(No Model.)

W. W. ALEXANDER

ELECTRIC SWITCH.

No. 506,297. Patented Oct. 10, 1893.

Fig. 1.

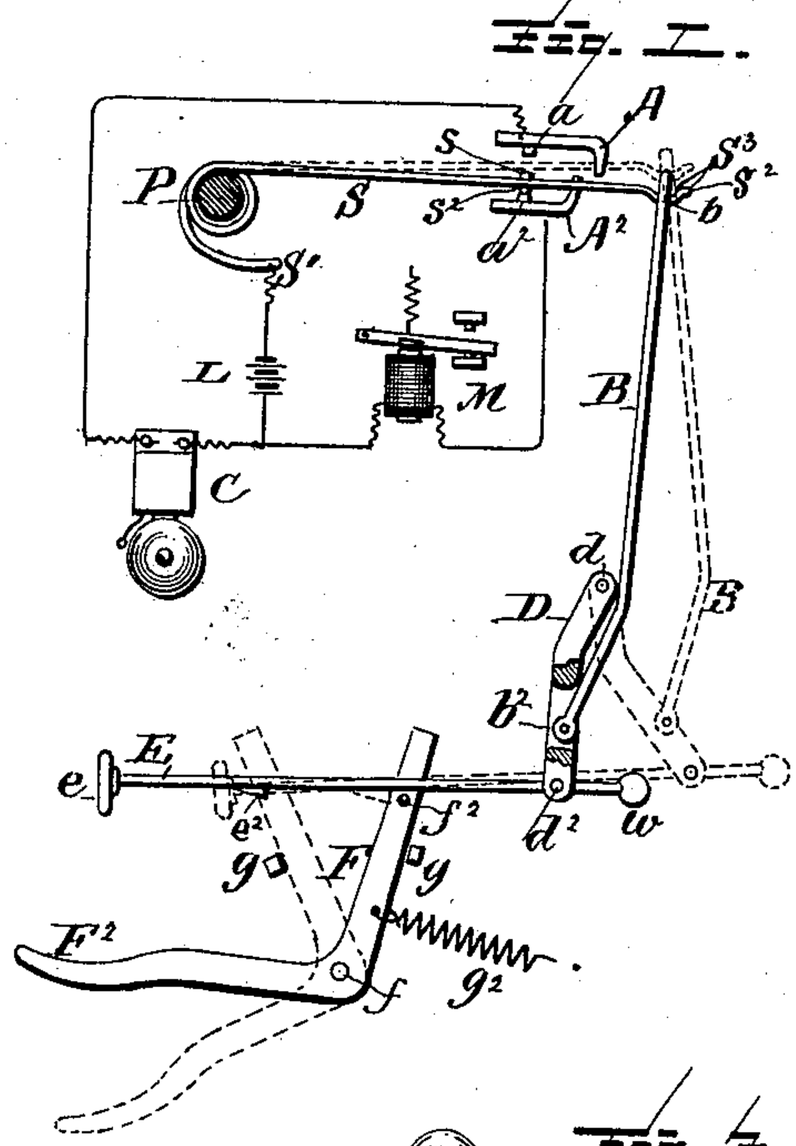

Fig. 2.

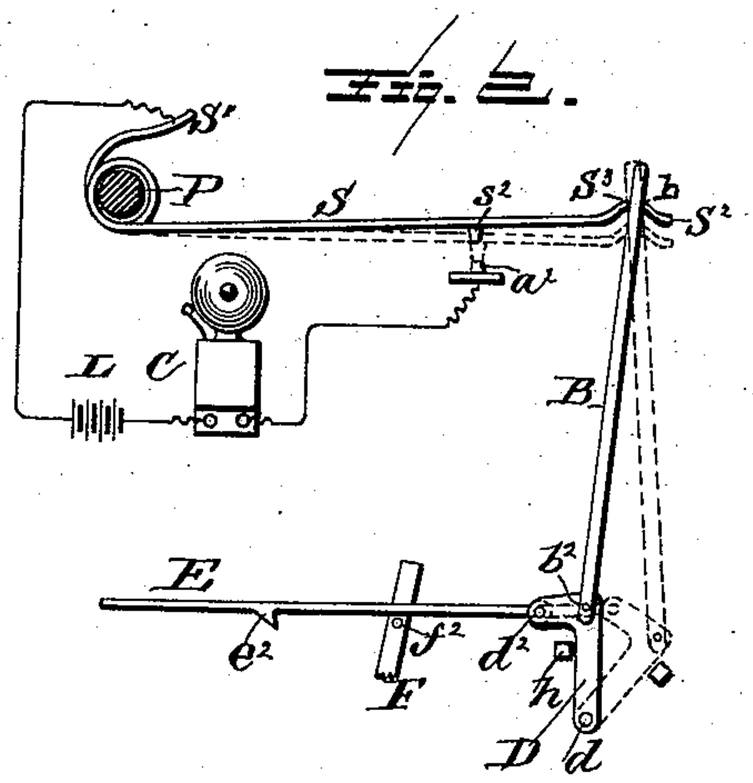

Fig. 3.

