Dec. 31, 1929. H. J. L. FRANK 1,741,227

COMPOUND SWITCH

Filed Jan. 10, 1924 4 Sheets-Sheet 1

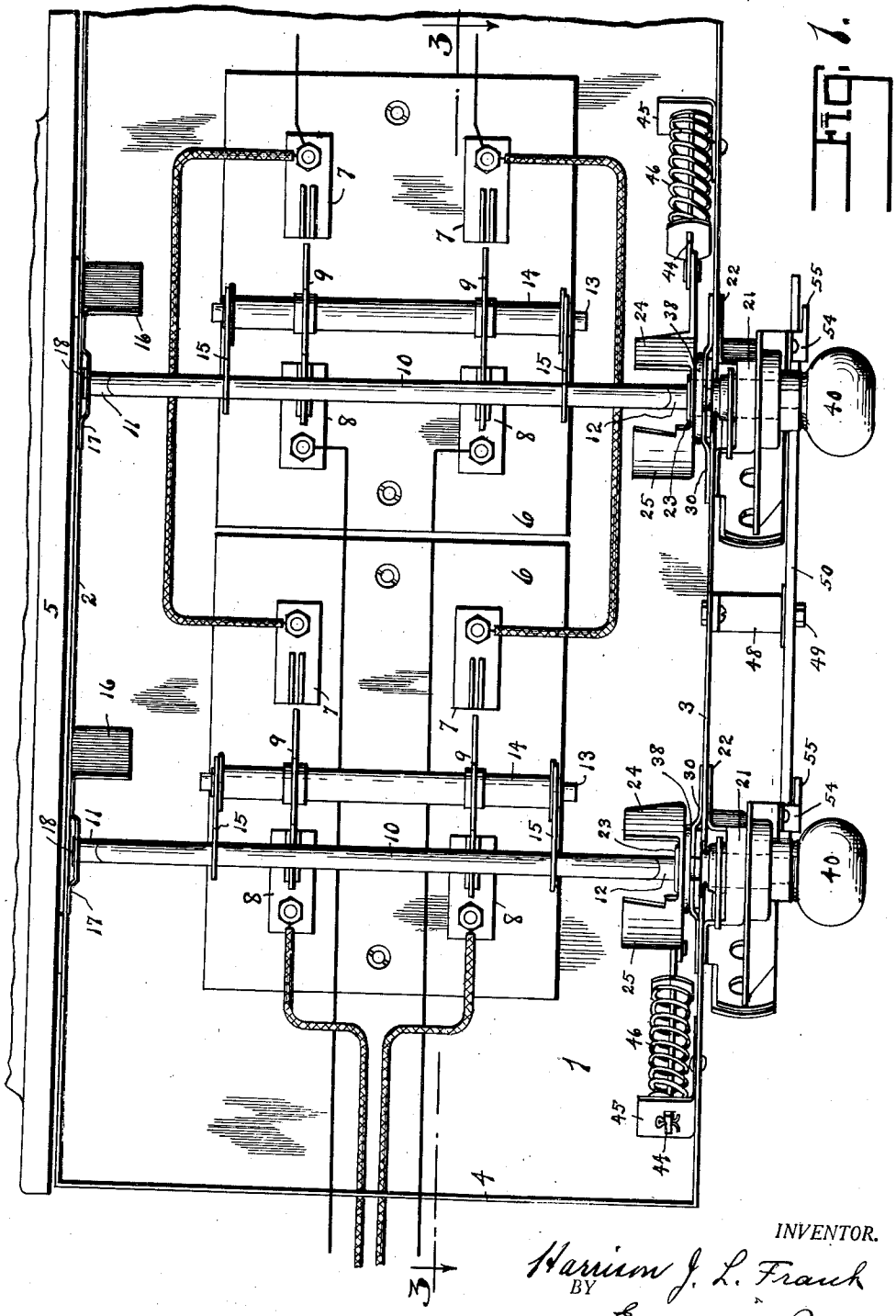


Fig. 1.

