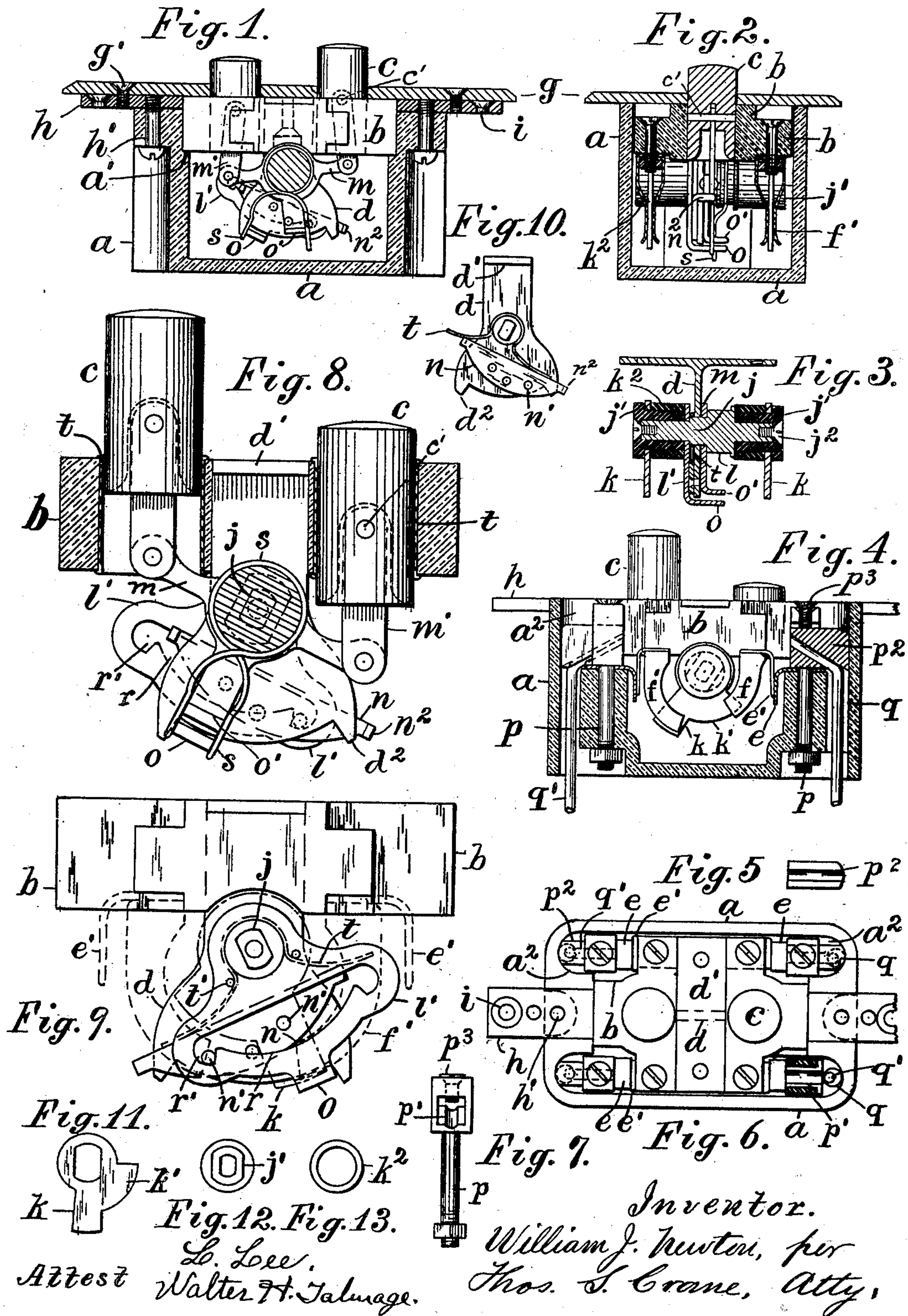


W. J. NEWTON.
SNAP PUSH BUTTON SWITCH.

(Application filed Oct. 17, 1901.)

