L. KELLNER.

DOUBLE THROW SAFETY SWITCH.

APPLICATION FILED AUG. 27, 1920.

1,402,297.

Patented Jan. 3, 1922.

4 SHEETS—SHEET 1.

Fig. 1.

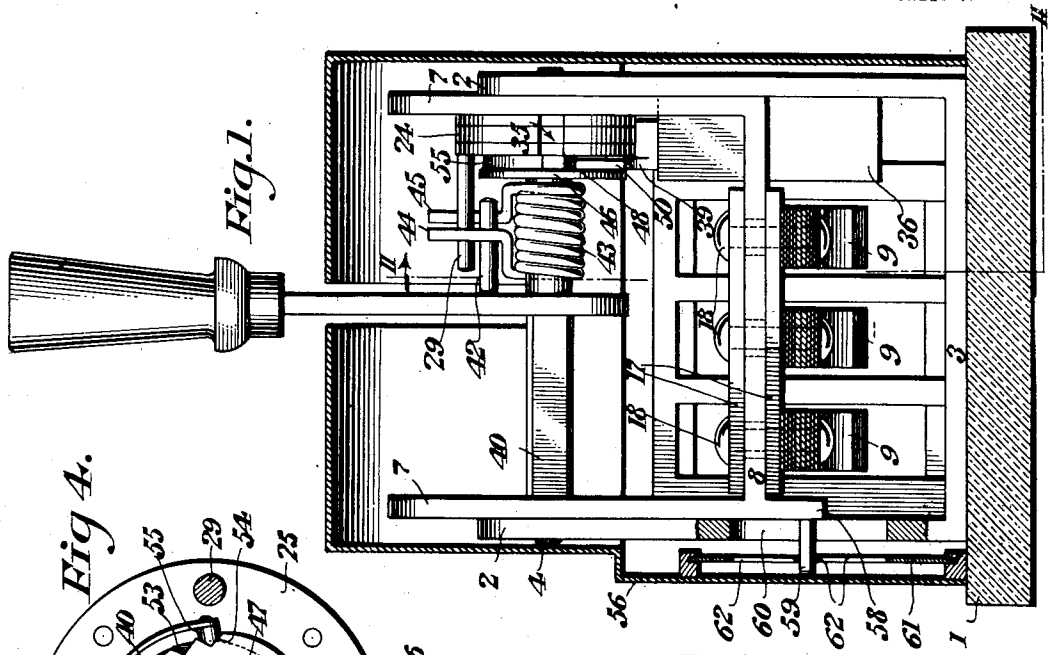


Fig. 4.

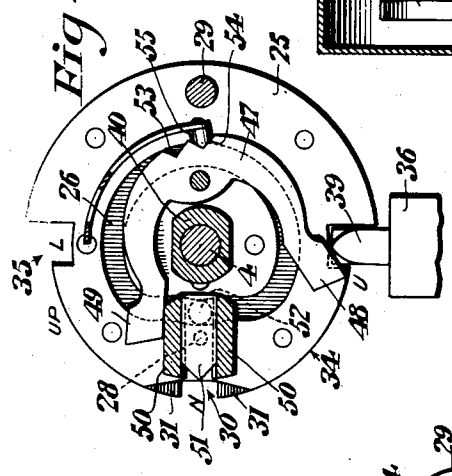


Fig. 2.