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Filed Jan. 10, 1924 4 Sheets-Sheet 2

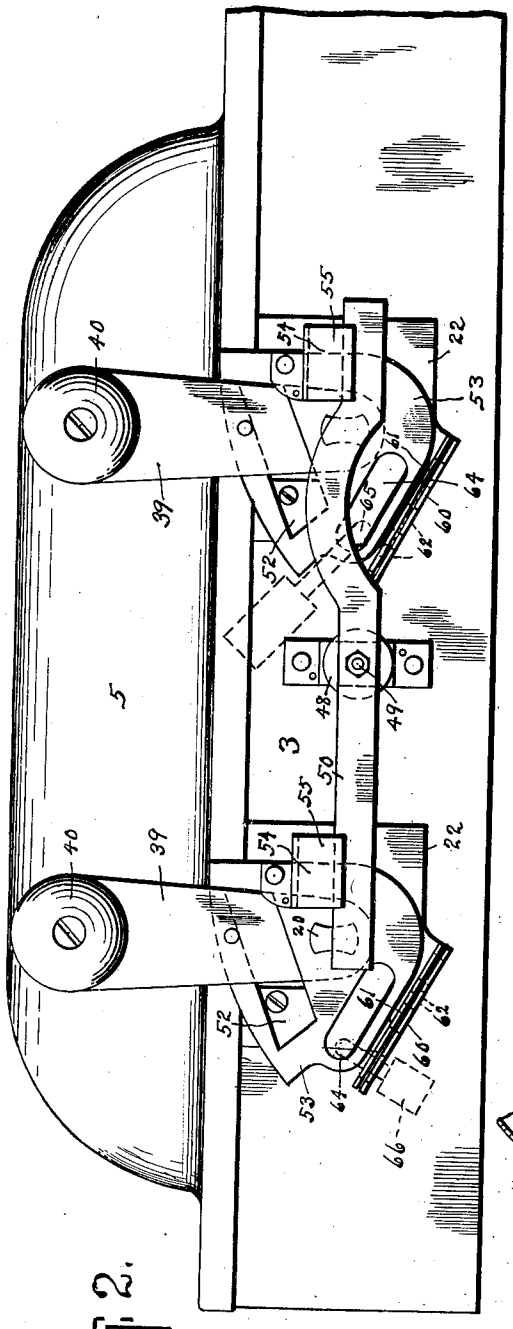


Fig. 2.

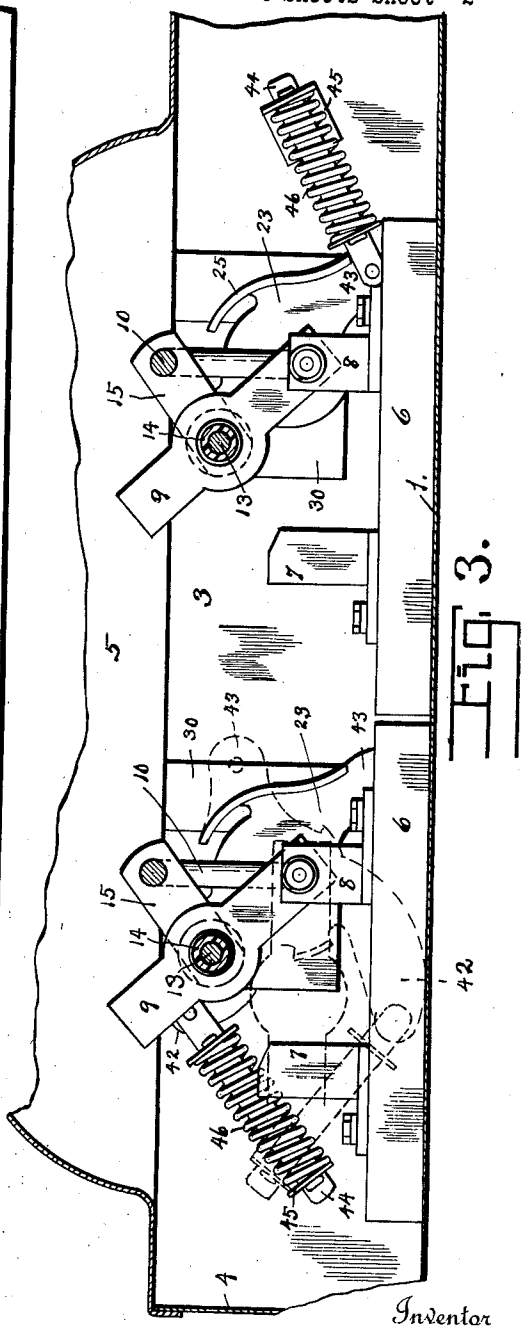


Fig. 3.

