(No Model.) 2 Sheets—Sheet 1.

J. J. WOOD.

ELECTRIC SWITCH.

No. 474,050. Patented May 3, 1892.

FIG. 1.

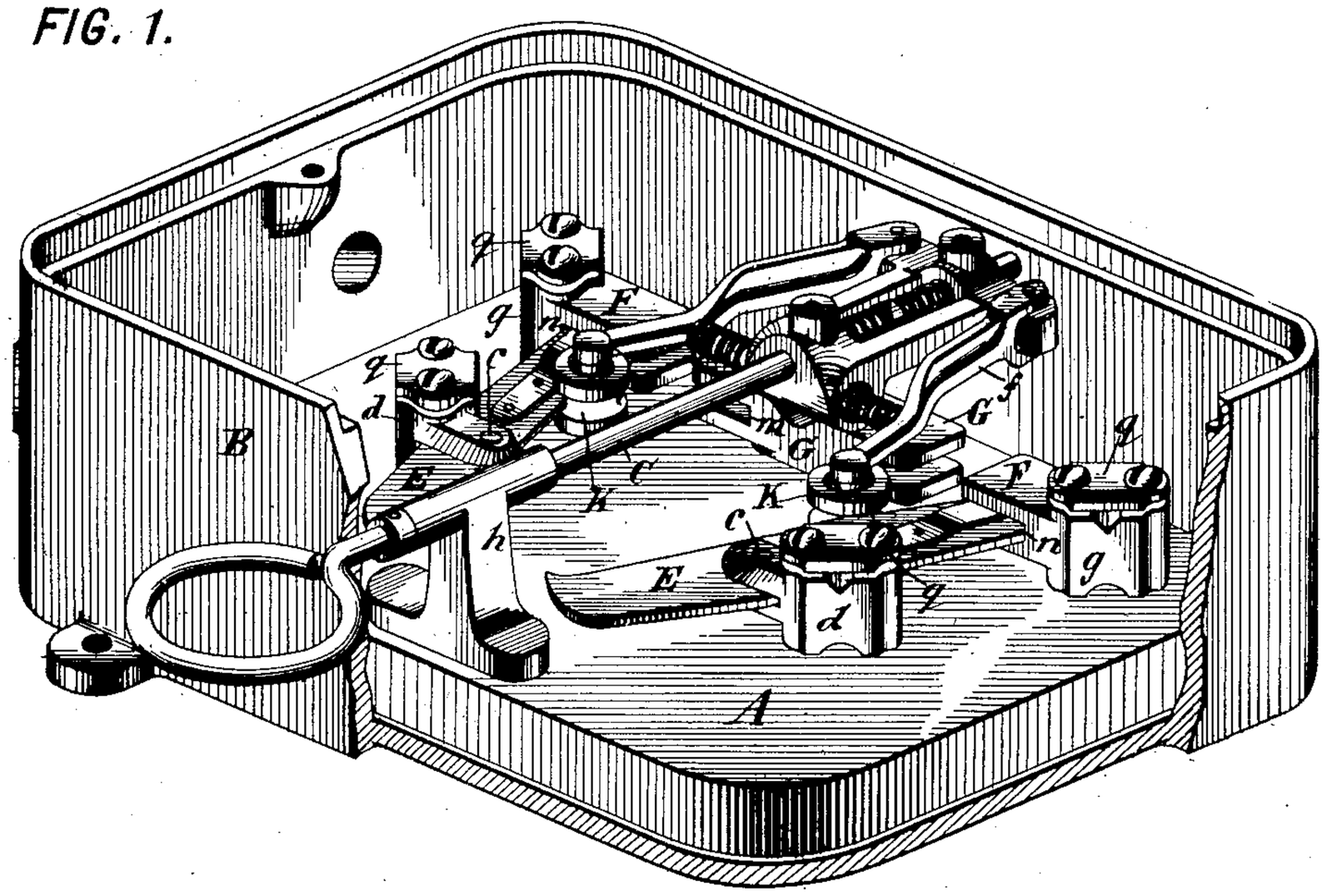
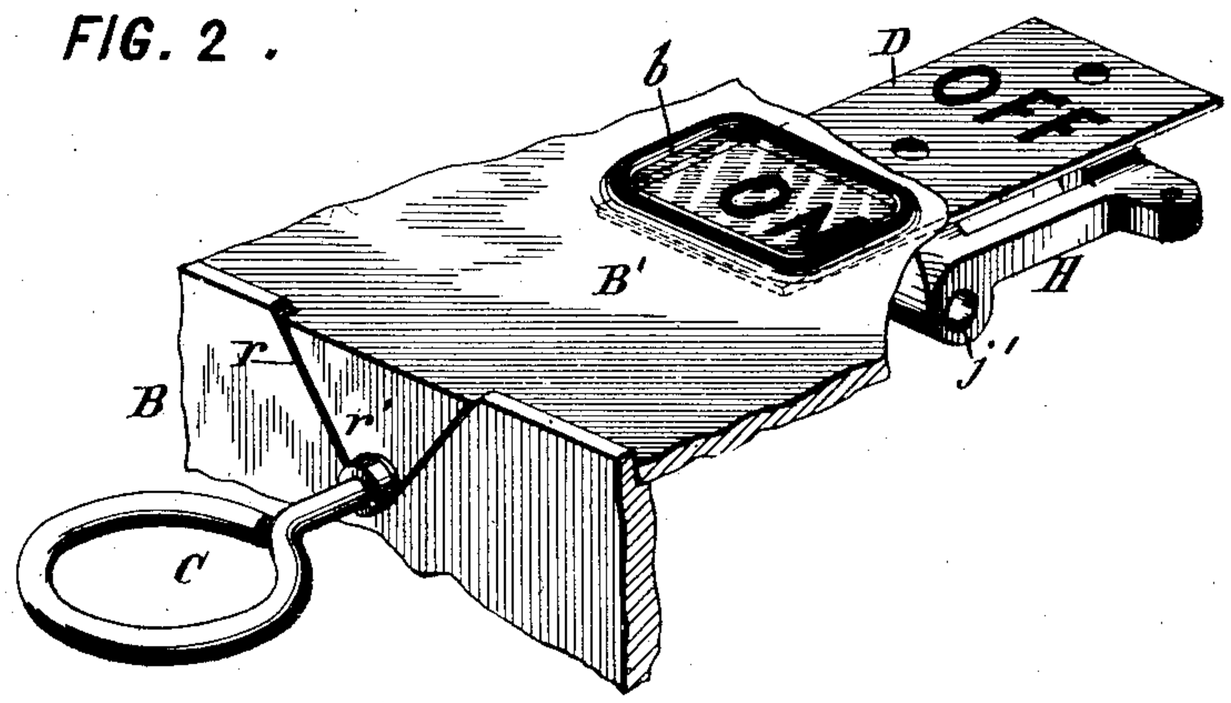


