

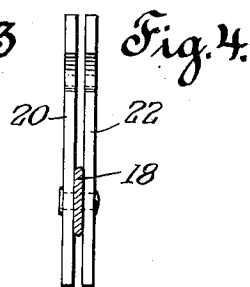
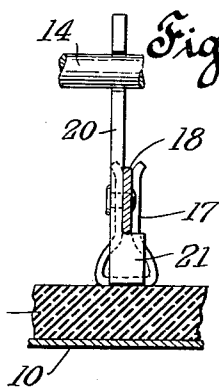
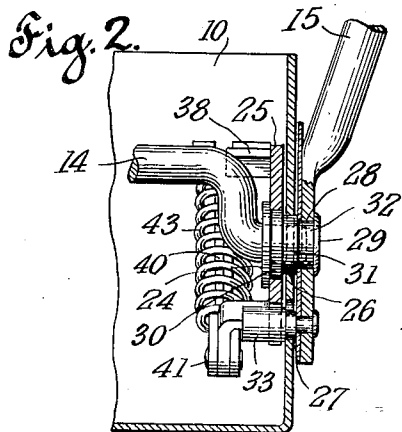
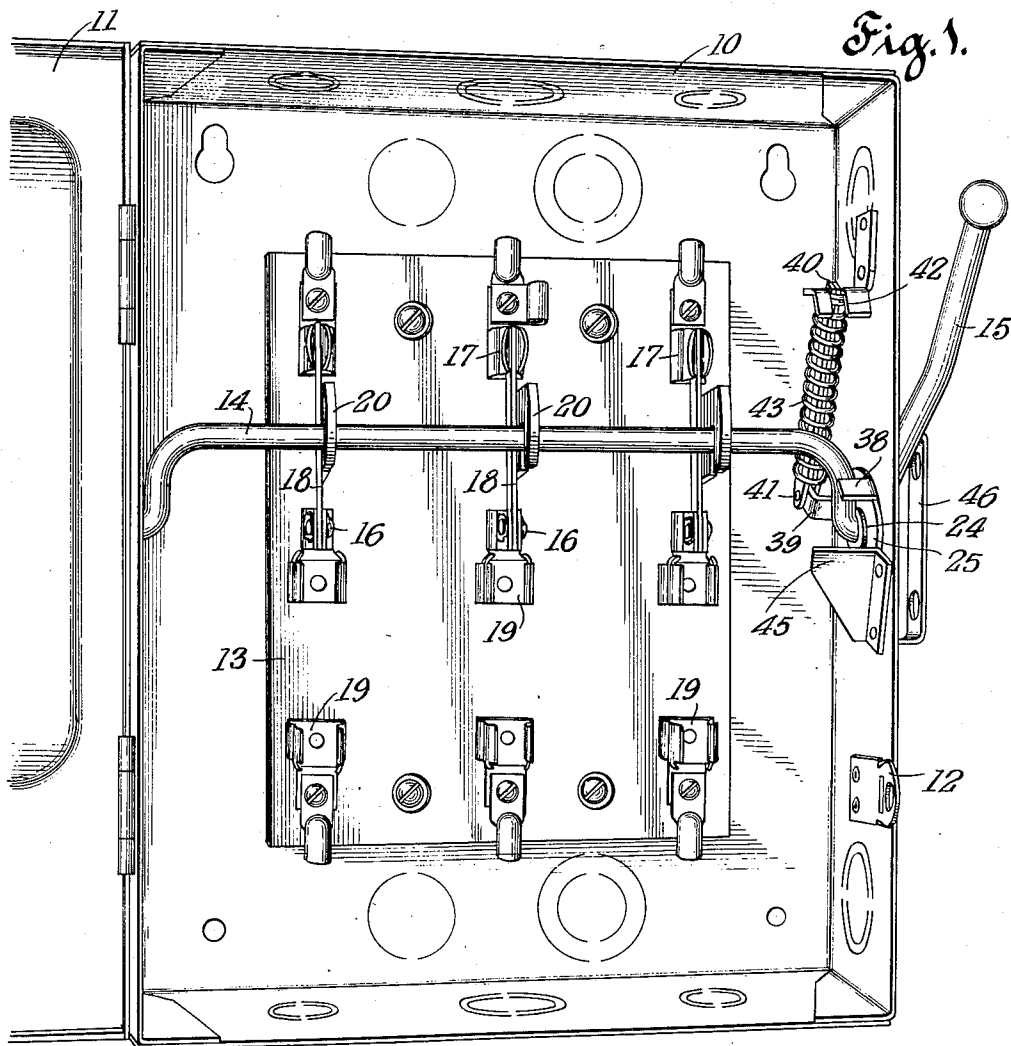
Dec. 22, 1931.

