(No Model.) 2 Sheets—Sheet 1.

J. F. McLAUGHLIN.

ELECTRIC SWITCH.

No. 528,014. Patented Oct. 23, 1894.

Fig. 1.

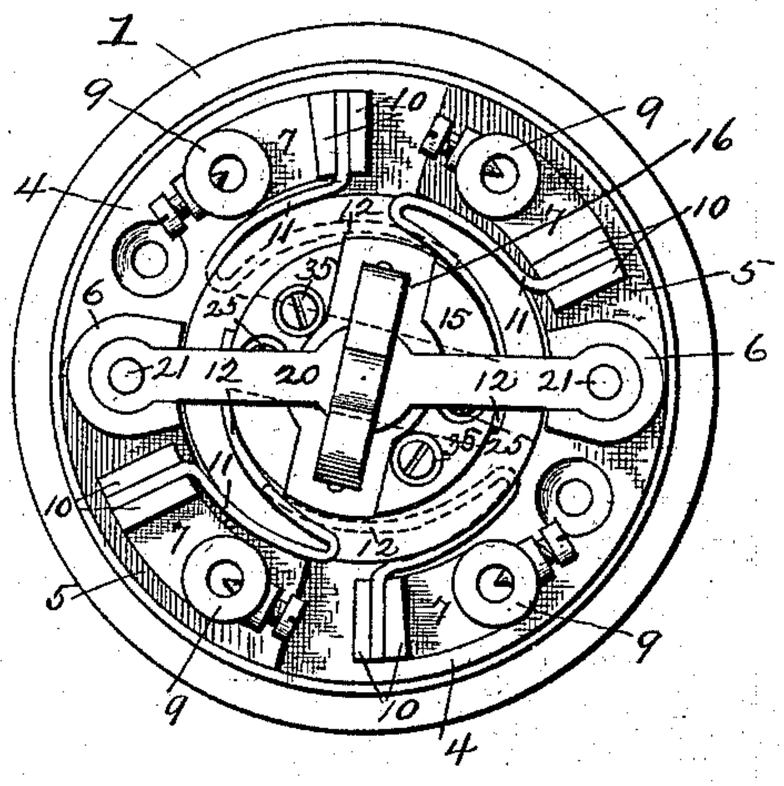


Fig. 2.