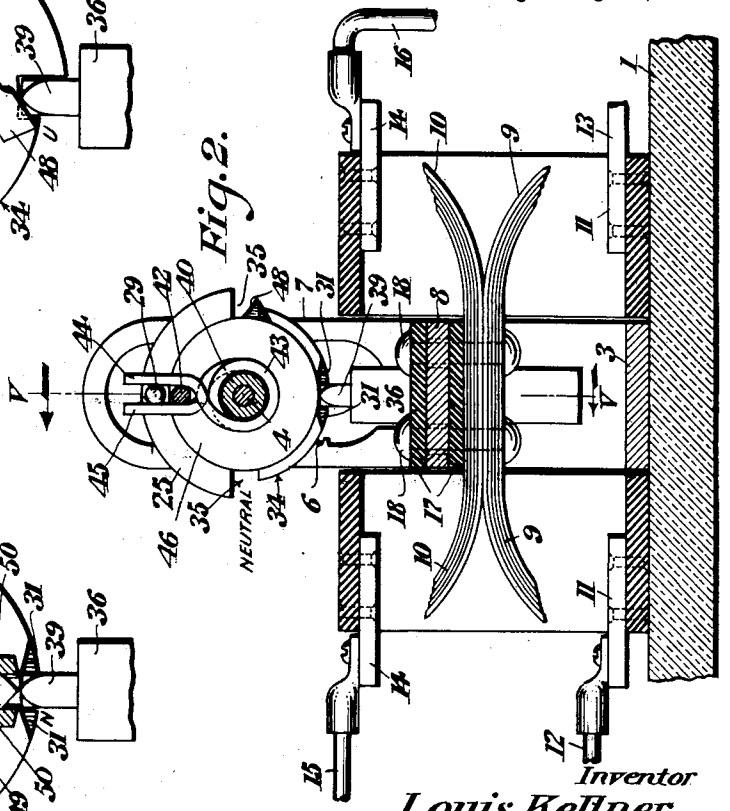
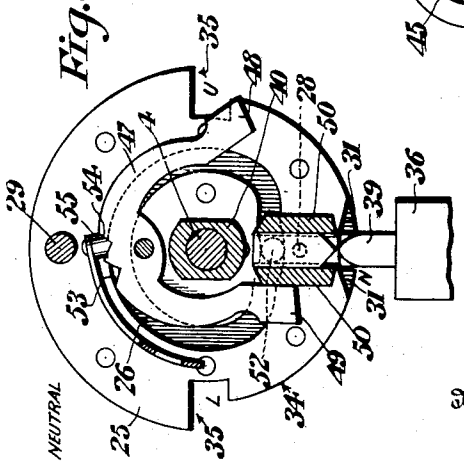


Fig. 3.



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4 SHEETS—SHEET 2.

Fig. 5

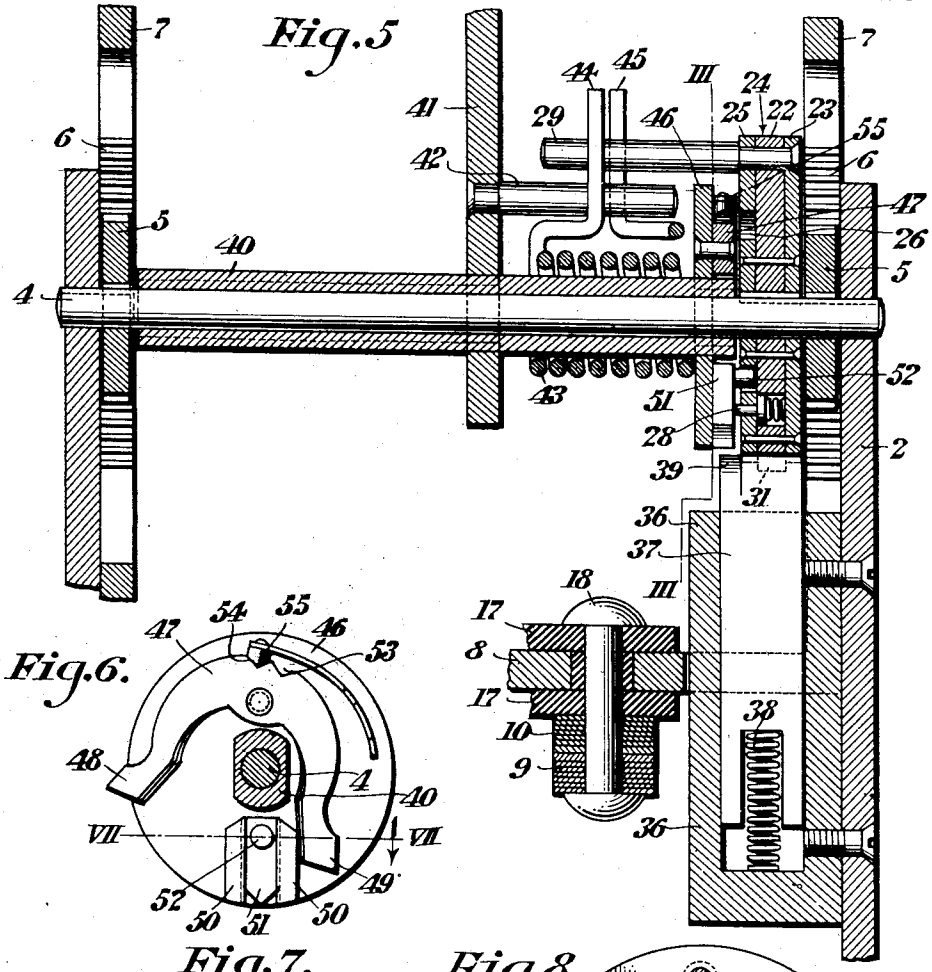


Fig. 6.