H. J. HAMMERLY

1,838,020

INCLOSED SWITCH

Original Filed Jan. 26, 1929 2 Sheets-Sheet 1



INVENTOR
Herman J. Hammerly
BY *[Signature]* ATTORNEY

Dec. 22, 1931.

H. J. HAMMERLY

1,838,020

INCLOSED SWITCH

Original Filed Jan. 26, 1929

2 Sheets-Sheet 2

Fig. 5.

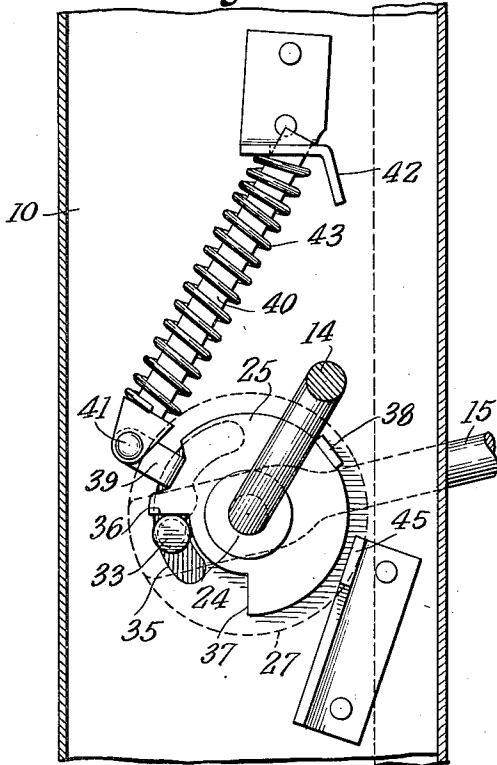


Fig. 6.