(No Model.)



Inventor.
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UNITED STATES PATENT OFFICE.

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SNAP PUSH-BUTTON SWITCH.

SPECIFICATION forming part of Letters Patent No. 707,622, dated August 26, 1902.

Application filed October 17, 1901. Serial No. 79,037. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. NEWTON, a citizen of the United States, residing at 143 West Fourth street, New York, county of New York, State of New York, have invented certain new and useful Improvements in Snap Push-Button Switches, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to that class of switches in which push-buttons are connected to an operating-lever which actuates the contact-arms of the switch after the buttons place a spring under tension to move the arms quickly at the desired time.

The object of the invention is partly to furnish an improved construction for the locking device which holds the contact-arms from movement until the push-buttons have developed the spring-pressure.

The invention also includes a particular construction for the contact-arms, with segmental wings constantly in contact with the conducting-springs, and also a special construction for the insulating-base and the push-buttons, whereby the switch mechanism may all be constructed very close to the base, and thus occupy less space when inserted in the wall.

The invention also includes other details of construction, which will be understood by the following description and by reference to the drawings, in which—

Figure 1 is a side elevation of the switch with the casing in section at the center line. Fig. 2 is an end view of the same with the casing and push-button in section at the center of one of the buttons. Fig. 3 is a section of the post and the parts carried thereby. Fig. 4 is a longitudinal section of the casing at the center of the binding-posts with one of the binding-posts in section and only the contact-making parts of the switch illustrated. Fig. 5 shows the under side of the clamp-block for the binding-posts. Fig. 6 is a plan of the switch and its casing complete. Fig. 7 is an end view of one of the binding-posts. Fig. 8 shows the base of the switch in section at the center of the push-buttons and the operating mechanism viewed from the plane of

the tension-spring, and Fig. 9 is a side elevation of the same parts viewed from the opposite end of the spindle and having the contact-arm and its insulating-hub removed. Figs. 8 and 9 are drawn on twice the scale of the other figures. Fig. 10 is an elevation of the post, the locking-plate, and the spindle. Fig. 11 is an elevation of one of the contact-arms. Fig. 12 is an end view of the insulating-bushing for the same, and Fig. 13 is an end view of the collar for the bushing.

a designates the casing, having a recess *a'* to receive the insulating guide-block *b* to serve as a guide for the two push-buttons *c* and is a foundation-piece and insulator-base for the switch mechanism. A groove is formed in the outer side of the guide-block to receive the foot *d'* of the post *d*, which connects all the switch mechanism to the block. The casing is formed with recesses *a''* in its four corners to receive binding-posts, and the corners of the guide-block are notched to clear such binding-posts. The shanks *p* of the posts are secured in the bottoms of the recesses *a''*, and their heads are slotted, as shown in Fig. 7, and formed each with an inclined grooved seat *p'* in the bottom, over which a removable grooved gib *p''* is inserted and pressed toward the seat by set-screw *p'''*. A hole *q* is extended through the casing from the base of the incline to the back of the casing, and the gib *p''* is extended over such hole into contact with the end of the recess, by which construction each of the conductors *q'* when pushed into the hole *q* from the back of the casing is bent by the inclined surface of the gib and led into the groove *p'*. Contact-springs *f* and *f'* are secured upon four corners of the guide-block adjacent to the corner notches and provided with spring-leaves *e'* to contact with spring-leaves *e*, which are projected from the binding-posts. The guide-block is held in the casing by the face-plate *g* and is attached to the casing by joint-plates *h*, which are secured thereto by screws *h'* and have the face-plate in turn attached to them by screws *g'*. The joint-plates are also provided with holes *i* to attach the entire casing and switch to the face of a wall-box. The guide-block can be lifted from the casing with all the switch mechanism by merely unscrew-