Fig. 7.

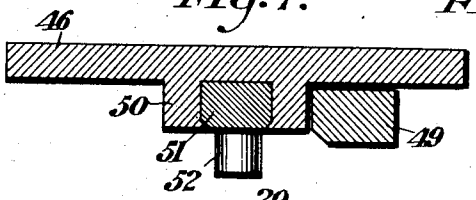


Fig. 8.

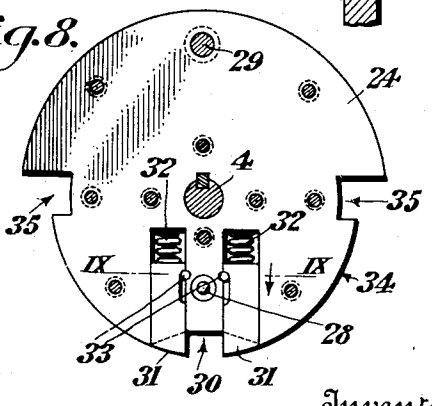


Fig. 10.

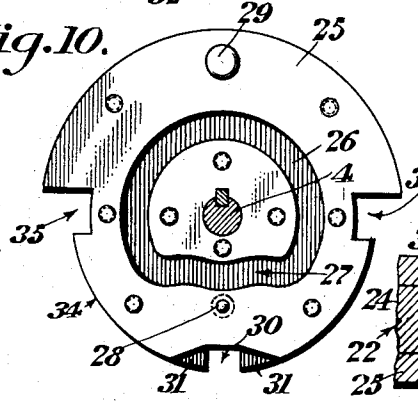
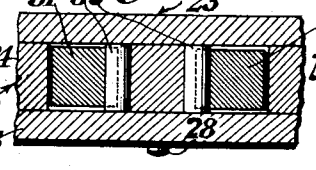


Fig. 9.



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4 SHEETS—SHEET 3.

Fig. 11.

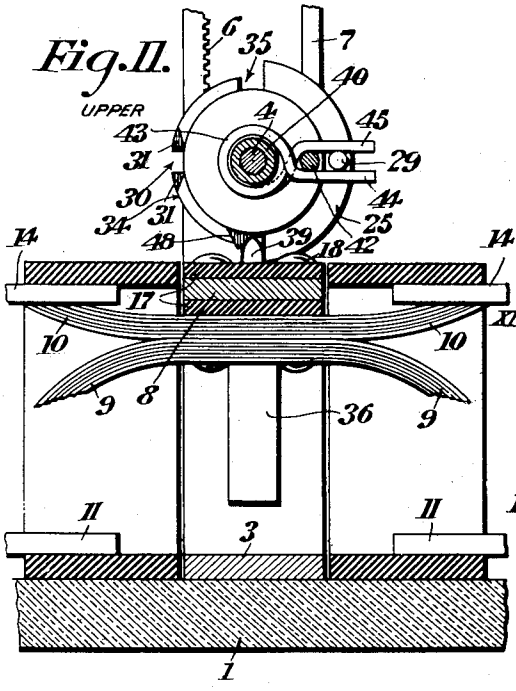


Fig. 12.

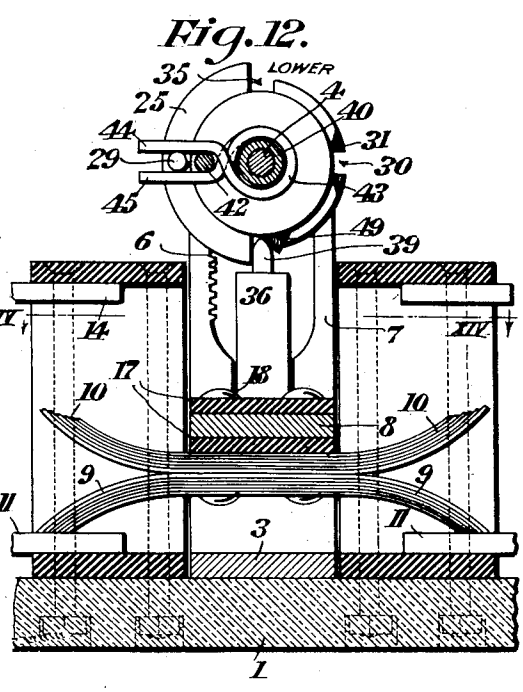


Fig. 13.

