(No Model.)

A. SWAN.

ELECTRIC SWITCH.

No. 461,456. Patented Oct. 20, 1891.

Fig. 1.

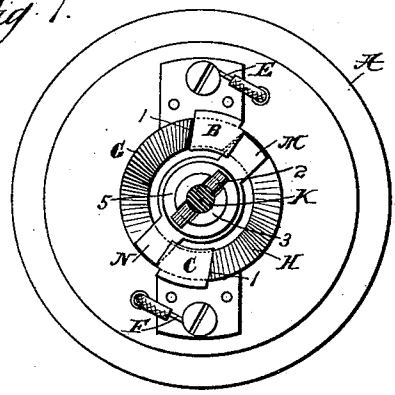


Fig. 2.

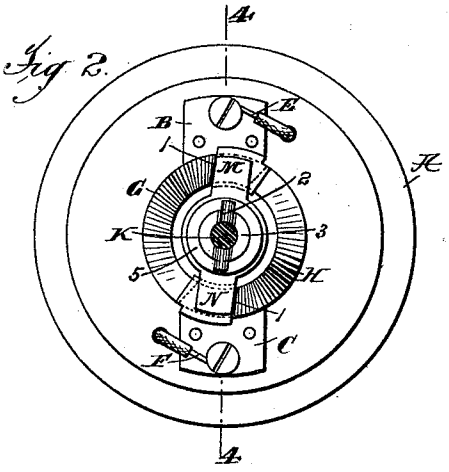


Fig. 3.

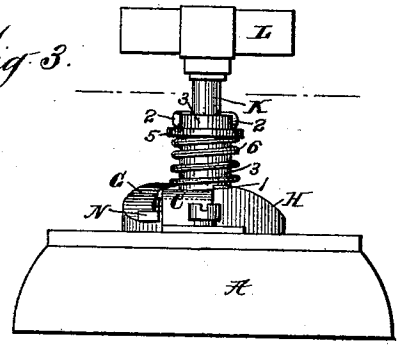


Fig. 4.

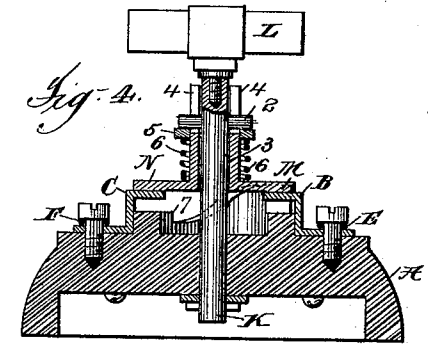


Fig. 5.

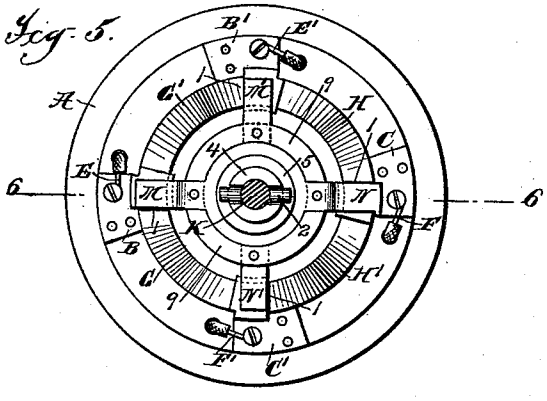
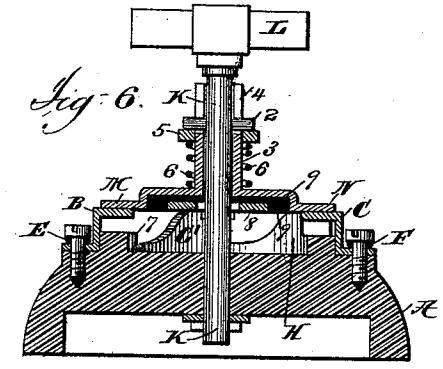


Fig. 6.



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UNITED STATES PATENT OFFICE.

ALFRED SWAN, OF ORANGE, NEW JERSEY, ASSIGNOR TO THE INSULITE MANUFACTURING COMPANY, OF NEW YORK, N. Y.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 461,456, dated October 20, 1891.

Application filed August 6, 1890. Serial No. 361,213. (No model.)