ing the face-plate *g* and when inserted in the casing is placed in circuit with the conductors *q'* by the automatic contact of the leaves *e e'*. The post *d* is formed with a central hole or bearing for the spindle *j*, and the latter is provided with insulating-bushings *j'* at its opposite ends, secured by screws *j²*. The spindle is shown flattened where the bushings are fitted thereto to prevent them from turning, and the bushings are flattened in like manner, as shown in Fig. 12, and the contact-arms *k* are fitted thereto and clamped between a collar upon the bushing and a loose collar *k²*, fitted between the arm and a shoulder upon the spindle. The contact-plates *f* and *f'* are shown separated about forty-five degrees, and the contact-arm *k* is formed with a segmental wing *k'* at one side, extending nearly ninety degrees from the arm and adapted to constantly maintain contact with the spring *f* during the normal movements of the arm *k*. The contact-springs are made each with two leaves, as shown in Fig. 2, so that the contact-arm and its wing, especially the latter, in moving between the leaves rub over the same, and thus preserve clean surfaces. A shoulder is formed at one side of the post by a drum *l* and upon the opposite side by a segmental plate *l'*, which is fitted to turn with the spindle and held thereon by the screw which secures the bushing *j'*. The segmental plate is formed with a lug *o*, which projects over the end of the post, and the latter is formed with two ears or stops *d²* to determine the movement of the arm *k* to and from the contact-springs *f'*. The arm *k* and springs *f'* are shown in full lines in Fig. 4; but in Fig. 9 these parts are shown in dotted lines to display their relation to the other parts without obscuring the same. An operating-lever *m* is fitted to turn upon the spindle and formed at one side with an arm having a lateral lug *o'*, which is held normally in line with the lug *o* upon the plate *l'* by the opposite ends of a wire spring *s*, which is wound several times around the drum *l*, as shown in Fig. 2, and the ends extended to the opposite sides of the two lugs, as shown in Fig. 8. The lug *o'* upon the operating-lever is constantly in contact or engagement with one free end of the spring, and the lug *o* upon the segmental plate *l'* is always in constant contact or engagement with the opposite end of the spring, the ends being pushed apart when the lugs are separated, as shown in Fig. 1, and tending normally to draw the lugs into line with one another, as shown in Fig. 8. The push-buttons are made hollow for more than half of their length upon the inner end, forming in each a long chamber of sufficient width for the link to vibrate therein and having a pin *c'* through the upper end of the chamber to form a pivot for the link. One of the links *m'* is extended into each of such chambers and jointed upon the pivot *c'*, and the outer end of the link is also connected to one end of the arm *m* by a pivot. The spin-

dle *j* is pivoted in the post *d* very close to the insulating guide-block *b*, so that the ends of the operating-arm *m* move close to or into the sockets through which the push-buttons move when each in turn is protruded. Such position of the operating-arm is shown at the left side of Fig. 8, and the push-buttons are formed with the chambers in their inner ends and the links extended into such chambers, so that the switch mechanism may all be constructed close to the guide-block to permit the use of a very shallow casing *a*. The switch thus requires a shallower recess to be formed in the wall where it is placed. The movement of the push-button throws the lug *o'* alternately to one side or the other of the spindle and tends by winding the spring *s* around its barrel to produce a tension upon the lug *o* of the segmental plate. Such tension would turn the spindle and shift the contact-arms *k* except the segmental plate were locked until the spring tension was sufficient to separate the switch-contacts quickly, and this is effected by the following construction: The segmental plate *l'* is formed with a curved slot *r*, having notches *r'* in its opposite ends, and a locking-plate *n* is pivoted upon the middle line of the post adjacent to the segmental plate and provided with studs *n'* to engage such notches alternately when the segmental plate is moved into contact alternately with the two lugs *d²*. A wire spring *t* is extended partly around the spindle *j* and bent over two pins *t'*, projected from the segmental plate at equal distances from the notches *r'*, and the opposite ends of the spring are fitted to the adjacent edge of the locking-plate *n* and operate to tip the opposite ends of the locking-plate alternately outward when the spring is moved with the segmental plate. While the segmental plate is moving the spring *t* presses one or the other of the studs *n'* against the curved surface of the slot *r* in the segmental plate, and such stud drops into the notch *r'* at the end of such slot when the segmental plate has reached the limit of its movement, as shown in Fig. 9, by the contact of the lug *o* with the ear *d²* upon the post. The segmental plate is thus always locked when shifted to either of its extreme positions and is only released to shift the contact-arm *k* after the movement of the appropriate push-button has considerably bent the springs *s*. The locking-arm is formed with ends *n²*, bent past the sides of the post into the path of the operating-lever *m*, so that the inward movement of the appropriate push-button brings the operating-lever into contact with one of the bent arms, as shown in Fig. 1, and serves to tip the locking-plate sufficiently to disengage the stud *n'* from the notch *r'*. Prior to such disengagement the movement of the lug *o'* from the lug *o* places the spring *s* under tension, as shown in Fig. 1, so that the release of the segmental plate from the stud *n'* permits the spring *s*, by its action upon the lug *o*, to instantly reverse