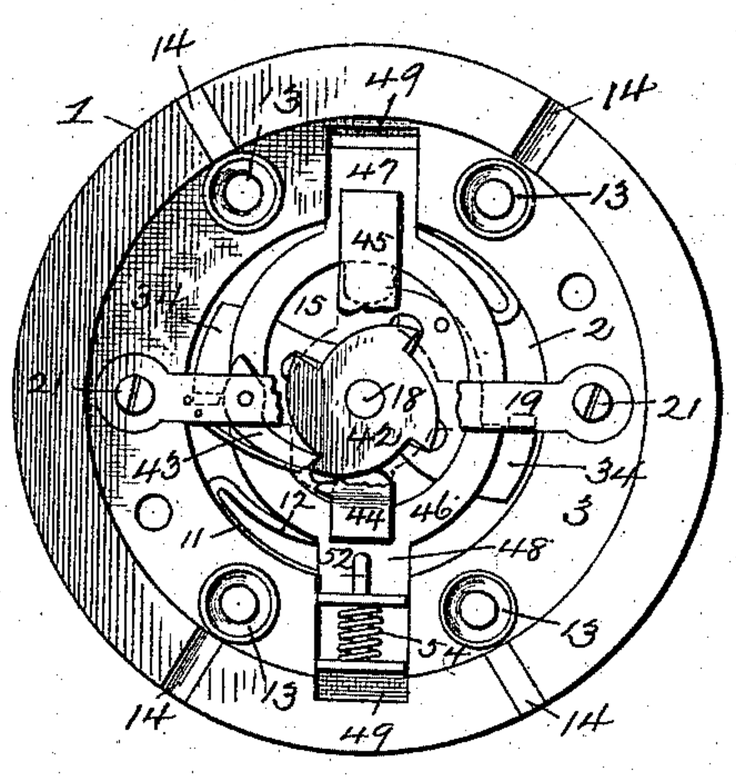


Fig. 3

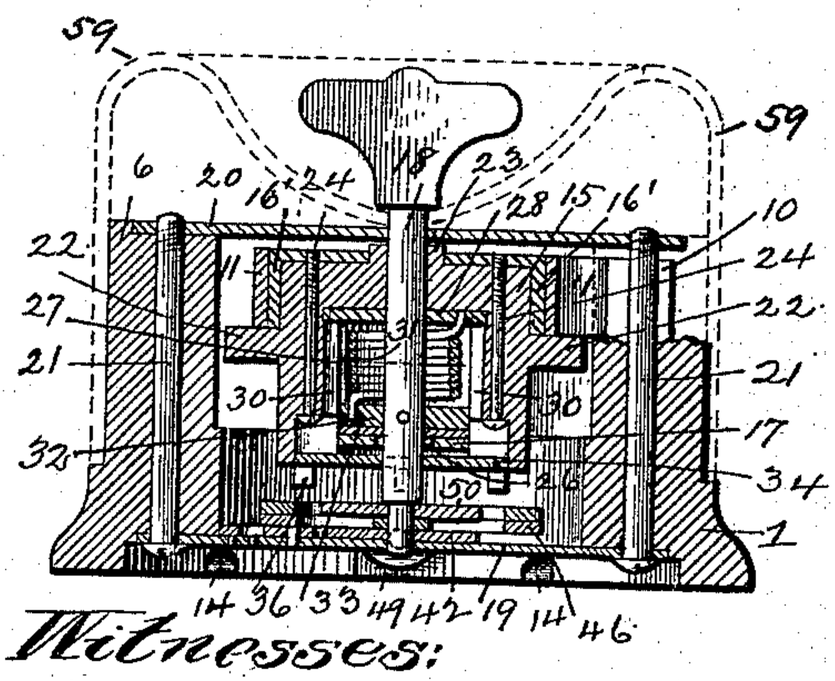
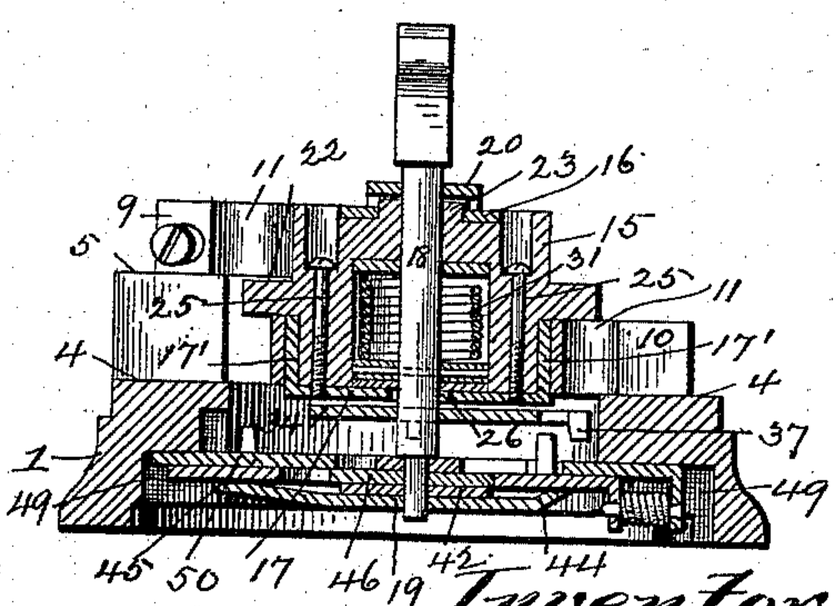


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

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ELECTRIC SWITCH.

No. 528,014. Patented Oct. 23, 1894.

Fig. 5.