To all whom it may concern:

Be it known that I, ALFRED SWAN, a subject of the Queen of Great Britain, residing at Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Electric Switches, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to electric switches, its object being to provide an improved switch in which both make and break shall be beyond the control of the operator after the operating movement has passed a certain point and in which it shall be impossible for the circuit to be made or broken by the reverse movement of the switch.

A full description of my invention will now be given, reference being made to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a plan view of my improved switch with the handle removed and having the circuit broken. Fig. 2 is a similar view showing the circuit closed. Fig. 3 is a side elevation of Fig. 1 with the handle in place. Fig. 4 is a section on the line 4 4 of Fig. 2 with the handle in place. Fig. 5 is a plan of a multipolar switch, showing the circuit closed. Fig. 6 is a section on the line 6 6 of Fig. 5 with the handle in place.

Referring now especially to Figs. 1 to 4, A is the insulating base of the switch, supporting the contact-plates B C, with which the line-wires E F make contact by the usual contact-screws, as shown, or in any other suitable manner. The base A is provided with cams or inclines G H, and the contact-plates B C extend inward over the lower parts of the cams, so that the switch-arms form contact therewith after passing off the highest parts of the cams, the contact-plates being a little below the highest parts of the cams, so that shoulders 1 are formed upon the cams, extending above the contact-plates.

In the block A is mounted to rotate a small shaft K, provided with a handle L, by which it is operated, this handle being secured in the upper end of the shaft K, preferably by being screwed into the latter, as shown in Fig. 4, the handle and shaft thus being connected on movement of the handle in one direction and the handle being unscrewed from the shaft on movement in the opposite direction. This shaft K carries a cross-pin 2, and between the cross-pin and the base A is mounted loosely upon the shaft-sleeve 3, which carries the switch-arms M N and is provided with slots 4, extending longitudinally of the sleeve and shaft, in which the pin 2 engages for operating the sleeve when the shaft is rotated. A collar 5 is loose upon the sleeve 3, and a coiled spring 6 encircles the sleeve between the collar and the switch-arms, the collar 5 being held against upward movement by the pin 2.

The cams G H, as above explained, project slightly above the surface of the contact portions of the plates B C, forming shoulders 1, and these cams are provided also with shoulders 7, extending slightly above their lowest parts beneath the contact-plates and in position to hold the switch-arms from reverse movement to engage any part of the contact-plates. When the contact-plates extend in two horizontal planes and vertical arms contact the parts, as in the construction shown, the contact-plates will be so constructed that the switch-arms do not drag upon the vertical arms of the contact-plates as they move downward in the circuit-breaking movement. This result may be obtained either by placing the vertical arms beyond the ends of the switch-arms or, as shown, forming lips upon the plates which project beyond the vertical edges. The switch may readily be constructed, however, so that the plates lie in a single plane.

The operation of the switch will readily be understood from the drawings and a brief description. As the handle L and shaft K are rotated the sleeve 5 and switch-arms M N are carried forward over the cam-surfaces, which operate to raise the arms and compress the spring 6 between the switch-arms and loose collar 5, slots 4 permitting the sleeve 3 to move longitudinally of the shaft while being rotated therewith by the pin 2. As the switch-arms M N reach the highest part of the cams G H and pass off the shoulders 1 the force of spring 6 throws the sleeve down and carries the switch-arms into contact with

the contact-plates, as shown in Figs. 2 and 4, thus closing the circuit. Any reverse movement of the switch-arms M N to break the circuit is prevented by the shoulders 1 and by the unscrewing of the handle L from the shaft K. A further rotation of the shaft K carries the switch-arms M N over the contact-plates B C, and as the switch-arms reach the ends of and pass off the contact-plates the spring 6 throws the switch arms downward into the position shown in Figs. 1 and 3, thus breaking the circuit instantaneously, the switch-arms being out of contact with the contact-plates during the breaking movement. Any reverse movement of the switch-arms to close contact with the contact-plates is prevented by the shoulders 7 at the foot of the cams and by the unscrewing of handle L, as before.

It will thus be seen that an instantaneous make and break is produced, which is beyond the control of the operator after the operating movement has passed a certain point, and that no reverse movement of the switch-arms can either make or break the circuit.

