W. L. HAMILTON.

SWITCH.

APPLICATION FILED MAR. 13, 1915.

1,230,089. Patented June 12, 1917.

Fig. 1.

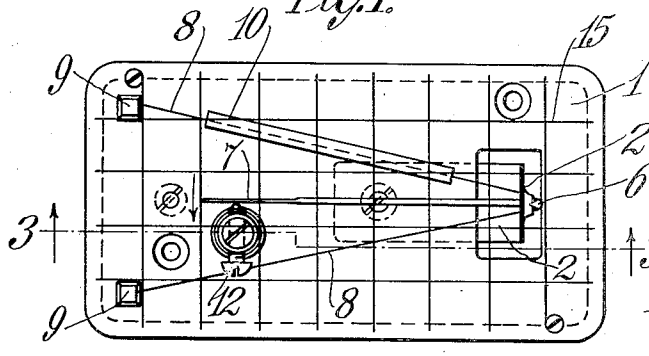


Fig. 2.

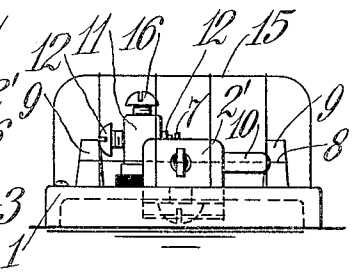


Fig. 3.

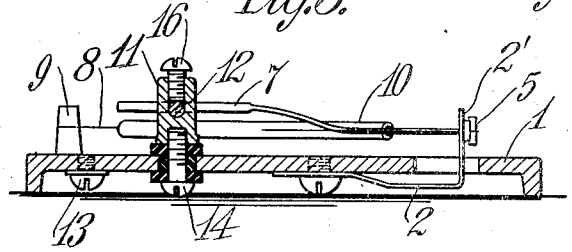


Fig. 4.

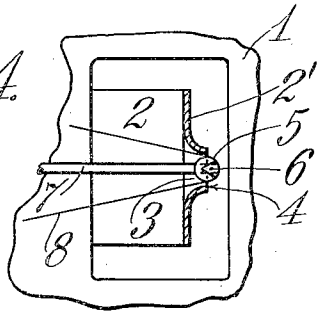


Fig. 7.

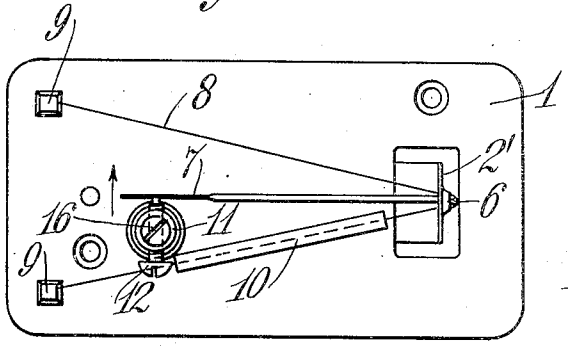


Fig. 5.

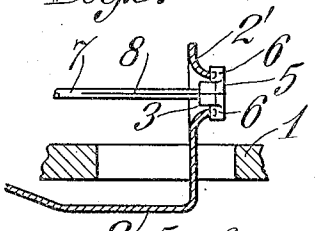
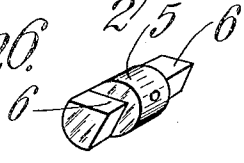


Fig. 6.



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SWITCH.

1,230,089. Specification of Letters Patent. Patented June 12, 1917.

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To all whom it may concern:

Be it known that I, WALTER L. HAMILTON, a citizen of the United States of America, residing in the city of Holyoke, county of Hampden, and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Switches, of which the following is a specification.

This invention relates to circuit closers and particularly to improved circuit closers, which are arranged to be operated by sudden changes in temperature.

An object of the invention is to provide an improved circuit closer, operable by sudden changes in temperature, which is extremely sensitive and is arranged to respond to small temperature variations.

Another object is to provide an improved device of the class described, which, although operable by sudden changes, is unaffected by gradual variations in temperature.

Another object is to provide an improved device of the class described, which may be readily converted from a circuit closer to a circuit opener to open a circuit upon sudden changes in temperature.

