick-break switch in which, during the operating movement of the switch, there is little if any spring force or other pressure exerted against the box cover to change its fully closed relation with the box.

Another object is to provide a front-operated switch in which the cover and the operating handle may be readily removed from the box as a unit.

Another object is to provide a switch construction in which the operating handle is mounted on the cover in such a manner that, when the switch is in the "off" position, the cover may be opened without removing the handle or any of its connections.

Another object is to provide a front-operated inclosed switch having a main cover and

a fuse protecting cover and having a lever connection between the fuse cover, the operating handle and the switch throwing mechanism and so arranged as to lock the fuse cover when the switch is in the "on" position and to prevent access to the fuse compartment except when the switch is in the "off" position.

Another object is to provide an inclosed fuse switch having a box and a two-part cover, one of which covers is hinged and may be opened for manipulation of the fuses only when the switch is in the "off" position and the other cover being normally secured to the box but being hinged in such a manner that it may be opened for inspection of the switch contacts when the switch is in the "on" position, the construction including such a correlation of parts that the switch may be operated when the last mentioned cover is open for inspection of the fuse contacts.

Another object is to provide a quick-make and quick-break inclosed switch construction in which all of the operating mechanism, except the operating handle, is inclosed within the box or casing and in which the switch crank is mounted within and independently of the box.

Another object is to provide an inclosed switch construction having an operating handle mounted on the cover and a mounting means for the switch and its operating mechanism, the mounting means being independent of the box or casing to permit the assembling of the switch and its operating mechanism outside of the box and a simple "pin and hole" means for connecting the switch operating means with the external operating handle when the switch mechanism is placed within the box and for permitting the ready detachment of the external operating handle and the cover for the purpose of wiring or connecting the switch terminals.

Another object is to provide an inclosed fuse switch construction having an unusually rugged and efficient interlocking means of connection between the operating handle, the switch mechanism and the fuse door for preventing access to the fuses except when the switch is in the "off" position.

Another object is to provide an inclosed switch construction in which the external operating handle is mounted on the cover and is so co-related with the switch mechanism that its projecting end rests comparatively close to the surface of the box cover in both its "on" and "off" positions.

In carrying out the invention I prefer to provide a box having a two part cover, the parts of which are hinged together at the front of the box. The handle is pivotally mounted in one section of the cover and the switch is actuated by moving the handle up and down. The switch mechanism per se is immaterial to the present invention but is mounted on an interior carrier which also furnishes bearings for the crank shaft. Quick make and break mechanism is supported by this carrier frame and connected to an offset crank carried by the cover and connected to the operating handle. Details of the construction in its preferred form will be more fully understood from the following specification and the accompanying drawings.

Fig. 1 is a front view of a switch box, part of the cover being broken away to show the interior mechanism.

Fig. 2 is a vertical sectional view on the plane of the line 2—2 of Fig. 1 but also showing the handle and snap action mechanism.

Fig. 3 is a horizontal sectional view on the plane of the line 3—3 of Fig. 1 looking upwardly and indicating in dotted lines a form of switch block.

Fig. 4 is an exploded perspective view showing the parts of the switch actuating mechanism.

Fig. 5 is a fragmentary side view showing the switch actuating and snap action mechanism in the "off" position.

Fig. 6 is a similar view showing the parts in the "on" position.

Fig. 7 is a detail view of one of the crank shaft bearings.

The box 10 may be of any suitable construction preferably of sheet steel as is customary. The cover is formed of two sections, 11 and 12, which are hinged together. The lower section 12 is preferably secured snugly to the box, by screws such as 13 or other suitable means, and the upper part, 11, is adapted to be secured by a spring latch 14 of any suitable form. In other instances, it may be preferable to reverse the relative position of the covers so that the part 11 becomes the lower part and the construction of the co-related parts is such that they may be arranged with the fuse receiving parts in either end of the box, and without departing from the spirit of my invention.