the position of the segmental plate, as well as the spindle, with the contact-arms k . When the contact-arm is engaged with the contact-spring f' , as shown in Fig. 4, such reversal
 5 breaks the contact instantly and avoids the sparking in the desired manner. When the contact-arm is clear from the spring f' , the corresponding reversal throws the contact-arm into the spring f' , and thus makes the
 10 contact instantaneously, as desired.

From the above description it will be understood that the segmental plate l' is the means for turning the spindle to shift the contact-arms k and that the operating-lever
 15 m turns loosely upon such spindle while winding up the springs s to quickly shift the contact-arms when the segmental plate is released from the restraint of the locking-stud n' .

I am aware that other locking devices have been constructed to effect this object, and I do not therefore claim such a device broadly; but I am not aware that any segmental plate
 25 has ever been used with a concentric slot having notches at opposite ends and a locking-plate having studs to engage such notches alternately.

In the present invention the locking-plate n is thrown into its reverse positions by the
 30 reversal of the position of the spring t through the agency of the pins t' upon the segmental plate; but such movement of the locking-plate toward a reverse position brings one or the other of the studs n' into contact with
 35 the curved slot r before the notch r' is reached, and the curve of the slot r is made concentric with the spindle j , so that the wall of the slot may move smoothly over the stud until it drops into the notch. The ends of the op-
 40 erating-lever m operate alternately upon the bent ends n^2 of the locking-plate to withdraw the stud n' from the notch with which it is engaged, and the opposite stud then operates to engage the notch at the opposite end of the
 45 slot r , so that the relation of all the parts to the push-buttons is reversed after the actuation of each.

I find it a great advantage to construct all of the mechanism upon the guide-block b and
 50 to arrange the latter within the casing so as to make contact by the spring-plates $e e'$, as this permits the casing to be secured in the wall-box and the conductors connected with the binding-posts without inserting the
 55 switch. Such a removable guide-block has heretofore been employed in connection with a metallic bridge for attaching it to the wall-box and for sustaining the switch mechanism; but in the present invention I find it more
 60 convenient to furnish the casing with the joint-plates h , by means of which it can be secured to the wall-box with the conductors completely connected to the binding-posts. In my construction the joint-plates h are sunk
 65 into notches in the face of the casing and flush with such face, as shown in Fig. 4, so that when the switch is inserted, as shown in

