

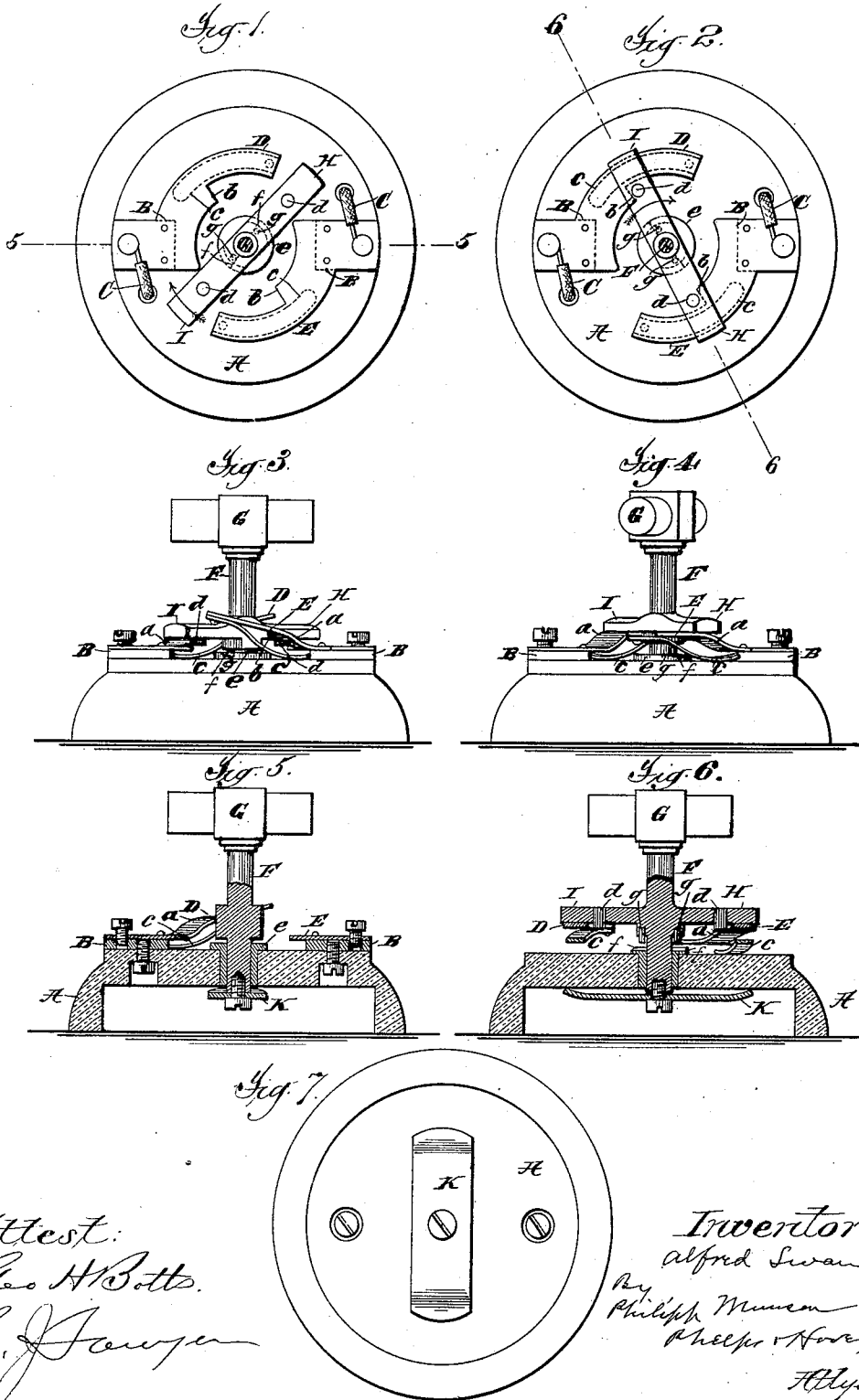
(No Model.)