FIG. 2.



WITNESSES:
John Becker
Fred C. Fischer

INVENTOR
James J. Wood,
BY
Arthur O. Fraser & Co
ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

J. J. WOOD.

ELECTRIC SWITCH.

No. 474,050. Patented May 3, 1892.

FIG. 3.

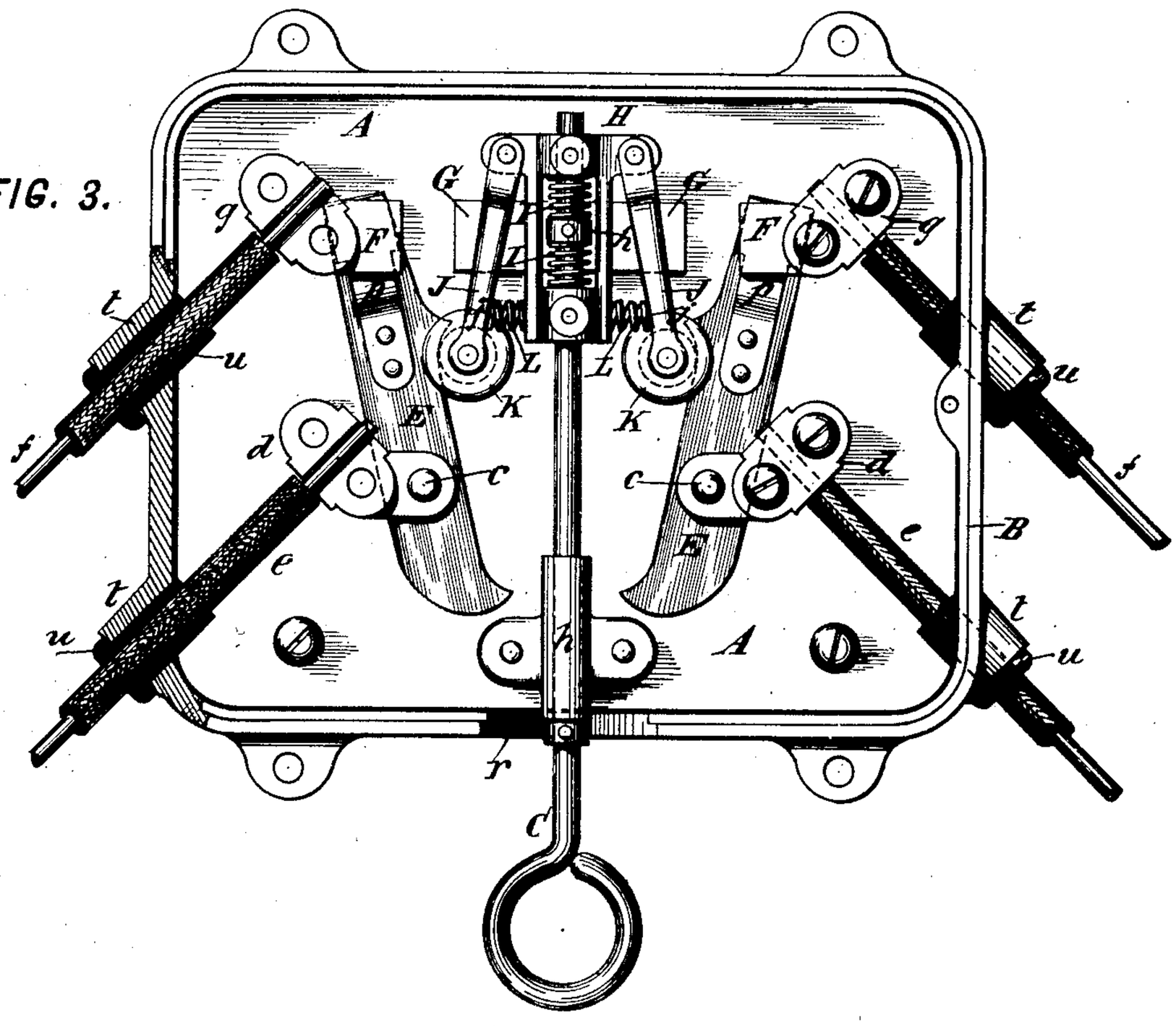


FIG. 4.