The switch contacts and the line terminals may be of any suitable form and are mounted in the lower part of the box as indicated at

15 of Fig. 1, being supported by a carrier frame having a bottom plate 16 which is secured by screws 17 in the bottom of the box. The load terminals are carried by a block 18 which is suitably secured in the upper part of the box. The circuit protecting fuses 19 of any suitable type are accessible for installation, inspection or replacement when the upper part of the box is open.

The operating crank 20 is supported in flanges 21 and 22 of the carrier and connected in any suitable manner to the movable switch member.

The snap action mechanism includes a disc 23 which is mounted on one end of the crank shaft 20. This disc has a lug 24 to which is attached one end of the rod 25, the other end of which is guided in the bracket 26 secured to the side flange or plate 22. Spring 27 on the rod 25 constitutes the power device of the snap action mechanism. Lugs 28 and 29 which project from the disc 23 engage the arm 30 of the crank shaft to move it to the "off" and "on" positions, respectively.

The arm 31 is mounted on the end of the crank shaft 20 and forms a part of a hub which also includes discs 32, 33, 34 and 35, all held together by rivets 36 which pass through elongated slots 37 in the disc 23.

This hub and the arm 31 thus have a lost motion connection with the disc 23. The flange 22 also has a bearing for the washer 38 through which the rivets 36 pass so as to permit a limited rocking movement of the arm 31 and the hub just described.

The handle 40 is secured to the shaft 41 within the pocket 42 on the front of the upper section of the cover of the box so that when the handle is raised or lowered the shaft 41 is turned with it. One end of the shaft 41 is supported in the side wall 43 of the pocket and the other end is supported in the bearing 44. This shaft 41 has an offset crank pin 45 which is connected in a hole 46 in the link 47, the other end of which is hinged at 48 to the outer end of the arm 31 above mentioned.

Intermediate the ends of the link 47 is a roller or pin 50 which is adapted to travel in a slot in a side plate or flange 22 of the carrier frame. This slot is of angular formation and has two portions 51 and 52 for guiding the pin 50 of the actuating link. The portion 51 serves as the guide when the switch is being actuated in the normal manner. For instance, if we consider the parts in the position shown in Fig. 2 with the switch "off", the switch is actuated by raising the handle whereupon the offset end 45 of the shaft 41 swings the upper end of the link 47 to the rear and starts to rock the link about the pin 50 which is supported at this instant in the elbow 53 of the slot.

The arm 31 then starts to rotate and, as the handle 40 continues to rise, the pin 50

slides down the inclined portion 51 of the slot and thus continues the rotation of the arm 31 and the action of the quick make and break mechanism in the usual manner.

5 To open the circuit the handle 40 is moved downwardly so that the link 47 is tilted about the pin 50 and then moved to the left (considered from the viewpoint of Fig. 6). This rotates the arm 31 and thus actuates the snap
10 action mechanism in the usual manner.

When the switch is in the "on" position with the snap action mechanism in the position in Fig. 6, it is impossible to open the cover because of the interlock of the pin 50
15 in the slot 51.

When the switch is "open" and the fuse protecting cover is open, it is impossible to actuate the switch to close the circuit because when this cover is open the pin 50 will be in
20 the portion 52 of the slot where it has been raised by the opening movement of the cover.

The crank 20 stops against the bottom flange 21' when the switch is opened and against the flange 21' when it is "closed."

25 By removing the screws 13 the lower half of the cover can be raised for inspection of the switch when the switch is "on." The two-part cover can be readily removed with the handle 40 and shaft 41 by disconnecting
30 the crank pin 45 from the hole 46 in the link 47 to facilitate inspection, wiring, etc.

It will be noted that the crank shaft 41 is positioned very close to the inside of the cover and, except for the crank portion 45
35 at its extreme end, it has no portion which approaches nearer to the switch or fuse parts in any of its operative positions.