2 Sheets—Sheet 1.

A. SWAN.
ELECTRIC SWITCH.

No. 463,396.

Patented Nov. 17, 1891.



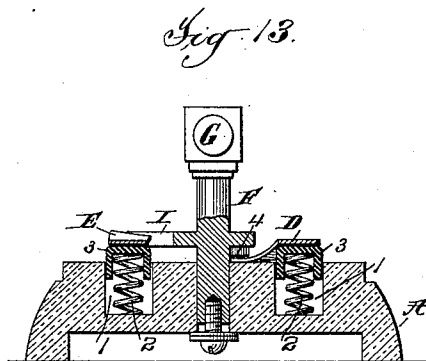
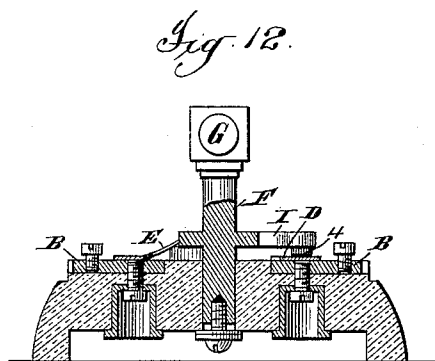
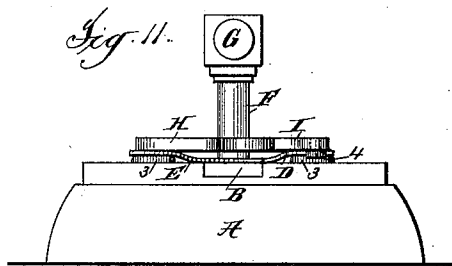
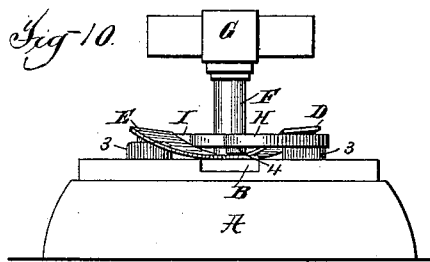
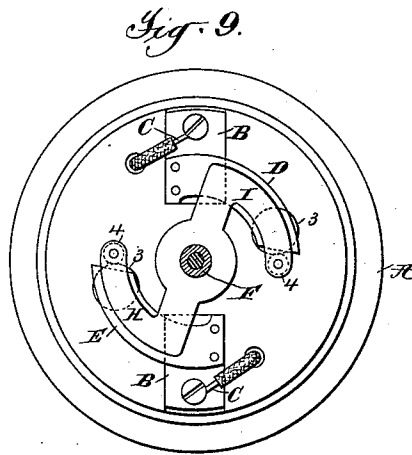
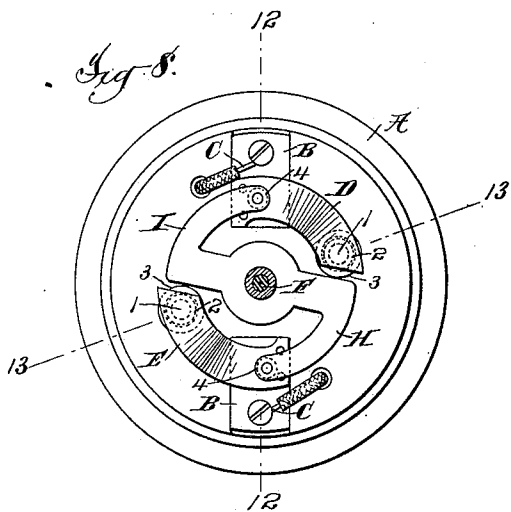
(No Model.)

2 Sheets—Sheet 2.

A. SWAN.
ELECTRIC SWITCH.

No. 463,396.

Patented Nov. 17, 1891.