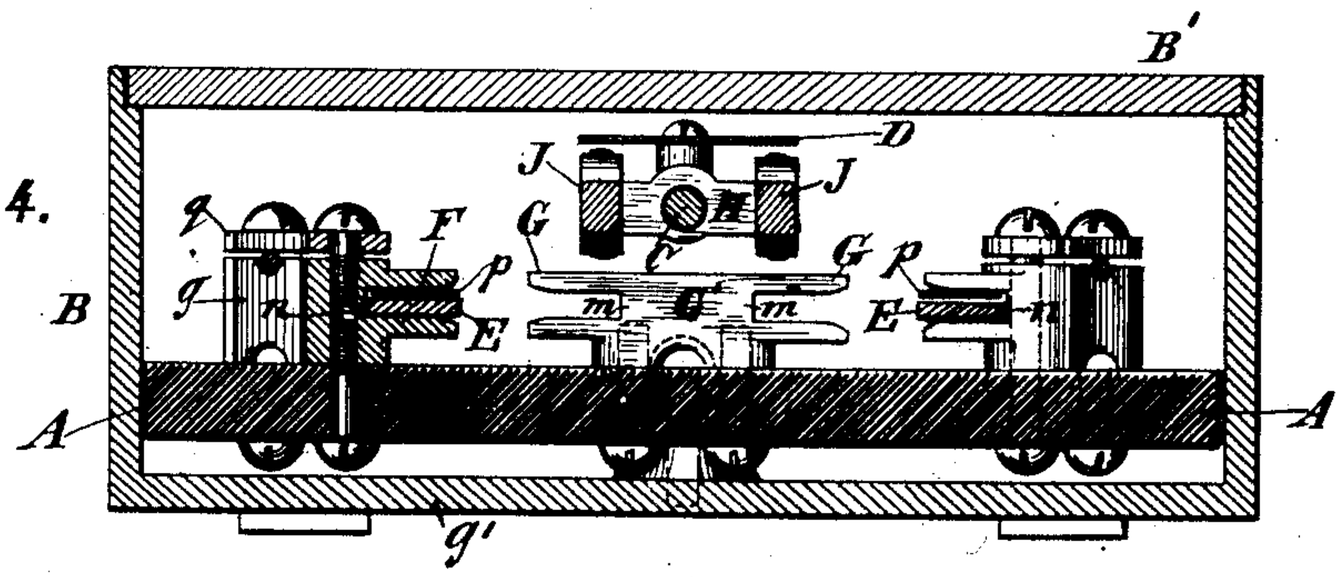


FIG. 5.

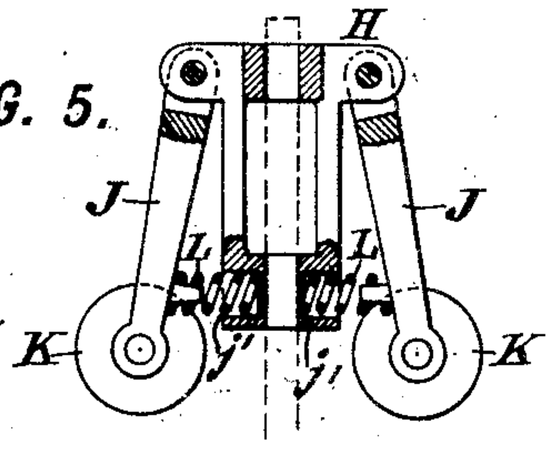
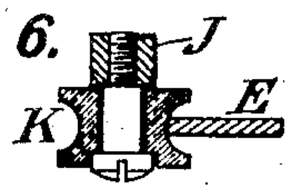


FIG. 6.



WITNESSES:
John Becker
Fred White

INVENTOR:
James J. Wood
By his Attorneys,
Arthur G. Brown & Co.

UNITED STATES PATENT OFFICE.

JAMES J. WOOD, OF FORT WAYNE, INDIANA.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 474,050, dated May 3, 1892.

Application filed November 3, 1891. Serial No. 410,728. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. WOOD, a citizen of the United States, residing in Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Electrical Switches or Cut-Outs, of which the following is a specification.

This invention relates to switches or cut-outs used for closing or breaking electric circuits or throwing a loop or branch into or out of circuit. It is designed more particularly for hand-switches used in arc-lighting circuits to throw in or out a loop or branch entering a building or including the lights upon a subscriber's premises.

The class of switches to which my invention pertains is that known as "quick-action" or "snap-over" switches, or those which when manipulated effect a rapid and instantaneous make or break between the respective contacts, so as to reduce flashing to the minimum and render the action of the cut-out absolute.

My present invention introduces certain improvements upon the construction of switch disclosed in my patent, No. 443,693, dated December 30, 1890.

The switch or cut-out as improved by my present invention is simplified in construction and its operation is made more certain as compared with the construction disclosed in my said patent.

Figure 1 of the accompanying drawings is a perspective view showing my improved cut-out with the cover of the inclosing box removed and the box partly broken away to better show the working parts. Fig. 2 is a fragmentary perspective view of part of the box with the cover on. Fig. 3 is a fragmentary front view showing the cut-out with the cover removed, the left-hand portion of the inclosing box being in section. Fig. 4 is a transverse section on the line 4 4 in Fig. 3. Fig. 5 is a fragmentary front view, partly in section. Fig. 6 is a fragmentary cross-section.