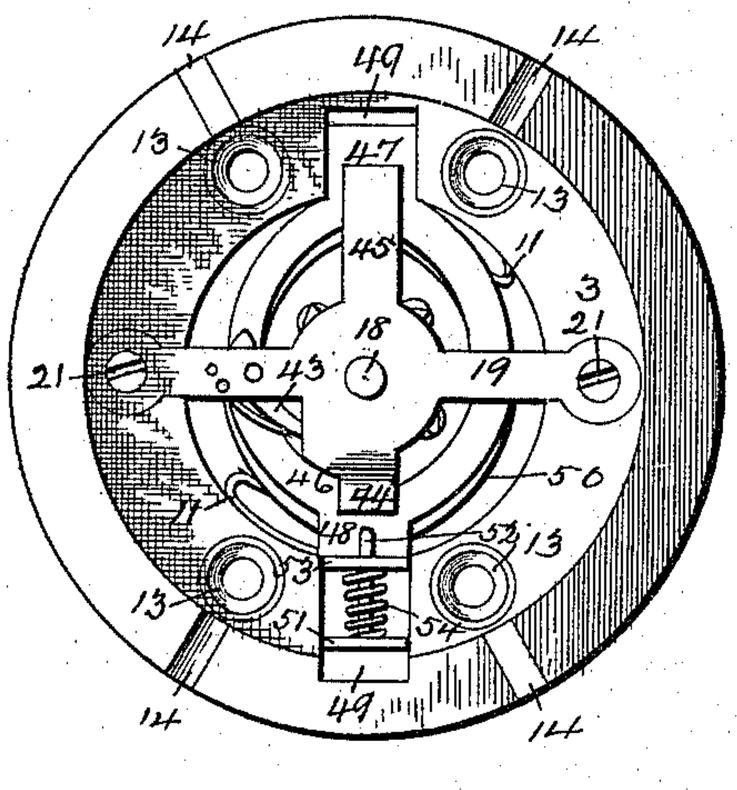


Fig. 6.

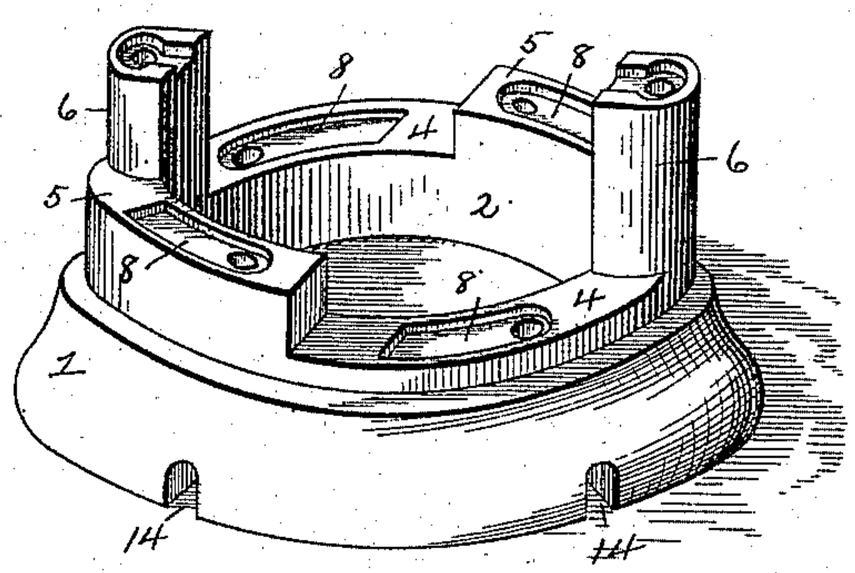


Fig. 7.

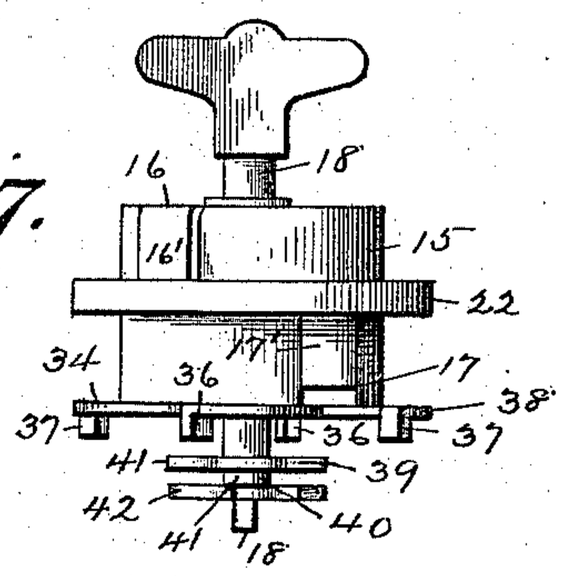


Fig. 8.