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COMPOUND SWITCH

Filed Jan. 10, 1924 4 Sheets-Sheet 3

Fig. 5.

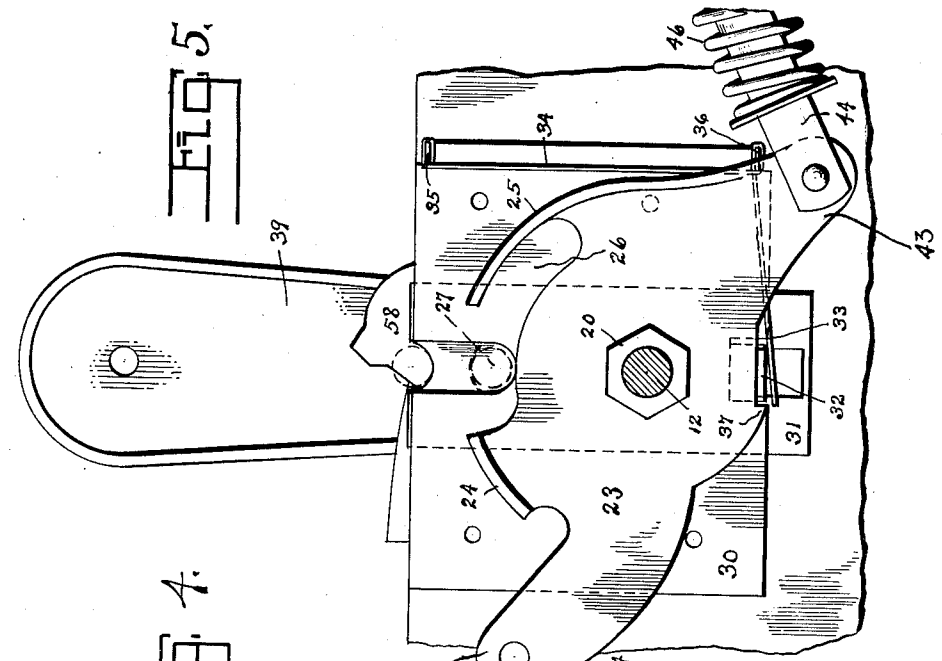
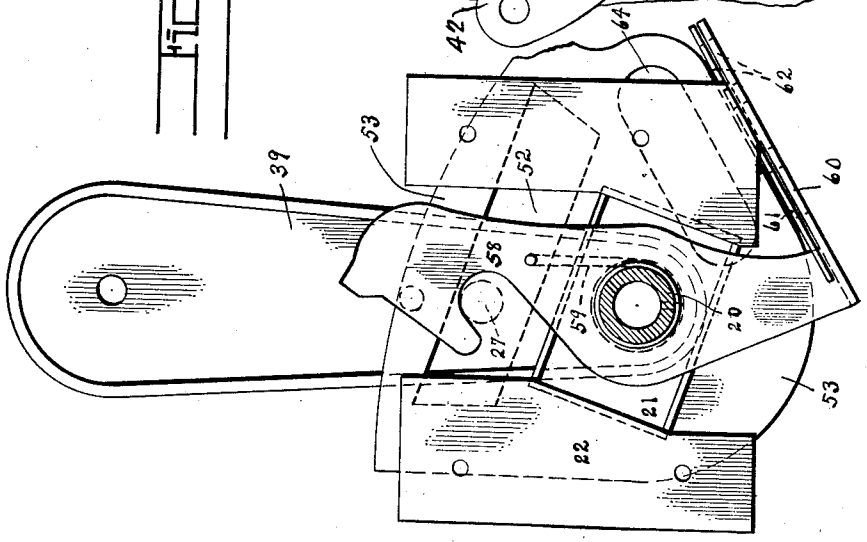


Fig. 4.



