

No. 732,477.

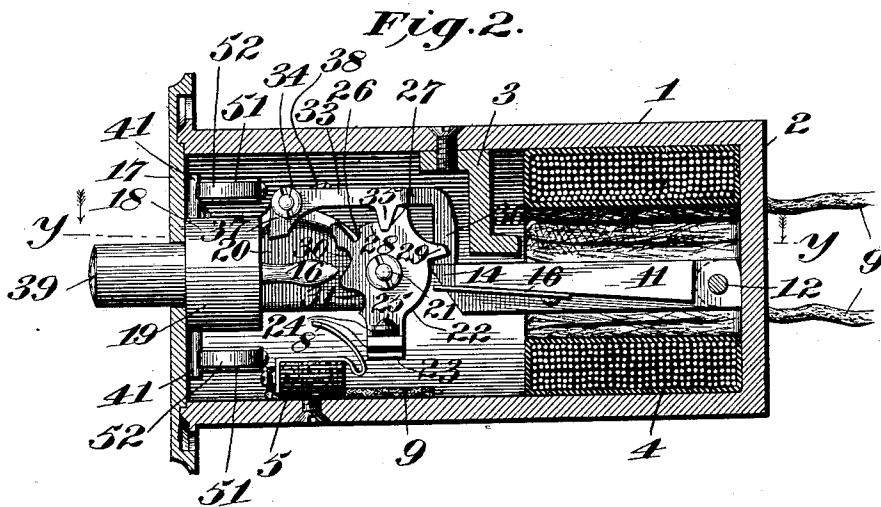
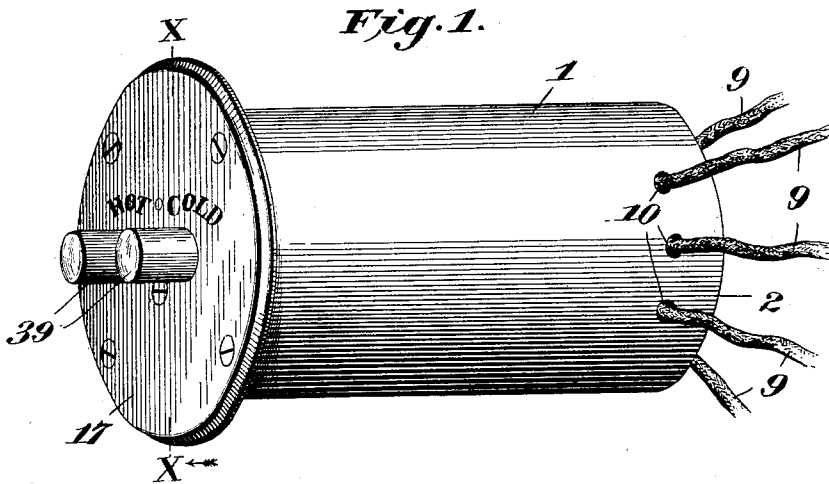
PATENTED JUNE 30, 1903.

I. G. WATERMAN.
ELECTRIC SWITCH.

APPLICATION FILED AUG. 2, 1902.

NO MODEL.

5 SHEETS—SHEET 1.



WITNESSES:

