

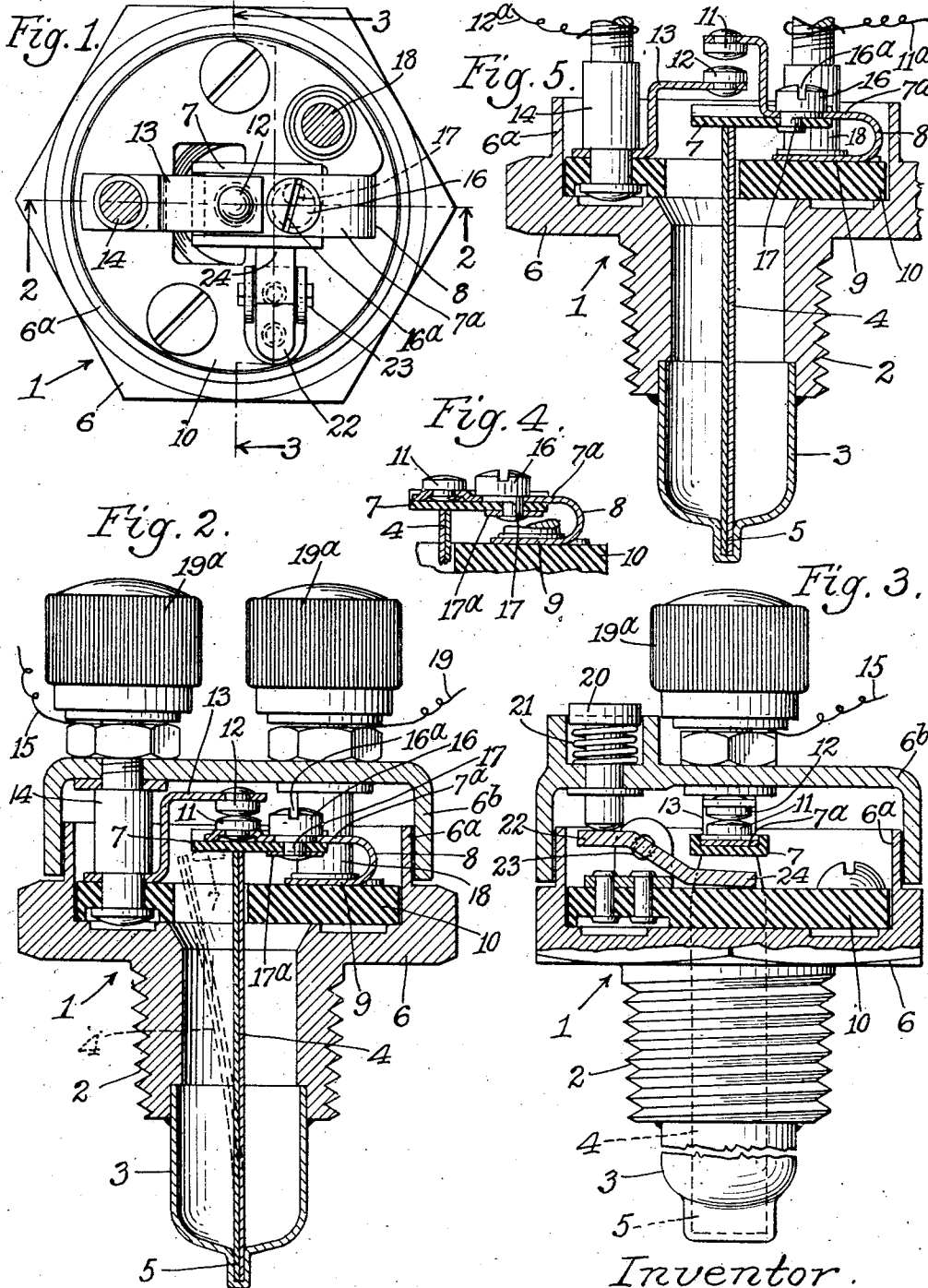
Dec. 30, 1941.

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2,268,445

ELECTRIC SWITCH

Filed Sept. 19, 1939



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UNITED STATES PATENT OFFICE

2,268,445

ELECTRIC SWITCH

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Application September 19, 1939, Serial No. 295,653

6 Claims. (Cl. 200—138)

This invention relates to electric switches and has for its object to provide a new and improved device of this description.

