T. E. BARNUM.

ELECTRIC SWITCH.

APPLICATION FILED APR. 8, 1912.

1,149,325. Patented Aug. 10, 1915.

Fig. 2.

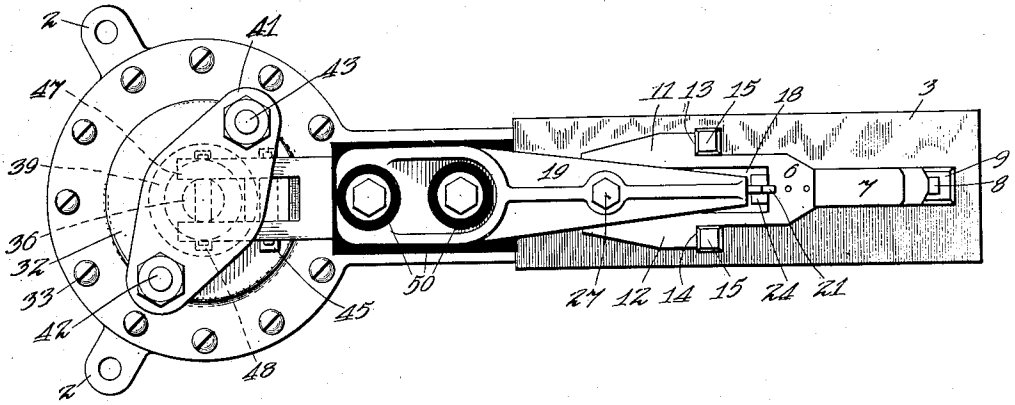
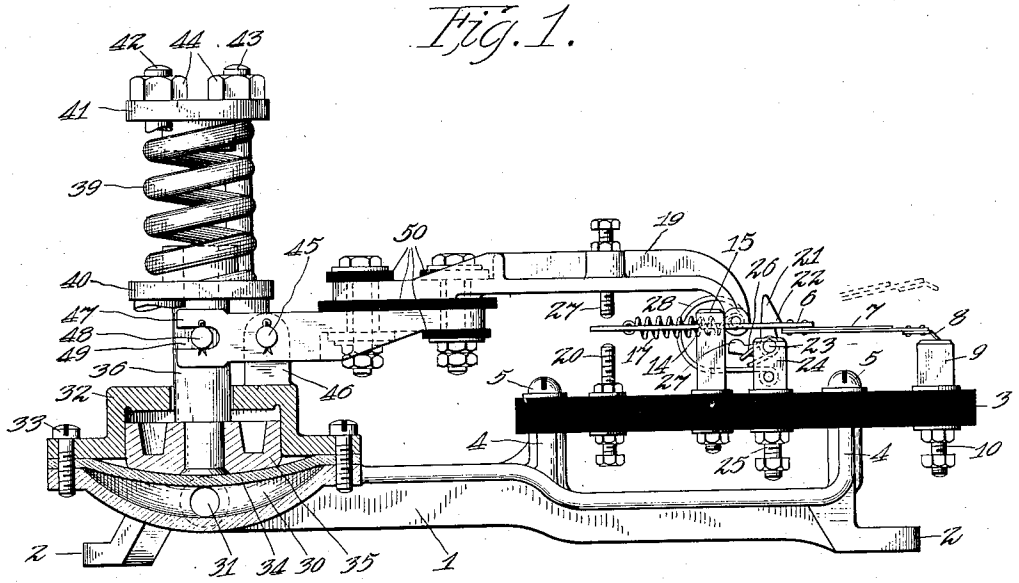


Fig. 1.



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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH.

1,149,325. Specification of Letters Patent. Patented Aug. 10, 1915.

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To all whom it may concern:

Be it known that I, THOMAS E. BARNUM, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Electric Switches, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in electric switches.

It is particularly applicable to pressure operated switches but is not limited thereto.

It is one of the objects of my invention to provide a sensitive but positively acting switch and one which will make and break circuit with a snap action.

Various other objects and advantages of my invention will be hereinafter clearly and fully set forth.

For the purpose of more clearly disclosing the nature and advantages of my invention I shall describe the embodiment thereof illustrated in the accompanying drawing. It should be understood, however, that my invention is not limited to the specific embodiment thereof selected for the purpose of illustration.

In the accompanying drawing:—Figure 1 is a side elevation of the device, parts thereof being shown in section, and Fig. 2 is a top plan view of the device.

The device chosen for the purpose of illustration is a pressure operated switch. The several parts of the device are mounted upon an elongated base 1 having suitable supporing lugs 2. The switch mechanism is mounted upon an auxiliary insulating base 3 supported on upwardly projecting lugs 4 of the main base and held in place by means of screws 5.

