(No Model.)

J. F. McLAUGHLIN.

ELECTRIC SWITCH.

No. 428,934. Patented May 27, 1890.

Fig. 1.

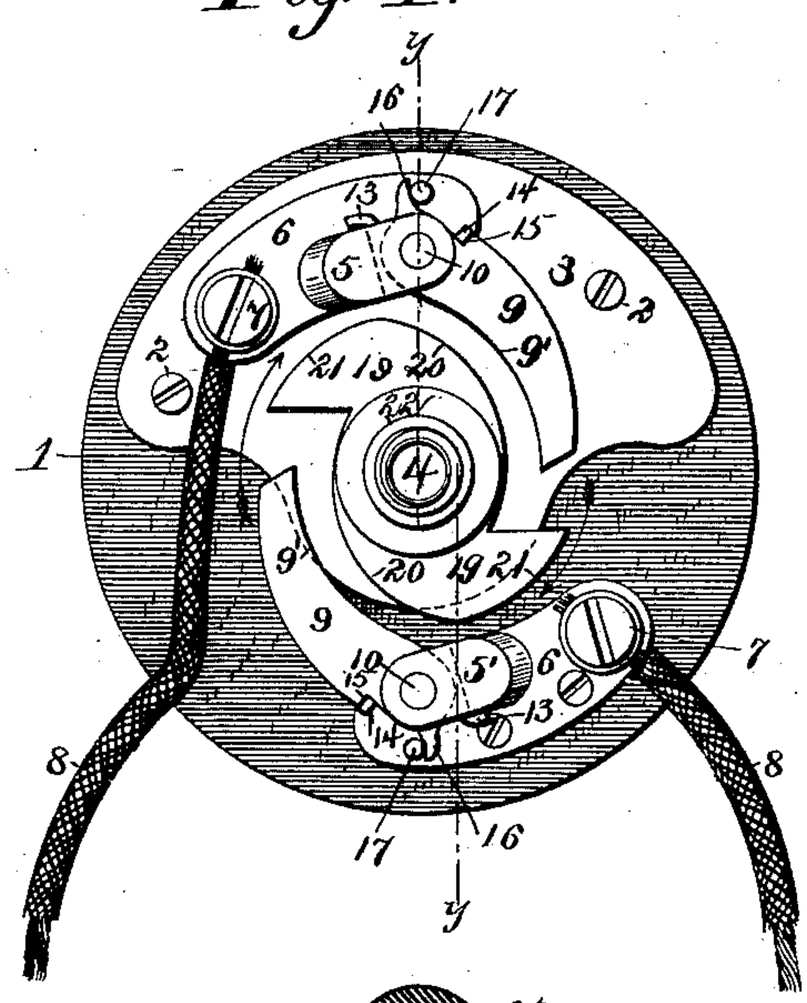


Fig. 2.