A further object is to provide an improved circuit closer or opener, which is simple and comparatively inexpensive to manufacture.

With these objects in view, the apparatus in general comprises a contact arm pivotally supported in a delicate manner on suitable knife edges, a post with which said arm is arranged to contact to close an electrical circuit, and a wire passing around a portion of the knife edge support and having its two ends fixed to the base plate of the apparatus. This wire is arranged substantially in V-form having its two ends secured to the base plate in spaced relation with its central portion extending about the knife edge support. Thus, the wire, as arranged, has two sections and the apparatus is constructed and arranged so that the wire will turn the contact arm and close a circuit, whenever a difference in the rate of expansion of the two sections of the wire occurs.

One preferred embodiment of my invention, for the purposes of illustrating the way in which the invention may be carried out, is shown in the accompanying drawings, in which—

Figure 1 is a top plan view of the apparatus;

Fig. 2 is an end elevational view thereof;

Fig. 3 is a sectional elevational view taken on the line 3—3 of Fig. 1 and looking in the direction of the arrows;

Fig. 4 is a sectional plan view of a portion of the apparatus and illustrates the pivotal mounting for the contact arm;

Fig. 5 is a sectional elevational view of the portion of the apparatus shown in Fig. 4;

Fig. 6 is a perspective view of the knife edge member in which the contact arm is mounted; and

Fig. 7 is a view similar to Fig. 1 showing the apparatus arranged for "closed circuit" operation.

Referring to the drawings, 1 represents a baseplate, suitably formed to receive the various parts of the apparatus and preferably hollowed out, as shown in Fig. 3, to receive the terminal screws. Secured to the under side of the base 1 and within the hollowed out portion, is a flat spring 2 which has a vertically bent end portion 2′. The latter extends upwardly through a suitable opening in the base 1, as shown in Fig. 3, and has an opening 3 therein. This opening is formed by first punching a hole through the flat metal and then swaging this hole, by means of a die, until the metal adjacent the hole is forced away from the plane of the flat metal spring 2. By this operation, a rounded flaring opening is formed as will be seen in Figs. 4 and 5.

In the rim 4 of the opening 3 are a pair of notches arranged vertically one above the other to receive a pair of knife edges 6. The latter are clearly shown in perspective in Fig. 6 and are formed by filing or cutting away the end portions of a short cylindrical piece 5. This cylindrical portion 5 lies within the opening 3 (see Figs. 4 and 5) and has secured thereto an arm 7. Passing centrally around a portion of the periphery of the member 5 is a wire 8, which is arranged to hold the knife edges 6 in position in their support. Wire 8 may be formed of any suitable material but preferably material having a high degree of elasticity and a relatively high coefficient of expansion should be employed. The two ends of this wire are brought backwardly through the opening 3 and secured under tension to a pair of spaced posts 9 integral with the base 1. One of the two sections of the wire 8

extending from the posts 9 to the member 5,—the uppermost as viewed in Fig. 1, has a tube 10 thereon. The latter rests loosely upon the wire 8 and is formed of suitable heat-resisting material, such as pipe clay, for example.

Secured to the base 1 by the screw 14 and suitably insulated therefrom, as shown in Fig. 3, is a post 11. A screw 12 extends horizontally through the post 11 and is provided at its end with a contact tip of suitable material, such as platinum, for example. This screw 12 may be clamped in various positions of adjustment by a set screw 16 vertically mounted in the post 11. The arm 7, heretofore described, is arranged, when moved, to engage the screw 12 and thereby close an electrical circuit. The terminals of this circuit are connected to the apparatus by the screws 13 and 14, the current being transmitted from the screw 13 to the arm 7 by the metallic base 1, spring 2, and member 5.

If desired, a covering 15, formed from crossed wires bent as shown in Fig. 2, may be secured to the base 1, as shown in Figs. 1 and 2 to protect the apparatus from damage without interfering with the transmission of heat waves to the wire 8.

