

N. H. HOLLAND.
ELECTRIC SWITCH.
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1,214,920.

Patented Feb. 6, 1917.

2 SHEETS—SHEET 1.

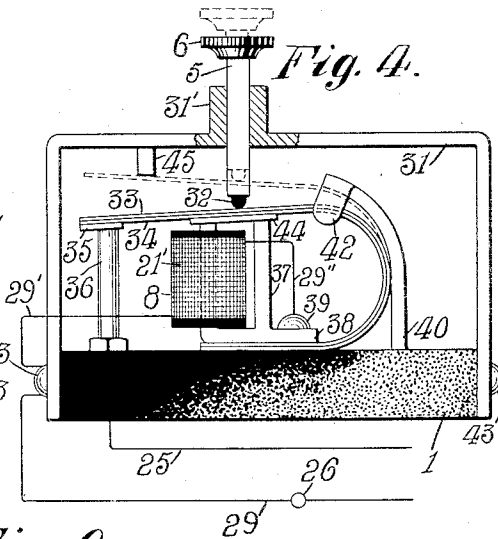
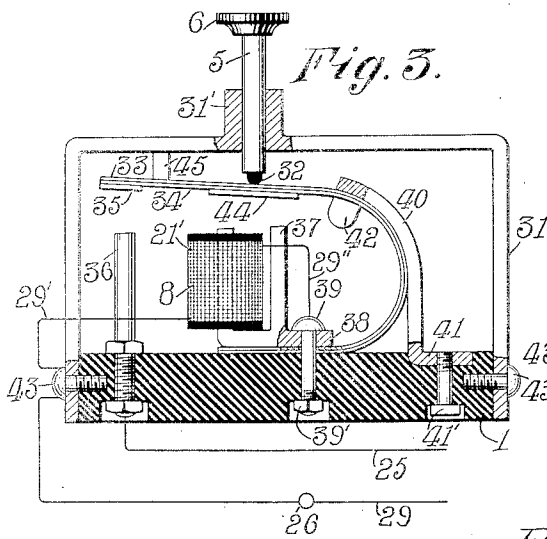
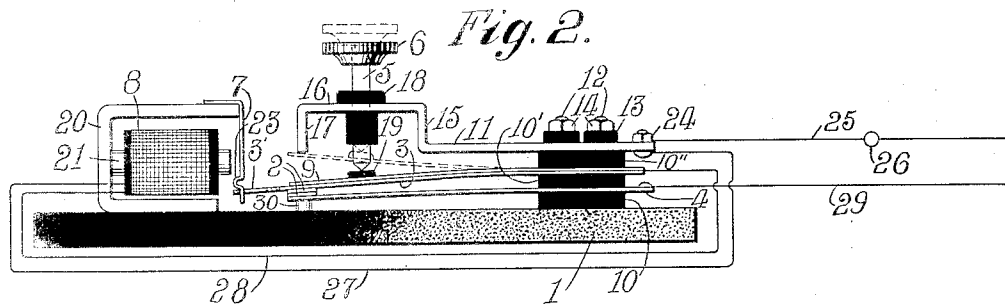
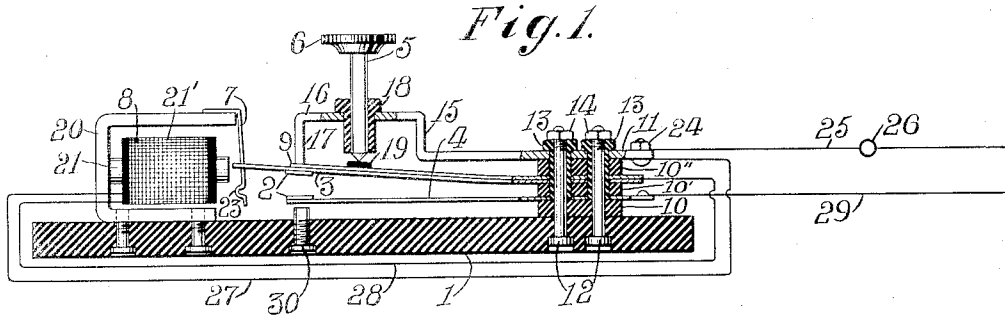


Fig. 6.

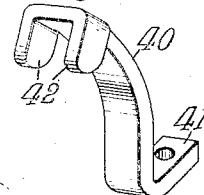
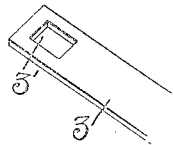


Fig. 5.



