(No Model.)

J. F. McLAUGHLIN.

ELECTRIC SWITCH.

No. 428,935. Patented May 27, 1890.

Fig. 1.

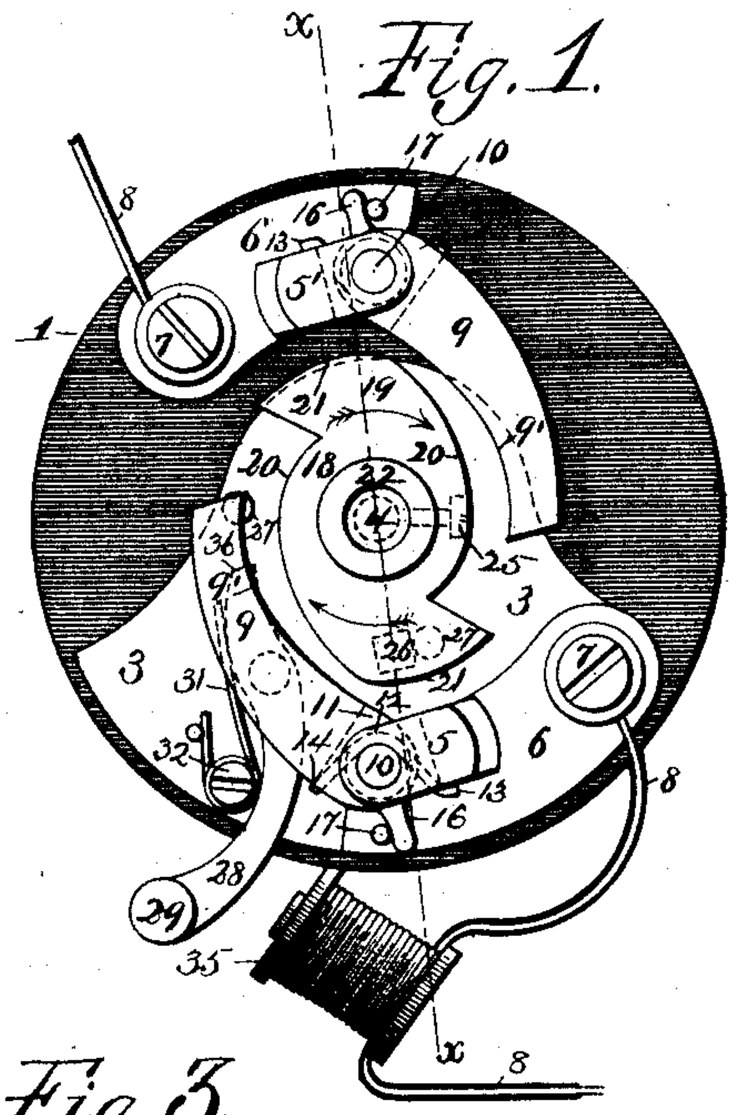


Fig. 2.