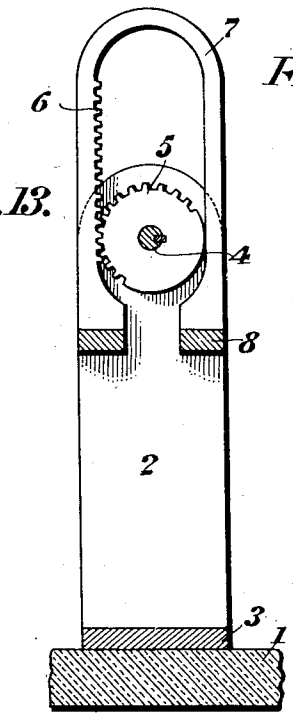
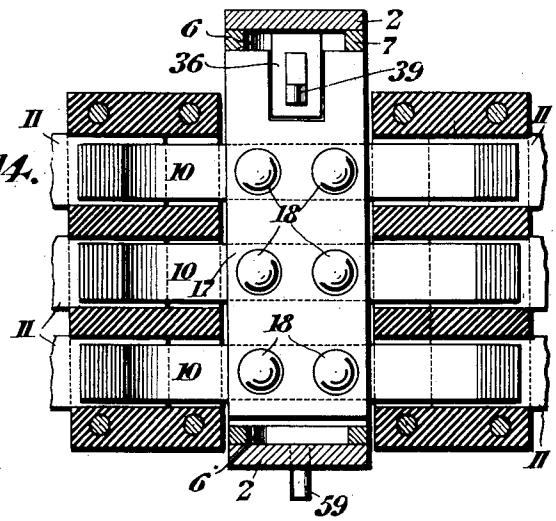


Fig. 14.



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APPLICATION FILED AUG. 27, 1920.

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4 SHEETS—SHEET 4.

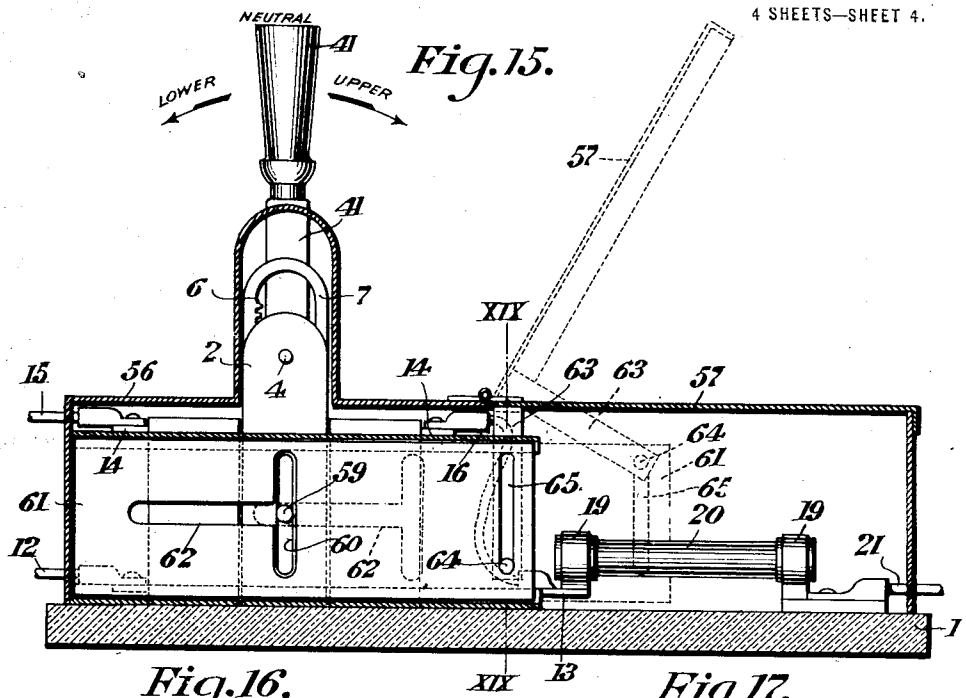


Fig. 15.

Fig. 16.