WITNESSES

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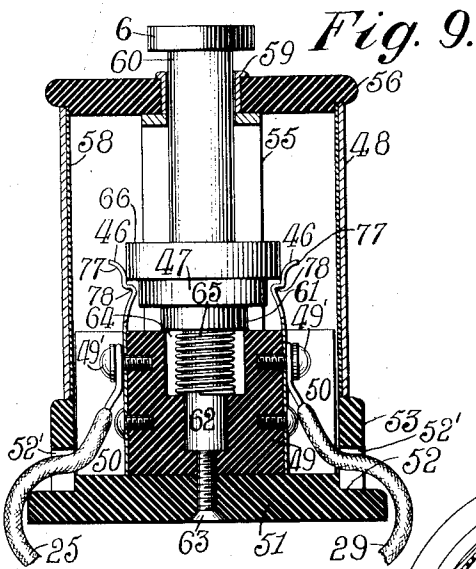
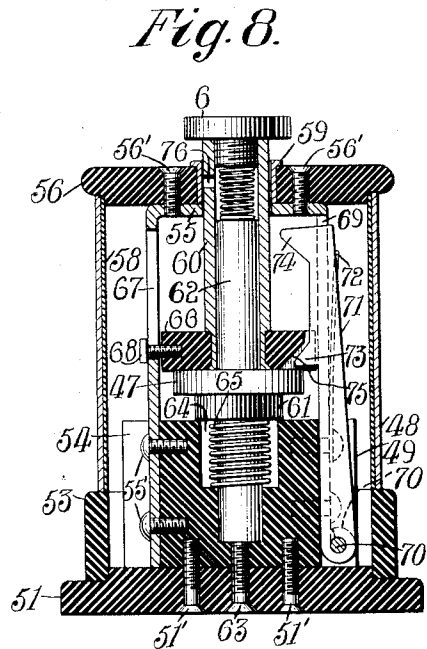
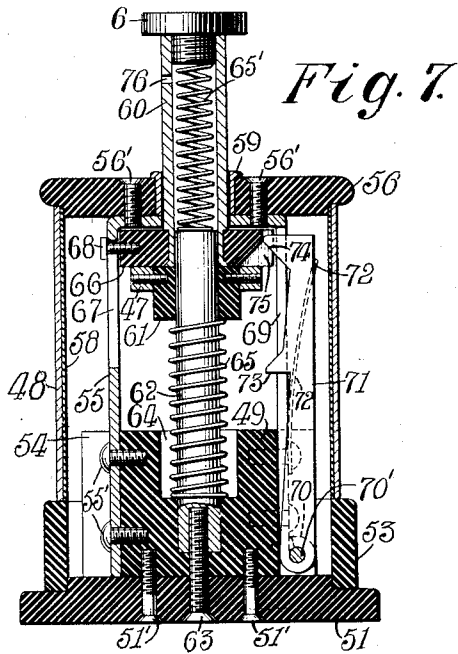
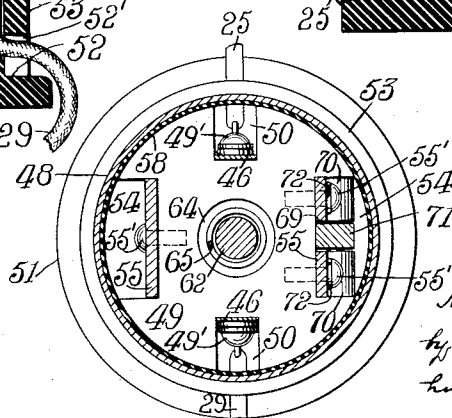
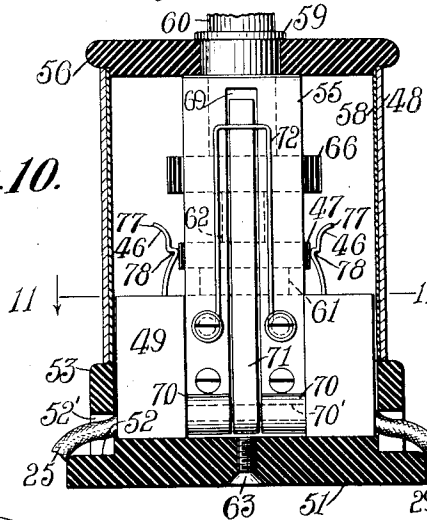


Fig. 10.



WITNESSES

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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH.

1,214,920.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of West Orange, Essex county, New Jersey, have invented a certain new and useful Improvement in Electric Switches, of which the following is a description.