The invention has as a further object to provide an electric switch which may be arranged either to open a circuit or close a circuit in response to variations in temperature. The invention has as a further object to provide an electric switch embodying a bimetal thermostatic element which acts either to normally hold the circuit closed or to normally hold it open and then under a predetermined rise in temperature, to move so as to cause the circuit to be opened or to be closed.

The invention has as a further object to provide an electric switch of this description wherein the bimetal thermostatic element engages a non-conducting member. The invention has a further object to provide an electric switch of the kind described, with adjustable means for adjusting this non-conducting member engaged by the bimetal thermostatic element.

The invention has further objects which are more particularly pointed out in the accompanying description.

Referring now to the drawing, Fig. 1 is a plan view of one form of the device embodying the invention, with the top removed;

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1, with the top in position;

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1, with the top in position;

Fig. 4 is a detailed view showing the adjusting means;

Fig. 5 is a sectional view showing a modified construction.

Like numerals refer to like parts throughout the several figures.

Referring now to the drawing, I have shown in Figs. 1 to 4 one form of switch embodying the invention. In this construction there is a switch housing or casing 1 which is preferably provided with a screw threaded portion 2 by means of which it may be supported in position. Connected with the switch casing is a hollow member 3 which may be attached to the casing in any desired manner, as by soldering. Located within the casing is a bimetal thermostatic strip 4 which has its end 5 fixed to the member 3 and which projects up into the enlarged part 6 of the casing, which is hollow and contains other parts of the switch. The hollow projecting part of the casing is closed at its lower end and is preferably sealed so as to be non-leaking. The enlarged part 6 is provided with the annular

member 6a over which fits a cover 6b. The bimetal strip 4 may be made in any of the usual ways from two pieces of metal having different coefficients of expansion.

The upper end of the bimetal strip 4 engages a member 7 which is of any suitable non-conducting material. The member 7 is connected to one member 7a of a looped spring 8, which has the other member 9 fastened to a fixed part 10 in the casing. The member 7a of this spring carries an electrical contact 11 which cooperates with an electrical contact 12 attached to the member 13, electrically connected to the conducting member 14 with which is connected an electrical conductor 15.

The non-conducting member 7 is preferably adjustably connected to the spring 8 so that it may be moved to increase or decrease the portion thereof which projects beyond the thermostatic element 4. In the construction herein shown this adjustment is arranged so that it may be easily and quickly made and so that the member 7 may be moved a very small amount in either direction at any given adjustment. In the construction shown, in order to secure this adjustment, there is a member which has a head 16 provided with a tool receiving notch 16a, and a body 17 which passes through the spring and is connected to the member 7 in any suitable manner, as by means of the piece 17a connected to the body 17. The body 17 is eccentrically connected with the head 16, as shown in Fig. 4, so that as the adjusting member is turned, the member 7 will be moved backward or forward, depending upon the direction of rotation of the head. When it is desired to have the circuit open at a lower temperature, the adjusting member is moved so as to bring the free end of the member 7 nearer to the thermostatic element 4 and when it is desired that the circuit be opened at a higher temperature, the adjusting device is moved to move the free end of the member 7 farther away from the end of the thermostatic element 4. The contact 11 and the spring 8 are connected with a conducting member 18, to which is connected a conductor 19. The conductors 15 and 19 may be electrically connected to the contacts 11 and 12 in any desired manner. As herein shown, the parts 14 and 18 are illustrated as binding posts and the conductors are held in contact therewith by the binding post nuts 19a.

The contacts 11 and 12 when closed, complete a circuit between the conductors 15 and 19 and when opened, break this circuit. Under normal

conditions these contacts 11 and 12 are held together as shown in Fig. 2, so as to complete the circuit. When the temperature to which the bimetal thermostatic element 4 is subjected, reaches a predetermined point, the thermostatic element bends to the left so as to release the member 7. When this is done the spring member 7a, which has been prevented from acting by the thermostatic element 4, then acts to move the contact 11 away from the contact 12 and open the circuit. This spring member moves down when released, so as to move down past the upper end of the bimetal element 4 and the circuit can then only be completed by the intervention of some individual, and even with the intervention of an individual can only be completed after the temperature of the thermostatic element has lowered to a predetermined amount.