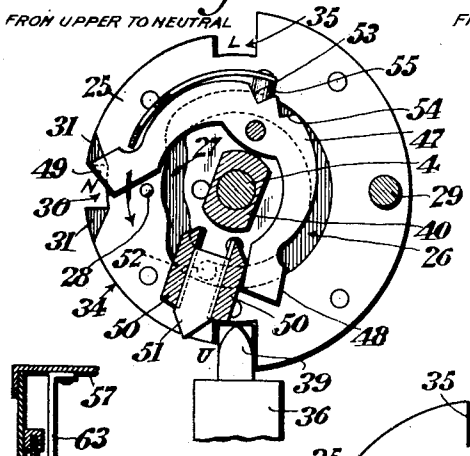
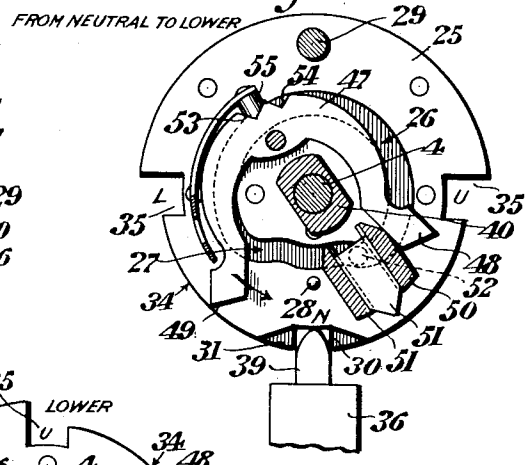


Fig. 17.



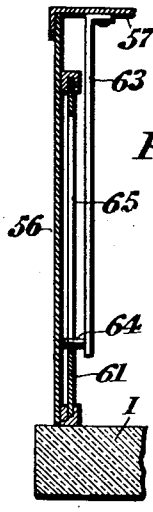


Fig. 19.

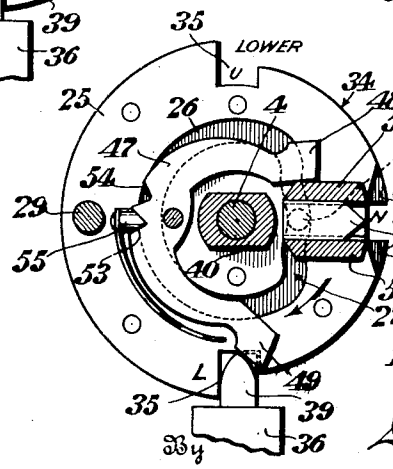


Fig. 18.

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UNITED STATES PATENT OFFICE.

LOUIS KELLNER, OF NEW YORK, N. Y.

DOUBLE-THROW SAFETY SWITCH.

1,402,297. Specification of Letters Patent. Patented Jan. 3, 1922.

Original application filed September 10, 1918, Serial No. 253,441. Divided and this application filed August 27, 1920. Serial No. 406,410.

To all whom it may concern:

Be it known that I, LOUIS KELLNER, a citizen of the United States, and resident of the borough of Manhattan, county of New York, city and State of New York, have invented certain new and useful Improvements in Double-Throw Safety Switches, of which the following is a specification. (Case K.)

One of the main objects of this invention is to provide a safety snap switch adapted for use on two circuits, the terminal-bridging means of the switch having an "on" position for each of the circuits and an intermediate or neutral position, the live parts of the switch mechanism being inclosed in a protecting casing having a closure which is automatically locked when the terminal-bridging means is shifted to either of its two "on" positions.

Another object of the invention is to provide an armored and fused switch, of this type, having a safety closure means whereby the fuse plugs will be covered and inaccessible at all times except when the brush block or plate is in its neutral position, the closure being automatically unlocked when the brush-carrying block is shifted to neutral position.

This application is a division of application Serial No. 253,441, filed September 10, 1918, upon which Patent No. 1,354,764, was granted October 5, 1920.

