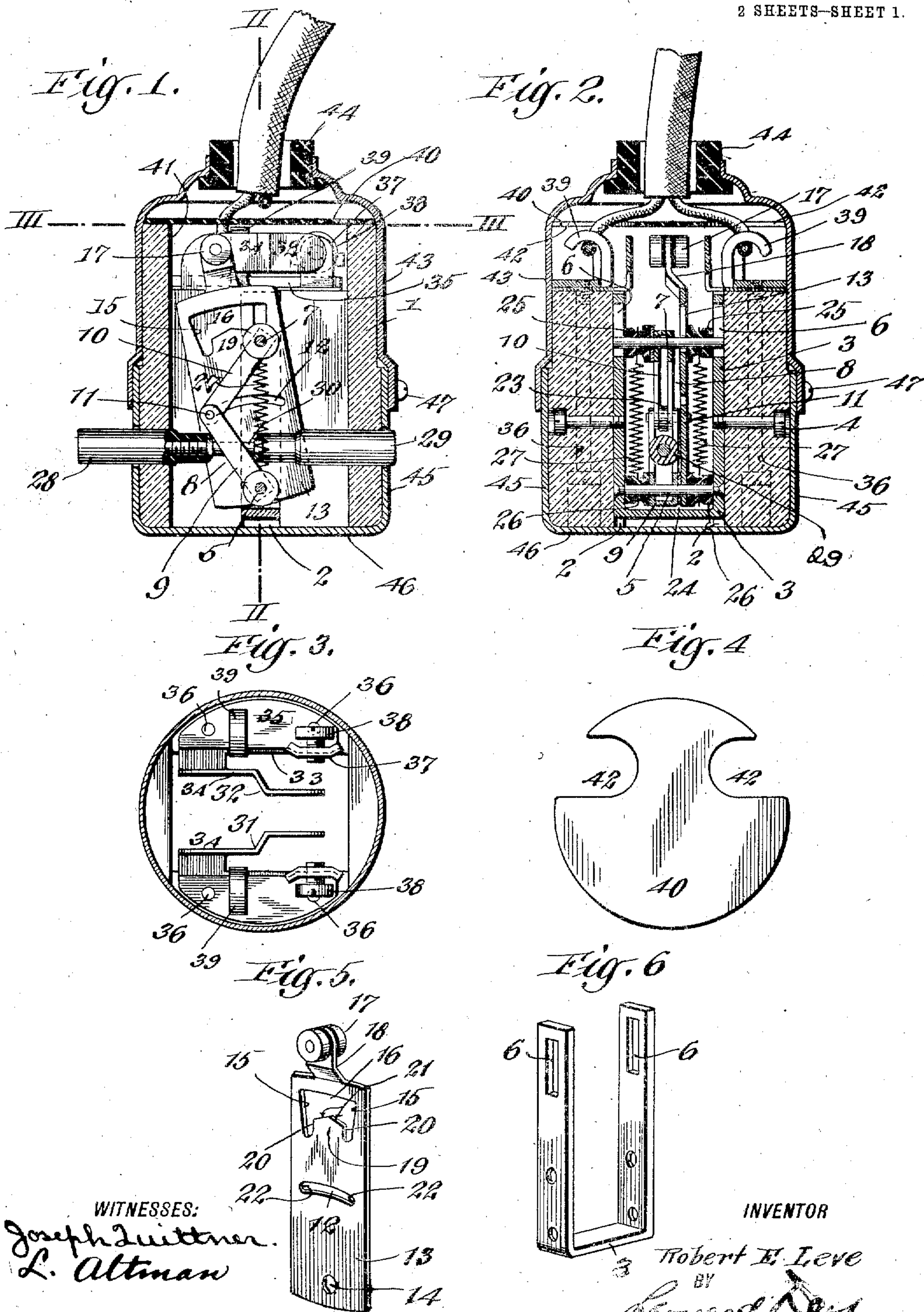


R. E. LEVE.
PENDANT SNAP SWITCH.
APPLICATION FILED APR. 6, 1910.

989,618.

Patented Apr. 18, 1911.