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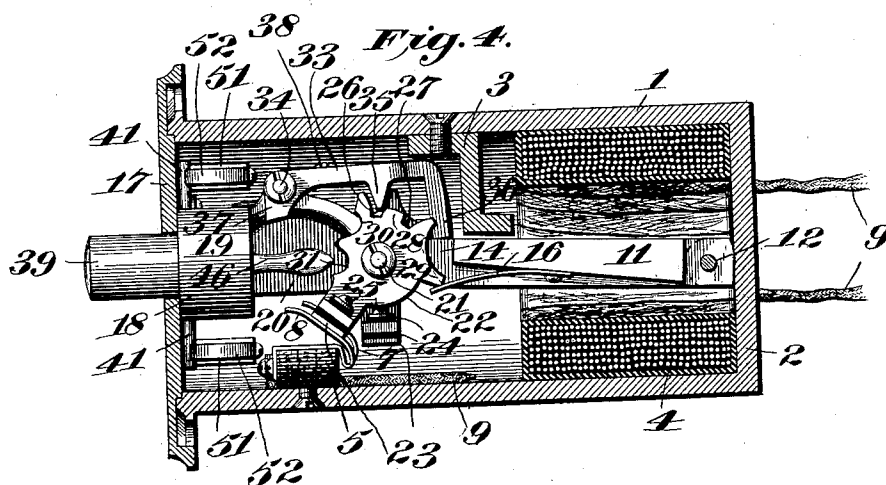
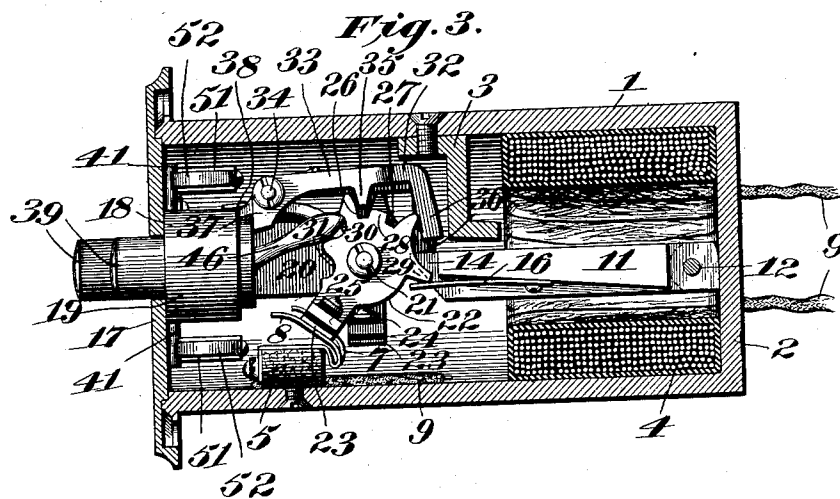
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5 SHEETS—SHEET 2.

NO MODEL.



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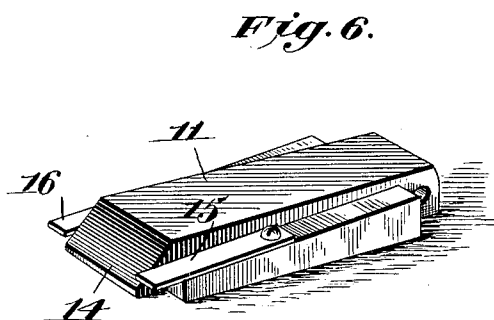
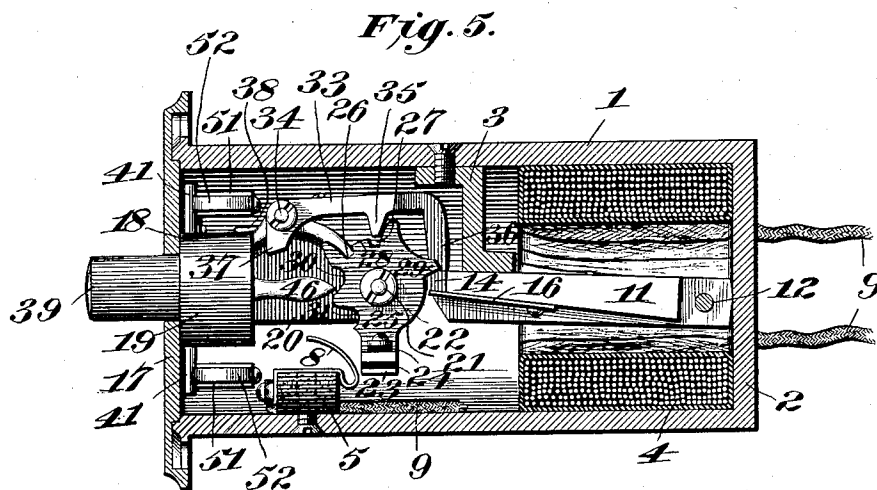
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NO MODEL.

5 SHEETS—SHEET 3.



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5 SHEETS—SHEET 4.