While I have shown and described the operating handle 40 as being mounted on the
40 fuse protecting cover 11, it will be readily apparent that, in order to suit other conditions, the handle may be mounted on the relatively fixed cover 12 which covers the switch mechanism.

45 It is also quite clear that, when so desired, the switch mechanism and the fuse receiving elements may be reversed end for end, relative to their respective locations in the box.

50 I claim:

1. An inclosed switch construction embodying a box having a cover portion hinged across the front of the box, a switch carrier frame mounted in the box including quick-
55 make and break mechanism and a side plate having a slot with a straight portion and an arcuate portion, a handle hinged to the cover and means of connection between said handle and the quick-make and break mechanism including a link having a projection
60 slidable in the straight portion of the slotted side plate to actuate the switch and swinging in the arcuate portion to form a safety interlock.

65 2. An inclosed switch construction in-

cluding a box having a cover formed in two parts hinged together, one of the parts being fixed to the box, a latch for the other part of the cover, quick-make and break
70 mechanism mounted within the box for actuating the movable part of the switch, a handle hinged to one part of the cover of the box, a shaft extending to one edge from the handle and means of connection between
75 said shaft and the quick-make and break mechanism including a link connected to said shaft and a slotted plate forming interlocking means preventing the opening of the said other part of the cover when the switch is
80 closed.

3. An inclosed switch construction including a box, a cover for said box, switch mechanism within said box, an operating handle mounted on said cover at approximately its
85 median line, a shaft connected to said handle on the opposite side of said cover and projecting laterally towards one side of said cover and closely to the inner surface of said cover and having a crank portion at its far
90 end for readily detachable and operable engagement with said switch mechanism.

4. An inclosed switch construction including a box, a cover for said box, a switch carrier frame mounted in the box and having a
95 guide slot therein, quick-make and break mechanism mounted in said box, a handle mounted on said cover and movable therewith and also movable independently thereof, means of connection between said handle and the quick-make and break mechanism and including a link having a projection guided in the slot in said frame to form a safety interlock.

5. An inclosed switch construction including a box, a cover for said box formed in two
105 parts and hinged together, one part being normally fixed to the box, quick-make and break mechanism for actuating the switch, a carrier frame detachably mounted within the box for supporting the switch mechanism, a
110 handle hinged to one part of the cover of the box at approximately the vertical center line of the cover, and a crank shaft connected to said handle and extending from said handle to one side of said box and having a readily
115 detachable connection with the switch operating mechanism.

6. An inclosed switch construction including a box, a cover for said box, a switch carrier frame mounted in the box and having a
120 side plate provided with a guide slot having a straight portion and an arcuate portion, switch mechanism mounted in said box, a handle hinged to the cover and means of connection between said handle and the switch mechanism and including a link having a projection slidable in the straight portion of the slot in the side plate to form an interlock and being slidable in the arcuate por-
125 130

tion of said slot to permit a partial opening movement of said cover.

7. An inclosed switch construction including a box, a cover for said box formed in two parts and hinged together, one part being normally fixed to the box, a latch for the other part of the cover, quick-make and break mechanism mounted within the box for actuating the switch, a handle hinged to one part of the cover at approximately the vertical center line of the cover, a shaft extending from the handle to one side of the box and means of connection between said shaft and the quick-make and break mechanism and including a link connected to said shaft, a projection on said link and a side plate having a slot for engagement by said projection to prevent the opening of said cover when the switch is in the closed position.

8. A safety switch comprising a box containing stationary and movable switch members in one end and protective fuses in the other end, covering means for the front of the box including a swinging door movable to permit access to the fuses, an operating crank supported in the box behind the switch contacts, means of connection between said crank and movable switch contact, snap action mechanism mounted at one side of the box and having lost motion connection for the crank, an operating handle hinged at the front of the upper part of the box, a transverse countershaft connected to said handle and having an offset end connected to the snap action mechanism and interlocking means between the snap action mechanism and the door.

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