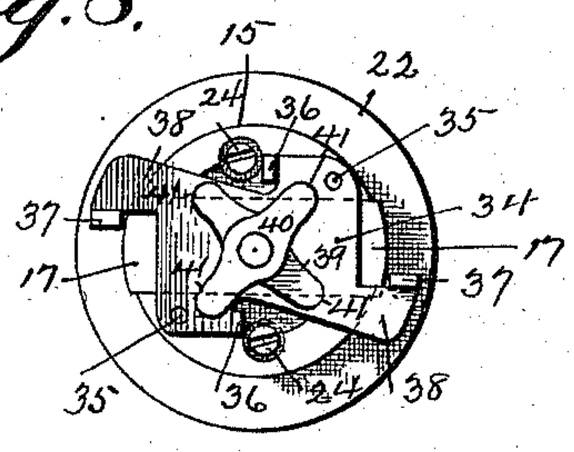


Fig. 9.

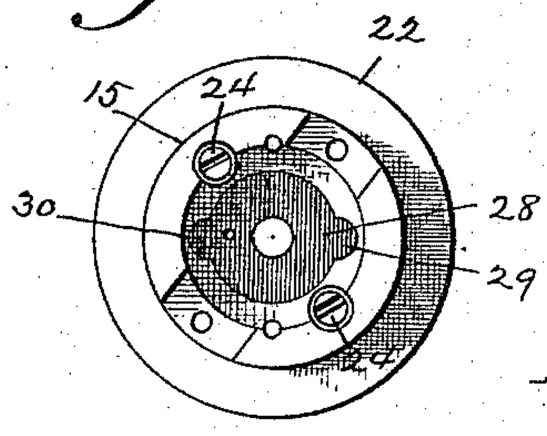


Fig. 10.

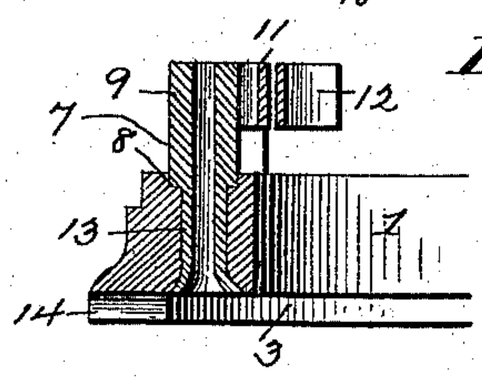


Fig. 12.

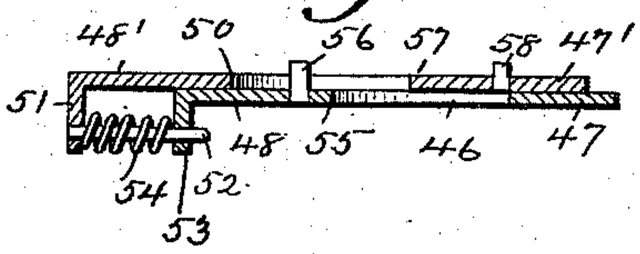
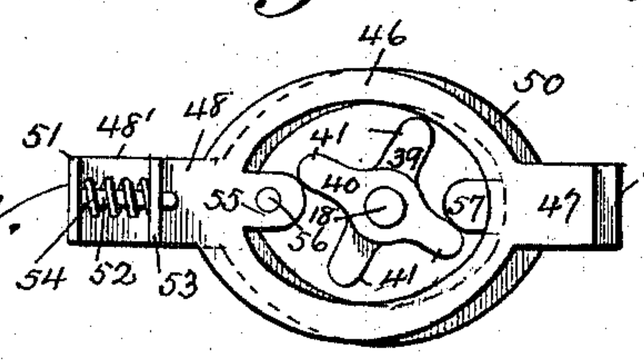


Fig. 11.



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UNITED STATES PATENT OFFICE.

JAMES F. McLAUGHLIN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO JAMES W. DIFENDERFER, OF SAME PLACE, AND THEODORE H. GEHLY, OF YORK, PENNSYLVANIA.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 528,014, dated October 23, 1894.

Application filed May 6, 1893. Serial No. 473,292. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McLAUGHLIN, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

My invention has reference to improvements in electric switches of the kind known in the art as snap switches, which operate to break and make a circuit rapidly, and the object of my invention is to provide against the possibility of leaving the switch in a condition in which the circuit is imperfectly established whereby in a case of heavy currents, the danger of unduly heating or melting the contacts is entirely avoided. With the view of securing this result the movement of the contacts are not controlled from moment to moment by the operator, but are entirely automatic from beginning to end. These movements are produced by a spring which the operator first places under tension and then releases, so that in each case the movement of the contacts is exceedingly rapid and cannot be stopped either accidentally or intentionally at intermediate points. This will more fully appear from the following detailed description with reference to the accompanying drawings.