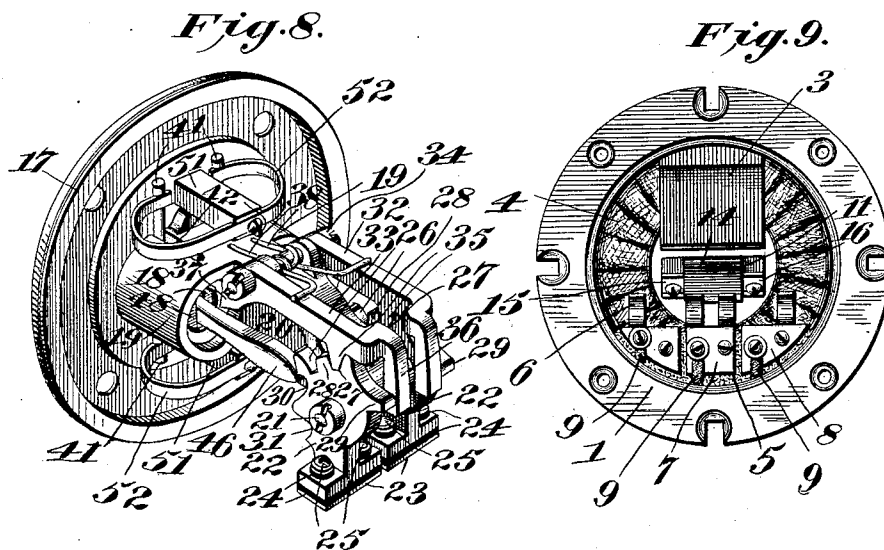
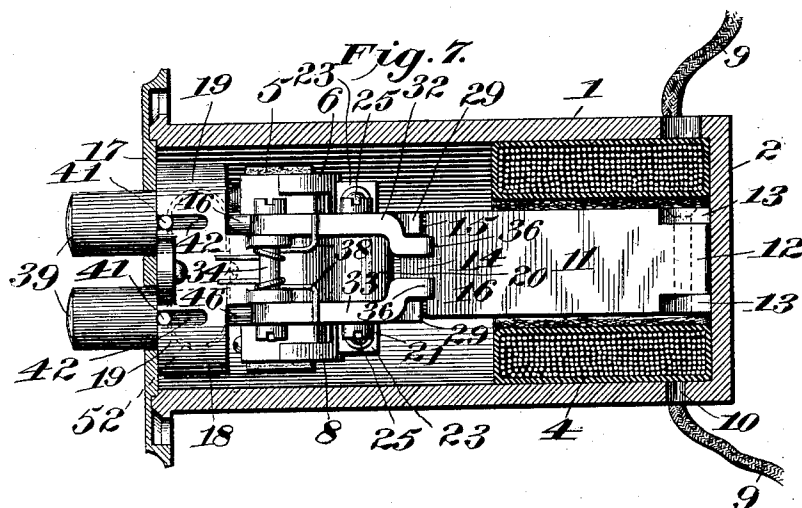
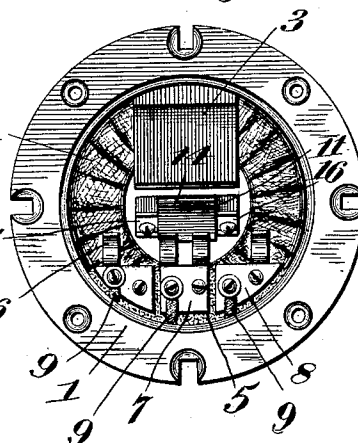


Fig. 9.



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APPLICATION FILED AUG. 2, 1902.

NO MODEL.

5 SHEETS—SHEET 5.

Fig. 10.

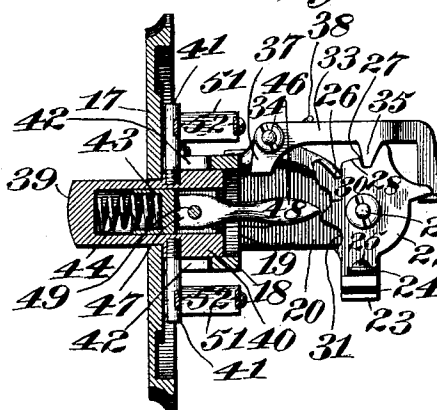


Fig. 11.

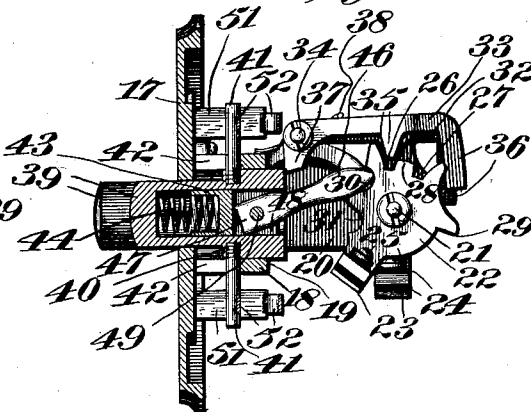


Fig. 12.

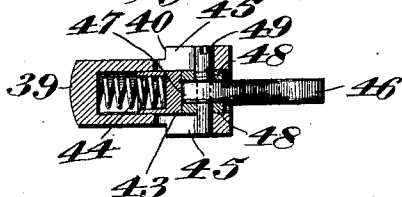


Fig. 15.