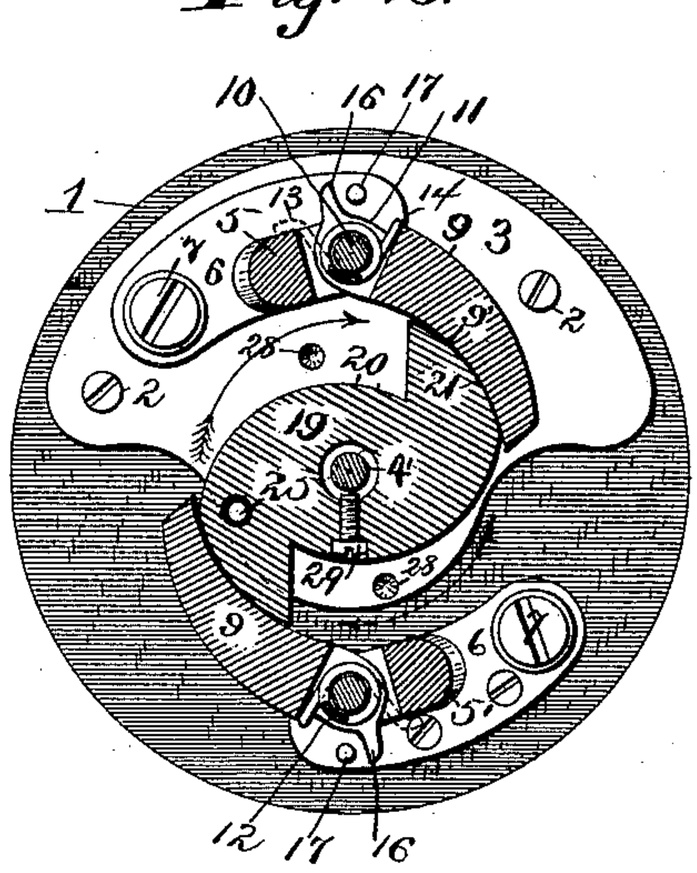


Fig. 3.

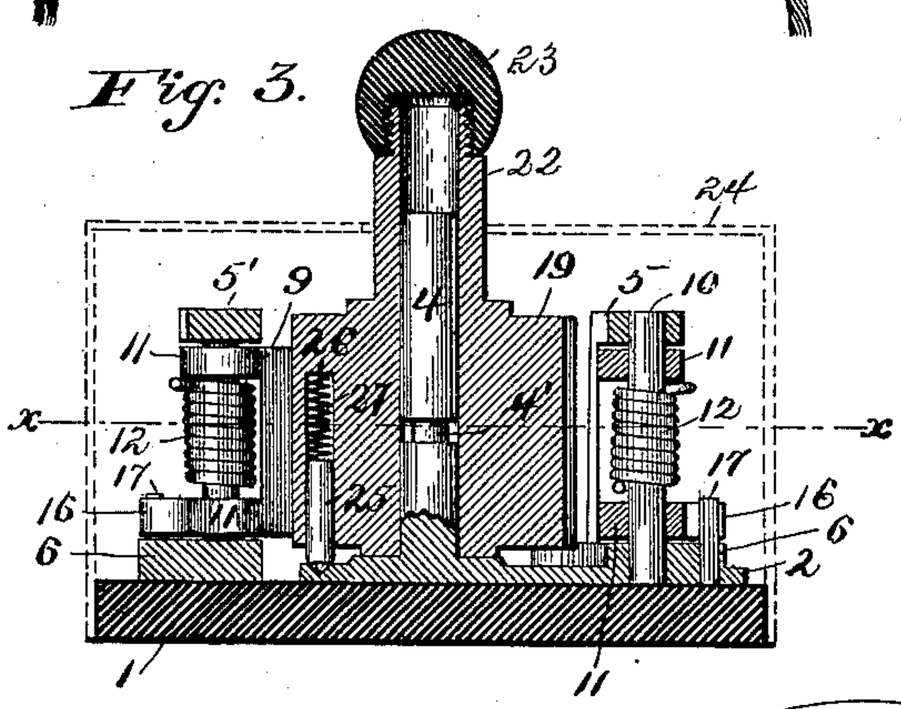


Fig. 4.