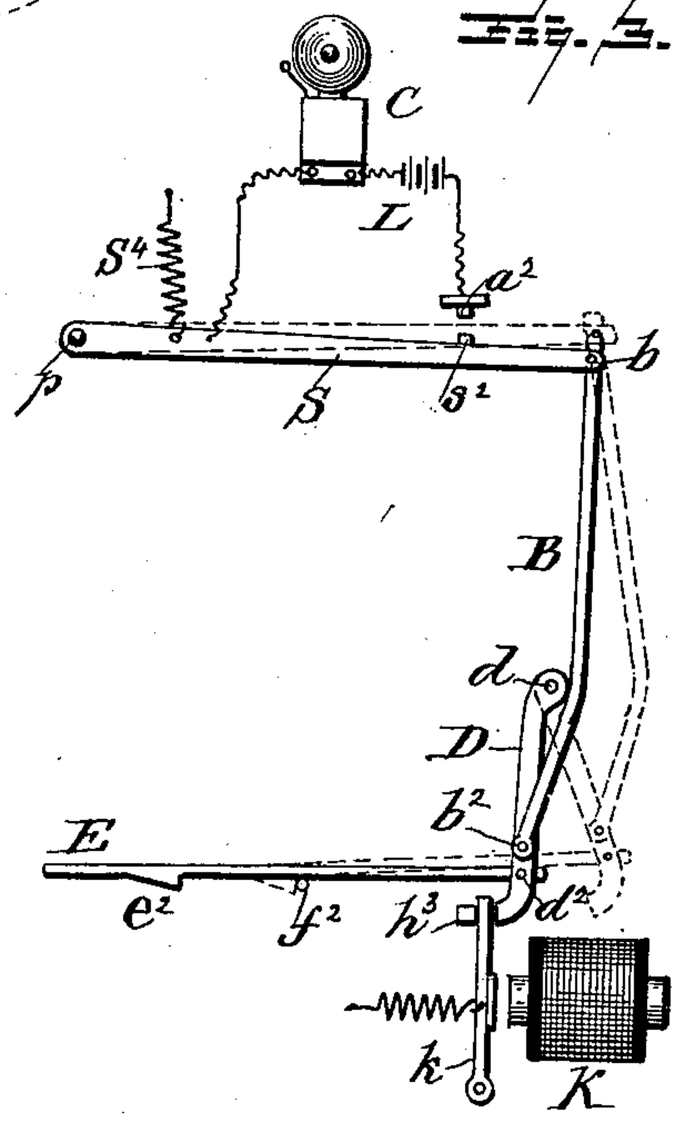

Fig. 4.

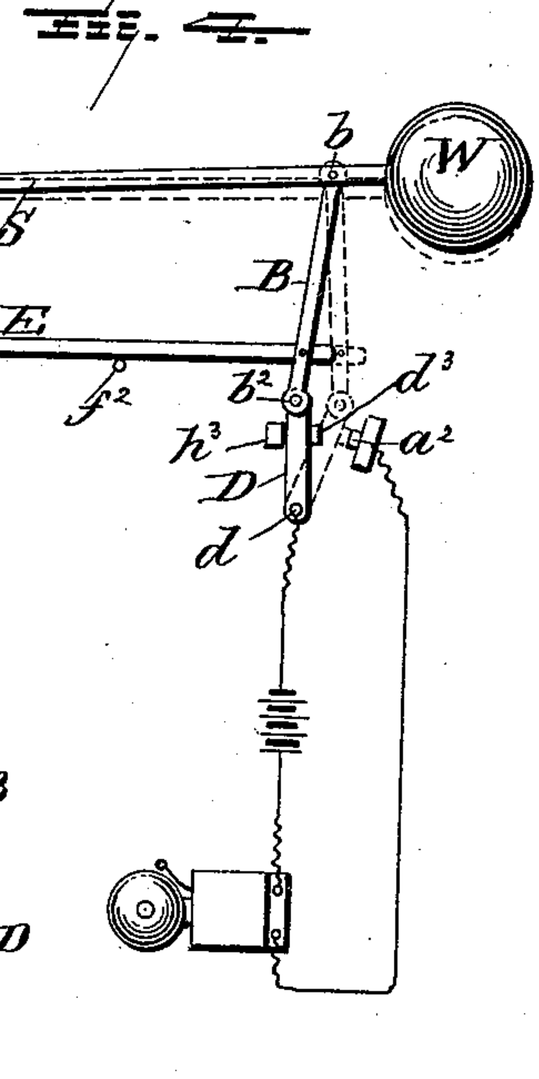

Fig. 5.