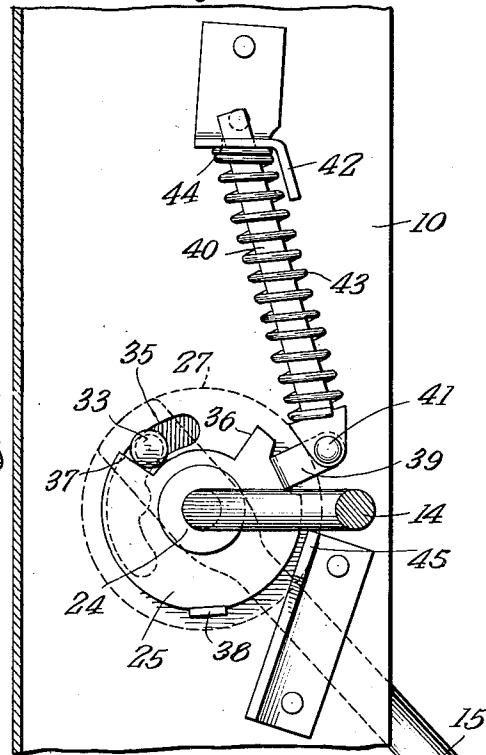
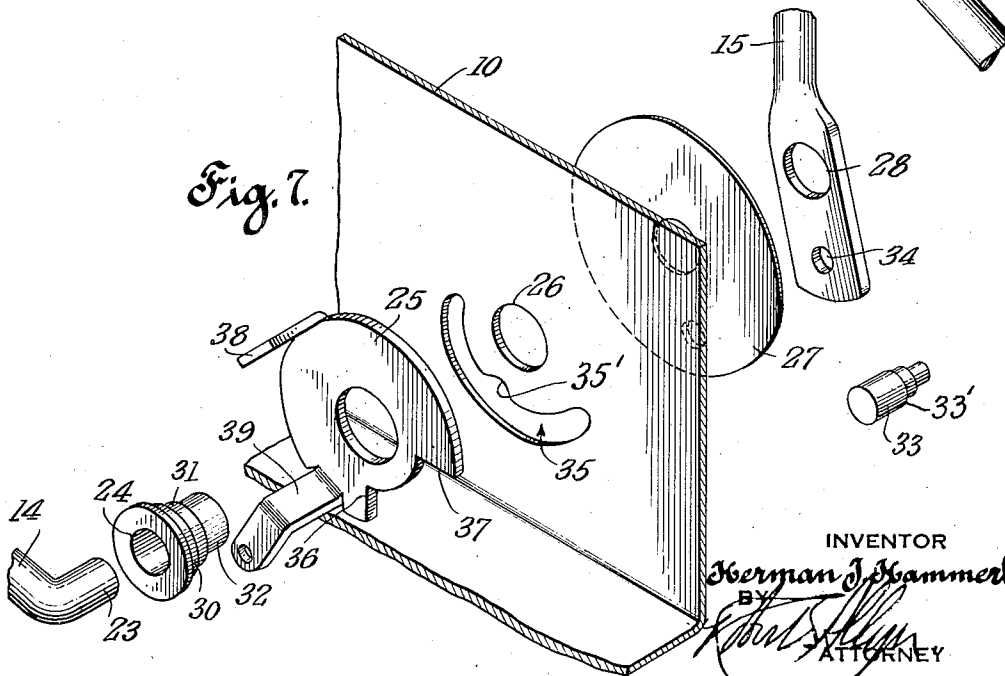


Fig. 7.



INVENTOR

Herman J. Hammerly

BY

ATTORNEY

UNITED STATES PATENT OFFICE

HERMAN J. HAMMERLY, OF WALLINGFORD, CONNECTICUT, ASSIGNOR TO THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, OF PLAINVILLE, CONNECTICUT, A CORPORATION OF CONNECTICUT

INCLOSED SWITCH

Application filed January 26, 1929, Serial No. 335,250. Renewed November 3, 1931.

This invention relates to the class of inclosed switches having an external operating handle for automatically causing a quick-make and quick-break movement of the internal switch blades by the usual manual operating movement of the handle.

The particular object of my invention is to provide a very simple, cheap, reliable and unusually sturdy means for causing a powerful quick-make and quick-break movement of switch blades or contacts.

Another object is to provide a quick-make and quick-break mechanism in which the operating movement is started manually but in which the quick movement is spring-pressed and entirely out of control of the operator after the spring movement has once been started.

Another object is to provide a switch construction having an external operating handle and an internal loose-connection quick-make and quick-break means, so constructed that the quick-make and quick-break means cannot be cramped or bound by any lateral pressure that may be applied through the external handle.

Another object is to provide a construction in which a single bushing serves as a support for the operating crank, the quick-break mechanism and the handle, and which bushing is provided with shoulders for holding the parts in position so that they cannot bind and interfere with the quick-break action.

Another object is to provide a quick-make and quick-break switch construction in which the operating handle and its correlated loose connection parts are secured in position by means of a bushing in such a manner that the operating crank may have a relatively loose or endwise shucking engagement with the bushing since the crank plays no part in the securing of the loose connection parts in position.

Another object is to provide a switch construction having an external operating handle operably supported in one wall of the box and having a further interlocking engagement with the wall of the box which makes it practically impossible to injure or

separate the parts by any ordinary prying movement of the handle.