In Figs. 5 and 6 is shown a multiple-branch switch, in which two sets of contact-plates B C and B′ C′ and two sets of switch-arms M N and M′ N′ are used. In this construction the arms M′ N′ are carried by a collar 8, which is secured to a block of insulating material 9, placed between the collar 8 and the sleeve 3, carrying switch-arms M N, and serving to insulate the two sets of switch-arms M N from each other. The collar 8 is provided with an opening about the shaft of sufficient size to prevent contact therewith or may be insulated therefrom, if desired. The construction and operation of the multiple-branch switch in other respects are identical with the single switch previously described.

It will be understood that while a double switch is shown any number of switch-arms may be employed and the device used for control of any desired number of lines.

My invention is not to be limited to the specific form of the devices shown, as it is evident that these may be varied widely by one skilled in the art without departing from my invention, and the construction of the moving parts of the switch as shown constitutes only the preferred form of these parts, and other arrangements of parts may be used with the base. The construction shown, however, in which two switch-arms engage cams on opposite sides of the axis and slide upon the rotating shaft, insures a very easy and certain operation, the pressure upon opposite sides of the axis of rotation being equalized. A single arm may be used, however, operated by the cams and closing the circuit in any suitable manner.

What I claim is—

1. In a switch, the combination of a base provided with a series of insulating-cams, contact-plates, each in advance of a cam and lying in a plane between the top of said cam and the foot of the next succeeding cam and at right angles to the axis of rotation of the switch arm or arms, a switch arm or arms engaging and spring-pressed against said cams and contact-plates, and means for rotating said switch arm or arms over said cams and contact-plates against said spring-pressure, substantially as described.

2. In a switch, the combination of a base provided with a series of insulating-cams, contact-plates, each in advance of the top of a cam and lying in a plane between the top of said cam and the foot of the next succeeding cam and at right angles to the axis of rotation of the switch arm or arms, a switch arm or arms engaging and spring-pressed against said cams and contact-plates, means for rotating said switch arm or arms over said cams and contact-plates against said spring-pressure, and a shoulder at the foot of each cam preventing reverse movement of the switch when the circuit is broken, substantially as described.

3. In a switch, the combination of a base provided with a series of insulating-cams, contact-plates, each in advance of the top of a cam and lying in a plane between the top of said cam and the foot of the next succeeding cam and at right angles to the axis of rotation of the switch-arms, switch-arms engaging said cams on opposite sides of the axis of rotation, a shaft by which the switch-arms are rotated and on which they slide, a spring pressing said arms against said cams and contact-plates, and a shoulder at the foot of each cam preventing the reverse movement of the switch when the circuit is broken, substantially as described.

4. The combination, with the base A, having insulating-cams G H, of the shaft K, carrying cross-pin 2, longitudinally-slotted sleeve 3, carrying switch-arms M N, spring 6, pressing said switch-arms against the cams, and contact-plates B C, each in advance of the top of a cam and lying in a plane between the top of said cam and the foot of the next succeeding cam and at right angles to the axis of rotation of the switch-arms, substantially as described.

5. The combination, with the base A, having insulating-cams G H, of the shaft K, carrying cross-pin 2, longitudinally-slotted sleeve 3, carrying switch-arms M N, spring 6, pressing said switch-arms against the cams, and contact-plates B C, each lying in advance of the top of a cam and in a plane between the top of said cam and the foot of the next succeeding cam and at right angles to the axis of rotation of the switch-arms, substantially as described.

6. The combination, with the base A, having insulating-cams G H, each provided at its foot with a shoulder 7, of the shaft K, carrying cross-pin 2, longitudinally-slotted sleeve 3, carrying the switch-arms M N, spring 6, pressing said switch-arms against the cams, and contact-plates B C, each lying in advance

of the top of a cam in a plane between the top of one cam and the foot of the next succeeding cam and at right angles to the axis of rotation of the switch-arm, substantially as described.

7. A switch-block consisting of the switch-base A, having one or more insulating-cams, as G, each provided at its foot with a shoulder 7, and one or more contact-plates, as B, each lying in advance of the top of a cam and in a single plane between the top of said cam and the foot of the next succeeding cam and extending over and past said shoulder, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ALFRED SWAN.

Witnesses:
C. J. SAWYER,
J. J. KENNEDY.