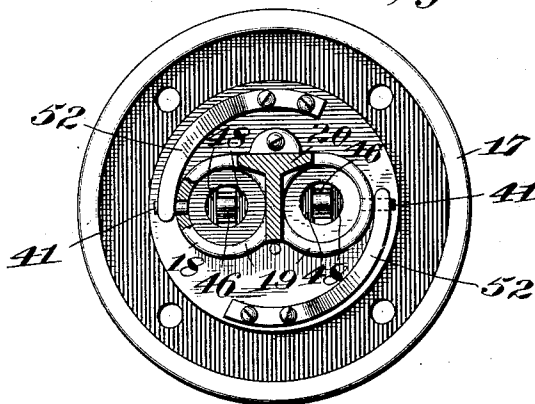


Fig. 13.

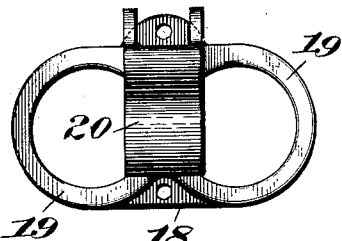
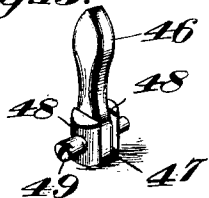


Fig. 14.

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UNITED STATES PATENT OFFICE.

ISAAC G. WATERMAN, OF SANTA BARBARA, CALIFORNIA.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 732,477, dated June 30, 1903.

Application filed August 2, 1902. Serial No. 118,065. (No model.)

To all whom it may concern:

Be it known that I, ISAAC G. WATERMAN, a citizen of the United States, residing at Santa Barbara, in the county of Santa Barbara and State of California, have invented certain new and useful Improvements in Electric Switches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to electric switches.

The object of the present invention is the provision of an electric switch of compact construction and few parts, which will have an improved snap-action and novel locking device and adapted for positive and reliable action and easy manipulation.

A further object is to provide in an electric switch a novel electromagnetic throw-off.

The present invention is intended for use as a push-button switch, and one of the principal objects sought after is to accomplish the throwing of the switch to "on" and "off" positions by alternate operations of the same push-button, thereby providing a simpler and more compact as well as more easily understood switch.

The invention set forth herein is adapted for use in various connections to control electric circuits, but is particularly intended to be used in connection with my invention for the electrical control of water to bath-tubs, &c., forming the subject-matter of an application filed of even date herewith.

Having the foregoing and other not specifically-mentioned objects in view, the invention consists of the improved features and novel combinations of parts set forth in detail hereinafter and recited in the appended claims.

In the accompanying drawings, Figure 1 is an exterior perspective of the switch; Fig. 2, a longitudinal section on line XX of Fig. 1, certain parts being in full lines and the switch-contact tumblers being in "off" position; Fig. 3, a similar view showing the near switch-contact tumbler in "on" position and the far switch-contact tumbler in "off" position, the near push-button and finger being depressed and in the position assumed on the completion of the turning of the switch-contact tumbler and the armature being in normal position; Fig. 4, a similar view, but showing the push-button and finger in normal position, the armature attracted and in position just prior to the completion of its movement and the throwing of the switch-contact tumbler and the locking-lever in the position it assumes just prior to releasing the switch-contact tumbler; Fig. 5, similar view showing the parts when thrown by the armature to the "off" position; Fig. 6, a detail perspective of the armature; Fig. 7, a section on line yy of Fig. 2; Fig. 8, a detail perspective of the cap and switch mechanisms carried thereby; Fig. 9, a view looking into the casing or shell of the switch, the cap and attached parts, as shown in Fig. 8, being removed; Fig. 10, a detail section through the cap and one push-button with other parts of one of the switch mechanisms in full lines and in normal position; Fig. 11, a similar view illustrating the manner of throwing the switch-contact tumbler on the depression of the push-button; Fig. 12, a sectional detail of the push-button; Fig. 13, a detail of the finger and pivot; Fig. 14, a detail of the frame on the cap for the support and attachment of the parts; and Fig. 15 a sectional plan of the back of the cap, illustrating modified forms of springs for the retraction of the push-buttons.

The switch has a cylindrical casing 1, having solid end 2 and a pole-piece 3, and 4 is a magnet-coil of ring form located in the casing and adapted for the magnetization of the pole-piece 3. Secured to an arc-shaped piece of insulating material 5, which is fastened to the interior of the casing near its mouth, are the contacts 6, 7, and 8. The wires 9 from the magnet-coil and contacts are led out through holes 10 in the casing, as shown in Figs. 1 and 2, and may be included in the circuits of the system set forth in my application filed of even date herewith (this switch being particularly designed therefor) or any circuits intended to be controlled.