The movable contact member of the switch comprises an elongated rigid metal plate 6 having a yielding extension 7 secured thereto, said extension carrying a contact tip 8. The contact tip is adapted to cooperate with a contact post 9 secured to the auxiliary insulating base by suitable means such as a bolt 10, said bolt also serving as a terminal. The plate 6, as is best illustrated in Fig. 2, is provided on opposite sides with offset portions 11 and 12 having alined knife edges 13 and 14. The plate 6 is supported by rectangular posts 15 and 16 provided on opposite sides thereof and having in their vertical faces horizontal notches for receiving the knife edges 13 and 14 of said plate. This provides a horizontal knife edge pivot for the contact member, said member being retained in engagement with said posts by a helical spring 17. The plate 6 is provided with a slot 18 for receiving said spring which is connected at one end to said plate and at its opposite end to the extremity of a lever 19, said slot 18 in said plate also accommodating the end of said lever. The lever 19 and spring 17 in addition to holding the contact member in place also constitutes the operating means therefor. The lever 19 is movable vertically to throw the end of the spring 17 connected thereto to opposite sides of the pivot of the contact member thereby imparting to said member through the medium of said spring a snap movement in both directions. The movement of the contact member is of course limited in one direction by its cooperating contact 9, while a pin 20 adjustably mounted upon the auxiliary base 3 adjacent the rear end of said member, limits the movement thereof in the opposie direction. It will be readily observed that by adjusting the pin 20 and thereby varying the range of movement of the contact member, said contact member may be made to operate upon any predetermined degree of movement of the lever 19. In other words, the sensitiveness of the switch may be regulated by adjustment of the stop pin 20.

Obviously, with the extremity of the lever 19 to either side of a straight line passing through the pivot and the point to which the spring is connected to the contact member, the spring will exert a sufficient tension on the contact member to firmly hold the same in either of its extreme positions. When, however, the extremity of the lever is in alinement with both the pivot of the contact member and the point of connection of the spring with the contact member there will be practically no tension on a contact member. This condition occurs just prior to each operation of the contact member with the result that when said member is in engagement with its coöperating contact, it is likely to momentarily make a poor contact therewith prior to being snapped out of engagement with the same. This is likely to cause arcing which is destructive

to the contacts and also affects the sensitiveness of the switch in breaking circuit. To overcome this undesirable condition I have provided means for automatically locking the movable contact member in engagement with its coöperating contact and holding the same in engagement therewith until sufficient tension is placed thereon to at once snap it out of engagement with the stationary contact. This means includes a latch 21 also projecting through the slot 18 in the plate 6, contiguous to the extremity of said slot. This latch has a small lip 22 adapted to engage the upper side of the contact member when the same engages contact 9. The latch 21 is pivoted on a stud 23 carried by U shaped support 24 mounted upon the auxiliary base 3, and secured thereto by suitable means such as a bolt 25 adapted to form a terminal. The latch 22 is biased in a direction to engage the contact member by a coil spring 26 secured at one end to said latch and at its other end to the device 24 or other stationary part. For disengaging the latch from the contact member I have provided on the latch a tail piece 27 in the path of the extremity of the lever 19. The lever 19 upon striking the tail piece 27 trips the latch, thereby releasing the contact member but the parts are so designed that the latch will not be thus tripped until the extremity of the lever has passed the neutral line to insure immediate operation of the contact member upon release thereof from the latch. Accordingly, a quick break of the circuit is insured, and all tendency of the contact member to hang in a balanced condition prior to interruption of circuit is entirely eliminated.

To insure operation of the contact member should the spring 17 fail to operate the same, I have provided a pin 27 on a lever adapted to strike the rear extremity of the contact member thereby disengaging said contact member from its coöperating contact. Further, I have adjustably mounted the pin 27 on the lever 19 so as to insure operation of the contact member upon any desired degree of movement of the arm 19.

The movable contact member may be connected in circuit in any preferred manner, as for example, by a flexible conductor 28 secured at one end to said member and at its opposite end to the device 24 having the terminal bolt 25. The conductor may be passed through the slot 18 in the contact member.

I shall now describe the pressure operated device for actuating the lever 19. In the base 1 is formed a concave pressure chamber 30 provided with a suitable port 31. A cap 32 is placed over this chamber and secured in place by any suitable means such as screws 33. Between the two sections of the chamber is supported a diaphragm 34 of any preferred type. Resting on the diaphragm and working in a suitable chamber in the cap 32 is a piston 35 having an upwardly extending piston rod 36. A helical spring 39 opposes operation of the piston by the diaphragm. This spring is confined between two plates 40 and 41, the former mounted upon a reduced portion of the piston rod and the latter being carried by rods 42 and 43 projecting upwardly from the diaphragm chamber and being provided with nuts 44 engaging the top of the plate 41. The diaphragm presses the plunger upwardly while the spring 39 acting upon the piston rod forces the same downwardly. The lever 19 is fulcrumed upon a pin 45 supported by a lug 46 provided on the cover of the diaphragm chamber. The rear end 47 of the lever is preferably bifurcated to straddle the lug 46 and also the piston rod 36. The bifurcated portions of the lever are connected to the piston rod by a pin 48 carried by the latter and working in slots 49 in the bifurcated portions of the lever. With this arrangement when the piston is forced upwardly by the diaphragm the lever 19 is rocked upon its pivot to throw the outer end thereof downwardly causing the movable member of the switch to disengage its coöperating contact. On the other hand, when the pressure on the diaphragm decreases the spring forces the piston downwardly rocking the lever 19 in the opposite direction, thereby causing the movable contact member to engage its coöperating contact.