Referring to the drawings, let A designate a base-plate, preferably of insulating material, slate being best adapted for this purpose. On this plate are mounted all the operative parts of the switch. The base-plate and operative parts are inclosed within a box B, which may be made of cast-iron, the base-plate being fastened to the bottom or back of the box by suitable screws. The front of the box is closed by a cover B′, having in its front an opening or window *b*, through which may be seen one or other of the words "On" or "Off" marked on an indicating-plate D, as shown in Fig. 2. This plate is a common feature in hand-switches or cut-outs for indicating at a glance the position of the switch. The box incloses all the operative parts except the handle C, which projects out through the bottom of the box into position to be grasped by the hand and moved forcibly up or down to throw the switch on or off. Within the box are two tilting levers E E, fulcrumed on pivotal studs *c c*, passing through ears which project from posts or standards *d d*, which are fastened to the insulating base-plate A. These standards constitute, also, the binding-posts for connecting the main-line wires *e e*, as shown in Fig. 3. Thus these wires are put into electric connection with the levers E E, which are of metal and constitute the connecting-plates of the switch. The upper ends of the levers are prolonged to make contact with one or other of two contact-plates F and G. The two contact-plates F F are in connection, respectively, with binding-posts *g g*, to which are connected the wires *f f* of the loop or branch circuit, the connection of which is governed by the switch. The plates F F are constructed as parallel ears projecting from and integral with the standards *g g*, which are fastened to the insulating base-plate preferably by screws *g′*, passing through from the rear of the plate, as shown in Fig. 4. The contact-plates G G also consist of similar double ears formed integrally with a metal standard G′, which is fastened to the base-plate. The contact-plates G G and standard G′ constitute, consequently, a bridge-piece having contact portions or surfaces at its opposite ends to make contact with the levers E E.

When the levers E E are tilted into contact with the plates G G, a current entering through one line-wire *e* flows through the corresponding lever E, the bridge G, and the other lever E, and out through the other line-wire *e*, so that in this position of the switch the loop or subscriber's branch is cut out or open-circuited. When the levers are tilted to

the opposite position, as shown in Figs. 1 and 3, with their ends in contact with the plates F F, the current flows from one lever to its plate F, thence to wire *f*, and through the loop to the other plate F, and out by the other lever E to the other line-wire *e*.

The operating handle or bar C consists of a rod mounted to slide longitudinally through a sliding bushing formed in a standard *h*, which is fastened to the base-plate A. On the upper part of this rod is freely mounted a cross-head or yoke-frame H, having openings through which the rod loosely passes. On the rod is fixed a collar *h'*, and between this collar and the upper and lower end portions of the frame H are confined springs I I coiled around the rod. It is to this frame H that the indicating-plate D is fastened, as shown in Fig. 2. To the wings or arms of the cross-head or frame H are pivoted or hinged two arms J J, the opposite ends of which carry studs on which turn anti-friction rollers K K. As the rods C move up or down the rollers K K roll against the inner sides or edges of the levers E E, being pressed outwardly thereagainst by springs L L. Each spring L is engaged at one end by a lug *j*, projecting into it from the arm J, while the other end of the spring enters a socket *j'* in the lower portion of the frame H.

The rollers K K are made of insulating material to prevent passage of the current through the operating mechanism from one lever to the other. I prefer to make the rollers of porcelain, and to prevent them running off the levers they are formed with a peripheral groove, which engages the inner edge of the lever, as shown best in Fig. 6.