Witnesses
L. C. Hills.
C. C. Schiller.

Inventor:
William W. Alexander,
By his Attorney
E. E. Masson

UNITED STATES PATENT OFFICE.

WILLIAM W. ALEXANDER, OF KANSAS CITY, MISSOURI.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 506,297, dated October 10, 1893.

Application filed February 16, 1891. Serial No. 381,563. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. ALEXANDER, a citizen of the United States, residing at Kansas City, in the county of Jackson, State of Missouri, have invented certain new and useful Improvements in Electric-Circuit Switches, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to devices for breaking or closing electric circuits; and the objects of my improvement are to provide a simple and reliable trip-switch device for closing and breaking an electric circuit, to be operated by a very small amount of force, and also to provide means for resetting it after it has been tripped. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a diagram elevation of a trip switch constructed in accordance with my invention, in which figure a spring normally pulls upward upon a pivoted trip lever. Fig. 2 is a diagram elevation of a modification of the same invention, in which figure a spring normally presses down upon a pivoted trip-lever. Fig. 3 is a diagram elevation of a modification of the invention shown in Fig. 1, in which modification, the pivoted trip-lever is adapted to be tripped either by a trip-rod or by an electro-magnet. Fig. 4 is a diagram elevation of the invention, in which a weight is used in place of a spring; and, Fig. 5 is a diagram elevation of the invention showing a modification of form of one of the members of the switch.

It is well known that the contacts which are used for making and breaking electric circuits are liable to be oxidized or to become coated with non-conducting substances, and consequently fail to complete or close the circuit when desired unless considerable pressure is used in bringing the contact surfaces together, and said pressure is generally limited in the delicate machines used for operating electric circuits. With my improvement a sensitive machine or switch is temporarily locked or held from action by a system of levers which can be tripped by a very slight pressure upon one or more of them.

I will first proceed to describe the invention as shown in Fig. 1, in which a a^2, are the contact points or anvils rigidly secured to supports; in this case the supports are shown at A A^2; these supports have one of their ends bent toward each other to permit the movable member S of the switch to slide forcibly against the side of said bent ends. The latter extend in the same horizontal line or even slightly beyond each other, and for that reason one of the bent rods is placed on the side of the other, but out of contact therewith and are out of electrical connection except at the moment the movable member S, slides from one upon the other and thus the switch is provided with an anvil contact made under pressure and also with a sliding contact to further insure the closing of the circuit. The movable member S, carries switch points s s^2, opposite the anvils a a^2, and is in the form of a spring wire, preferably having a portion coiled loosely upon a post P, and having one end S′, suitably secured. The opposite end is either perforated to receive a pivot pin or preferably looped or bent at S^3, to receive and retain that point, as by a pivot, one end b of a member or connecting rod B; the opposite end of said rod is pivoted, at b^2, to a third member or trip-lever D. Said trip lever has one end pivoted at d, to a suitable rigid support and is adapted to turn or oscillate upon said pivot. The rod B and lever D are suitably formed or bent so that the pivot or fulcrum d, will occupy a position slightly on the right hand side (in this case) of a straight line passing through the pivot points b, b^2, of the rod B; and as in that position the rod B, bears against the upper portion of the trip lever D, close to its pivot; said rod B, is locked and retains the movable member or spring S, depressed as shown in full lines. But as the pivot points b b^2, and d, are very nearly on a straight line, it follows that a very slight lateral pressure (toward the right hand side) on the lower end of the lever D, will trip under the upward pressure of the spring S, and permit it to occupy the position shown by dotted lines and thus break the circuit at the contact a^2, and make the circuit with the contact anvil a.

The parts shown in Fig. 1, I prefer to make as follows: the spring S of steel, the supports

A A^2 of brass, the contact points or anvils a a^2 and the switch points s s^2 of platinum.

To trip the member or lever D, various means may be used. I have shown in Fig. 1 a trip rod E, pivoted at d^2, to the lower end of the trip lever and provided with a handle e, at one end by which it can be operated and a weight w at the opposite end to partly counterbalance it, so that the long end may be elevated by delicate means. The trip lever D, and its trip rod E, can be set by means of the handle e, on the end of the latter; or a setting lever F preferably of bell-crank form; said lever being pivoted at f, to a rigid support that may be provided with stop pins g; it can be operated upon by pressing upon the arm F^2, of the lever and it is provided with a spring g^2, or its equivalent, to retract it. The upper arm of the lever carries a pin f^2, projecting laterally therefrom to engage with a hook or shoulder e^2, projecting from the bottom of the trip rod E.