My invention relates to electric switches. It is well known that when switches are opened on any kind of a circuit, a spark is apt to be produced and this is especially the case where the switch is included in a circuit of high voltage, such as the lighting circuits commonly employed for the operation of business phonographs or the like. When an electric switch is used in connection with such a phonograph, it may be necessary, for convenience of operation, to place the same in close proximity to desks and tables, which are generally strewn with papers and other inflammable materials; if, under the circumstances, the switch sparks to any extent, a destructive fire may result. In order to eliminate this danger, it is necessary to obviate sparking to the fullest possible extent. The primary object of my invention is to provide a switch which is constructed to be opened quickly so as to avoid drawing a prolonged spark between the contacts thereof.

A further object of my invention is to provide a switch constructed in such a way the contacts thereof will be normally spaced apart, but suitably arranged to be closed at the will of the operator, the contacts being adapted to quickly separate from one another when the switch is to be opened.

Another object of my invention is to provide a switch construction wherein the contacts thereof are associated with suitable devices for holding the same together in a positive fashion when the circuit in which the switch is included is closed, the devices in question becoming automatically inoperative when the circuit is to be opened. These and other objects of my invention will appear from the following description taken in connection with the accompanying drawings, which illustrate several forms of my improved switch, the same reference characters being used to indicate the same parts

throughout the several views. In said drawings—

Figure 1 is a vertical longitudinal section showing one form of my switch with the parts in open position.

Fig. 2 is a side elevation of the form of switch shown in Fig. 1, showing the parts in circuit closing position.

Fig. 3 is a vertical sectional view of another form of my switch construction showing the parts in open circuit position.

Fig. 4 is a side elevation of the last named form of switch showing the contacts pressed together into circuit closing position.

Fig. 5 is a perspective view of a fragment of the switch shown in Figs. 1 and 2.

Fig. 6 is a perspective view of a detail used in connection with the form of switch shown in Figs. 3 and 4.

Fig. 7 is a longitudinal section of a third form of my switch, the parts being shown in open circuit relation.

Fig. 8 is a similar sectional view showing the parts in circuit closing relation.

Fig. 9 is a vertical section of the same form of switch taken on a plane at right angles to the plane of the section of Figs. 7 and 8 and showing the parts of this form of my switch in circuit closing position.

Fig. 10 is a view of the same partly in vertical section and partly in elevation, showing the contacts about to be moved apart, and

Fig. 11 is a horizontal sectional view on the line 11—11 on Fig. 10.

In the detailed description of my invention, I shall refer first to the form of my invention shown in Figs. 1 and 2. My improved switch includes a block of insulation forming a base and a pair of relatively movable contacts 2 which are connected in the circuit which my improved switch is to control. The upper contact 2 in Fig. 1 is fastened, as by soldering, to the lower face of a resilient conducting strip 3 and the lower contact 2 is fastened, as by soldering, to the upper face of a resilient conducting strip 4. These two conducting strips may be in the form of leaf springs, and they are mounted in such a way as to insulate them from each other. Normally they hold the

contacts 2 apart. I provide for moving these two contacts together by means of a stem 5 having a push button 6, the same being arranged to act preferably upon the upper strip 3 and force the same down toward the strip 4. The free end of this strip 3 is provided with an opening 3', and when the contacts are together this strip 3 is engaged by means of a leaf spring catch 7 in the shape of an armature which passes through opening 3' and is actuated to move into holding position with respect to the strip 3 by means of an electromagnet 8. I also provide a third resilient conducting strip 9 which is superposed upon the conducting strip 3 and arranged between the same in the stem 5. This conducting strip performs a certain function and the release of the catch 7 as will be fully hereinafter set forth. I preferably mount the lower conducting strip 4 upon an insulating disk 10 on the base 1 and on this strip I place another insulating disk 10' upon the top of which are laid the ends of the conducting strips 3 and 9. Over the ends of these strips and directly above the first two disks is laid a third insulating disk 10''; and on the top of this third disk I place a rigid arm 11 of conductive material which carries the stem 5 adjacent its outer end. Fastening devices, preferably in the shape of bolts 12 pass through the base 1, the disks 10, 10' and 10'', and the arm 11 to hold these parts together. The base 1 is provided with holes therethrough which are counterbored on the lower side thereof to receive the heads of the bolts 12, and the disks 10, 10' and 10'' and the arm 11 also have holes therethrough to permit the passage of these bolts 12. The holes in the lowest disk 10 are smaller than the holes through the two upper disks; the holes of the lowest disk being of the same diameter as the shanks of the bolts 12 and the holes through the base. I make the holes through the end of the lower strip 4, the two disks 10' and 10'', the strips 3 and 9, and the arm 11 of larger diameter than the shanks of the bolts 12, so that said holes will accommodate insulating sleeves 13 which incase the shanks of the bolts 12 and have flanges at their upper ends to engage the top of the arm 11, these sleeves engaging at their lower ends the lower disk 10. The upper ends of these insulating sleeves are engaged by binding nuts 14 which are mounted upon the upper ends of bolts 12 and coact with said bolts to hold all of the parts through which the bolts pass securely in position. As stated above, the contact strips 3 and 9 are in contact with each other, this being accomplished by placing their ends together between the insulating disks 10' and 10'' as clearly shown in the drawings. The arm 11 ex-