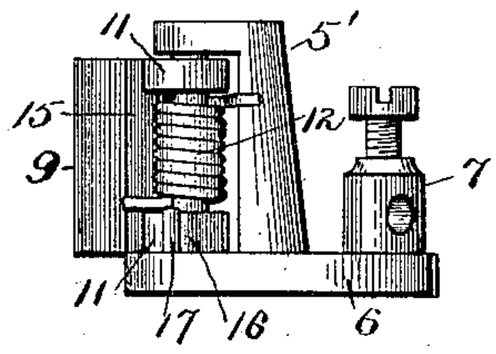
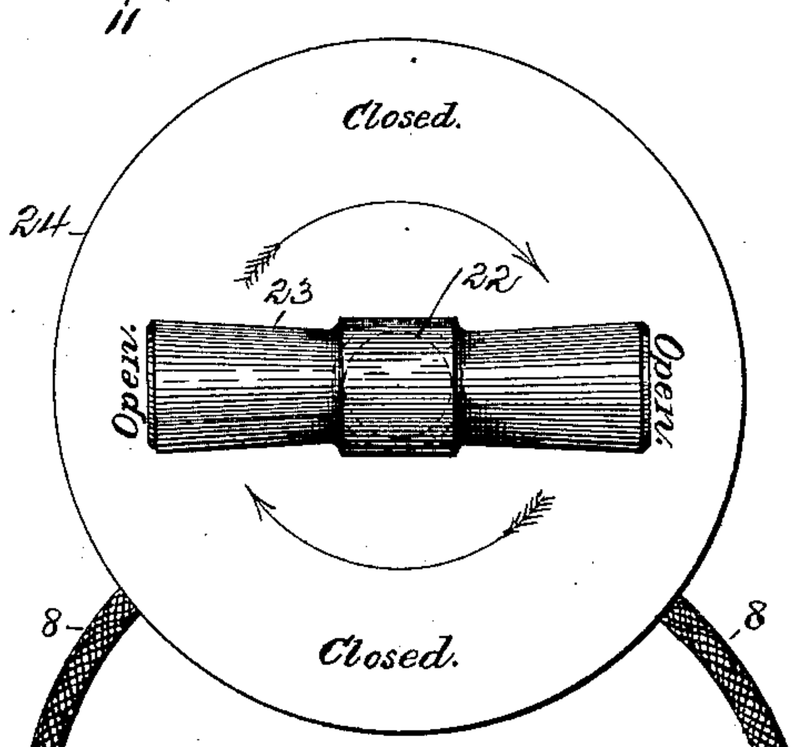


Fig. 5.



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JAMES F. McLAUGHLIN, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 428,934, dated May 27, 1890.

Application filed November 13, 1889. Serial No. 330,154. (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 Electrical Switches, of which the following is a specification.

My invention has reference to improvements in switches for electric circuits carrying currents of large volume, such as electric-lighting circuits, or electric circuits used for the transmission of power. In switches of this character it is essential that the current-carrying part of the same be heavy enough and of such good conductivity as to prevent their heating by the passage of the current, that the contact-surfaces be extensive, and that they be pressed into contact with considerable force in order that the resistance at the contact-surfaces, known as the "transition resistance," be reduced to a minimum. It is also essential that the contact-surfaces be kept clean by the action of the switch itself, and that a small movement of the parts be sufficient to close and open the circuit. All these requirements are fulfilled in my improved switch, which acts by the partial rotation of one of its elements, and is therefore what is known in the art as a "turning switch," as distinguished from a "plug" or "jackknife" switch.

In the accompanying drawings, which form a part of this specification, my improvement is clearly illustrated as follows: In Figure 1 I show a plan view of my improved switch with the protecting-case and the hand-piece removed, showing the switch open. Fig. 2 is a sectional view on line *x x* of Fig. 3, showing the switch closed. Fig. 3 is a sectional view on the line *y y* of Fig. 1. Fig. 4 is a side elevation of one of the contact levers or brushes pivoted in position upon its supporting-bracket; and Fig. 5 is a plan view of my improved switch with the protecting-case and the hand-piece in position thereon.

The operative parts of my switch are mounted upon a base 1, of insulating material, which may be of hard rubber, wood, and the like, but which by preference is made of some refractory material, such as stone, slate, glass, porcelain, or asbestus. In the drawings this base-plate is shown circular in form; but it may be differently shaped, as will be readily understood. Suitably secured upon the base-plate by screws 2 2 is a casting 3, being in fact a sectoral plate, as shown in Figs. 1 and 2, with a cylindrical post 4 rising from the center of the sector, and which in the drawings is shown as in one piece with the sectoral plate, but which may be separately made and secured to the center of the sector. On diametrically-opposite sides of the post 4 are mounted brackets 5 5′, rising from metal plates 6, and to each of these metal plates is also secured a binding-post 7, into which the conductors 8 8 are clamped. One of these brackets—namely, the bracket 5—is mounted upon the sectoral plate of the casting 3, and, if so desired, it may be cast in one piece with the same, and this construction is shown in Fig. 3; but, if so desired, the bracket 5 may be separately made, with its metal base-plate 6 secured to the sectoral plate 3. The bracket 5′ is mounted upon the insulating base-plate 1, and to each bracket is hinged a curved contact lever or brush 9 by a pintle 10, passing through the upper arm of the bracket and through lugs 11 11, extending from the contact levers or brushes 9 and into the metal base 6 of each bracket.