In Fig. 1 is shown an electric circuit to illustrate the action of the switching of the circuit by the switch member or spring S. When said spring is, as shown in full lines, the circuit is closed through the electro-magnet M, and after the device has been tripped, the spring S, will assume the position shown in dotted lines, thereby breaking the circuit through the electro-magnet M, and closing it through the electric bell C. Figs. 2, 3 and 4 show modifications of the manner of controlling the circuit by said switching device.

In Fig. 2 the movable member or spring S is so coiled upon the post P, that the normal tendency of its free end is to press down upon the connecting rod B, and the lower end of the latter is pivoted at b^2, to the trip lever D. This trip lever is pivoted at d to a suitable rigid support and it is adapted to bear against a stop pin h, secured also to said support in such a position that the pivot b^2, will be slightly on one side, (the left hand side in this case) of a straight line passing through the pivots b, d, so that a very slight pressure upon the end of the trip rod E, will start the trip lever toward the position shown by dotted lines and permit the spring S, to assume the position shown by dotted lines and consequently bring its switch point s^2, forcibly against the anvil a^2.

In Fig. 3, the movable member S, is a rigid rod pivoted at p, to a rigid support, but having a normal tendency to be pulled up by a spring S^4. The connecting rod B, is pivoted at b, to its outer end, and has its lower end pivoted at b^2, to the trip lever D, and said lever is pivoted at d, to a rigid support. The lower end of said lever is made to bear against the armature k, of the electro-magnet K, the upper end of said armature bearing against a rigidly secured stop h^3; the parts being arranged in such a manner that when the lever D, is set, ready to be tripped the pivot b, is nearly upon a line passing through the pivots b b^2 (but slightly on the right hand side in this case) so that it can be easily tripped by the attraction of the electro-magnet upon the armature.

Although Figs. 1, 2 and 3 have been called elevations the devices shown therein could be as well operated as if they were regarded as plans or top views.

In Fig. 4 the movable member S, is to have one end pivoted at p, to a rigid support while its opposite end carries a weight W. The connecting rod B, has its upper end pivoted at b, to said part S, while its lower end is pivoted at b^2, to the trip lever D, the latter carrying an anvil d^3, adapted to form a contact with the rigidly secured contact point a^2. When the trip lever is in position to be tripped, one side thereof rests against a rigidly secured stop h^3, so that the pivot b^2, is nearly on a line passing through the pivots b d. The trip rod E, is shown pivoted to the connecting rod B, but it may as well be pivoted to the trip-lever.

In Fig. 5, the movable member or spring S, is connected as in Fig. 1, with the connecting rod B, and the trip lever is given a circular form (although it may be in the form of a segment of a circle or other curved body). It is perforated at d, to a stationary arm h^4, the end of which serves also as a stop for the connecting rod B. Said rod has besides its upper pivot pin b, a pivot pin b^2 (which may carry a roller) which bears against the circular surface of the trip lever D; the pin d, being nearly upon a straight line passing through the pivots b, b^2, so that a slight pressure upon the end of the trip rod E, pivoted to the lower end of the connecting rod will trip the device and permit the free end of the spring S to be elevated to break and make a circuit.

Having fully described my invention, what I claim is—

1. In an electric switch, the combination of a spring forming part of an electric circuit, a trip lever and connecting rod retaining the said spring and means for resetting the trip lever or switch, substantially as described.

2. In an electric switch, the combination of a pivotally retained member S, a trip member D, a connecting rod or member B, and a trip rod connected with said trip lever, substantially as described.

3. In an electric switch, the combination of an electric circuit, a pivotally retained rod having electric contact points and adapted to slide forcibly against the sides of the supports of the stationary contact point for said rod, a trip member, a connecting rod B, and a trip rod for said trip lever, substantially as described.

4. An electric switch having a series of members united together by pivots, of which three of said pivots are nearly on a straight line when said members are in a position to be tripped, one of said pivots being station-

arily retained and the other two being movable, with a trip rod substantially as described.

5. In an electric switch, the combination of three pivoted members, two of said members having three pivots arranged together nearly upon a straight line, out of which position they are to be tripped, two of said members having a stationary pivot and also a movable pivot, and the other having both pivots movable, with a trip rod, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM W. ALEXANDER.

Witnesses:

DAVID ELLISON,

HENRY C. MURDOCK.