The operation is as follows: While at rest in either position the outward pressure of the springs L L being communicated through the rollers K K to the levers E E holds the latter firmly in their tilted position. When it is desired to throw the switch, the operator moves the rod C up or down, as the case may be, thereby communicating longitudinal movement to the rollers through the medium of one of the springs I, the frame H, and the arms J J. The rollers thus roll along the inclined inner sides of the levers toward the fulcrums thereof, and in so doing are caused to approach each other, and consequently to further compress the springs L L. As soon as the rollers pass over the fulcrums of the levers they act against the opposite arms of the levers and tilt them rapidly from one extreme position to the other. By this tilting movement the inclined edges of the levers against which the rollers act are brought to the opposite inclination, so that the tension of the springs L L is effective to cause the rollers to roll to the extreme ends of the levers, where they are stopped and serve to hold the levers firmly in their new position. The tension of the spring I is chiefly advantageous for impelling the rollers past the fulcrums of the levers when the latter begin to tilt. By this construction the switch is held in either position and is thrown instantaneously from one position to the other, it being impossible for it to be left in an intermediate position. This construction obviates the possibility of the levers being left in a position where the contacts will burn or arc.

I will now more particularly describe those features wherein my present invention is distinguished from the construction of cut-out box disclosed in my aforesaid patent.

The terminal contact-plates F F and bridge-piece G in my former construction were spring-contacts consisting of two leaves or members, between which the prolonged ends of the levers E E are embraced. Distinct stops (lettered *m n* in the said patent) entirely independent of the contacts F and G were provided for limiting the movement of the levers. According to my present invention I make the contacts F and G as rigid forks or parallel plates, between which the end of the lever may enter, and at the bases of the intervening spaces or bifurcations are formed abrupt shoulders *m n*, which serve to limit the movement of the levers E E, while also serving at the same time to increase the area of metallic surfaces in contact, the stop-surfaces thus constituting part of the contact-surface through which the current may flow. By reason of the formation of the levers with projections engaging the rollers at the opposite limit of their travel the stopping of the levers may also serve to stop the rollers. The bifurcations are made somewhat wider than the thickness of the levers E E in order to admit of the levers entering them freely, and to afford a good contact each lever is provided with a leaf-spring *p*, fixed to it and having its free end overlying the contact end of the lever, so that this end of the spring enters the bifurcations with the lever, and by pressing forwardly against one contact-surface forces the lever backwardly against the other, so that a good contact is made not only between the rear surface of the lever and the rear plate or fork of the contact-terminal, but also between the front face of the spring *p* and the forward fork or plate of the terminal.

In my former construction the two levers E E were connected together through the medium of an insulating-link in order to insure their simultaneous movement. By my improved construction I am able to dispense with this link and the attached strips or arms connecting it to the levers, and in place thereof I have applied a very simple construction, which accomplishes the same result. Formerly only one spring was used between the arms J J to press them apart, so that the reaction of the pressure exerted against one lever was transmitted to the other. I now employ two distinct springs L L, each of which acts only upon one lever and reacts upon the intervening frame or carrier H, since the two sockets *j'* are separated at their inner ends by an intervening partition. It results that

each spring is compressed independently of the other, thus throwing the levers more positively and avoiding any necessity for mechanically connecting the two levers together, as experience with this construction has shown that it is impossible for one lever to be thrown in advance of the other.

In my former construction I provided concave runways along the inner sides of the levers, as shown at *i* in Fig. 9 of my said patent, the insulating-rollers K K running in these ways. With this construction there has been found some liability of the current jumping or flashing across between the lever E and arm J. I now construct the rollers K K in such manner that the levers E E may be simplified by omitting the runways *i i*, while at the same time I secure the advantage of utilizing the flanges on the rollers to serve as insulating-shields for guarding against any flashing of the current across between the lever E and arm J. To this end the rollers are made each with a peripheral groove which runs over the edge of the lever, the front and back surfaces of the roller thus constituting overhanging flanges, which project sufficiently over the lever to lengthen and render circuitous the space through which an arc must pass.