Attest:
Geo. H. Botts.
C. J. Sawyer

Inventor:
Alfred Swan
Philip Munson Phelps
Attys

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. 463,396, dated November 17, 1891.

Application filed May 7, 1891. Serial No. 391,882. (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.

10 This invention relates to electric switches, its object being to provide an improved switch in which both make and break are instantaneous after the operating movement has passed a certain point and in which the maximum pressure upon the circuit-closing parts during contact is obtained.

A further object is to provide a simple switch in which it is impossible for the circuit to be closed or broken by reverse movement.

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

25 Figure 1 is a plan view of my improved switch with the handle removed and showing the circuit broken. Fig. 2 is a similar view, showing the circuit closed. Fig. 3 is an elevation of Fig. 1 with the handle in place. Fig. 4 is a similar view of Fig. 2. Fig. 5 is a section on the line 5 5 of Fig. 1. Fig. 6 is a section on the line 6 6 of Fig. 2. Fig. 7 is a bottom plan view of the switch-block. Figs. 8 and 9 are views similar to Figs. 1 and 2, showing a modification. Figs. 10 and 11 are elevations of the same similar to Figs. 3 and 4; and Figs. 12 and 13 are sections on respectively the lines 12 12 and 13 13 of Fig. 8.

Referring now to said figures, A is the insulating-base of the switch, which is made of any suitable insulating material and upon which are secured metal plates, on which are the contact-plates D E, either secured thereto, as shown, or forming a part thereof, the wires C connecting with the plates B of the contact-plates by contact-screws, as shown, or in any other suitable manner. These contact-plates D E are thin plates of some spring metal of high conductivity, such as brass, and are 50 curved, preferably through about a quarter-

circle, concentrically with the line of rotation of the switch-arms. The curved arms extend from the plates B in the direction of rotation of the switch-arms and are free at their ends farthest from the plates. The contact-plates 55 are bent upward from the plates B, so as to form inclines *a*, which act as cam-surfaces upon the switch-arms. At the tops of the cams thus formed the contact-plates are cut away, so as to reduce their width, thus forming shoulders *b* for a purpose to be described hereinafter. 60

Under the free end of each of the contact-plates D E a flat spring *c* is mounted upon the base, so as to press against the under side of the contact-plate at its free end and preferably secured thereto, as shown, and moving freely on the base A. If preferred, however, the spring may be secured to the base and rest against the under side of the contact-plate without being secured thereto, in which case the spring *c* must be of such length as not to extend beyond the free end of the contact-plates when the latter are depressed. The contact-plates are held normally in the position shown in Figs. 3 and 4 by their own spring-tension and that of the springs *c*. 75

A shaft F is mounted to rotate in the base and carries the usual operating-handle G and switch-arms H I, which are formed integral therewith, as shown, or secured rigidly thereto in any suitable manner. The shaft F preferably extends through the base A, as shown, and a strong flat spring K is secured at its lower end, this spring being so formed as to rest against the bottom of the base and exert a downward pressure upon the shaft F. The switch-arms H I are of the usual form, consisting of bars formed in whole or in part of some metal of high conductivity, and each carries a projection or stud *d*, of insulating material, these studs projecting slightly below the lower side of the switch-arms, so as to come in contact with the contact-plates D E, and being so positioned as to move over the wider portions of the contact-plates, as the switch-arms are rotated up, to pass off the shoulders *b* when the tops of the cams *a* are reached and lie inside the narrow free ends of the contact-plates. Reverse movement of 100

the switch when the circuit is closed is prevented by the studs *d* engaging the shoulders *b*.

For the purpose of preventing reverse movement of the switch when the circuit is broken, the plate *e*, forming a bearing for the switch-arms upon the top of the base *A*, is provided with one or more notches *f*, the rear sides of which form shoulders, and the shaft *F* is provided with downwardly-extending pins *g*, which prevent reverse movement by coming in contact with the shoulders formed by the notches *f* when the circuit is broken, as shown in Fig. 3.