The wire 8 and arm 7 are so assembled that the latter does not touch the screw 12. It will be seen that one section of the wire 8 is completely exposed to the action of heat waves while the other section is protected therefrom by the tube 10. Now, when a sudden rise in temperature occurs, the uncovered section of the wire will be expanded by the increased temperature. One section of wire 8 is, however, protected from the direct action of the heat by the tube 10, and this section therefore does not expand equally with the uncovered section, in other words the expansion of covered section of wire 8 is retarded unless the rise in temperature is gradual. It will therefore be seen that, with unequal expansion of the sections of wire 8, there will be an unbalanced pull on the covered section of the wire which will turn the member 5 on its knife edges and the arm 7 will be turned in the direction of the arrow to engage the screw 12. Thus, an electrical circuit including any desired alarm devices or other electrically controlled devices may be closed by a sudden rise in temperature. It is to be understood that wire 8 has sufficient elasticity to permit it to be assembled under an initial tension, which is great enough to prevent slackening of the wire (and thus breaking the grip of the wire on member 5) as the total length of the wire increases under the action of heat.

Gradual temperature changes do not cause the arm 7 to move. This is due to the fact that there is time for the heat to penetrate within the loosely fitting tube 10 to the wire. Thus, both sections are acted upon equally for all practical purposes by gradual changes and no appreciable turning movement results.

The apparatus has been described as arranged for "open circuit" operation. It may, however, be easily arranged for "closed circuit" operation by simply placing the tube 10 on the other section of the wire 8, as shown in Fig. 7.

It is to be noted that the apparatus is extremely simple in construction, having few parts, each of which is simple to make. No special operations requiring skilled labor are necessary, and the device may be made up at a comparatively low cost. However, notwithstanding the simplicity of the structure, it is extremely delicate and is sensitive to very small sudden changes in temperature.

It is recognized that many changes may be made in the specific form of the apparatus described without departing from the scope of my invention, which is defined in the appended claims.

What I claim is:

1. A circuit closer, comprising, in combination, a suitable base, a movable contact arm pivotally mounted thereon and forming one terminal of an electrical circuit to be closed, a fixed contact on said base and insulated therefrom, said contact arranged in the path of said arm and forming the other terminal of the circuit to be closed, a wire arranged in V-form having its two ends secured to said base and its central portion in engagement with a portion of said movable arm, and a heat resisting element on a portion of said wire, all constructed and arranged so that a sudden change in temperature will expand certain portions of said wire more rapidly than other portions, whereby a movement of the wire results to turn said arm to engage said fixed contact.

2. A circuit closer, comprising, in combination, a suitable base, a movable contact arm, arranged to form one terminal of an electrical circuit to be closed, a knife edge support for said arm, a fixed contact on said base and insulated therefrom, said contact arranged in the path of said arm and forming the other terminal of the circuit to be closed, a wire having its central portion in engagement with a portion of said arm and its two ends secured to said base in spaced relation, and a heat insulating tube surrounding a portion of said wire, all constructed and arranged so that unequal expansion is caused in certain portions of said wire, whereby a movement of the wire is caused to turn said arm into engagement with said fixed contact.

3. A circuit closer, comprising, in combination, a suitable base, a yieldable upright secured thereto, a movable arm adapted to

form one terminal of a circuit to be closed, a member secured to said arm having knife edges to engage said upright, a wire bent into V-form having its central portion in engagement with said member and its two ends fixed in spaced relation to said base, a tube of heat resisting material on one limb of said V-shaped wire, and a fixed contact arranged on said base in the path of said arm, said fixed contact being insulated from said base and adapted to form the other terminal of the circuit to be closed, all constructed and arranged so that one limb of said V-shaped wire is expanded by a sudden rise in temperature more rapidly than the other limb, whereby a movement of the wire is caused to turn said arm to engage said fixed contact and close the circuit.

4. A circuit controller, comprising, in combination, a suitable base, a movable contact arm pivotally mounted thereon and forming one terminal of an electrical circuit to be controlled, a fixed contact on said base arranged in the path of said arm and forming the other terminal of said circuit, a wire arranged in V-form having its two ends secured to said base and its central portion in engagement with a portion of said movable arm, and a heat resisting element on a portion of said wire, all constructed and arranged so that a sudden change in temperature will expand certain portions of said wire more rapidly than other portions, whereby a movement of the wire results to turn said arm relatively to said contact to control said electrical circuit.

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