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Dec. 31, 1929. H. J. L. FRANK 1,741,227

COMPOUND SWITCH

Filed Jan. 10, 1924 4 Sheets-Sheet 4

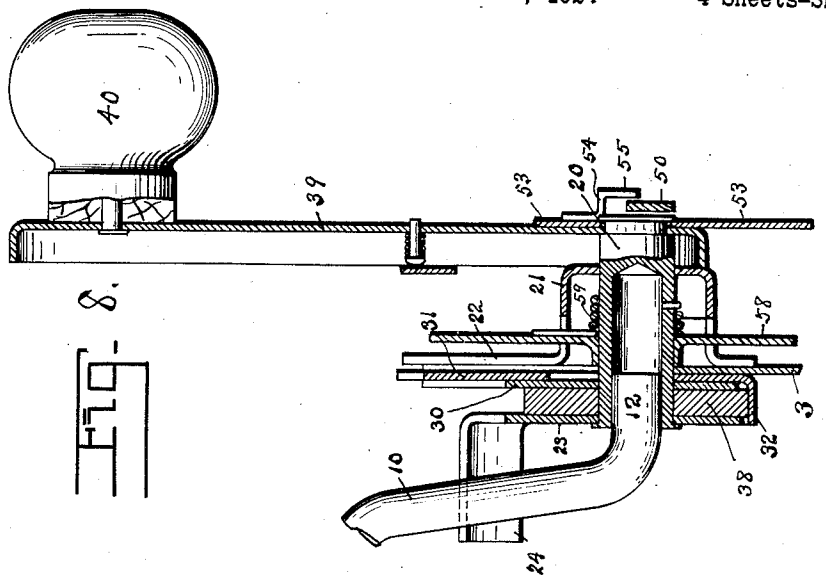


Fig. 8.

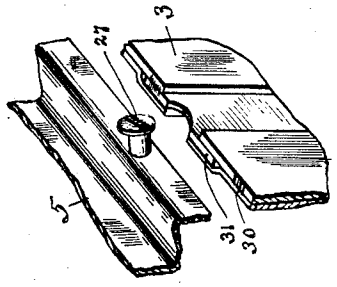


Fig. 6.

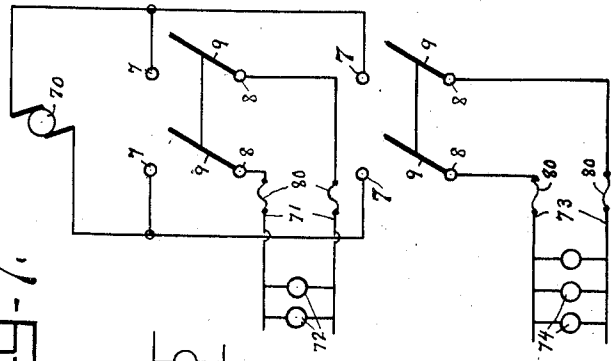


Fig. 9.

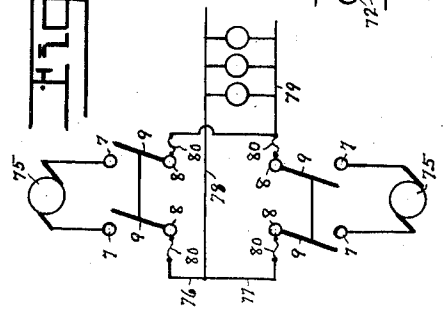


Fig. 7.

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UNITED STATES PATENT OFFICE

HARRISON J. L. FRANK, OF DETROIT, MICHIGAN, ASSIGNOR TO BULLDOG ELECTRIC PRODUCTS COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF WEST VIRGINIA

COMPOUND SWITCH

Application filed January 10, 1924. Serial No. 685,320.

This invention relates to the combination of two single-throw switches in such a manner that when one is closed the other is held open, such devices being especially adapted for use in current-consuming systems which have two sources of current and in systems where a single source of current is to be connected into either one of two supply circuits or to the lines of a reversing motor, and its object is to provide an interlock between a pair of single-throw switches which will permit only one of them to be in closed position at any time.

A further object of this invention is to provide means whereby said switches may both be locked in open position and to provide a casing for the switches and a cover therefor which cannot be opened so long as either of said switches is closed.