tends away from the disk 10'' substantially parallel to the base 1 and then is bent upward as shown at 15. From the upwardly extending section 15, extends a section 16 which is parallel to the base, and the end of the section 16 remote from section 15 is bent toward the base as shown at 17 for engaging the contact strip 9 when the switch is open. The stem 5 is mounted in an insulating sleeve 18 forming a bearing therefor and carried by the section 16 of the arm 11, and the upper face of the conducting strip 9 is provided with an insulating piece 19 secured thereto, adjacent the lower end of the spindle 5, this insulating piece being engaged by the spindle to permit the button 6 to be pushed to force the contact pieces 2 together.

In order to mount the magnet 8 in proper position on the base 1, I provide a U-shaped frame 20 of soft iron which is secured to the base 1 by fastening devices passing through the base and secured to one arm of frame 20. This frame is provided centrally thereof with a horizontal core 21 passing axially through the coil 21'. The contact strip 3 extends over to a point adjacent one end of this core. The armature 7 passes through aperture 3' in strip 3 and is normally held away from the end of the core 21 by its own resiliency. At its lower end the spring armature 7 is bent to form a projection 23 on the side toward the core 21, this projection engaging over the strip 3 at one of the edges of the aperture 3' when the armature is attracted by the magnet, and serving thereby to hold the contacts 2 together when the button 6 has been depressed. The end of the arm 11 remote from the electromagnet has a binding post 24 connected with one lead of a circuit 25. This circuit may be an ordinary lighting circuit containing translating devices, such as lamps or a phonograph to be operated, a translating device being indicated diagrammatically by the numeral 26 in Figs. 1 and 2. From the post 24 a conductor 27 leads to the coil of the magnet 8; and from the said coil, a conductor 28 leads to the end of the strips 3 and 9 beneath the post 24, being electrically connected to each of these strips. The return side of the circuit is indicated at 29 connected to the lower strip 4. A stud 30 carried by the base projects beneath the lower strip 4 and acts as a stop for the two strips when the contact pieces 2 are moved downwardly together.

In operation, when the circuit containing the device 26 is to be closed, the button 6 is depressed to force the stem 5 downward, the stem acting through the insulating piece 19 to force downward the strips 3 and 9 and thus to move the contacts 2 into circuit closing position. When the contact pieces 2 touch each other, current flows from the

conductor 25 through the wire 27 to the coil of the magnet 8, and thence through the wire 28, the strips 3 and 9, the contact pieces 2, the strip 4, and the return wire 29. As a result, the magnet 8 is energized attracting the spring armature 7, and, as the end of the strip 3 adjacent the core 21 is below the projection 23 at this time, the armature 7, when it moves toward the core, will cause the projection 23 to engage the top of the strip 3 at the front edge of the opening 3' and act as a catch to hold the strips 3 and 4 in position to keep the contact pieces 2 together. The circuit is thus closed and kept closed in a certain and positive manner and any sparking that might result from imperfect contact conditions is entirely eliminated.

When it is desired to again open the circuit containing the device 26, the operator simply releases the button 6. Owing to the resiliency of the strip 9, this strip and the stem 5 move upward; but, as the strip 3 is held depressed by the projection 23, the circuit remains closed until the strip 9 engages the part 17 of the arm 11. (See dotted lines in Fig. 2). When this happens, current flows from the conductor 25 through the arm 11, the strip 9, the strip 3, contact pieces 2 and lower strip 4 to the return conductor 29. The magnet 8 is thus short circuited and becomes deenergized at once, the armature 7 being released and moving away from core 21 by means of its own resiliency until the projection 23 clears the front edge of the recess 3' in the conducting strip 3; whereupon this strip flies up owing to its own resiliency and moves the contact pieces 2 apart. The circuit is thus broken with such quickness that an arc at the contact pieces 2 is avoided and sparking suppressed.

From the above description, it will be seen that when the circuit is closed, the switch contacts are forced to engage each other in a positive and certain manner and are firmly held together; and when the circuit is opened by the operator by releasing the button 6, the contact pieces are quickly snapped away from each other to open the circuit the moment the catch 7 releases the upper strip 3. The operation of the switch is such as to minimize objectionable sparking and consequent danger of fire.