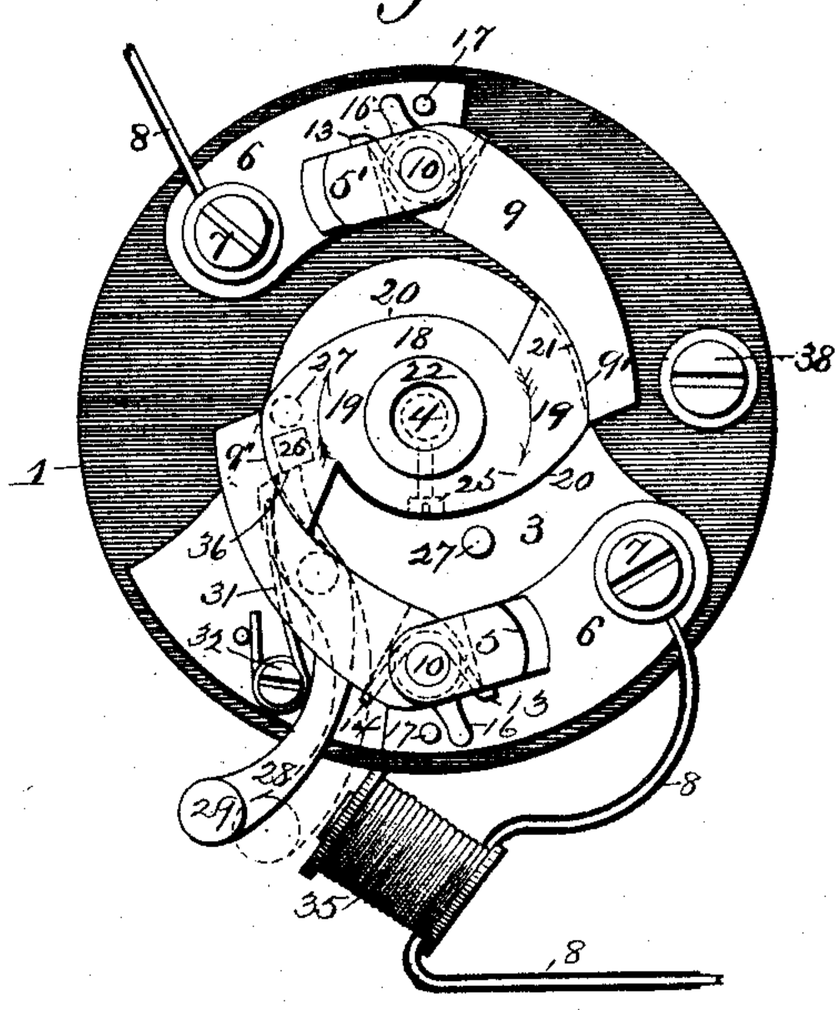


Fig. 3.

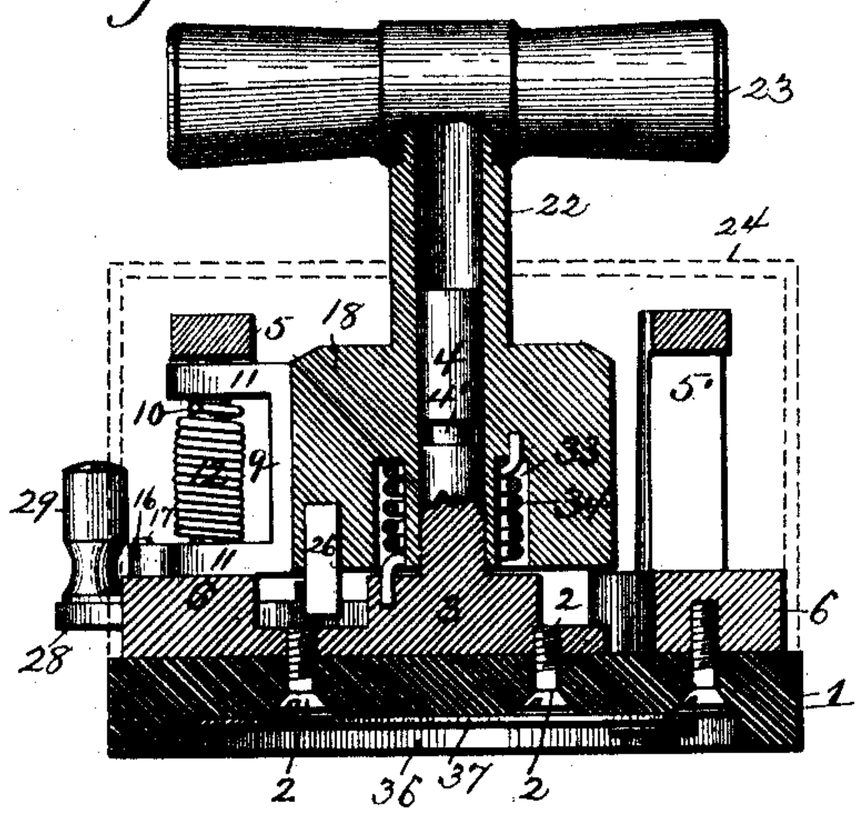


Fig. 4.