Fig. 1 is a perspective view of an inclosed switch embodying my invention and showing the parts of the switch in the closed circuit position with the cover open and broken away.

Fig. 2 is a fragmentary transverse sectional view showing the mounting of the handle, operating crank, and quick-make and break mechanism.

Fig. 3 is a detail edge view showing one form of connector between the operating crank and a switch blade.

Fig. 4 shows another modified form of connector.

Fig. 5 is a vertical sectional view and side elevation showing the parts of the handle, the operating crank and the quick-break mechanism in the closed circuit position.

Fig. 6 is a similar view showing the parts in the open circuit position.

Fig. 7 is a perspective view showing the bushing and associated parts for supporting the crank, the operating handle and the quick-break mechanism in one wall of the box.

The box 10 may be of any suitable type and construction and provided with any suitable form of cover 11 and latch 12.

The switch mechanism will usually be mounted upon an insulating base 13 suitably secured in the box. The operating crank 14 is pivotally supported and adapted to be operated manually by an external handle 15 as will hereinafter be understood.

The invention is particularly applicable to switches for controlling two or more legs of a circuit and will therefore be provided with such a number of blades and correlated elements as may be required. Each circuit controlling unit usually consists of a knife blade switch and a protecting fuse of any suitable type. In the form shown I have illustrated three switch units but it will be necessary to describe only one which is typical. The switch jaws 16 and 17 may be of any suitable type for coacting with a switch blade 18. Preferably, this blade is hinged to the jaw 16 which constitutes a supporting post. Clips, such as 19 are provided for the usual car-

tridge type of fuses although the invention is not limited to such detail.

Each switch blade is connected to the operating crank 14 by means of a plate or connector 20 formed of fibre or other suitable insulating material notched at one end to receive the operating crank 14, and is riveted or otherwise suitably secured near the other end to the switch blade.

The inner end or foot 21 of this plate 20 forms a stop for the "on" position of the switch blades and is adapted to strike against the insulating base 13 when the switch is closed so that the shock of the closing movement is taken up by the various insulating connectors or plates which are more or less resilient and are not subject to fracture. This foot 21 extends down below the switch blade, as shown in Fig. 3, and when the circuit is opened the upper edge of this foot passes by the adjacent edge of the jaws 17 and serves to cut off or interrupt any arc which may form between the jaw and the switch blade. This foot 21 may be wider or thicker as shown in Fig. 3 so as to overlap both edges of the jaw 17. Another modification shown in Fig. 4 embodies two connector plates 20 and 22, the lower ends of which serve as arc interrupters adjacent both edges of the jaw 17.

The ends of the operating crank 14 are bent outwardly and supported in the opposite sides of the box. The right hand end 23 has a bearing in the bushing 24. This bushing also supports the oscillating disc 25 and in turn is supported in the opening 26 in the side wall of the box. The washer 27 is supported on the bushing outside the box and the outer end of the bushing passes through an opening 28 in the handle and is riveted or spun over at 29 to hold the parts together.

The bushing 24 is provided with a shoulder 30 forming a bearing for the disc 25 and a shoulder 31 which constitutes the bearing in the opening 26. The outer portion 32 of the bushing affords support for the washer 27 and the handle. The width of these shoulders 30, 31 and 32 measured in an axial direction is such as to space the disc 25 and the washer 27 and handle 15 so that no matter how tightly the bushing is riveted over and no matter how the handle is twisted the parts will always be free to operate independently as is necessary in a quick-make and break switch. This is particularly important in constructions of this character where the box is usually formed of sheet metal and the walls are somewhat flexible. There should therefore be sufficient freedom of movement between the end of the operating crank, the bushing, the oscillating disc 25 and the operating handle 15, to positively prevent binding under any ordinary operating conditions.