In the form of my invention shown in Figs. 3 and 4, I have a switch which operates in a manner similar to that just described, the switch being however of slightly different construction. I use a base 1 of insulation as before and to this base I secure an inverted U-shaped frame 31 of electrically conductive material. This frame has in its top a boss 31' with a bore therethrough to receive the stem 5 having the operating button 6, and to the lower end of this stem is

secured a piece of insulation 32. I provide a conducting strip 33 to be operated by the stem 5, this strip corresponding to the strip 9 in the first form of my invention, and a strip 34 which carries a contact piece 35, the strip 34 corresponding to the strip 3 in the first form of my invention. The strips 33 and 34 are U-shaped, the upper arm of each being longer than the lower arms, which are secured to the base 1. The outer end of the upper arm of the strip 34 has a contact piece 35 fastened thereto, as by soldering, in position to move against a fixed contact 36. This contact is in the form of a metallic bolt having a threaded lower end which passes through a hole in the base 1 and is engaged by nuts at the top and bottom of the base which hold it tightly in position, the lower nut being located in a counter-bore in the bottom of base 1, if desired. As clearly shown the fixed contact 36 extends upward the required distance from the top of the base 1.

I also provide the electromagnet 8 which comprises a coil 21' of wire on one limb of the U-shaped core 37 having a perforated lug 38 extending laterally from the lower end thereof, a fastening bolt 39 passing through the perforation in lug 38. Thus U-shaped core 37 is placed in an upright position on the top of the base 1 above the lower ends of the strips 33 and 34, the latter being provided with registering holes for the bolt 39, which serves to hold the core, the base, and the contact strips together. The lower end of this bolt has a fastening nut 39' thereon located in a counter bore recess in the bottom of the base.

I preferably locate the fixed contact near one end of the base 1 and the magnet 8 near the middle thereof. At the opposite end of the base, I provide a stop 40 in the shape of a curved arm having its lower end bent laterally to provide a horizontal projection 41. The projection 41 has therein a threaded hole engaged by a threaded bolt 41' which passes through a counter bored passage in the base 1, the stop 40 being thus held in fixed relation to the base 1. The arm 40 is curved at its upper end to fit the bent middle portions of the contact strips 33 and 34 and it is provided on its upper end with a pair of lugs 42 extending downwardly and adapted to receive the contact strips 33 and 34 between them. The frame 31 is secured to the base 1 by suitable screws shown at 43, and on the lower side of the strip 34 at a distance from its outer end is an armature 44, adapted to be attracted by the core 37. A stop 45 extending downwardly from the top of the frame 31 limits the upward movement of the strips 33 and 34.

The circuit is shown as before comprising

the main conductors 25 and 29 and the translating device 26. The conductor 25 leads directly to the fixed contact 36 and is secured to the lower end of the same. The conductor 29 is secured in electrical connection with the arm or frame 31 by means of one of the screws 43 and from this screw a conductor 29' leads to the coil 21', a conductor 29'' leading from this coil and being preferably fastened, as by the bolt 39, to the projection 38 of the core 37. The strips 33 and 34 are not insulated from the core 37, and they are in electrical contact with each other the same as the strips 3 and 9.

To close the circuit containing device 26, the operator presses down upon the button 6 forcing the strips 33 and 34 downwardly and causing the contact piece 35 to move against the end of the fixed contact 36. Current now flows from the conductor 25 through the contact 36, contact piece 35, strip 34, the conductor 29'', the coil 21', the conductor 29', the frame 31, and thence to the return conductor 29. The magnet is thus energized and the core will hold down the armature 44 forcing the contacts 35 and 36 together. When the switch is to be opened, the operator releases the button 6 and the spring strip 33 now moves the stem 5 upward. At this time, the strip 33 strikes the projection 45, which is electrically conductive. The magnet 8 is now short circuited, as current flows from the conductor 25 through the contacts 36 and 35 to the lower strip 34, and thence through the upper strip 33 to the frame 31 and back through the return conductor. The magnet 8 is, therefore, deenergized and the spring strip 34 is released. It flies up under the influence of its own resiliency and snaps the contact piece 35 quickly away from the contact 36. The operation of this form of my switch is, therefore, similar to the operation of the first form of switch and affords the same advantages.