Figure 1 is a plan view of the switch with the casing removed. Fig. 2, is a bottom view of the same with parts broken away. Fig. 3, is a vertical section of the switch with the casing shown in dotted lines. Fig. 4, is a like section, but at right angles to that shown in Fig. 3. Fig. 5, is a bottom view of the switch with the movable parts in a different position than in Fig. 2. Fig. 6, is a perspective view of the insulating base. Fig. 7, is an elevation of the rotary switch block. Fig. 8, is a bottom view of the same. Fig. 9 is a like view with parts removed, and Figs. 10, 11 and 12, are detail views.

Referring to the drawings, there is shown a base or support 1, having a central circular opening or passage 2, enlarged into an annular recess 3, at its lower end. The upper face of the base 1, is formed with two pairs of segmental flat ledges 4, 4 and 5, 5. The ledges 4, 4, are diametrically opposite each other, and so are the ledges 5, 5, all disposed around the opening 2. The ledges 5, 5, project above the ledges 4, 4, and each ledge 5, terminates at one end in an upwardly projecting boss 6, the boss on one ledge 5, being diametrically opposite that on the other ledge 5. The base or support, together with the ledges 4, 5, and bosses 6, which are formed integral with said base, is composed of any suitable insulating material, but is preferably formed of porcelain, since this material is refractory as well as insulating and may be readily molded to the desired shape.

On each ledge 4, 5, there is mounted a segmental metallic casting 7, seated in a correspondingly shaped recess 8. This casting terminates at one end in a binding post 9, and at the other end in two upturned lips 10, between which is firmly grasped one end of a flat metallic strip 11, bent to the shape of a V, and having its free end 12, curved to the arc of a circle. This strip 11, constitutes a fixed spring brush with its end 12, bearing on the rotary member of the switch, as will be hereinafter explained. The casting 7, may be secured in place in any suitable manner but by preference this casting has formed on it a tubular extension 13, in line with the binding post 9, which extension passes through a suitable hole formed in the base and countersunk at its lower end, so that when the said block is seated in the recess 8, with the tubular extension 13, in the said hole, its lower end may be spun out or expanded into the counter-sink before mentioned, as shown. The extension 13, is, in effect, a tubular rivet and admits of a leading-in wire, entering through a suitable groove 14, formed in the base, being passed up through the said hollow rivet into the binding post, where it is secured in the usual manner.

The rotary member of the switch consists of a cylindrical block 15, of porcelain or other suitable insulating material, carrying contact plates 16, 17, to be hereinafter described. This block is mounted to turn loosely upon an upright spindle 18, journaled at its lower end in a cross bar 19, and at its upper end in another

cross bar 20. The lower bar 19, has its ends seated in recesses formed in the under side of the base within the annular recess 3, and the bar 20, has its ends seated in recesses formed in the upper faces of the bosses 6, and these two bars are connected together by means of screws 21, passing through the base and bosses 6, as shown in Fig. 3.

In the drawings two pairs of brushes 11, are used there being one pair for each contact plate 16, 17. The contact plate 16, extends diametrically across the top of the block 15, and its ends 16′ are turned downward along the outer surface of the block and terminate at an annular flange 22, projecting from the said block about midway of its length. This contact plate 16, is let into the upper face of the block 15, flush therewith, and its ends 16′, are let into the sides of the block, but project slightly beyond the same. The plate 16, is insulated from the spindle 18, and is also prevented from coming in contact with the bar 20, by an annular rib 23, formed on the block 15, around the hole provided for the passage of the spindle 18, and projecting above the upper surface of the plate 16. The other contact plate 17, is let into the bottom of the block 15, and extends diametrically across the same at right angles to the plate 16, and its upturned ends 17′, are let into the sides of the block but project slightly beyond the same and terminate at the flange 22. Both plates 16, and 17, are secured in place by screws 24, and 25, respectively, countersunk into the block 15. (See Figs. 3 and 4.)