Upon the pintle 10 is placed a strong helical spring 12. One free end 13 of the spring 12 bears upon the bracket 5 or 5′ and the other end 14 against the shoulder 15, formed on the curved lever between the lugs 11 11. The tendency of the springs 12 is to throw each contact lever or brush with its long arm toward the center of the sectoral plate 3; but this forward movement is limited by a tooth 16, projecting from one of the lugs 11, coming into contact with a stop-pin 17, rising from the metal base 6 of each bracket. Thus it will be seen that if each contact lever or brush 9 is free to follow the action of its impelling-spring 12 it will be thrown with its long arm toward the center of the sectoral plate 3, and will be arrested in the position shown in Fig. 1, where each tooth 16 is represented as in contact with its stop-pin 17. In this condition of the device the spring 12 is under considerable strain, and if in the man-

ner hereinafter described the long arms of the levers 9 are forced back from the center of the sectoral plate the strain of each spring 12 is considerably increased. The pintles 10 and the springs 12 can be made as heavy as desired, and for the purposes of my invention they should be made as heavy as possible, for the current controlled by the switch must pass from the bracket 5′ into the switch-lever 9 by way of the pintle 10 and the spring 12, and in order to prevent the heating of these parts their conductivity must be made as great as practicable.

Upon the cylindrical post 4 is journaled a switch-block 18, the same being a heavy casting formed with two wings 19 19, as clearly shown in Figs. 1 and 2. Each wing 19 is formed with a cam-surface 20, which is eccentric to the cylindrical post 4, and with a contact-surface 21, which is in effect a segment of a cylinder-surface concentric with the cylindrical post 4. The cam and contact surfaces meet at an obtuse angle, as is clearly shown in Figs. 1 and 2. The switch-block has a cylindrical portion 22, extending above the winged portion of the same, and a handle 23, of insulating material, is screwed onto the upper end of the cylindrical extension, as shown in Figs. 3 and 5.

As a protection against dust and dampness, a casing 24, having a central opening to allow the cylindrical extension 22 to pass through, is used, and it will now be seen that by turning said handle in the direction indicated by the arrows in Fig. 5 the switch-block will be moved from the position shown in Fig. 1 into the position shown in Fig. 2. By this movement, comprising only a quarter-revolution, the cam-surfaces 20 will first be brought into contact with the inner curved surfaces 9′ of the contact-levers 9, and will force said levers outwardly against the increasing tension of the springs 12, until finally the convex cylindrical contact-surfaces 21 bear upon the concave cylindrical contact-surfaces of the levers or brushes 9.

As has been stated above and as is shown in the drawings, the cam-surface of each wing joins the cylindrical contact-surface at an obtuse angle, whereby a steep cam-surface is secured and the contact-surface is well marked off and distinguished from the cam-surface. The effect of this construction is that the actuating-spring of the contact-lever, before the latter comes to bear upon the cylindrical contact-surface will be rapidly put under its maximum strain, which is then maintained uniform so long as the switch is in its closed position, and that the circuit will remain automatically closed only after the spring has thus been put under its maximum tension, since in all other positions there will be a tendency of the actuating-spring, acting through the contact-lever upon the cam-surface of the wing of the switch-block, to turn the latter back to again open the circuit. The closed position of the switch-block is shown in Fig. 2, and it will be seen that it secures forcible contact between extended contact-surfaces, and that this contact is established by a quarter of a rotation of the switch-handle. If the rotation of the switch-block is continued in the same direction one-quarter of a revolution, it is again brought to a position equivalent to that shown in Fig. 1, whereby the circuit is opened. It will, therefore, be understood that both for opening and for closing the circuit the switch-handle must be turned in the same direction one-quarter of a revolution, and that by the friction of the contact-surfaces on each other they are always kept clean.