In Figs. 7 to 11 inclusive, I illustrate a third form of switch which embodies the principle of my invention, but utilizes mechanical means instead of the electromagnet of the other forms of my invention herein described. In this third form of switch, I employ a pair of contacts 46 in the form of resilient strips, which are arranged to be bridged by means of a relatively movable contact 47 adapted to be forced between them. These contacts are mounted in a casing 48 having inside the same and on one end thereof an insulating block 49 to which the contacts 46 are fastened in any suitable manner. The insulating block 49 is provided in its sides with oppositely located recesses 50 extending from top to bottom of this block and the

conductors 25 and 29 have their inner ends located in these recesses. Preferably the same screws 49' as secure the contacts 46 to the block 49 are used to fasten the conductors 25 and 29 to the contact strips. The bottom of the casing is in the shape of a disk 51 having an annular shoulder 52 on its upper face to receive a ring 53. The disk 51 and the ring 53 are of insulating material and the ring is provided with holes 52' through which the conductors 25 and 29 may pass. The block 49 is secured to the disk 51, as by screws 51'. The block 49 has another pair of oppositely located recesses shown at 54, these recesses being larger than the recesses 50 and arranged with their centers in a line at right angles to a line passing through the centers of recesses 50. The recesses 54 also extend from top to bottom down the sides of the block 49 and they receive the ends of a yoke or inverted U-shaped frame 55, this frame being secured at one end to the block 49 by means of screws 55' in the recesses 54 and at the other end to an insulating disk 56 closing the upper end of the casing, as by screws 56'. This disk 56 also has a shoulder thereon which enables it to be fitted within the tubular casing 48 which has its lower end in engagement with the upper end of ring 53. The casing 48 has an insulating lining 58, this lining engaging the ring 53 and the shoulder on the disk 56. The yoke 55 is thus connected to the opposite ends of the casing in such a way as to hold the parts thereof in assembled relation.

The end closure disk 56 has a central opening which is lined with a bushing 59 to form a bearing for a hollow operating stem 60. The top of the yoke 55 is perforated in line with the bore of the bushing 59 so that the stem 60 can reciprocate freely when actuated. The outer end of this stem is internally threaded to engage a threaded boss on a head or button 6, which is arranged to be pressed by the operator's finger when the stem is to be forced into the casing to close the switch. It will be seen that this stem 60 corresponds to the stem 5 in the other forms of my invention herein described.

The movable switch contact 47 is preferably in the form of a metallic ring secured to a sleeve 61 of insulating material mounted to slide upon a guide stem 62. This guide stem is inserted at its lower end into a bore in the block 49 and is fastened in place by means of any suitable means such as a screw 63 which passes through the closure disk 51, the lower end of the block 49, and into a threaded bore formed in the end of this stem 62. The bore in the block 49 which receives the stem is enlarged at its upper end, as shown at 64, and this enlargement receives an end of a coil spring 65 which abuts against the insulating sleeve 61 at one end

and against the bottom of the enlarged portion 64 of the bore in the block 49 at the other end. This spring normally acts to push the block 61 and the annular contact 47 up above the contacts 46.

The guide stem 62 is of such a length that it extends from the block 49 practically through the length of the casing 48 to the closure disk 56. Its upper end enters the inside of the stem 60 and is inclosed by the inner end of this hollow stem even when the hollow stem is in its extreme upper position. The stem 60 contains a coil spring 65' as shown, which abuts against the inner end of the button 6 and the upper end of the stem 62, this spring normally holding the stem in the position shown in Fig. 7.

On its inner end the stem 60 carries an insulating block in the form of a disk 66 having a central bore therein. The stem 60 is reduced so that its end can be slipped through the bore of the disk 66, the said disk being confined between a shoulder at one end of the reduced portion of the stem 60 and an upset portion at the other end of said reduced portion. The frame 55 has a longitudinal slot 67 in one side and the disk 66 is provided with a projection 68 which may be in the form of a small screw passing through the slot 67 to hold this disk against rotation. At the same time the disk 66 is free to move with the stem 60 when this stem is forced toward or away from the block 49. The sleeve 61 carrying the contact ring 47 is not fixed to the disk 66 or inner extremity of the stem 60, but normally the spring 65 acts against the same to hold the same against the bottom of the disk 66 when the switch is open and the stem is in retracted or raised position. The frame 55 is also longitudinally slotted on its opposite side, as shown at 69, and the said frame at the end of the slot 69 adjacent the disk 51 is formed to provide a pair of alined transverse bearings 70 which receive a pivot 70' for a catch 71. This catch is located in one of the recesses 54 and extends toward the upper end of the casing being normally forced toward the stem 62 by a spring 72. The catch 71 has an inwardly extending projection 73 on its inner edge. The upper edge of this projection is beveled or inclined and the lower edge of the same is at right angles to the length of catch 71 for a purpose which will presently appear. The free end of the catch 71 is provided with a projection 74 which has its lower face beveled or inclined, and the adjacent side of the disk 66 has a notch 75, the inner end of which is inclined toward the center of the disk in a downward direction and receives the projection 74. The lower projection 73 is for the purpose of engaging the top of the contact ring 47 to hold the ring in circuit closing position with respect

to the contacts 46 after the sleeve 61 has been forced down; and the upper projection is intended to serve as a cam to be engaged by the disk 66 when the stem 60 is retracted to move the bar 71 outward to release the projection 73 from ring 47 and allow the spring 65 to move the sleeve 61 and contact 47 quickly away from the contacts 46.