2 SHEETS-SHEET 1.



WITNESSES:
Joseph Zuttner.
L. Altman

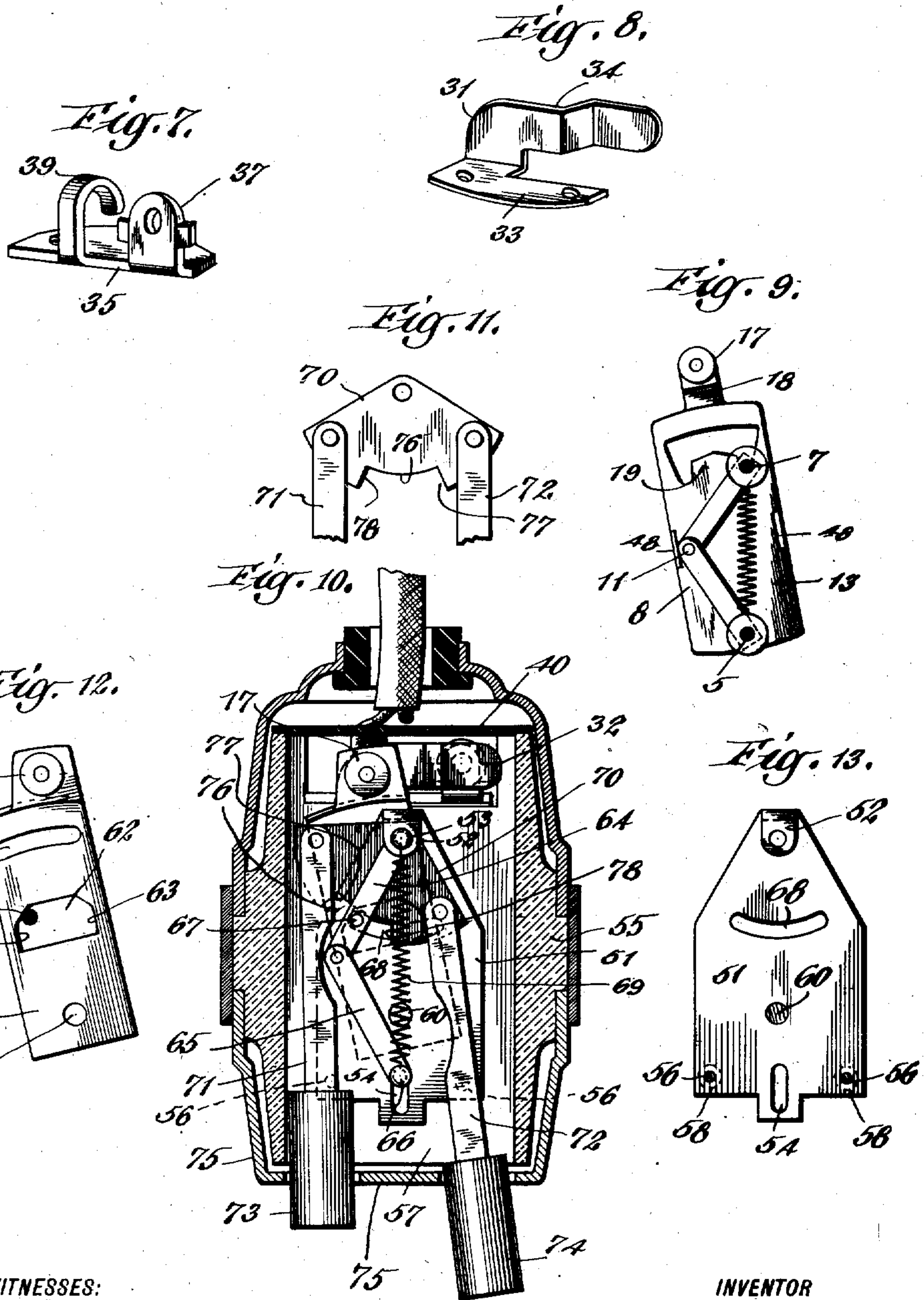
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UNITED STATES PATENT OFFICE.

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PENDANT SNAP-SWITCH.

989,618.

Specification of Letters Patent.

Patented Apr. 18, 1911.

Application filed April 6, 1910. Serial No. 553,709.