Fig. 1, the face-plate g serves by its connection with the joint-plate (through the screws g') to hold the switch mechanism effectively
 70 in place. In like manner by the removal of the face-plate the switch can be drawn out of its casing without disconnecting any of its parts and may thus be repaired or replaced with a duplicate. It is well known that very
 75 great damage is done to switches by the workmen employed in making the electric connections to the wall-boxes, if such switches are attached to the casing, and the removability of the switch from the casing and its adapta-
 80 bility for insertion therein, as described above, therefore obviates a great deal of damage and loss. By mounting the switch mechanism entirely upon the guide block or base and forming the push-buttons hollow upon their
 85 inner ends and extending the links upward into the push-buttons I am enabled to bring the operating-lever of the switch very close to the guide-block, so that, in fact, one end of the operating-lever moves into the hole or
 90 socket through which one of the push-buttons slides when such push-button is retracted, as is apparent by reference to Fig. 8. The entire switch is thus made very compact, so as to require a small casing, and thus occupies less
 95 room in the wall than some other constructions. In the present construction the push-button is formed with a cavity in which the links m' can rock, and the links are pivoted to the push-button, so that there is no rigid
 100 connection between the two and nothing to guide the push-button or hold it from tipping and jamming fast in the face-plate, and suitable guides are therefore provided by the
 105 block b .

The block b may be made of porcelain, which material does not admit of making smooth and uniform holes to fit the push-buttons, and I therefore bush the holes with brass bush-
 110 ings t , which are shown in Fig. 8, but omitted from the other figures on account of the smallness of the scale. Such bushings fit the push-buttons snugly and guide them to move in a straight line only, while the arm m and links
 115 m' are free to oscillate.

Having thus set forth the nature of the invention, what is claimed herein is—

1. In a snap push-button switch having a spindle with contact-arms insulated upon its opposite ends and an operating-lever pivoted
 120 to turn upon the spindle, of a locking device for the spindle comprising a segmental plate secured to the spindle and having a curved slot with notches at its opposite ends, a spring placed under tension by the operating-lever
 125 to turn the spindle, and a locking-plate pivoted adjacent to the segmental plate and provided with studs to engage the notches alternately, and having its ends projected in line with the ends of the operating-lever to be
 130 moved alternately thereby, and thus release the segmental plate and spindle while under the spring-pressure.

2. In a snap push-button switch, the com-

bination, with two push-buttons and their
 guide-block, of a post supported upon such
 guide-block between the buttons, a spindle
 fitted to turn in the post and having contact-
 5 arms insulated upon its opposite ends, an oper-
 ating-lever fitted to turn upon the spindle
 with the push-buttons connected to its ends,
 and an arm projected from one side of such
 lever with a lug to engage a spring, a spring
 10 wound around the spindle with one of its ends
 applied to the lug on the arm, a segmental
 plate attached to the spindle with a curved
 slot having notches at its opposite ends, and
 having a lug to engage with the other end of
 15 the spring, and a locking-plate pivoted upon
 the post next the segmental plate and pro-
 vided with studs to engage the notches alter-
 nately, and having its ends projected in line
 with the ends of the operating-lever to be
 20 moved alternately thereby.

3. In a snap push-button switch, the com-
 bination, with two push-buttons and their
 guide-block, of a thin post supported upon
 such guide-block between the buttons, a spin-
 25 dle fitted to turn in the post with contact-
 arms insulated upon its opposite ends, an oper-
 ating-lever fitted to turn upon the spindle
 and having the push-buttons connected to its
 opposite ends, and an arm projected from one
 30 side of such lever with a lug to engage a
 spring, a barrel upon the spindle with a spring
 wound around the same and one of its ends
 applied to such lug, a segmental plate at-
 tached to the spindle with a curved slot hav-
 35 ing notches at its opposite ends and a lug to
 engage one end of the spring, and a locking-
 plate pivoted upon the post next the segmen-
 tal plate and provided with studs to engage
 the notches alternately, and having its ends
 40 projected in line with the ends of the operat-
 ing-lever to be moved alternately thereby.