The ends 16′, of the contact plate 16, are in the path of the brushes 11, mounted upon the ledges 5, and which will be hereinafter referred to as the upper brushes, and the ends 17′, of the plate 17, are in the path of the other or lower pair of brushes, on which latter the flange 22 rests and thereby upholds the block 15. The spindle 18, passes through a perforation 26, in the plate 17, and this perforation is made so large that the spindle and plate are effectually insulated one from the other by an ample air space.

Formed in the block 15, and concentric therewith is a cylindrical chamber 27, open at its lower end. At the upper end of this chamber there is a plate 28, having wings 29, at diametrically opposite points seated in grooves 30, formed in the walls of the chamber, and this plate has a central perforation for the passage of the spindle 18. To this plate is secured one end of a helical spring 31, the other end of which is secured to a disk 32 fixed to the spindle 18, at a point near the lower end of the chamber, by means of a pin, as shown in Figs. 3 and 4. The spindle is therefore connected to the block 15 by means of the disk 32, spring 31 and plate 28, the latter being held against movement relative to the block by the wings 29 engaging in the grooves 30.

The disk 32 is insulated from the contact plate 17, by means of a washer 33, of vulcanized fiber, or other suitable insulating material.

Seated in the annular bottom face of the block 15, is a plate 34, quadrangular in general outline and secured in place by screws 35, passing through the block, and this plate is formed with the two diametrically opposite and downwardly projecting lugs 36, and with two other downwardly projecting lugs 37 formed on wings 38, extending outwardly from opposite corners of said plate. The lugs 37 are at the ends of a diameter at right angles to that passing through the lugs 36, but are at a greater distance from the center of the plate through which the spindle 18, passes, than are the lugs 36. Near its lower end the spindle 18 carries two arms 39, 40, each terminating in a tooth 41, on each side of the spindle 18. The two arms 39 and 40 are at right angles to each other, so that the teeth are equidistant, and these teeth are rounded at their outer ends as shown. Immediately below the arms 39, 40, the spindle carries a ratchet wheel 42, which in the present instance is shown with four teeth. The arms 39 and 40 and the ratchet wheel 42 are fixed to the spindle 18 in any suitable manner so as turn therewith. The bar 19 in which the lower end of the spindle is journaled carries a spring actuated pawl 43, engaging the ratchet wheel 42.

Projecting centrally from the bar 19, at right angles thereto, are two fingers 44, 45, the finger 45 being shorter than the finger 44, and both fingers being upturned at the ends and forming a support for an oval frame 46, from the ends of which extend arms 47, 48, entering guides 49, formed in the base at diametrically opposite sides of the opening 2. On the frame 46 there is another and similar frame 50 also provided with arms 47′, 48′. The arms 48′ of the frame 50 are longer than the arm 48, of the frame 46, and terminates in an angle extension 51, from which a pin 52 projects and has its free end extending through a perforation in a similar angle extension 53 formed on the end of the arm 48, and between these two extensions the pin 52 is surrounded by a helical spring 54, the tendency of which is to cause one plate to slide on the other by forcing the two extensions 51, 53, apart. The frame 46 is formed with an inwardly projecting tooth 55 and a stud 56 projecting from said tooth. The frame 50, has a similar inwardly projecting tooth 57 at its opposite end, and also a stud 58 which projects from the body of the frame in line with said tooth. The teeth 55 and 57 of the two frames are in the path of the teeth 41 on the arms 39 and 40, that is, the arm 40 is in the plane of and capable of engaging the tooth 55 of the frame 46, while the arm 39, is in like relation to the tooth 57 of the frame 50. The studs 56 and 58 are in the paths of the studs 36 and 37 of the plate 34, that is, the frames 46 and 50 being movable, one on the other and in relation to the studs 36 and 37, carry the studs 56 and 58, into and out of the path

of the said studs 36 and 37, the stud 56 being in the path of the studs 36 and the studs 58, being in the path of the studs 37.

When the parts of the switch are assembled, the spring 31, is under moderate tension and the block 15 is prevented from turning under the action of this spring by one of the studs 56 or 58 engaging one of the studs 36 or 37, as the case may be, and the spindle 18 is prevented from turning under the action of this spring by the ratchet wheel 42 and pawl 43. This ratchet and pawl therefore act as a lock against any attempted reverse movement of the winding key and this key-lock being independent of the lock for the switch block, an injury to the former would not affect the successful operation of the switch as a whole; whereas if the two locks are made dependent upon each other, as has heretofore been attempted, an injury to either destroys the efficiency to both, and either impairs or renders impossible the effective operation of the switch as a whole.