The pin or stud 33 is riveted or otherwise suitably supported in an opening 34 in the

handle and passes through the washer 27 and the slot 35 so as to engage the spaced shoulders 36 and 37 on the disc 25. The washer 27 serves to cover up the slot 35.

The disc 25 is provided with two lugs 38 and 39 which are spaced apart and between which the arm of the operating crank 14 swings. The rod 40 is hinged at 41 to the lug 39 and is guided by the bracket 42 at the other end. The spring 43 on the rod 40 presses at one end against the head of the rod 40 near the pivot 41 and the other end is held in operative position against the bracket 42 by means of the projecting end of the bracket in which position the spring affords compression action for the quick-make and quick-break movement.

When the switch is closed with the parts in the position shown in Figs. 1, 2 and 5, the spring 43 tends to rotate the disc 25 in an anticlockwise direction, as shown in Fig. 5, thus pressing the lug 38 on the disc 25 against the arm of the crank 14, which crank in turn presses down on the connectors 20 and thus holds the switch blades 18 in the closed circuit position.

In the open circuit position the spring 43 presses the disc 25 in a clockwise direction as viewed in Fig. 6, so that the lug 39 presses against the arm of the crank 14 which in turn is passed against the stop or abutment member 45 secured to the inner wall of the box.

A strap member 46 may be secured on the outside of the box and provided with suitable holes or openings for sealing or locking the handle 15 either in the open circuit or closed circuit position.

To close the switch from the position of Fig. 6, the handle is moved upwardly and the pin 33 engages the shoulder 37 to rotate the disc 25 anticlockwise, thus compressing the spring 43. When the hinged joint 41 passes the center line, the spring snaps the disc 25 to the position shown in Fig. 5 out of the control of the operator with a quick-make action.

The opening of the circuit is accomplished similarly by the movement of the operating handle from the position shown in Fig. 5 to the position shown in Fig. 6. The lost motion space between the shoulders 36 and 37 on the disc 25 which alternately engage the pin 33, the lost motion space between the lugs 38 and 39 which alternately engage the arm 14 of the operating crank and the biasing relation of the spring 43, all cooperate to provide a quick-make and a quick-break movement of the switch blades.

The slot 35 is enlarged intermediate its ends and preferably at approximately its center at 35' to permit the entrance of the large end of the pin or stud 33 but it is obvious that when the pin is moved away from the central position by means of the operat-

ing handle, the shoulder 33' on the pin will overlap the edges of the slot and will thus have a locking engagement with the wall of the box which cannot be disengaged by any prying movement of the handle.

The quick-make and quick-break elements are all secured in position entirely independently of the internal operating crank. One end of the crank has its bearing in the hole in the bushing 24 and the other end has its bearing in a hole in a wall of the box at the opposite side of the box. As the operating crank has no part in the securing of the other parts in position, this construction permits of considerable endwise or shucking movement of the crank which greatly facilitates the assembling and free action of the parts.

I claim:

1. In an electric switch, a box, switch mechanism mounted therein and including a switch blade and an operating crank connected thereto, quick-break mechanism connected to said crank and an external operating handle having a pin projecting through a wall of the box, said quick-break mechanism including a disc having a lost motion connection with the handle and a one piece bushing extending through the disc, the wall of the box and the handle and holding the disc and handle in position and having a recess in which the end of the crank is detachably supported.

2. In an electric switch, a box, switch mechanism mounted therein and including a pivoted switch blade and an operating crank connected thereto, quick-break mechanism within the box and an external operating handle, said quick-break mechanism including a spring pressed disc having a lost motion connection with the handle through the box wall and a single bushing providing a support for the operating crank, the disc and the handle, said bushing having shoulders for supporting it in the box and for supporting said disc and handle.

3. In an electric switch, a box, switch mechanism mounted therein and including a switch blade, an operating crank, a connector between the blade and the crank, quick-break mechanism and an external operating handle, said quick-break mechanism including a disc having a lost motion connection with the handle and a single bushing for supporting the operating crank, the disc and the handle, said bushing having shoulders for supporting it in the box and for supporting said disc and handle.