Another object of this invention is to provide a pair of switches and a case therefor which shall be provided with a cover, and interlocking devices between the switches and the cover so constructed that a single locking device, such as a padlock, may lock either switch or both switches in open position or either switch may be locked in closed position while at the same time the cover may be locked closed if desired.

In the accompanying drawings, Fig. 1 is a plan of this improved switch with the cover open. Fig. 2 is a side elevation thereof. Fig. 3 is a section on the line 3—3 of Fig. 1. Fig. 4 is a side elevation of the operating handle and cover lock. Fig. 5 is a similar elevation of the interlock for the cover. Figs. 6 and 7 are wiring diagrams. Fig. 8 is a vertical section of the operating mechanism. Fig. 9 is a detail of the interlock for the cover.

Similar reference characters refer to like parts throughout the several views.

While the switches and their case are described as resting on the plate 1, which is hereafter called the bottom, it is to be understood that the present device may be mounted at any desired angle and that the bottom 1 will possibly be as often in a vertical position as horizontal. The sides 2 and 3 and ends 4 of the case are shown entire, but they may be formed with knock-outs to admit circuit wires as may be found necessary. The cover 5 is hinged to the side 2 and is domed to permit the switches to be opened, to provide electrical clearance, and to provide space for the expansion of gases produced when a circuit is broken or ruptured.

The switches are each shown mounted on a base 6 of insulating material, although both may be mounted on the same base. Each switch embodies a pair of stationary contacts 7, a pair of pedestals 8 to which the knife-blade contacts 9 are pivoted, a bail 10 having pivot portions 11 and 12 in alinement with the pivots of the movable contacts 9, a cross bar consisting of the metal rod 13 and its sleeve 14 of insulating material extending through holes in the knife-blades 9, and links 15 connecting to this cross bar and to the bail 10. The bails swing down to the left in Fig. 3 to close the switches and this movement is limited by the extensions 16 on the aperture plates 17 which are attached to the side 2 to serve as bearings for the ends 11 of the bails. I prefer to form the heads 18 on the ends of these bails to prevent endwise movement thereof.

In order that the cover cannot be opened while either switch is open, an interlock is provided at each switch. The side 3 is formed with a vertical slot to admit the hollow operating shaft 20 (Fig. 8) which is journaled in the pressed out portion 21 of a supporting plate 22 which is shown in side elevation removed from the case in Fig. 4. The end 12 of the bail is journaled in this shaft. Attached to the inner end of this shaft is an actuator 23 having inwardly turned flanges 24 and 25 between which the bail extends, as shown in Fig. 1. This actuator also has a notch 26 which receives the screw 27 on the cover so that when the switch is closed, the flange 25 prevents the cover from being opened.

In order to prevent the switches from being closed when the cover is open, a guide plate 30 is attached to the side 3 and guides the stop plate 31 which is vertically movable and has a projecting finger 32 (Figs. 5 and 8) engaged by one arm 33 of a spring whose

other arm 34 connects to a pin 35, the spring being fulcrumed on the pin 36. The finger 32 is therefore normally pressed up into the path of the lug 37 on the actuator plate. A washer 38 is placed on the shaft 20 between the guide plate 30 and the actuator 23. A handle 39 with a knob 40 is secured to the outer end of the shaft 20.

When the parts are in the position shown in the drawings, which is in open-switch position, the pins 27 on the cover are between the flanges 24 and 25 of the two switch-actuators 23 and push down the lock plates 31 to carry the fingers 32 thereon below the path of the lugs 37 on the actuators. Either of the operating handles can therefore be swung to close its switch. When the cover is raised, the resilient arms 36 press up the lock plates and bring the fingers 32 into the paths of the lugs 37 and thus prevent either switch being closed. When either switch is closed, the flange 25 of its actuator extends over the adjacent pin 27 on the cover and thus prevents the cover from being opened. Arms 42 and 43 are formed on the actuators and connect to the rods 44 whose outer ends are slidable on the brackets 45 pivoted on the side 3. On the rods are the springs 46. These quick-make quick-break devices are described in my co-pending application Ser. No. 588,306, filed Sept. 15, 1922. They are preferably placed on opposite sides of the switch actuating mechanisms in order to balance the pull which is very desirable in large switches, but these positions may be varied as desired.