The responsiveness of the switch to varying pressures may be regulated to a certain extent by design and adjustment of the spring 39 while the finer adjustment of said switch may be made as before described through adjustment of the pin 20.

In practice the lever 19 is preferably formed in sections insulated from one another as shown at 50.

What I claim as new and desire to secure by United States Letters Patent is:—

1. In a pressure-actuated switch, in combination, a pivoted operating member, an oppositely pivoted contact member, a helical spring connecting said members on opposite sides of the pivot of said contact member whereby movement of said operating member to one side of the pivotal point of said contact member tends to move said contact member to open or closed position, and means to hold said contact member in closed position for a predetermined time after said helical spring is biased to open the same.

2. In a pressure-actuated switch, in combination, a pivoted operating member, an oppositely pivoted contact member, a helical spring connecting said members on opposite sides of the pivot of said contact member whereby movement of said operating member at the point of connection of said

spring thereto to one side of the pivotal point of said contact member biases said spring to move said contact member to open or closed position, and a pivoted latch biased to automatically engage and lock said contact member is closed position, said latch being tripped by said operating member in a predetermined position to release said contact member.

3. In an electric switch in combination, a pivoted contact member, an operating member therefor, a spring connected to said contact member and said operating member upon opposite sides of the pivot of said contact member whereby movement of said operating member to opposite sides of said pivot causes said contact member to be snapped in opposite directions and an adjustable pin carried by said operating member to engage and actuate said contact member upon failure of said contact member to respond to said spring.

4. In an electric switch, in combination, a pivoted contact member, an operating member therefor, a helical spring connecting said members on opposite sides of the axis of the former for moving the same in response to movement of said operating member, and adjustable means for determining the degree of movement of said operating member to carry said spring across the axis of said contact member.

5. In an electric switch, in combination, a pivoted contact member, a pivoted operating member therefor, an energy storing connection between said members for effecting a delayed movement of the former in response to movement of said operating member, and adjustable means for varying the degree of movement of said operating member to effect movement of said contact member through said connection.

6. In a pressure actuated switch, in combination, a pivoted contact member, a pivoted operating member therefor, an energy-storing connection between said members for effecting an accelerated movement of the former after a predetermined movement of said operating member, adjustable means for varying the degree of movement of said operating member in one direction to effect said accelerated movement of said contact member, means to render said energy-storing connection ineffectual during a predetermined movement of said operating member in the other direction and to lock said contact member in its then position during said pedetermined movement of said operating member, and adjustable means carried by said operating member to insure operation of said contact member in one direction independently of said energy-storing connection.

7. In an electric switch, in combination, an elongated supporting frame, an insulating block carried thereby at one end, a pivoted operating member mounted at the other end of said frame and extending over said block, a pivoted contact member alined with said operating member and extending over said block, an energy storing connection between said members to effect delayed accelerated movement of said contact member upon movement of said operating member, a stationary contact on said block and terminal connections for said contact member and said stationary contact also mounted on said block.

8. In an electric switch, the combination with an elongated metallic frame for attachment to a suitable support, of an insulating block carried by said frame in a position to be spaced from such support, a stationary contact mounted on said block, a switch operating member pivoted at the other end of said frame and extending over said block, a pivoted operating member alined with said operating member and having a contact at its extremity to engage said stationary contact, an energy storing connection between said members for effecting a delayed accelerated movement of the operated member, and terminal connecting means for both of said contacts mounted on said block.

9. In an electric switch, in combination, an elongated operated member having a central slot and lateral lugs, spaced posts having notches to receive said lugs, a pivoted operating member having its extremity movable through the slot of said operated member, and a coil spring connecting said members and also movable through said slot.

10. In an electric switch, in combination, an elongated operated member having a central slot and lateral lugs, spaced posts having notches to receive said lugs, a pivoted operating member having its extremity movable through the slot of said operated member, a coiled spring connecting said members and also movable through said slot and a pivoted latch for said operated member projecting through said slot and having an offset arm in the path of movement of the extremity of said operating member.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

THOMAS E. BARNUM.

Witnesses:
FRANK H. HUBBARD,
H. L. ROCKWELL.