To all whom it may concern:

Be it known that I, ROBERT E. LEVE, a citizen of the United States, and a resident of the borough of Manhattan, county, city, and State of New York, have invented certain new and useful Improvements in Pendant Snap-Switches, set forth in the following specification.

This invention relates to snap switches, the specific embodiments illustrated being pendant snap switches.

An object of the invention is to simplify the construction of switches of this class and to insure an instantaneous make and break.

A further object of the invention is to provide, in a simple manner, for the locking of a switch blade in each of two extreme positions, such as open or closed position with respect to the switch contacts.

To the above ends the novel employment of a toggle is contemplated whereby a hammer part at the knuckle of the toggle is utilized to strike a hammer blow on a part of the switch blade to effect instantaneous movement of the switch blade from one position to the other and vice versa. Also a combined locking and guiding pin is fixed to the extremity of what may be termed a floating toggle arm to cooperate with locking shoulders provided on the switch blade for the purpose of locking the switch blade in each of its two extreme positions until the instant the switch blade is to be shifted by the hammer blow. The general object of the invention is also furthered by the employment of tandem push buttons for breaking the toggle.

The invention consists of the construction, combination and arrangement of parts set forth in and falling within the scope of the accompanying claims.

The invention will be described in its preferred embodiments in the following specification which should be read in connection with the accompanying drawings forming a part of this application, and in which,—

Figure 1 is a vertical section through an embodiment of the invention, but showing parts in elevation; Fig. 2 is a vertical section taken through line II—II of Fig. 1 also showing parts in elevation; Fig. 3 is a horizontal section through line III—III of Fig. 1 showing parts in plan; Fig. 4 is a plan view of the insulating shield for protecting the switch contacts; Fig. 5 is a perspective view illustrating the switch blade; Fig. 6

is a perspective view illustrating the frame for the switch mechanism of the embodiment shown in Figs. 1, 2 and 3; Fig. 7 is a perspective view of the cord gripping terminal plate; Fig. 8 is a perspective view of one of the switch contacts; Fig. 9 is a detail vertical elevation embodying parts corresponding to those shown in the previous figures but showing a modification of the switch blade; Fig. 10 is a vertical section corresponding to Fig. 1, but showing a modified embodiment of the invention; Fig. 11 is a detail elevation of the actuating rocking sector of Fig. 10; Fig. 12 is a detail elevation of the switch blade of the Fig. 10 construction; and Fig. 13 is a detail elevation of the mechanism frame for the construction of Fig. 10.

Referring now particularly to the embodiment illustrated in Figs. 1 to 8 inclusive, 1 indicates a suitably shaped, cored casing of insulating material preferably porcelain, which is shown pressed in one part, although this is not essential to the invention. The casing 1 is provided with interior lengthwise channels 2 oppositely positioned and arranged to seat the opposite legs of the U shaped mechanism supporting frame 3 which is fixed in position in an obvious manner by the countersunk screws 4. An arbor 5 is mounted in the frame 3 crosswise to its length and in the lower portion thereof as indicated. In the upper portion of the legs of the frame 3 oppositely arranged guiding slots 6 are provided in vertical alinement with the arbor 5. A combined guiding and locking pin 7 has its respective ends working or floating in the slots 6. A toggle 8 has the extremity of its arm 9 pivoted to the arbor 5 and the extremity of its other or floating arm 10 pivoted to the guiding pin 7. A part of the toggle at the knuckle is designated a hammer part, specifically, in this embodiment, it is the knuckle pin 11 extending to the right as shown in Fig. 2 so that it projects through the clearance slot 12 provided in the switch blade 13. The switch blade 13 is pivoted at its lower end through the medium of the bearing 14 upon the arbor 5 and extends substantially lengthwise alongside of the toggle 8 in the frame 3 but has a sidewise swinging movement about the arbor 5 limited by the radial stop walls 15 at the sides of the opening 16 provided through the switch blade body for the passage of the pin 7. The