When the circuit is closed by the switch, the current will enter by one of the binding-posts 7 and pass by the contact-lever connected therewith to the switch-block, and from the same to the other contact-lever and out by the other binding-post connected therewith. By reason of the metallic connection of one of the binding-posts with the sectoral plate 3 and with the cylindrical post 4, upon which the switch-block is mounted, there will ordinarily be also a branch path for the current directly from said binding-post to the switch-block. This path, however, is uncertain, by reason of the loose connection between the switch-block and post 4, and also by reason of the fact that the bearing of the switch-block will ordinarily be oiled, and is liable to retain dust and other unavoidable impurities which become lodged therein, and which, together with the oil, might form an insulation between the post 4 and the switch-block. For this reason I use two contact-levers, both bearing forcibly and frictionally upon the switch-block.

When the switch-block is turned from its position shown in Fig. 1, where the circuit is open, to the position shown in Fig. 2, where the circuit is closed, the operator is apprised of the fact that that position has been reached by the increased mechanical resistance which is offered to the turning of the block; but when the block is turned from "circuit closed" to "circuit open" special provision must be made for apprising the operator of the fact that the switch is now open, so that he may not by a continuous movement accidentally close the circuit again. This is effected by a pin 25, freely sliding in a cylindrical socket 26, formed in one of the wings of the switch-block. A helical spring 27 is also placed in the socket behind the pin 25, and this pin is thus forced, with its conical or rounded end, into contact with the sectoral plate 3, and in the face of the latter there are formed shallow depressions 28, corresponding to the two positions of the pin 25 when the switch-block is turned to open the circuit.

It will now be seen that when the switch-block is turned to open the circuit the rounded end of the pin 25 will engage the depressions 28, and a further turning of the switch-block will now be gently resisted, so that the operator

will become aware of the fact that the circuit is open. This pin 25, therefore, acts as a lock for the switch when the circuit is open.

Upon the top of the casing 24 the positions of the handle, when the circuit is open or closed, are indicated by the words "open" and "closed" marked thereon. It will, however, be understood that by reason of the increased mechanical resistance offered to the turning of the switch-block from either of its ultimate positions the operator can manipulate the switch with safety without looking at the inscriptions upon the face of the casing—as, for instance, in a dark room.

In order to prevent the switch-block 18 from being raised from its bearing by the manipulation of the handle, or from moving away from its bearing by the action of gravity, when the switch is fixed with its base-plate against a wall or a ceiling, a neck 4′ is formed on the post 4, and a screw-pin 29, screwed into the switch-block, engages with its point the said neck.

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

1. In an electrical switch, the combination of a rotary winged switch-block, each wing having one cam and one convex cylindrical contact-surface meeting at an obtuse angle, with spring-actuated contact-levers within the sweep of the cam-surfaces of the block, substantially as described.

2. In an electrical switch, the combination of a rotary winged switch-block, each wing having one cam and one convex cylindrical contact-surface meeting at an obtuse angle, with contacts each having a concave cylindrical contact-surface within the sweep of the cam-surfaces of the block and conforming to the contact-surfaces of the latter, substantially as described.

3. An electrical switch consisting of an insulating-base, a metallic plate secured thereon, a rotary winged switch-block and spring-actuated contact-lever, both mounted on said plate, and a spring-actuated contact-lever mounted on the insulating-base out of contact with the metallic plate, both levers being in the path of the wings of the switch-block, substantially as described.

4. In an electrical switch, a rotary switch-block mounted upon a casting and acting in conjunction with spring-actuated contact-levers, in combination with a spring-actuated sliding lock-pin seated in the switch-block and having a conical or rounded point, and depressions or cavities in the casting spaced to correspond to the positions of the lock-pin when the switch is open, whereby the switch-block is locked when the circuit is open, 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:
EDWIN F. GLENN,
HERBERT P. KER.