In the drawings, Fig. 1 is a transverse sectional view of the inclosing casing, the switch mechanism being shown in end elevation, parts thereof being broken away and shown in sectional view to more clearly illustrate certain features of construction;

Fig. 2 a longitudinal section view on the line II—II of Fig. 1, the inclosing casing being omitted;

Fig. 3 a detail sectional view on line III—III of Fig. 5, of the brush block releasing means when the brush block is in neutral position, as illustrated in Fig. 2;

Fig. 4 a similar view of the releasing means with the brush block in its upper position as shown in Fig. 11;

Fig. 5 a partial transverse sectional view on the line V—V of Fig. 2;

Fig. 6 a detail side elevation of the latch releasing means;

Fig. 7 a sectional view thereof on the line VII—VII of Fig. 6;

Fig. 8 a detail sectional view of the latch disk;

Fig. 9 a detail sectional view of the latch disk on the line IX—IX of Fig. 8;

Fig. 10 a detail elevation of the face of the latch disk;

Fig. 11 a detail sectional view of the switch showing the brush block in its upper position;

Fig. 12 a similar view showing the brush block in its lower position;

Fig. 13 a detail elevation of one of the gears and racks for shifting the brush block;

Fig. 14 a horizontal sectional view on the line XIV—XIV of Fig. 12;

Fig. 15 a longitudinal sectional view of the inclosing casing of the switch showing the switch in elevation and illustrating the safety cover;

Fig. 16 a sectional view similar to Fig. 3, of the brush block releasing means, showing the position of the parts when the brush block is about to be moved from its upper position to neutral position;

Fig. 17 a similar view with the parts in a position about to release the brush block from its neutral to its lower position;

Fig. 18 a similar view when the brush block is in its lower position; and

Fig. 19 a detail sectional view of the cover mechanism.

Referring to the various parts by numerals, 1 designates the base of the switch to which is secured the rigid standards 2, said standards being connected together by a bottom plate 3. These standards are at opposite sides of the base, and extending between them near their upper ends is a transverse rock shaft 4. At each end of the said shaft near the inner faces of the standards is rigidly secured a pinion 5, said pinions being adapted to engage the rack 6 formed on the inner faces of slotted arms 7, said arms at their lower ends carrying the brush block 8. To the lower side of the brush block are secured two sets of brushes 9 and 10, the lower set 9 being adapted to be carried down into engagement with the lower contact plates 11, said plates being connected to circuit wires 12 and to fuse plug connections 13. The upper set of brushes 10 is adapted to be moved into engagement with upper contact plates 14 which are connected to circuit wires 15 and

fuse plug connections 16. The brushes are insulated from the brush block by means of insulation plates 17 and properly insulated bolts 18. The space between the upper and lower sets of contact plates is sufficient to permit the brush block and the brushes to be placed in a neutral position between them, in which position the brushes will be out of contact with both sets of contact plates. Fuse plug connections 13 and 16 are connected in any suitable manner with the fuse plug clips 19; fuse plugs 20, and circuit wires 21, all of said devices being preferably mounted on the base 1 as indicated in Fig. 15, and in a convenient position to be inclosed within a suitable protecting box.

With the parts in lower circuit-closing position, as shown in Figs. 12 and 18, the brush block 8 may be shifted to neutral position to break the connection between the contacts 11 by swinging the handle 41 toward the right, as viewed in the drawings, to its vertical central position shown in Fig. 15. This movement of the handle rotates trip disk 46 in the direction indicated by the arrow in Fig. 18, the initial movement of said disk causing the end 49 of trip yoke 47 to ride over lug 39 on the latch bolt and rock the yoke to retract the cam end 49 and project the cam end 48. As the disk 46 continues to rotate the pin 52 on trip dog 51 will engage in the circular portion of the cam slot 26 in latch disk 24, thus projecting the trip dog 51 in the path of the beveled lug 39 on the latch bolt 37. As the trip disk completes its movement the latch bolt will be forced downwardly by the trip dog 51 out of the notch marked "L" in Fig. 18, whereupon the motor spring 43, which has been placed under tension by the movement of pin 42 on the handle 41 relatively to pin 29 on latch disk 24, will rotate the latch disk with a rapid snap action to the position shown in Fig. 3 and the latch bolt will snap into the notch 30 in the latch disk. This rotation of the latch disk will bring the straight part 27 of the cam slot 26 to a position to again retract the trip dog 51, as shown in Fig. 3, and move the brush block to the position shown in Figs. 1 and 2. If, after the operation just described, it is desired to return the mechanism to the lower circuit-closing position, the operating handle is swung back to the left as indicated by the arrow marked "Lower" in Fig. 15. In moving the lever toward the left the trip disk, the yoke and the trip dog will move as indicated in Fig. 17. When the arm 49 of the trip yoke engages the trip pin 28 it will be swung on its pivot to cause the arm 49 to extend beyond the periphery of the trip disk and into the path of the beveled lug 39 on the latch bolt; the other arm of the trip yoke will be swung into engagement with one of the flanges 50, said flange forming a rigid stop to prevent any further swinging movement of the trip yoke. As the operating lever is forced downwardly to complete its operating stroke the cam end 49 of the trip yoke will force downwardly the latch bolt and free it from the latch disk. The movement of the operating lever has swung downwardly the end 45 of the power spring thereby causing the end 44 to bear with increased tension against the actuating pin 29. As soon, therefore, as the latch bolt has been forced downwardly out of the latch recess 30 the power spring will rotate the latch disk through the actuating pin 29, thereby rotating the shaft 4 and the pinions 5 in the direction to throw downwardly the rack 6, arms 7 and the brush block carried thereby. The latch disk will make a quarter revolution, or until the two ends 44 and 45 of the power spring 43 again engage the setting pin 42 carried by the operating lever. At this point in the rotation of the latch disk the latch bolt 37 will be projected by its spring into one of the locking notches 35. As viewed in Fig. 17 the latch bolt will snap into the locking notch marked "L." The parts then will be in the position shown in Figs. 12 and 18.