upper end of the switch blade 13 is provided with the bridge contact 17 secured to but insulated from the laterally offset projecting lug 18, as indicated. An upward projection 5 19 of the switch blade into the opening 16 provides opposite locking shoulders 20 co-operating with the locking pin 7, while the upper end of this projection 19 terminates in two symmetrical downwardly beveled 10 faces 21. The symmetrically positioned end walls 22 of the clearance slot 12 form laterally spaced striker anvils located across the path of movement of the knuckle pin 11, it being understood that the length of the arc 15 separating the striker anvils 22 is less than the arc shaped throw of the knuckle pin 11. Although this construction is not essential, the toggle arms 9 and 10 are shown formed of bent metallic strips substantially U 20 shaped with their terminal legs connected by the knuckle pin 11 and spaced apart by the washer 23 which also serves to increase the mass at the knuckle of the toggle. A washer 24 is also shown slightly spacing the 25 switch blade 13 from the toggle 8. Grooved fiber washers 25 are fitted on the guiding pin 7 and similar fiber washers 26 are fitted on the ends of arbor 5. These fiber washers serve as spacers for the switch mechanism 30 and also as anti-friction bearings for the ends of two opposite tension springs 27 which are, therefore, through the medium of the washers, arbor 5 and pin 7, connected to the extremities of the toggle arms and tend 35 always to draw the floating pin 7 toward the arbor 5. A pair of tandem push buttons 28 and 29, are connected in alinement by the stem 30, extending axially from the push button 29 through the legs of the toggle arm 40 9 and threaded into the opposite push button 28. They are shown seated in a cross-wise position through opposite holes provided in the insulating casing 1 and so that the inner end of each push button is arranged operatively to engage one of the opposite sides of the pivoted toggle arm 9. Similar brush contacts 31 and 32 are provided for coöperation with the bridge contact 17. Each contact comprises a flat base 50 member 33 perforated for the passage of screws and with a struck up and inwardly offset contact finger 34, as illustrated. Each of these brush contacts is seated on suitably formed opposite ledges of the casing 1 and 55 clamped in position by an overlying terminal comprising a flat base portion 35 having spaced perforations threaded to receive the ends of screws 36 passing lengthwise through the porcelain casing; a struck up binding post member 37 provided with the 60 usual binding screw 38; and an up- and over-turned friction hook 39 adapted to hook over and grip the insulation of the terminal wire connected with the binding post 65 38. An insulating fiber disk 40 is also pro-

vided to be seated on the up-standing ledges 41 of the porcelain casing to protect the switch mechanism. It is provided with opposite slots 42 for the passage of the terminal wires. The porcelain casing 1 and 70 the entire mechanism is shown inclosed in a metallic shell which is shown in two parts,—an upper spun-metal part 43 provided with the insulated bushing 44 and the lower spun metal part 45 having a bottom closure 46 75 and perforations for the push buttons 28 and 29, it being understood that the push buttons 28 and 29 may be assembled after the lower part 45 has been slipped over the bottom of the porcelain casing, after which the push 80 buttons may be inserted through the holes provided therefor and screwed together in tandem engagement. The top shell 43 may be held in position by friction or by any suitable means securing the overlapping 85 rims of the top and bottom shells, such as screws 47.

In Fig. 9 a slight modification of the switch blade is illustrated. In this modification the clearance slot 12 is omitted and 90 the knuckle pin 11 of the toggle is not rearwardly extended. There are, however, provided striker anvils in the form of struck out ears 48 which lie across the path of movement of the toggle knuckle itself so 95 that in this modification the knuckle of the toggle is the hammer portion which coöperates with the anvils 48.

Operation Figs. 1-9.—The switch is shown in the figures in open circuited position. The floating pin 7 is drawn down 100 firmly by the springs 27 into the pocket formed between the right hand stops 15 and 20 formed in the switch blade. The stop wall 15 prevents the swinging of the switch 105 blade to the left and the stop wall 20 prevents its swinging to the right. In other words it is locked in the position shown. In closing the switch, the push button 28 is pressed so that its inner end operatively en- 110 gages the pivoted toggle arm 9 straightening out the toggle into dead center position which causes the pin 7 to travel upwardly in the slot 6 to clear the stop shoulder 20. As soon as the toggle has been broken, that 115 is, forced slightly to the right of dead center position, the tension of springs 27 causes the toggle knuckle to snap to the right. There is provided a sufficient amount of lost motion for the hammer portion at the 120 knuckle of the toggle from the dead center position of the toggle to engaging position of the hammer portion with the striker anvil of the knife blade. This allows the toggle to acquire considerable momentum and 125 to deliver a sharp hammer blow to the switch blade, which instantly snaps it into closed position so that the bridge 17 electrically connects the brush contacts 31 and 32. It should be noted that the inner end of the 130