In order to close the switches, the handles 39 must be swung to the right in Fig. 2. A pedestal 48 rigidly attached to the side 3 carries a pivot 49 of any desirable type on which a bar 50 is mounted and this bar prevents either switch being closed when the other is in closed position. The operating handles are loose on the shafts 20 and they extend through slots 52 on the operating plates 53 which are rigidly attached to the shafts 20. Dogs 54 are attached to these operating plates and swing the bar 50 on its pivot when the operating handles are turned. These dogs have flanges 55 to prevent the bar 50 from becoming disengaged and are rigidly attached to the plates 53 to prevent them from swinging to inoperative position.

In order that a lineman or other employee may lock either or both switches in open positions and also prevent the cover of the case from being opened, a hook 58 is mounted on each shaft 20 (Fig. 4) and is adapted to extend over the adjacent pin 27 on the box cover. Each hook is normally held to engage the pin 27 by means of a spring 59 wound on the shaft 20. A perforated plate 60 extends from this hook and lies flat against the perforated plate 61 extending from the supporting plate 22. A padlock 66 (shown in dotted lines in Fig. 2) secured in any one of the holes 62 in these plates prevents the cover of the case from being opened, and when, in addition thereto, the padlock has its hasp extending through the slot 64 in the adjacent operating plate 53, that particular switch is also locked. If a padlock hasp 65, shown in dotted lines in Fig. 2, is extended through the slot 64 of the right hand operating plate 53 (Fig. 2) and around the bar 50, then neither switch can be closed.

Referring now to Fig. 6, 70 indicates a current source with wires leading to the stationary contacts 7 of both switches. Wires 71 lead from one pair of pedestals 8 for the knife-blades 9 to the lamps 72 while other wires 73 lead from the second pair of pedestals 8 to the lamps 74. Any other devices for consuming current may be thus connected alternately by these switches to the current source.

In Fig. 7, two sources 75 of current are shown and the switches and wires 76 to 79 inclusive for connecting either of these sources to the place of use of the current. This system is useful where a factory has its own generating plant but has arrangements to use public current when necessary.

In both of these systems the source of supply is entirely cut out and the knife-blades 9 and the fuses 80 are dead when the switches are opened. This makes for absolute safety when fuses must be replaced.

It will be noted that this compound switch is constructed of the same parts or units as are now used in the manufacture of single-throw quick-make and quick-break switches such as are shown in my said co-pending application Ser. No. 588,306. It can be supplied with cut-outs or fuses if desired by those skilled in the art. The switch may be inspected in either open or closed position by partly removing the screws 27 so as to free the cover.

It will be noted that when the shackle of a padlock is placed around the bar 50 and through the holes 62 of the plates 60 and 61 of the front switch it will lock the bar to prevent the rear switch being operated. When the shackle is passed through the slot 64 and around the bar and through the holes 62, both of the switches are locked in open position.

The details of construction of the various parts of this switch mechanism and the proportions and sizes of the parts may all be changed by those skilled in the art without departing from the spirit of my invention as set forth in the following claims.

I claim:—

1. A compound switch comprising a pair of independent switches, operating means for each, a cover for said switches, interlocking means between said cover and each of said operating means constructed and arranged to lock said cover when either switch is closed,

means to prevent both switches being closed at the same time and separate means to prevent either of them being closed.

2. A compound switch comprising a pair of independently operable switches, an operating device for each switch, a bar extending between said operating devices and movable by either to prevent the operation of the other, and stationary plates provided with perforations to receive locking devices which may engage said operating devices to prevent their operation, the operating device of one of said switches being provided with an aperture to receive a locking device whereby said operating device and said bar may be so locked as to prevent the actuation of either operating devices.

3. A compound switch comprising a pair of independently operable switches, an operating device for each switch, an element cooperating with both said operating devices and operable by either to prevent the operation of the other, and stationary plates provided with perforations to receive locking devices which may engage said operating devices to prevent their operation, the operating device of one of said switches being provided with an aperture to receive a locking device whereby said operating device and said bar may be so locked as to prevent the actuation of either operating devices.

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