When the switch is included in an electric circuit the terminals of the latter may be connected to either the pair of binding posts connected to the upper brushes, or to the pair of binding posts connected to the lower brushes, or one branch of the circuit may include the upper pair of brushes and the other branch of the circuit may include the lower pair of brushes, in which latter case both branches of the circuit are made or broken simultaneously thereby reducing sparking, when the circuit is broken, to a minimum.

Assuming that the switch has been introduced into a charged electric circuit and is in a position in which the circuit is broken and it is desirable to establish the circuit, the switch will operate as follows: The spindle 18, is rotated in its bearings by means of the thumb piece 34, and carries with it the toothed arms 39, and 40, and the ratchet wheel 42, at the same time winding up the spring 31. The rotary switch block 15, is, during the rotation of the spindle, locked against the action of the spring 31, by one of the studs 36 or 37 engaging the stud 56 or 58 on the frame 46 or 50, but for the sake of clearness of description, it will be assumed that one of the studs 36 is in engagement with the stud 56, on the frame 46. The rotation of the spindle brings one of the teeth 41 of the arm 40 against the tooth 55, of the frame 46, and moves the latter longitudinally against the action of the spring 54, thereby carrying the tooth 56, out of the path of the stud 36. The block 15, is now free to move and is rotated by the spring 31, until stopped by one of the studs 37, coming into contact with a stud 58, on the frame 50. At the instant the rotary switch block is released, the pawl 43, falls in front of a tooth on the ratchet wheel 42, and the spindle 18, may now be released since the pawl 43, will hold it against the action of the spring 31, which, as before stated, is always under moderate tension. When the spindle is again turned in the same direction the frame 50 is moved until its stud 58, is out of the path of a stud 37, and the block 15, is again released, and as often as the spindle is turned it moves first one frame and then the other, each time releasing the switch block 15.

In the switch described, the relation of the parts is such that turning the spindle on its axis through an arc of ninety degrees is sufficient to release the switch block, so that the latter will be released four times during one complete revolution of the spindle, and each time it is released, it moves a quarter revolution under the action of the spring 31. In each position of the block 15, both pairs of brushes are either on the contact plates 16 and 17, or are on the periphery of the insulating block 15. Thus the circuit is alternately made and broken twice during one full revolution of the switch block.

The extent of the movement of the rotary member of the switch is not at any time under the control of the operator, since it is only released when the thumb piece has been turned a quarter revolution and is then moved by the spring 31, to a new position. For this reason the switch cannot be left in such a position that its contact brushes are in but partial contact with the contact plates, nor can the operator make or break the circuit slowly. This is an advantage since in either of these cases there is danger, with heavy currents, of fusing the contact surfaces before full contact is established, and of establishing arcs when the circuit is broken.

The switch is inclosed by a casing 59, indicated by dotted lines in Fig. 3.

The flange 22, of the block 15, besides serving to support the latter, also serves to effectually insulate the upper and lower sets of brushes, one from the other. This is of advantage, since, in order to make the switch compact, the brushes of the upper set overlap those of the lower set, and should an arc be formed between a brush of one set and its contact plate, at the instant of breaking the circuit, the arc cannot jump to the adjacent brush of the other set, being prevented by the interposition of the insulating flange 22.

Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. In an electric switch, the combination with a rotary spring actuated switch block; of a lock for holding the block against the action of the spring, composed of two sliding plates each provided with a stud in the path of a corresponding stud on the switch block; and a winding key for the spring, provided with arms engaging the lock plates to move them with their studs out of the paths of the corresponding switch block stud when the spring is wound up, substantially as described.

2. In an electric switch, the combination with a rotary spring-actuated switch block, of sliding plates each provided with a stud

in the path of a corresponding stud on the switch block, and a winding key for the spring, a pawl and ratchet for the key and arms on the latter engaging and actuating the plates to move them with their studs out of the paths of the switch block studs, substantially as described.

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

JAMES F. McLAUGHLIN.

Witnesses:

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H. F. REARDON.