opposite push button 29 is spaced sufficiently apart from the inner end of push button 28 so that the toggle arm 9 may complete its swing to the right and the toggle exert its entire force in shifting the switch blade without striking the inner end of push button 29 to interrupt its movement. To shift the switch blade from closed circuited position to open circuited position the operation is the reverse of the above, it being understood, of course, that the push button 29 is the operative button for this operation. Furthermore, in connection with this apparatus the advantageous features of ready assembling should be noted. Practically the entire switch mechanism may be assembled outside of the porcelain casing 1 as it is mounted in the U shaped metallic frame 3 which can be slipped into the porcelain casing and secured therein after the switch parts have been properly assembled.

Modification.—A modified construction is shown in Figs. 10 to 13. In this construction the brush contacts or contact fingers 31 and 32 and the terminal construction shown in Fig. 7 as well as the protecting disk 40 shown in Fig. 4 are the same as previously described. In this embodiment the frame is in the form indicated in Fig. 13. It comprises a metallic plate 51 of suitable shape having its upper end turned down over the front of the plate to form the spaced lug 52 which together with the plate is perforated to form a bearing for the arbor 53 which is aligned with the guide slot 54 provided in the lower end of the frame plate 11. This frame plate is to be secured within the porcelain casing 55 in any suitable manner, as by means of screws 56 but spaced apart from the flat inner wall 57 of the casing 55 by feet 58 on the rear of the plate. (See dotted lines in Fig. 13.) The switch blade 50 is shown in Fig. 12 having provided at its upper end the bridge contact 17 insulated as previously described from the blade proper. The switch blade is pivoted to the frame plate 51 at the bearing 59 by means of the pin 60 and occupies a position in a clearance space at the rear of the plate 51. The slot 61 provides play for the rearwardly projecting end of the arbor 53, while the end walls of the slot 61 serve as stops to limit the throw of the switch blade by engaging the rearwardly projecting end of the arbor 53. The switch blade 50 also has a central perforation 62 the side walls 63 of which are the striker anvils. The upper arm 64 of the toggle has its extremity pivoted to the arbor 53, while the extremity of the lower or floating arm 65 of the toggle is provided with a guide pin 66 which works in the slot 54. In this construction the hammer portion at the knuckle of the toggle is not located exactly at the pivot pin of the knuckle but corresponds substantially in position with the toggle knuckle.

This hammer portion is shown in the form of a pin 67 fixed to the arm 64 and extending rearwardly through the clearance slot 68 provided in the plate 51 and then through the perforation 62 in the switch blade 50 to cooperate with the anvils 63. The tension spring means connecting the extremities of the toggle is indicated by 69 and tends to break the toggle, the throw of which is limited by the engagement of the pin 67 with the end walls of slot 68. Between the toggle arm 64 and the plate 51 the rocking sector 70 is freely pivoted on the arbor 53. Links 71 and 72 are pivoted to the opposite extremities of this sector 70 and terminate respectively in push buttons 73 and 74 which project through suitable openings in the outer metallic shell 75. The arc shaped edge of the sector 70 is cut away at 76 to form faces 77 and 78 which are symmetrically positioned at opposite sides of the center line of the sector and extend across the path of movement of the pin 67.

Operation Figs. 10-13.—This switch, like that shown in Figs. 1 and 2 is shown in open circuit position. To shift it into closed circuit position the push button 74 is pushed to rock the rocking sector 70 counter-clockwise. Face 76 engages pin 67 carrying the toggle to dead center position. In this position the arbor 53, pin 67 and slot 54 are in line. The pin 67 is not yet in contact with the right hand anvil 63 of the switch blade. A further movement of the push button 74 causes the toggle to be broken on the right hand side of dead center, whereupon the pin 67 snaps to the right and strikes the anvil 63 a hammer blow to snap the switch blade to the right and cause the bridge 17 to contact with the brush contacts of the switch. The pin 67 follows up the anvil 63 and by reason of the tension of spring means 69 holds the switch blade and the bridge 17 in its closed position. To operate the switch to open position a similar sequence of steps takes place upon pushing the push button 73 although, in this case, the face 77 engages the pin 67 to break the toggle to the left.