4. A snap action switch comprising a box having a side wall, a bushing rotatably mounted in said wall, a throwing disc mounted on said bushing inside of said box, an operating handle mounted on said bushing outside of said box and having a lost motion connection with said disc through said box wall, and a switch crank having one end

detachably mounted in said bushing and lost motion means of connection between said disc and said crank.

5. In an electric safety switch, a box, a switch mechanism operating crank, a bushing in the box wall supporting one end of said crank, an operating disc and a handle mounted on said bushing said handle having a pin fastened thereto and movable in a curved slot in said box wall, said slot having an enlarged portion to permit the insertion of the pin and said pin having a shoulder adapted to overlap and interlock with the inner edge of said slot except at said enlarged portion.

6. In an electric safety switch, a box, a switch operating crank supported at one end in the box wall, said wall having a curved slot concentric about the end of said crank, an operating handle, a pin rigidly secured to said handle, said pin having shoulders of different diameters, one of which moves freely in the slot in the box wall and another shoulder being sufficiently large to engage the adjacent edges of the slot when the pin travels through the slot in the operating movement of the switch.

7. In an electric safety switch, a box, switch mechanism mounted therein and including an operating crank, quick-break mechanism within the box and an external operating handle, said quick-break mechanism including a spring pressed disc having a lost motion connection with the handle through the box wall and a single bushing for providing a pivotal support for the operating crank, the disc and the handle, said bushing having shoulders for supporting it in the box and for supporting said disc and handle, said box and handle having interlocking engagement in addition to said bushing.

8. In an electric safety switch, a box, switch mechanism mounted therein and including an operating crank, quick-break mechanism and an external operating handle, said quick-break mechanism including a disc having a lost motion connection with the handle and a single bushing providing a support for the operating crank, the disc and the handle, said bushing having shoulders for supporting it in the box and for supporting said disc and handle without binding, said lost motion connection including a pin carried by the external handle and having a shoulder inside the box for interlocking with a slot in the wall of the box.

9. In an electric safety switch, a box, switch mechanism mounted therein and including an operating crank, quick-break mechanism connected to said crank and an external operating handle having a pin projecting through a curved slot in a wall of the box, said quick-break mechanism including a disc having a lost motion connection with the handle and a one piece bushing providing a pivotal support for the operating crank,

the disc and the handle and said pin having a shoulder overlying the inner edges of the slot.

10. In an electric safety switch, a box having a slotted wall, switch mechanism mounted therein and including an operating crank, quick-break mechanism within the box and an external operating handle, said quick-break mechanism including a spring pressed disc, a pin secured to the handle and extending through the slot in the box wall, and a single bushing providing pivotal support for the operating crank and the disc and being riveted to the handle, said bushing having shoulders for supporting it in the box and for supporting said disc and handle, said pin having a shoulder for interlocking with the edges of said slot in the path of movement of said pin.

11. In an electric safety switch, a box having a slotted wall, switch mechanism mounted therein and including an operating crank, quick-break mechanism and an external operating handle, said quick-break mechanism including a disc having a lost motion connection with the handle and a bushing providing pivotal support for the operating crank, the disc and the handle, said bushing having shoulders for supporting it in the box and for supporting said disc and handle without binding, said lost motion connection including a pin riveted to the handle and having a shoulder inside the box for interlocking with the edge of the slot in the wall of the box.

12. In an electric safety switch, a box having a curved slot in its side wall, switch mechanism mounted in the box and including an operating crank, quick-break mechanism connected to said crank and an external operating handle having a pin projecting through the curved slot, said quick-break mechanism including a disc having a lost motion connection with the pin carried by the handle and a one piece bushing providing a support for the operating crank, the disc and the handle, said pin having a shoulder overlapping the edges of the slot, and said slot having an enlarged portion to permit the insertion of the pin.

HERMAN J. HAMMERLY.

55

60

65