The operation of the device will be understood from a brief description. In the position of parts shown in Figs. 1, 3, and 5 the switch-arms *H I* lie between and out of contact with the contact-plates *D E* and are held in their lowest position by the tension of spring *K* upon the shaft *F*. The pins *g* are within the notches *f*, and any reverse movement of the switch is prevented by the shoulders formed by the rear sides of the notches. As the shaft *F* is rotated, the switch-arms are carried forward with the studs *d* in contact with the wider rear portion of the contact-plates *D E*, and the switch-arms and shaft *F* are raised against the tension of spring *K* by the cams *a* on the contact-plates. As the switch-arms reach the tops of the cams, the studs *d* pass off the shoulders *b* and the switch-arms are thrown downward by the tension of spring *K* into contact with the contact-plates. The movement of the switch-arms over the cams *a* has also depressed somewhat the contact-plates *D E* against their own spring-tension and that of the springs *c*, so that the contact-plates also are thrown up by this spring-tension as they are released by the passage of the studs *d* off the shoulders *b*. The contact-tension, therefore, is that of the spring *K* and of the spring contact-plates increased by the springs *c*, so that a maximum contact-pressure is produced. In this position of the parts, as shown in Figs. 2, 4, and 6, it will be seen that no reverse movement of the switch-arms is possible, as the studs *a* engage the shoulders *b* upon the contact-plates and hold the switch-arms normally against reverse movement. When the circuit is to be broken, the switch-arms are rotated until they reach and pass off the free ends of the contact-plates, when the contact-plates are released and are thrown upward by their spring-tension and that of the springs *c*, and the switch-arms are thrown downward by the spring *K*, thus producing an instantaneous break and restoring the parts to the position shown in Figs. 1, 3, and 5.

While I prefer to use the construction shown, employing the spring *K* and making the shaft *F* movable during the closing and breaking of the circuit, this is not absolutely essential, but the shaft may be rigid and the contact tension be produced entirely by the spring-contact plates and springs *c*. The springs *c*

may also be omitted, if desired, and the contact-plates *D E* be made of sufficient strength to produce the required tension. One of the objects of my invention, however, is to provide a switch in which a maximum contact-pressure is obtained, and for this purpose I find the construction shown and described well adapted.

Referring now to Figs. 8 to 13, the modification shown therein will be described. In this construction the contact-plates *D E* are of the same width throughout, and under the free end of each a recess *l* is formed in the base, in which openings are mounted coiled springs *2*, of a common form, which press against the free ends of the contact-plates and are under constant tension, tending to raise the latter and sufficient to hold them in their raised position when not depressed by the switch-arms. Each one of the springs *2* is preferably covered by an insulating-cap *3*, these caps moving up and down in the recesses *l* with the springs and being of sufficient length to fully cover the ends of the springs above the base when the springs are expanded to raise the contact-plates. The switch-arms *H I* are curved, as shown, preferably through a quarter-circle, corresponding to the length of the contact-plates *D E*, and these switch-arms rotate in a plane slightly above the fixed ends of the contact-plates, so that by their rotation the free ends of the contact-plates are depressed against the springs *2*. The shaft *F* is shown as having no movement transverse to the base, but it will be understood that the spring *K*, of the construction previously described, may be applied also to this construction, if desired, the gradual incline of the contact-plates forming the cams *a* of the previous construction. Each of the switch-arms carries at the end in advance, as the switch-arms rotate, a projection or stud *4*, of insulating material, these studs being the same in construction and function as the studs *d*, previously described. The operation of this device is as follows: In the position of parts shown in Figs. 8, 10, 12, and 13 the studs *4* are in contact with the fixed ends of the contact-plates *D E* and the circuit is broken. As the switch-arms are rotated over the contact-plates *D E* the contact-plates are gradually depressed against the tension of the springs *2* until the studs pass off the free ends of the contact-plates, as shown in Figs. 9 and 11, when the contact-plates are thrown upward by the springs *2* and press with nearly the greatest tension of the springs against the underside of the switch-arms. It will be seen that in this position no reverse movement of the switch-arms is possible; as the studs *4* engage the edges of the inner free ends of the contact-plates and prevent said movement. When the circuit is to be broken, the rotation of the switch-arms is continued until the switch-arms reach the free ends of the contact-plates, when the contact-plates are released and are thrown upward by the pressure