If, after the switch has been operated as above described to break the connection between the lower contacts 11, and the parts are in the neutral position shown in Figs. 1, 2, 3 and 15, it should be desired to close the circuit through the upper contacts 14, the handle 41 is swung to the right as indicated by the arrow marked "Upper" in Fig. 15. This movement of the handle will rotate the trip disk 46 to cause the cam end 48 of the trip yoke, which was projected to the position shown in Fig. 3 during the movement from lower position to neutral, to release the latch bolt from notch 30 in the latch disk, whereupon the motor spring will rotate the latch disk to the position shown in Figs. 4 and 11 and the latch bolt will snap in the notch marked "U" in the latch disk as shown in Fig. 4. This movement of the latch disk will cause the pinions 5 to shift the brush block to the position shown in Fig. 11, thus closing the circuit between the upper contacts 14.

In order to move the switch block from its upper position to its neutral position the operating lever is moved from its lower right-hand position to its upper midway neutral position. This movement of the operating lever will cause the rotation of the trip disk and the trip devices in the direction indicated by the arrow in Fig. 16. This movement of the trip disk will first cause the end 48 of the trip yoke to ride over the beveled lug 39 on the latch bolt and rock the trip yoke to the position shown in Fig. 16 with the end 49 thereof projected, and will then bring the pin 52 into the circular portion of

the slot 26, thereby projecting the trip dog beyond the periphery of the trip disk and into the path of the lug 39 of the latch bolt. The circular portion of the slot will hold the trip dog rigidly extended, and as the operating lever completes its upward movement the latch bolt will be forced downwardly and freed from the latch disk, thereby permitting the power spring to rotate the latch disk and the pinions in the direction to lift the brush-carrying block to its midway or neutral position. When the actuating pin is again parallel with the setting pin and the two ends of the power spring are in engagement with both of said pins the latch bolt will snap into the locking recess 30 as indicated in Fig. 3, in which position it will be held between the yieldable jaws 21. If the latch bolt does not accurately strike within the recess 30, but engages either one of the yieldable jaws, the said jaw will yield and permit the latch bolt to engage the inwardly beveled walls of registering recesses formed in the plates 23 and 25 of the latch disk and be thereby guided to its proper central position whereupon the inwardly pressed yieldable jaw will spring outwardly and engage the latch bolt.

When the switch is operated to shift the brush block from upper position to neutral position as just described, the parts will assume the positions shown in Figs. 2 and 3, except that the trip yoke 47 will be rocked in the opposite direction with the end 49 thereof projected in position to release the latch bolt upon a subsequent movement from neutral to lower position. If, with the parts in this position, the handle 41 is operated to return the mechanism to upper position, rotation of the trip disk will cause arm 48 of the trip yoke to engage trip pin 28 and the yoke will be rocked to project arm 48 into position to trip the latch bolt.