The numeral 11 represents the armature for the pole-piece 3, the same being pivoted at 12 to lugs 13 on the bottom of the casing and extending through the magnet-coil 4, and at its free end it is provided with a tooth 14, while 15 and 16 are leaf-springs, secured at one end to the armature and disposed on opposite sides

of the tooth 14, while their free ends project beyond the end of the armature.

A face-plate or cap 17 covers the mouth of the casing and affords means for connecting the switch to the wall as well as a support for the switch mechanisms. Secured to the back of this cap is a frame 18, having the cups 19 and a central extension 20.

The switch mechanisms are in all respects duplicates, and where only one mechanism is spoken of in the following description it will be understood that reference is being made to both. In this connection I desire to say that the present invention is not, therefore, limited to the use of two switch mechanisms, as only one or more than two could be used.

Pivoted on bolt 21 are switch-contact tumblers 22, having the contact strips or shoes 23 insulated from the tumblers by the insulation 24 and secured by the screws 25. The tumblers have notches 26 and 27, an intermediate projection 28, also a lug 29, against which the springs 15 and 16 press, (one for each lug 29,) and the finger-notches 30 and 31. There are locking-levers 32 and 33 pivoted on a bolt 34 on extension 20 and having a tooth 35 adapted to fit in the notches 26 and 27. The locking-levers also have heads 36, engaged by the tooth 14 of the armature, and said levers are provided with tails 37, whose office will presently appear, and are held normally in engagement with the armature and the switch-contact tumblers by springs 38.

It will be understood that there are two switch-contact tumblers and two locking-levers and that the action of each of these mechanisms is entirely independent of the other mechanism. One strip or shoe 23 is adapted to bridge contacts 6 and 7, and the other shoe 23 is adapted to bridge contacts 7 and 8.

Slidable in the cups 19 are the push-buttons 39, having the shoulders 40 to prevent them from detachment and provided with pins 41, working in slots 42 in the cup to prevent turning of the push-button. Within each push-button is a follower 43 of cup shape, and interposed between the follower and the solid end of the push-button is a coil-spring 44. In the sides of the push-button are slots 45.

The numeral 46 represents a finger having its flat end 47 resting against the follower, whereby the finger is kept projecting straight from the push-button. Located inside the push-button and on opposite sides of the finger are segments 48, through which and the finger is passed a screw 49, having its opposite ends projecting and received in slots 45 in the push-button. The finger is thus pivoted within the push-button and rendered adaptable for moving in and out thereof.

Secured to lugs 51 on the cap are the springs 52, which have their bowed ends bearing against the pins 41 of both push-buttons, whereby the push-buttons are kept normally

projected from the cap and the fingers 46 out of engagement with the respective switch-contact tumblers.

In Fig. 15 I have shown a modified arrangement of springs 52. Here leaf-springs are employed, one end of each being secured to the cap and the other end bearing on the single pin 41, used in this modification on each push-button.

The normal position of the parts is that of Figs. 1, 2, 7, 8, and 10. As the operation of both push-buttons and mechanisms controlled thereby is the same, the following description applies equally well to both. On pushing the button it moves in its cup 19 against the tension of spring 52, carrying with it the finger 46, which eventually strikes the switch-contact tumbler and is deflected into notch 30 of the tumbler and arrested. The movement of the push-button continues, thus putting increasing tension on the spring 44. The inner end of the push-button finally strikes the tail 37 of the locking-lever and throwing the tooth 35 out of notch 27. As soon as tooth 35 clears the projection 28 the switch-contact tumbler is freed, and the stored energy in spring 44 impels finger 46 and turns the tumbler with a quick snap action to the position shown in Fig. 3, causing the contact-shoe on the tumbler to bridge the contacts 7 and 8. On releasing the push-button the locking-lever drops, and the tooth 35 falls into notch 26 and locks the tumbler, and the push-button and finger return to normal position, as shown in Fig. 4. The switch-contact tumbler is thus locked in the on position. If the other push-button were operated, its set of mechanism would operate, in the same manner as previously described. If the same push-button as previously operated be again pushed, the finger 46 will be deflected into notch 31, and the foregoing action will be repeated—that is to say, energy will be stored in spring 44 by the arrest of the finger—and the tooth 35 of the locking-lever will be thrown out of notch 26 and the switch-contact tumbler snapped by the spring and finger to the off position of Fig. 2 and the tooth 35 will drop into notch 27. It will be understood, therefore, that alternate pushing in of the same push-button will alternately throw the switch on and off. Both buttons can be worked simultaneously or independently, as they in no manner coact with each other.