of springs 2, producing an instantaneous break and restoring the parts to the position shown in Figs. 9, 10, 12, and 13. It will be seen that in this position also no reverse movement of the switch is possible, as the switch-arms H I come in contact with the insulating-caps 3 over the springs and prevent any such movement. The purpose of the insulating-caps is obvious, as without them the switch-arms H I would, upon reverse movement, come in contact with the metallic springs 2 and through them close contact with the contact-plates.

It will thus be seen that in both the constructions shown and described an instantaneous make and break is produced, which is beyond the control of the operator after the operating movement has passed a certain point; that the springs are under greatest tension during contact; that no reverse movement of the switch-arms can either make or break the circuit, and that these results are attained in a switch of extreme simplicity and so constructed as to be of great durability.

My invention is not to be limited to the specific form of the devices shown, as it is evident that many other modifications may be made in the preferred construction without departing from my invention, and it will be understood that this switch is adapted for the changes in detail common in switch construction. Thus, while I have shown two switch-arms on opposite sides of the axis—and this is the preferable construction, as it insures a free, easy, and certain operation, the pressure upon opposite sides of the axis of rotation being equalized—a single arm may be used, closing the circuit in any suitable manner. It will be understood, also, that while a single switch is shown any number of switch-arms may be employed and the device used for the control of any desired number of lines.

What I claim is—

1. The combination, with one or more rotating switch-arms provided with insulating projections, of one or more spring contact-plates held under tension by the insulating projections during the rotation of the switch-arms and thrown into contact with the switch-arms when the insulating projections have passed off the contact-plates, substantially as described.

2. The combination, with one or more rotating spring-pressed switch-arms and cams by which the arms are raised against the spring-pressure during their rotation, the circuit being broken during the action of the cams, of one or more spring contact-plates in advance of the tops of the cams and below

the plane of the switch arm or arms when the latter are raised by the cams, whereby the switch arm or arms are thrown into contact with the spring contact plate or plates by the spring-pressure after the arms have passed the tops of the cams, substantially as described.

3. The combination, with one or more rotating switch-arms carrying insulating projections, of one or more contact-plates having cams engaged by said insulating projections during the rotation of the switch-arms and forming contact with said arms under spring-pressure when the insulating projections have passed off the contact-plates, substantially as described.

4. The combination, with one or more rotating spring-pressed switch-arms carrying insulating projections, of one or more contact-plates having cams engaged by said insulating projections during the rotation of the switch-arms and into contact with which said arms are thrown when the insulating projections have passed off the contact-plates, substantially as described.

5. The combination, with one or more rotating spring-pressed switch-arms carrying insulating projections, of one or more spring contact-plates having cams engaged by said insulating projections during the rotation of the switch-arms and forming contact with said arms under the spring-pressure of the arms and plates when the insulating projections have passed off the contact-plates, substantially as described.

6. The combination, with shaft F, carrying a switch arm or arms having insulating projections *d*, of one or more contact-plates D, having cam *a* and cut away to form shoulder *b*, substantially as described.

7. The combination, with switch-block A, of spring-pressed shaft F, carrying one or more switch-arms having insulating projections *d*, contact-plates having cams engaged by said insulating projections during the rotation of the switch-arms and into contact with which said arms are thrown when the insulating projections have passed off the contact-plates, and pins *f* and notches *g* on the shaft and base preventing reverse movement of the shaft when the circuit is broken; 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,
T. F. KEHOE.