There is illustrated one means of reestablishing the circuit, which consists of a resetting member 20 which is provided with a retracting spring 21 and which engages the end 22 of a lever pivoted at 23, the other end 24 of which passes under the member 7 or the member 7a of the spring 8, so that when the resetting member 21 is pressed, the member 8 will move the member 7 to bring contacts 11 and 12 together and permit the thermostatic element 4 to move in under the member 7 to its initial position, as shown in Fig. 2.

In Fig. 5 there is illustrated a construction where the contacts of the switch are normally open and are closed when the temperature reaches a predetermined point. This result is secured by placing the contact 11 attached to the spring 8, on the other side of the contact 12 attached to the member 13, that is by reversing their positions, shown in Fig. 1. The contact 12 is connected in circuit by the conductor 12a and the contact 11 is connected in circuit by the conductor 11a. It will be seen that the thermostatic element 4 when in the position shown in Fig. 5, holds the contacts 11 and 12 apart. When the thermostatic element 4 is heated to a predetermined degree, the top portion of it then moves to the left and releases the member 7 so that the spring 8 moves contact 11 to bring it in contact with contact 12 and complete the circuit. The member 7 is provided with adjusting mechanism like that shown in Figs. 1, 2 and 3. When the thermostatic element 4 is cooled sufficiently, the parts are returned to their normal position by the same resetting mechanism shown in Figs. 1 and 2, which when the resetting member 20 is pressed, moves the member 7 and separates the contacts 11 and 12, the member 7 being moved sufficiently to permit the thermostatic element 4 to move in under it as shown in Fig. 5.

The use and operation of my invention are as follows.

The switch is placed in the proper position where variations in temperature will affect the bimetal thermostatic element 4. If the device is used in a connection where the bimetal element 4 is to be acted upon by liquid or gas, the switch is inserted in position so that the part 3 projects into the liquid or gas, that is, so that the liquid or gas comes in contact with the part 3. It is preferred to have the part 3 a closed device so that the liquid or gas will not come directly in contact with the bimetal element 4, so as not to corrode any of the working parts of the switch. It is of course evident that the switch may be used in any position where such a switch is applicable.

When the switch shown in Figs. 1 to 4 is in proper position, the contacts 11 and 12 are closed. When the temperature of the thermostatic element 4 reaches a predetermined point, the upper end of the bimetal element will be moved to the left so as to move out from under the member 7. The spring 8 then moves the member 7 down, which carries with it the contact 11, thus breaking the circuit between the contacts 11 and 12. When the member 7 is in this position, it is in a position to prevent the thermostatic element 4 from being moved back to its initial position until it is cooled, and from of itself moving back to its initial position after it is cooled to the predetermined temperature. It will thus be seen that this device automatically breaks the circuit and maintains the circuit broken until the thermostatic device 4 has cooled sufficiently and until it is manually reset. The switch is applicable to any condition where it is desirable to have the circuit thus automatically broken, as, for example, where unless the circuit was broken, injury might result to some parts which it is desired to have protected from injury by this means. After the thermostatic element has cooled sufficiently, the circuit may be again completed by moving the resetting element 20, which by means of the end 24 of the resetting lever, moves the member 7 to permit the thermostatic element 4 to move in under it to its initial position, this movement of the member 7 bringing the contacts 11 and 12 together to complete the circuit.

In the construction shown in Fig. 5, the circuit is normally broken. When the thermostatic bimetal element 4 reaches a predetermined temperature, the upper end moves to the left and moves out from under the member 7 and the spring 8 moves the contact 11 into contact with the contact 12 so as to complete the circuit. When the parts are in this position, the member 7 prevents the return of the thermostatic element 4 to its initial position and it can only be returned to its initial position after the temperature has lowered to a predetermined point, and then only by means of the manual resetting device.

I claim:

1. An electric switch comprising a casing, two opposed cooperating contacts mounted therein, a spring with which one of said contacts is connected, a non-conducting element connected with said spring, and a flat straight bimetal thermostatic element within said casing, having one end connected to one end of the casing, the other end being free and extending in proximity to the other end of the casing, the free end of the thermostatic element normally engaging one face of the non-conducting element, the bimetal thermostatic element and the portion of the non-conducting element engaged by the thermostatic element being in alignment when the bimetal thermostatic element is in its normal position, which bimetal thermostatic element normally holds the non-conducting element in its normal initial position, the engaging end of said bimetal thermostatic element when the temperature reaches a predetermined point, moving along the face of said non-conducting element to a position to release the non-conducting element and the spring to cause said contacts to move relatively.