In the operation of this form of my switch, the button 6 is pressed when it is desired to close the circuit; whereupon the stem 60 is forced into the casing against the resilience of the spring 65' and the disk 66 is moved toward the block 49. As a result, the sleeve 61 with the contact ring 47 is moved toward the block 49 and the spring 65 is compressed. As soon as the disk 66 releases the projection 74, the spring 72 forces the catch 71 inward, and when the sleeve 61 is near the end of its movement toward the block 49, the ring 47 will strike the inclined upper edge of the projection 73 and slip past the same, the spring 72 yielding to a sufficient extent. When the sleeve 61 engages the upper end of the block 49, the ring 47 will be below the projection 73, the spring 72 forcing the catch inward so that the lower edge of the projection 73 will engage the top of the contact ring and hold the same and the sleeve 61 in depressed position in spite of the pressure of the spring 65. At this time, the projection 73 will be located in the recess 75 of the disk 66 which recess is deep enough to allow sufficient inward movement of the catch to carry the projection 73 over the top of the contact ring 47. The stem 60 may have a small aperture 76 therein to allow air to enter and leave the inside of the same.

I wish to call particular attention to the fact that the upper ends 77 of the contacts 46 are curved outward. The inner ends of these curved portions are spaced apart a distance which is less than the diameter of the disk 66, and at the inner ends of these curved portions, the contacts 46 are formed to provide projections 78 adapted to press upon the ring 47. This ring, as clearly shown in the drawings, is of less diameter than the disk 66. When the button 6 is depressed, the disk 66 will first engage the curved ends 77 before the ring 47 can engage the contacts 46 and will force the contacts 46 apart to a slight extent. The parts are designed in such a way that this movement of the contacts 46 away from each other will cause the projections 78 to be separated by a distance a little greater than the diameter of the ring 47 before the ring 47 moves between these projections. Consequently when the sleeve 61 strikes the block 49 and the projection 73 engages the contact ring 47, the disk 66 will hold the contacts 46 away from the ring 47 until the button 6 is released. When the

stem 60 is then retracted, the disk 66 moves away from the curved ends 77 of the contacts 46 and releases them and as soon as this takes place, the contacts 46 act through their own resiliency to move the projections 78 thereon against the ring 47; this position of the parts being shown in Fig. 10. By reason of this construction, the circuit will not be closed between the contacts 46 and the ring 47 without the ring 47 being first moved down far enough to permit the projection 73 of the catch 71 to move into locking position over the top of said ring. If the button 6 is now released, the spring 65' forces the stem 60 back to starting position carrying the disk 66 with it. The projections 73 and 74 on the catch 71 are, as shown in the drawings, spaced apart and the switch contacts 46 remain electrically connected while the disk 66 is moved back with the stem 60 to its position in Fig. 7. As the disk 66 and the stem 60 reach the end of their return or upward movement, the disk 66 engages the lower beveled edge of the projection 74 and throws the catch 71 outwardly. This action moves the projection 73 away from the ring 47 and releases this ring so that the spring 65 can now act to move the same out of engagement with the contacts 46. After the circuit has been closed, it can be opened only by the throwing out of the catch 71 when the disk 66 has reached a position near the upper end of the casing 48. The upward movement of the ring 47 out of engagement with the contacts 46 is then unobstructed, and the spring 65 is free to quickly throw the ring 47 out of engagement with the contacts 46 and to thereby open the circuit. The circuit remains closed only during the movement of the disk 66 from its lowest to substantially its highest position. By holding the button 6 in a position intermediate between its extreme upper and lower position, the circuit may be held closed as long as desired.

The principle of operation of my improved switch is accordingly such as to reduce dangerous sparking when the circuit is opened or closed to a minimum. It can, therefore, be used with entire safety, and very little danger of fire will attend its operation even when it is mounted upon an instrument near to a desk or table with a lot of papers thereon. Its utility and numerous advantages make it capable of being used to advantage in any kind of an electrical circuit where a certain and effective closing and a rapid opening of the circuit are desirable. I wish, of course, to have it understood that the above description and drawings are illustrative only, and I do not care to be limited to the exact structural details therein set forth; as many changes may be made in the specific devices shown and de-

scribed without departing from the spirit of my invention.