4. In a snap push-button switch, the com-
 bination, with two push-buttons and their
 guide-block, of the thin flat post supported
 45 upon such guide-block between the buttons,
 the spindle j fitted to turn in the post with in-
 sulating-hubs upon its opposite ends and con-
 tact-arms mounted thereon, the operating-le-
 ver m fitted to turn upon the spindle next the
 50 post and having the push-buttons connected
 to its opposite ends, and having the arm upon
 its outer side with the stud o' projected over
 the spindle, the barrel upon the spindle ad-
 jacent to such stud with spring s wound
 55 around the same and one end applied to the
 stud o' , the segmental plate l' attached to the
 spindle upon the opposite side of the post and
 formed with a curved slot having notches at
 its opposite ends and having a lug o projected
 60 over the end of the post adjacent to the lug
 o' and engaged with the opposite end of the
 spring s , the locking-plate n pivoted upon the
 post between the segmental plate and post,
 the spring t extended around the spindle with
 65 pins t' upon the segmental plate to hold the
 ends of the spring against the locking-plate,
 and studs upon the locking-plate to engage

the notches of the segmental plate alternately,
 with the ends of the locking-plate bent to pro-
 ject past the post in line with the ends of the
 operating-lever, substantially as herein set
 forth.

5. In a snap push-button switch, the com-
 bination, with two push-buttons, of a guide-
 block perforated for the movement of the
 same, a post supported upon the guide-block,
 75 the spindle j fitted to turn in the post with in-
 sulating-hubs j' upon its opposite ends and
 contact-arms mounted thereon with exten-
 sion-plates k' at one side of the same, the con-
 tact-springs f supported upon two corners of
 80 the block to constantly engage such exten-
 sion-plates, and the contact-springs f' sup-
 ported upon the opposite corners of the block,
 and means connected with the push-buttons
 85 for turning the spindle to move the contact-
 arms to and from the contact-springs f' .

6. In a snap push-button switch, the com-
 bination, with two push-buttons, of an insulat-
 ing guide-block b perforated for the move-
 90 ment of the same, a post supported upon the
 guide-block, the spindle j fitted to turn in the
 post with insulating-hubs j' upon its opposite
 ends and contact-arms k mounted thereon
 with segmental wings k' at one side of each
 95 the double spring-contacts f supported upon
 two corners of the block to constantly engage
 such segmental wings, the contact-springs f'
 supported upon the opposite corners of the
 block, means connected with the push-but-
 100 tons for turning the spindle to move the con-
 tact-arms to and from the contact-springs f' ,
 spring-plates e' clamped by the feet of the
 contact-springs f and f' at the four corners of
 the block, and a casing a having a recess upon
 105 the front to receive the guide-block, and
 binding-posts in its four corners with spring-
 plates e projected therefrom to contact with
 the spring-plates upon the switch when the
 switch is inserted in the casing.

7. In a snap push-button switch, the com-
 bination, with the guide-block having the
 switch mechanism mounted wholly thereon,
 and having spring-contacts with spring-plates
 115 e' projected therefrom as set forth, of the
 casing having a cavity upon the front to re-
 ceive the guide-block, and recesses in its
 four corners with passages for the conductor
 leading thereto, binding-posts secured in such
 120 recesses with spring-plates e projected there-
 from to contact with the spring-plates upon
 the switch, such binding-posts having each a
 grooved seat therein with grooved gib or block
 fitted over the seat and passage, and into
 contact with the end of the recess, and a set-
 125 screw to press the gib toward the seat to
 clamp the conductor thereon, whereby the
 conductors may be pushed automatically into
 the binding-posts from the passages when the
 set-screws are slackened, substantially as
 130 herein set forth.

8. In a snap push-button switch, the com-
 bination, with the metallic casing a having re-
 cess a' adapted to wholly inclose the switch,

of the insulating guide-block *b* forming the base of the switch and fitted detachably to such recess and having the switch mechanism supported thereon, the push-buttons *c* extended through the guide-block and formed each with the chamber extended from its inner end beyond the middle of its length with pivot *c'* across its inner end, the links *m* extended into the chamber and jointed upon such pivots, and the switch mechanism having an operating-arm attached to the opposite ends of the links, and provided with spindle close to the insulating guide-block,

whereby the operating-arm may be pivoted close to the guide-block and vibrated by the alternate movement of the push-buttons, and the link carried wholly within the guide-block and the push-button when the push-button is protruded, substantially as herein set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM J. NEWTON.

Witnesses:

THOMAS S. CRANE,

WALTER H. TALMAGE.