It is to be understood that suitable materials known to the art are employed in the construction of the various parts.

Although several embodiments of the invention have been illustrated and described, it is to be understood that these have been set forth merely for the purpose of illustration and that the true scope of the invention is that set forth in the accompanying claims.

What is claimed and what is desired to be secured by United States Letters Patent is:—

1. In a snap switch, a fixed frame; a switch blade pivoted to said frame and movable freely into each of two extreme

positions; means for locking said blade in each of said extreme positions; and means for first unlocking said blade and for striking it a hammer blow to shift it into the opposite extreme position.

2. In a snap switch, a fixed frame; a switch blade pivoted to said frame and movable freely into each of two extreme positions; means for locking said blade in each of said extreme positions; and means for unlocking said blade and for striking it a hammer blow at the instant it is unlocked to shift it into the opposite extreme position.

3. In a snap switch, a fixed frame having a slot and an arbor spaced apart from and alined with said slot; a toggle having a hammer part at its knuckle, the extremity of one arm pivoted on said arbor, and the extremity of its other arm provided with a guide pin working in said slot; a tension spring connecting the extremities of said toggle arms; a pivoted switch blade extending substantially lengthwise of said toggle and having laterally spaced striker anvils located substantially across the path of movement of said hammer part; and double acting means for breaking said toggle.

4. In a snap switch, a fixed frame having a slot and an arbor spaced apart from and alined with said slot; a toggle having a hammer part at its knuckle, the extremity of one arm pivoted on said arbor, and the extremity of its other arm provided with a guide pin working in said slot; a tension spring connecting the extremities of said toggle arms; a pivoted switch blade extending substantially lengthwise of said toggle and having laterally spaced striker anvils located substantially across the path of movement of said hammer part; stops limiting the swing of said blade; and double acting means for breaking said toggle.

5. In a snap switch, a fixed frame having a slot and an arbor spaced apart from and alined with said slot; a toggle having a hammer part at its knuckle, the extremity of one arm pivoted on said arbor, and the extremity of its other arm provided with a guide pin working in said slot; a tension spring connecting the extremities of said toggle arms; a pivoted switch blade extending substantially lengthwise of said toggle and having laterally spaced striker anvils located substantially across the path of movement of said hammer part; locking stops provided on said blade to coöperate

with said guide pin to lock said blade in each of its extreme positions; and double acting means for breaking said toggle.

6. In a snap switch, a fixed frame having a slot and an arbor spaced apart from and alined with said slot; a toggle having a hammer part at its knuckle, the extremity of one arm pivoted on said arbor, and the extremity of its other arm provided with a guide pin working in said slot; a tension spring connecting the extremities of said toggle arms; a pivoted switch blade extending substantially lengthwise of said toggle and having laterally spaced striker anvils located substantially across the path of movement of said hammer part; and double acting means for breaking said toggle comprising two oppositely acting push buttons.

7. In a push button snap switch; a casing of insulating material; a frame and a pivoted switch blade both extending lengthwise in said casing; a spring operated toggle for throwing said switch blade and mounted substantially lengthwise of said frame with the extremity of one arm pivoted to said frame; and a pair of tandem push buttons fixed one to the other and extending crosswise through suitable holes in said casing, the inner end of each push button being arranged operatively to engage the pivoted arm of said toggle.

8. In a snap switch, a fixed frame having a slot and an arbor spaced apart from and alined with said slot; a toggle having a hammer part at its knuckle, the extremity of one arm pivoted on said arbor, and the extremity of its other arm provided with a guide pin working in said slot; a tension spring connecting the extremities of said toggle arms; a pivoted switch blade extending substantially lengthwise of said toggle and having laterally spaced striker anvils located substantially across the path of movement of said hammer part; and a pair of tandem push buttons fixed one to the other and mounted with the inner end of each in operative position to engage one of the opposite sides of the pivoted toggle arm.

In witness whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ROBERT E. LEVE.

Witnesses:

LOUELLA F. LITTLE,
LEONARD DAY.