Having now described my invention, what I claim as new and desire to protect by Letters Patent of the United States is as follows:

1. In an electric switch, the combination of a pair of contacts spaced apart, a third contact movable to engage the first contacts and bridge the same, resilient means tending to hold the movable contact away from the first named contacts, means for forcing the movable contact into bridging position with respect to the first named contacts, a catch to engage the movable contact and hold the same in said position, and automatic means for releasing the catch to allow the movable contact to move quickly out of said position, substantially as described.

2. In an electric switch, the combination of a pair of contacts, a contact movable into position to engage and bridge the same, resilient means normally holding the movable contact out of bridging position with respect to said pair of contacts, a stem to force the movable contact into bridging position with respect to said pair of contacts, a catch to hold the movable contact in said position, and means actuated upon movement of said stem to release said catch, substantially as described.

3. In an electric switch, the combination of a pair of contacts spaced apart, a contact movable into position to bridge the said contacts, resilient means normally tending to hold the movable contact out of bridging position with respect to said pair of contacts, means for forcing the movable contact into engagement with the fixed contacts, a catch having means to engage the movable contact and hold the same in bridging position with respect to said pair of contacts and having also a cam edge, and means for engaging said cam edge to release the catch from the movable contact, substantially as described.

4. In an electric switch, the combination of a contact, a second contact movable to engage the first contact, a stem for forcing the movable contact to engage the first contact, a catch having means for holding the movable contact in engagement with the first contact, said catch being provided with a cam, means carried by the stem and coacting with said cam to release the catch from the movable contact, and resilient means engaging the movable contact to separate the same quickly from the first contact when the movable contact is released by the catch, substantially as described.

5. In an electric switch, the combination of a contact, a second contact movable into engagement with the first contact, a stem for forcing the movable contact into posi-

tion to engage the first contact, resilient means normally acting to hold the movable contact out of engagement with the first contact, a catch having a projection to act upon the movable contact to hold the same in engagement with said first contact, said catch having a second projection with a cam edge, and means carried by the stem and arranged to coact with said cam edge to release the catch from the movable contact, substantially as described.

6. In an electric switch, a casing having ends, an insulating block therein secured to one end of the casing, a frame secured to said block and to the other end of said casing to hold said ends together, a contact secured to said block and a second contact mounted in said casing and movable from without the same to engage the first contact, substantially as described.

7. In an electric switch, a pair of contacts, a third contact movable to bridge the first contacts, means for forcing the first contacts apart when the third contact is moved toward them, means for holding the movable contact in position for engagement with said pair of contacts, and means for rendering the holding means inoperative, substantially as described.

8. In an electric switch, a contact, a second contact movable toward the first contact to a position for engagement with the same, means for moving the first contact out of the path of the second contact when the latter is moved toward said position, means for holding the movable contact in said position, and means for rendering the holding means inoperative, substantially as described.

9. In an electric switch, a pair of contacts,

one movable toward the other, and a device movable in one direction for effecting such movement of the movable contact and having means for preventing the engagement of said contacts during its movement in such direction, said device when moved in the opposite direction being adapted to effect the engagement of said contacts, substantially as described.

10. In an electric switch, a pair of contacts, one movable toward the other, and a device movable in one direction for effecting such movement of the movable contact and having means for preventing the engagement of said contacts during its movement in such direction, said device when moved in the opposite direction being adapted to first effect the engagement of said contacts and to thereafter effect the disengagement thereof, substantially as described.

11. In an electric switch, a contact, a second contact movable toward and away from said first contact, a spring pressed device insulated from the movable contact and movable from its normal position and against the action of its spring to effect movement of the movable contact to a position for engagement with the first contact, means for holding the movable contact in said position, and means rendered operable upon the return of said device to normal position for releasing said holding means, substantially as described.

This specification signed and witnessed this 13th day of February 1914.

NEWMAN H. HOLLAND.

Witnesses:

FREDERICK BACHMANN,
JESSIE STALKER.

Corrections in Letters Patent No. 1,214,920.

It is hereby certified that in Letters Patent No. 1,214,920, granted February 6, 1917, upon the application of Newman H. Holland, of West Orange, New Jersey, for an improvement in "Electric Switches," errors appear in the printed specification requiring correction as follows: Page 2, line 17, for the word "in" read *and*; same page, line 18, for the word "and" read *in*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of September, A. D., 1917.

[SEAL.]

J. T. NEWTON,

Commissioner of Patents.

Cl. 175—284.