By my present invention the construction of the binding-post is also improved. My former patent shows binding-posts of ordinary construction having holes into which to thrust the ends of the wires and set-screws for bearing against the ends of the wires when inserted. By my present invention I construct the binding-posts *g* and *d* as standards of cast metal, from which project integrally the rigid ears constituting the fulcrum connection in the case of the standards *d*, or the contact-terminals F in the case of the standards *g*. Across the top of each standard is formed a V-groove, as shown, into which the end of the wire may be laid, and the wire is pressed into the groove by means of a top plate or clamping-plate *q*, which is drawn down against the wire by two screws entering the standard. A much larger area of contact-surface is thus assured for engaging the end of the wire. Each binding-post has two holes passing completely through it and tapped for engagement both with the screws which engage it from the back to hold the post or standard fast to the base-plate and for the screws which enter from the front to clamp down the cap-plate *q*. The wires *e f* enter the sides of the box, passing obliquely upward to the binding-posts and directly in line with the notches thereof. The object of turning the ends of the wires thus upward is to prevent any rain which may fall upon the wires from running into the box, as might occur were the wires introduced horizontally or downwardly. The wires pass through holes or sockets *t t*, a bushing of insulating material *u* being fitted tightly in the socket. These bushings are made a close fit with the exterior of the insulation and serve both to make a substantially weather-tight packing around the wire and to thicken its insulation where it passes through the iron box, thereby preventing any possibility of a current passing to the box. By reason of the holes being arranged directly in line with the grooves in the binding-posts it becomes only necessary for the operator to scrape the insulation off the end of the wire for a sufficient length to be engaged by the binding-post, and then to thrust the end of the wire through the bushing *u* and sufficiently within the box to introduce its bared portion into the groove in the binding-post, whereupon by tightening down the screws holding the cap-plate *q* of the post the connection is securely made.

The operating-rod C passes out through an angular notch *r*, formed in the lower side of the box, and when the cover B′ is applied this notch is closed by a downward projection *r′*, formed in the cover, which enters and fills the angular notch, as shown in Fig. 2. The cover fits into a groove in the edges of the box and is designed to be cemented in with a little putty placed in the groove to prevent moisture entering the box.

I claim as my invention the following-defined novel features or improvements, substantially as hereinbefore specified, namely:

1. In a quick-action switch, the combination of a lever of the first class, a grooved roller of insulating material mounted to run along said lever with its groove engaging the edge thereof, a carrying-arm on which the roller is mounted, and a spring pressing against said arm to communicate a tension to the roller and press it against the lever, whereby the flanges of said roller overhanging the edge of the lever serve as insulating-shields for preventing flashing or arcing between the lever and said arm.

2. In a quick-action switch, the combination of a lever of the first class, a roller movable along the lever past its fulcrum, the lever formed with projections to engage the roller at the opposite limits of its travel, a spring for pressing the roller toward the lever, and forked terminal contact-plates the bifurcations of which are entered by said lever, and the terminal shoulders of the bifurcations serving as stops to limit the movement of the lever and thereby in turn to limit the travel of the roller while increasing the conducting-surface of the contacts.

3. In a quick-action switch, the combination of a switch-lever in connection with a line-circuit, two opposite forked terminal contact-plates of rigid material, the bifurcations of which are entered by said lever in its movement, and a spring-plate carried by the lever and arranged to enter with it the bifurcations of said contacts and to press outwardly against one side thereof while forcing the lever in contact with the opposite side thereof, substantially as specified.

4. In a quick-action switch, the combination of two levers of the first class, an actuating part comprising two rollers movable along

the respective levers to opposite sides of their fulcrums, arms for carrying said rollers, a carrier to which said arms are connected, an operating-handle for moving said carrier, and two independent springs arranged to press outwardly on the respective arms and each reacting independently of the other against said carrier.

5. In an electric switch, the combination of a box B, inclosing the operating mechanism and formed at its lower front side with a notch *r* for the passage of the operating-bar of the switch mechanism, and a cover B′, fitting over said box formed at its bottom with an angular extension *r′*, adapted to fill said notch.

6. In an electric switch, the combination of binding-posts *d d*, conducting-levers E E, pivoted thereto, binding-posts *g g*, formed integrally with rigid contact-plates F F, bridge-piece G′, having rigid contact-plates G G, contact-springs *p p*, carried by the levers, and an operating mechanism for throwing the levers simultaneously from one pair of contacts to the other.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JAMES J. WOOD.

Witnesses:
E. J. HATHORNE,
BRAINARD RORISON.