The switch mechanism is preferably enclosed within a protecting box 56, the fuse plugs 20 being directly below a hinged cover 57. One of the arms 7 of the brush-carrying block is extended downwardly as at 58 in Fig. 1, and said extension carries an outwardly extending pin 59, said pin being adapted to reciprocate in a slot 60 in the adjacent standard 2. Mounted to slide longitudinally in the box 56 is a locking plate 61, said plate being guided in suitable ways arranged along its upper and lower edges. The pin 59 extends into a T-shaped slot 62, the shorter portion of said slot being vertical as shown in Fig. 16 and the longer portion thereof extending to the left from said shorter portion. In the neutral position of the operating lever, as indicated in Fig. 15, the pin 59 is at the junction of the two portions of the T-slot so that in said position of the operating lever the locking plate 61 may be moved toward the right longitudinally of the enclosing box. Secured to the hinged cover 57 is a depending arm 63, at the lower end of which is an outwardly extending pin 64 which engages in a vertical slot 65 in the locking plate. It is manifest that when the operating lever is in its neutral position the cover 57 may be raised, the pin 64 sliding the locking plate 61 toward the right as viewed in Fig. 15 and the pin 59 entering the long horizontal member of the T-slot 62. When, however, the operating lever is in either its "upper" or "lower" position the pin 59 will be at one or the other end of the short vertical portion of the T-slot 62 and out of line with the longer portion of said slot. It is manifest that in this position of the parts the cover 57 cannot be raised as it will be locked by the pin 59, plate 61, pin 64 and the arm 63. It is clear, therefore, that the fuse plugs cannot be reached without first placing the brush block in its neutral position. It is also manifest that the protecting cover 57 must be closed to enclose the fuse plugs before the operating lever can be moved from its neutral position, as when the cover is open pin 59 which moves with the brush block 8 is engaged in the horizontal portion of slot 62 in plate 61 and said block is locked in neutral position.

What I claim is:

1. In a multiple throw fused switch, the combination of terminal-bridging means reciprocable from an intermediate "off" position in opposite directions to either of two "on" positions, a pin movable with the bridging means, a fuse-enclosing casing having a hinged door, a locking plate slidably mounted in the casing, and means connecting the plate and door to move in unison, said plate having a T-slot therein in which said pin is engaged, the stem portion of which extends transversely of the path of movement of the pin and parallel with the path of movement of the plate, the pin being located at the junction of the two portions of the T-slot when the door is closed and the bridging means is in "off" position.

2. In an electric switch having terminal-bridging means reciprocable between "on" and "off" positions, a casing enclosing the live parts of the switch having a hinged door, a pin reciprocable with the bridging means, a plate slidably mounted in the casing having an angular slot through which the pin extends, and means connecting the plate with the door to move transversely of the path of movement of the pin when the door is shifted, one portion of the slot extending parallel with the path of movement of the plate and the other portion extending parallel with the path of movement of the pin.

3. In an electric switch having terminal-

bridging means reciprocable between "on" and "off" positions, a casing enclosing the live parts of the switch having a hinged door, a pin reciprocable with the bridging means, a plate slidably mounted in the casing having an angular slot through which the pin extends, and a bracket held to the inner side of the door having a pin-and-slot connection with the plate for sliding the plate when the door is swung on its hinges.

4. In a multiple throw safety switch, the combination of a switch casing having a hinged door, two sets of line terminals in said casing, a movable terminal bridging device in the casing, a support for the bridging device shiftably mounted in the casing, an operating handle connected to shift the support to move the bridging device to a neutral position or to a position bridging either set of line terminals, a locking member mounted on the bridging device support to shift therewith, and a plate connected with the door of the switch casing having an opening through which the locking member extends, said opening being shaped to permit movement of the bridging device support only when the door is closed and to permit opening of the door only when the bridging device is in neutral position.

5. In a multiple throw safety switch, the combination of a switch casing having a hinged door, two sets of line terminals in said casing, a movable terminal bridging device in the casing, a support for the bridging device shiftably mounted in the casing, an operating handle connected to shift the support to move the bridging device to a neutral position or to a position bridging either set of line terminals, a locking member mounted on the bridging device support to shift therewith, and a plate connected with the door of the switch casing having an opening through which the locking member extends, said opening having a part extending parallel with the path of movement of the plate by the door and a part in which the locking member is free to move in opposite directions when the door is closed.

6. In an electric switch, the combination of a switch casing having a movable closure, a terminal bridging device in the casing, a shiftable support for said device, a pin carried by said support, a plate slidably mounted in the casing, means connecting the plate with the closure for imparting a rectilinear movement to the plate when the closure is shifted, said plate having an angular slot therein in which the pin is engaged, and operating means for shifting the bridging device support between "on" and "off" positions and moving the pin to a point in one branch of the angular slot when the bridging device is moved to "on" position and to a point at the junction of the angularly disposed branches of the slot when the bridging device is moved to "off" position.

In testimony whereof I hereunto affix my signature.

LOUIS KELLNER.