To effect the automatic throwing of either or both switch-contact tumblers from the on to the off position, according as either one or both of them have been thrown to the on position by operation of the push-buttons, I have provided the electromagnetic releasing or throwing mechanism. If the magnet be energized by sending a current through the coil, the armature will be attracted and in moving will cause the spring 15 or 16 (or both, if both switch-contact tumblers are in the on position) to be put under tension, as shown in Fig. 4, by reason of the engagement of the

spring (or springs) with the lug (or lugs) 29; but just prior to the armature reaching the limit of its movement its tooth 14 raises the head (or heads) 36 and lifts the tooth (or teeth) 35 out of engagement with the switch-contact tumbler, (or tumblers,) whereupon the springs 15 and 16 (one or both) snap the tumbler (or tumblers) to the off position. On deenergization of the magnet the locking lever or levers drop back into engagement with the notches 27.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric switch, the combination with a movable switch-contact having two notches, of means for locking the switch-contact where thrown, and means for throwing the switch-contact comprising a movable throwing member, a pivoted finger carried by the movable throwing member and adapted to engage the notches aforesaid in alternation according to the position of the switch-contact, and a spring for projecting the finger on the release of the switch-contact, whereby a snap action is imparted to the switch-contact in throwing it.

2. In an electric switch, the combination with a rocking switch-contact, of a movable throwing member having a pivoted spring-projected finger adapted, on alternate movements of the throwing member, to engage different portions of the switch-contact and throw it in different directions, and means for returning said throwing member to normal position when released from manual pressure.

3. In an electric switch, the combination with a movable switch-contact adapted to move to different positions, of means for throwing said switch-contact comprising a movable member, a finger pivoted to the movable member and also movable as an entirety longitudinally in relation thereto, which is adapted to engage the switch-contact and move it to different positions on alternate movements of the movable member, and a spring interposed between the finger and the movable member and adapted to impart to the finger a snap action in throwing the switch-contact.

4. In an electric switch, the combination with a movable switch-contact, of means for locking said switch-contact in different positions, and throwing mechanism for the switch-contact, comprising a movable member adapted to disengage the locking means from the switch-contact member, and an independent member for throwing the switch-contact member when thus disengaged, said movable member and independent throwing member being relatively movable as entireties, and spring mechanism for actuating the throwing member on the release of the locking means.

5. In an electric switch the combination with a rocking switch-contact having two sets of notches, of a locking-lever having a tooth adapted to enter the respective notches of one set according to the position of the switch-contact, throwing mechanism for the switch-contact comprising a movable member, a finger pivotally mounted on the movable member and adapted to alternately engage the respective notches of the other set and rock the switch-contact in opposite directions on alternate movements of the movable member, and a spring interposed between the finger and the movable member, said movable member being adapted to initially cause the engagement of the finger and switch-contact and the arrest of the finger during the continued movement of the movable member, thus tensioning the spring, until the engagement of the movable member with the locking-lever causes release of the latter, whereupon the spring causes the finger to snap the switch-contact.

6. In an electric switch, the combination with a movable switch-contact, of a hollow push-button, a spring in said push-button, a pivoted finger movable in said push-button and actuated by the spring, and a limit connection between the finger and push-button for preventing detachment of the finger from the push-button.

7. In an electric switch, the combination with a movable switch-contact, of a hollow push-button, a spring for retracting said push-button, a spring within the push-button, a follower on said spring, a finger movable in the push-button and bearing on said follower, members movable in said push-button and to which the finger is pivoted, and means for preventing detachment of the finger and said members from the push-button, said finger being adapted, on alternate movements of the push-button, to engage and throw the switch-contact to different positions.

8. In an electric switch, the combination with a movable switch-contact, of manually-operated means for moving said contact, means for locking said contact, said locking means being adapted for release by the manually-operated means, an electromagnet, an armature for said electromagnet adapted to release the locking means, and a spring on the armature which is engaged with the switch-contact and is placed under tension when the armature is attracted by its magnet and prior to the release of the locking means, whereby the tension of the spring throws the switch-contact.

In testimony whereof I affix my signature in presence of two witnesses.

ISAAC G. WATERMAN.

Witnesses:

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