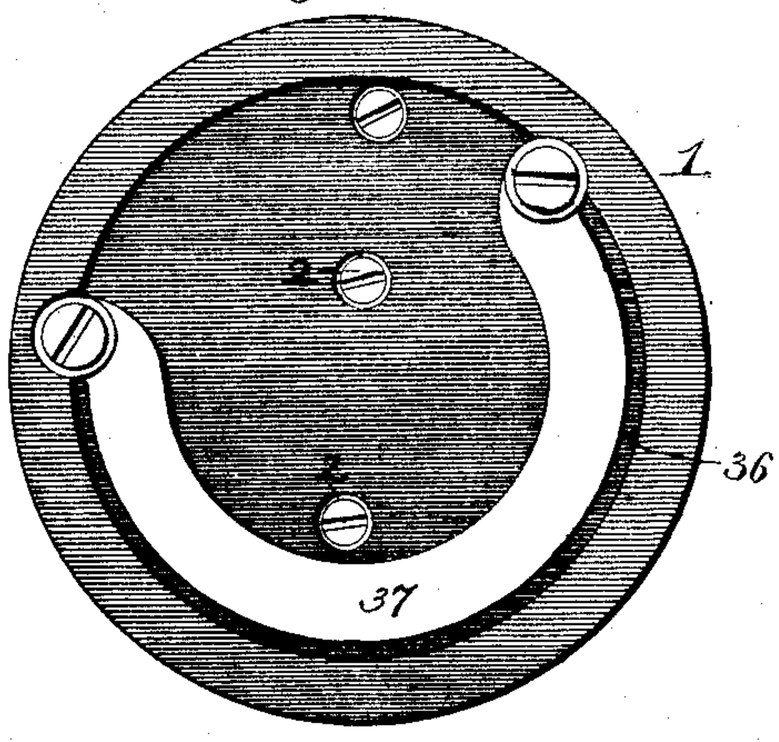
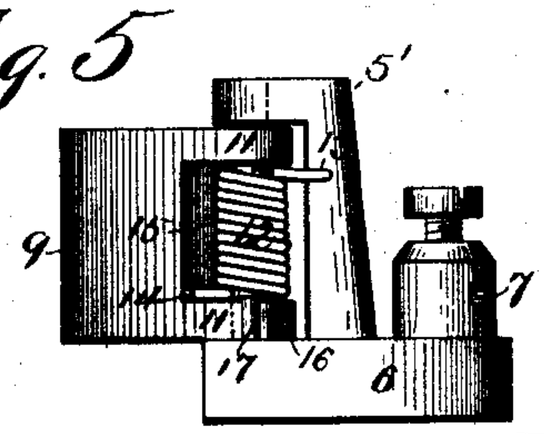


Fig. 5



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JAMES F. McLAUGHLIN, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 428,935, dated May 27, 1890.

Application filed November 27, 1889. Serial No. 331,774. (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 Combined Electric Switches and Cut-Outs, 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—and the same is an improvement upon the electric switch shown and described by me in my application, Serial No. 330,154, filed November 13, 1889; and the object of my present invention is to provide locking mechanism whereby the switch when closed will be safely locked against accidental displacement, but may be opened instantaneously by a very slight movement of a trigger provided for this purpose, and this movement of the trigger may be caused either arbitrarily by the hand of an operator or by an electro-magnet energized sufficiently by the current controlled by the circuit in which the switch is employed when said current increases above its normal or desired strength. I have also made provision, in addition to this electro-magnetic cut-out, for an ordinary cut-out, such as is used in other switches or in any place in the circuit independently of the switches. All this will more fully appear from the following detailed description, in which reference is made to the accompanying drawings, which form a part of this specification, and in which I have shown, in—

Figure 1, a plan view of my improved switch with the operating-handle removed and the switch open. Fig. 2 represents a similar view showing the switch closed. Fig. 3 is a vertical sectional view on the line *x x* of Fig. 1. Fig. 4 is an inverted plan view showing a safety-plug or cut-out applied to the base of the switch, and Fig. 5 is a side elevation of one of the contact levers or brushes pivoted in position upon its supporting-bracket.

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.

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 manner 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 will in part 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 Fig. 3.

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 Figs. 1 and 2 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. This last 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.

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 25, screwed into the switch-block, engages with its point the said neck.

From one of the wings of the switch-block projects downwardly a locking-pin 26, which is preferably made square. This square pin extends to within a short distance from the upper face of the sectoral plate, as shown in Fig. 3, and rising from said sectoral plate in the path of the square pin 26 are two stop-pins 27 27, which are spaced a little more than ninety degrees (90°) apart, and are so located that when the switch-block is in the position shown in Fig. 1 the locking-pin 26 will bear with one side against one of these stop-pins, and when the switch-block is in the position shown in Fig. 2 the opposite side of the locking-pin will be within a very short distance from the other stop-pin, so that it will be seen the switch-block can be moved in either direction throughout one quadrant.