2. An electric switch comprising a casing, two opposed cooperating contacts mounted therein, a spring with which one of said contacts is con-

ected, a non-conducting element, a connecting device for connecting said non-conducting element with said spring, a flat straight bimetal thermostatic element which normally holds the non-conducting element in its normal initial position, said bimetal thermostatic element when the temperature reaches a predetermined point, moving to a position to release the non-conducting element and the spring to cause said contacts to move relatively, said connecting device for connecting said non-conducting element with said spring also forming an adjusting device for said non-conducting element, to adjust its position with relation to said bimetal thermostatic element, to change the temperature at which the non-conducting element and spring are released.

3. An electric switch comprising a casing, two opposed cooperating contacts mounted therein, a spring with which one of said contacts is connected, a non-conducting element, a connecting device for connecting said non-conducting element with said spring, a flat straight bimetal thermostatic element which normally holds the non-conducting element in its normal initial position, said bimetal thermostatic element when the temperature reaches a predetermined point, moving to a position to release the non-conducting element and the spring to cause said contacts to move relatively, said connecting device for connecting said non-conducting element with said spring also forming an adjusting device for said non-conducting element, to adjust its position with relation to said bimetal thermostatic element, to change the temperature at which the non-conducting element and spring are released, said adjusting device comprising a head and a body portion passing through said spring and connected with said non-conducting element, said body portion being eccentrically connected with said head.

4. An electric switch comprising a casing, two opposed cooperating contacts mounted therein, a spring with which one of said contacts is connected, a non-conducting element connected with said spring, a flat straight bimetal thermostatic element within said casing, having one end connected to one end of the casing, the other end being free and extending in proximity to the other end of the casing, the free end of the thermostatic element normally engaging one face of the non-conducting element, the bimetal thermostatic element, the two contacts and the portion of the non-conducting element engaged by the thermostatic element being in alignment when the bimetal thermostatic element is in its normal position, which bimetal thermostatic element normally holds the non-conducting element in its normal initial position, the engaging end of said bimetal thermostatic element when the temperature reaches a predetermined

point, moving along the face of said non-conducting element to a position to release the non-conducting element and the spring to cause said contacts to move relatively, and a casing having a hollow projecting part, closed at one end, into which said bimetal thermostatic element is received, said casing having an enlargement into which the bimetal thermostatic element projects, said contacts and spring being located in said enlargement, the movement of said bimetal thermostatic element causing a relative movement of the contacts towards each other.

5. An electric switch comprising a casing, two opposed cooperating contacts mounted therein and normally in engagement to complete a circuit, a spring with which one of said contacts is connected, a flat straight non-conducting element connected with said spring, a bimetal thermostatic element within said casing, having one end connected to one end of the casing, the other end being free and extending in proximity to the other end of the casing, the free end of the thermostatic element normally engaging one face of the non-conducting element, the bimetal thermostatic element, the two contacts and the portion of the non-conducting element engaged by the thermostatic element being in alignment when the bimetal thermostatic element is in its normal position, which bimetal thermostatic element normally holds the non-conducting element in its normal initial position and the contacts in electrical engagement, the engaging end of said bimetal thermostatic element when the temperature reaches a predetermined point, moving along the face of said non-conducting element to a position to release the non-conducting element and the spring to cause said contacts to be separated to break the electric circuit.

6. An electric switch comprising two opposed cooperating contacts, a spring with which one of said contacts is connected, a non-conducting element connected with said spring, a bimetal thermostatic element which normally holds the non-conducting element in its normal initial position, said bimetal thermostatic element when the temperature reaches a predetermined point, moving to a position to release the non-conducting element and the spring to cause said contacts to move relatively to close the circuit, said bimetal thermostatic element being held in its released position by said non-conducting element, and a manual resetting device for resetting the parts to their initial positions, comprising a pivoted lever, a movable resetting member engaging one end of the pivoted lever, the other end of the pivoted lever when moved, moving said non-conducting element to move it and its associated contact to their initial positions, so as to free the bimetal thermostatic element so it can move to its initial position.

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