Underneath one of the contact levers or brushes 9 is pivoted upon the sectoral plate 3 a lever 28, extending with one end through a slot in the casing 24, and is there provided with a handle 29. The other or inner end of the lever 28 is formed into a tooth or dog, as shown, having a flat face 30. As will presently be seen, this lever 28 has the function of a trigger, and it will hereinafter be referred to as such. The inner end of this trigger-lever is thrown inwardly by the action of the trigger-spring 31, but is limited in its inward movement by the pin 32, with which the long arm of the lever comes into contact.

The arrangement of the parts is such that when the switch-block is turned from the position shown in Fig. 1 into the position shown in Fig. 2 in the direction of the arrows the locking-pin 26 will in the course of its movement bear upon the short arm of the trigger-lever and force that arm backward against the action of spring 31 until it has cleared that arm, when the dog end of the latter will again be forced inwardly, as shown in Fig. 2, whereby the switch-block becomes locked in position, so that it can be moved in neither direction by the handle 23.

For opening the switch it is necessary to move the trigger out of the path of the locking-pin 26, and this can be done by turning the outer end of the trigger-lever a very short distance, as indicated by dotted lines in Fig. 2. After this has been done the switch-block is unlocked, and may now be moved back to the position shown in Fig. 1; and I have provided means for effecting this movement automatically and with great rapidity. For this purpose there is formed on the under side of the switch-block an annular recess 33, in which is located a helical spring 34, one end of which is secured to the switch-block and the other end to the segmental plate, as is clearly shown in Fig. 3. The tendency of this spring is to turn the switch-block in a direction opposed to that indicated by the arrows, so that when the switch-block is turned from "open" to "closed" the spring 34 is put under tension, and when by pulling the trigger, as hereinbefore described, the switch-block is released it is rotated with great rapidity from "closed" to "open." Instead of pulling the trigger by hand, it may be pulled by the force of an electro-magnet 35, which electro-magnet may be, and preferably is, included in the circuit controlled by the switch, and the core and coils of which are so proportioned that it will be sufficiently ener-

gized to pull the trigger only when the current attains greater strength than is intended to be carried by the circuit. For this purpose it will be understood that the trigger-lever, or at least the outer end of the same, must be made of iron.

One end of the magnet-coil is connected with the binding-post 7, connected with bracket 5, and the other end of the magnet-coil is connected with the line. Thus by the use of the trigger-lever for locking and releasing the switch-block, which trigger-lever has only a small movement, and which may be effected by a slight force, I am enabled to utilize an electro-magnet operating in conjunction with it as an automatic electro-magnetic cut-out. I am, however, not deterred by this from using also an ordinary safety-plug or cut-out, and I have shown such device connected with my switch.

The insulating-base 1 has formed on its under side a recess 36, in which is placed a band 37 of easily-fusible metal, one end of which is connected with a binding-post 38, mounted upon the top of the insulating-base, and the other end is connected with the binding-post 7 of the bracket 5′. If this safety-plug is used as an auxiliary to the electro-magnetic cut-out, the binding-post 38 forms one terminal of the circuit and the free end of the coil of the electro-magnet 35 forms the other end of the circuit. If the safety-plug is not used, one terminal of the circuit is still formed by the free end of the coil of the electro-magnet and the other terminal by the binding-post 7 of the bracket 5′.

If the safety-plug alone is used without the electro-magnetic cut-out, the terminals of the circuit are formed by the binding-post 38 and by the binding-post 7 of the bracket 5, while if neither the safety-plug nor the electro-magnetic cut-out is used the terminals of the circuit are formed by the two binding-posts 7.

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 switch-block operating in conjunction with suitable contact-brushes, of a trigger for locking the block in its closed position, an electro-magnet for moving the trigger to unlock the switch-block, and a spring for automatically opening the switch when the block is unlocked, substantially as described.

2. In an electric switch, the combination, with a rotary switch-block operating in conjunction with suitable contact-brushes, of a trigger for locking the block in its closed position, an electro-magnet energized by the current controlled by the switch for moving the trigger to unlock the switch-block, and a spring for automatically opening the switch when the block is unlocked, whereby the circuit is broken when the current exceeds a predetermined strength, 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.