M. C. RYAN.

THERMAL SWITCH.

APPLICATION FILED MAR. 13, 1914.

1,150,706. Patented Aug. 17, 1915.

Fig. 1.

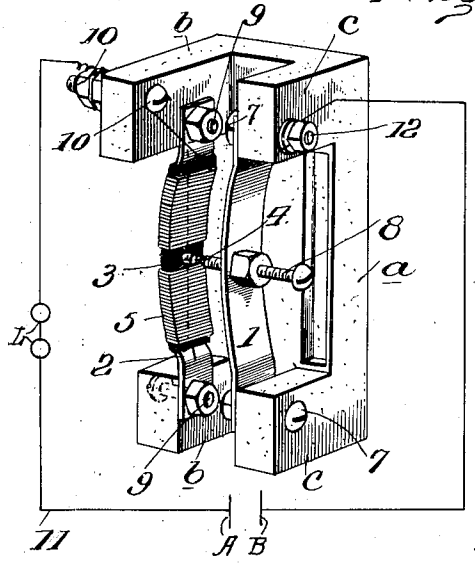


Fig. 3.

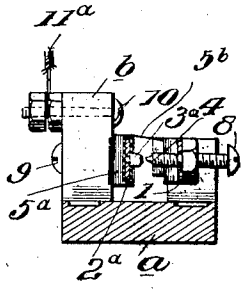


Fig. 2.

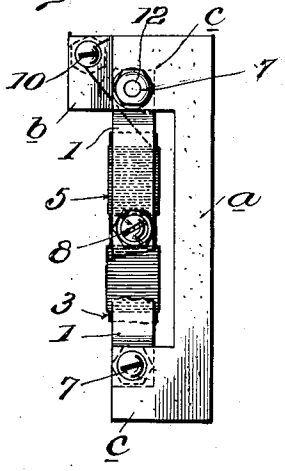
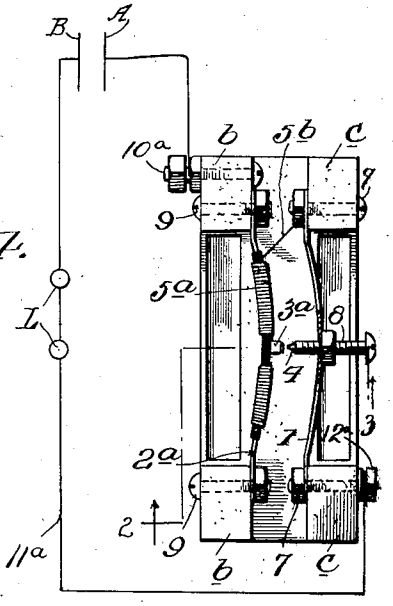


Fig. 4.



Witnesses

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THERMAL SWITCH.

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To all whom it may concern:

Be it known that I, MICHAEL C. RYAN, a citizen of the United States, residing at Phoenix, in the county of Oswego and State of New York, have invented certain new and useful Improvements in Thermal Switches, of which the following is a specification.

This invention relates to certain improvements in electric light flashers and the like; and the objects and nature of the invention will be readily understood by those skilled in the art in the light of the following explanation of the accompanying drawings illustrating what I now believe to be the preferred embodiment or mechanical expression from among other formations, arrangements and constructions within the spirit and scope of the invention.

An object of the invention is to provide a thermal switch so constructed and arranged as to maintain the relative positions of the contact points approximately uniform whatever changes may take place in the atmosphere in which the switch is located, whereby the action of the switch will be approximately uniform in high and low temperatures.

A further object of the invention is to provide a thermal switch wherein means carrying the fixed and movable contacts will expand and contract approximately uniformly under changes in atmospheric temperatures and thereby maintain the relative positions of said contacts approximately as originally set under varying temperature conditions and hence attain approximately uniform action of the switch regardless of the temperature of the atmosphere in which the switch is located.

A further object of the invention is to provide certain improvements in construction, arrangement and combination of parts for the purpose of increasing the efficiency and accuracy of thermal switches of the electric light flasher type.

The invention consists in certain novel features in construction and in combinations and arrangements as more fully and particularly set forth and specified hereinafter.

Referring to the accompanying drawings;—Figure 1, is a perspective view of a thermal switch in accordance with my invention, a light circuit controlled thereby being indicated. Fig. 2, is a side elevation, one of the contact carrying bars being partially broken away. Fig. 3, is a sectional view of the modification shown by Fig. 4, the section being taken on the line 2—3, Fig. 4. Fig. 4, is a top plan of a modification, a light circuit being indicated.

The switch comprises a pair of parallel similar arched bars 1, 2, spaced a distance apart and fixed at their ends against longitudinal movement. One of these bars at the crown of its arch or at its central portion carries a movable switch point or contact 3, and the other bar at its corresponding portion carries the relatively stationary or fixed and coöperating switch point or contact 4, and one of the bars is surrounded by an electrical resistance or heating coil 5, to periodically heat said bar and cause expansion and consequent lateral movement of the central portion thereof, so that the bar will cool and contract between the heating periods and thereby cause movement of the central portion of the bar back to normal. The circuit through the points 3, 4, is made and broken by said lateral movements of the bar which contacts and separates said points. The two bars are preferably composed of some suitable conducting metal possessing the expansion and contraction characteristics necessary for use in thermal switches. For instance, I usually form these two bars of brass, and so shape, or arrange and secure them that their contact or switch-point-carrying portions will uniformly move laterally under the expansion and contraction of the bars due to changes in the temperature of the atmosphere in which said bars are located. Hence, after the two contact or switch points have been once adjusted to attain a certain interval of time between the periods that said points are in contact, the relative positions of these points will not be thereafter so changed by unequal expansion of the point supports under atmospheric changes, as to cause the switch to operate with a materially different interval of time between said periods, or with intervals of time varying according to the temperature of the atmosphere.

In the particular example illustrated, I show a porcelain or other insulating block *a*, having two pairs of parallel corner lugs *b*, *c*, projecting from the outer flat face thereof and transversely perforated to receive binding posts forming clamping screws. These lugs are arranged at the two ends of the block in this instance. The switch-contact-

carrying bar 1, is arranged longitudinally of said block and spaced from the said outer face thereof and at its opposite ends laps the inner side edges of the two lugs *c*, and is fixedly clamped thereto by clamping screws 7, passing through the perforations in said lugs *c*. The central laterally-arched portion of said bar is free to move laterally under expansion and contraction of the bar, and is formed with a transverse tapped perforation through which conducting-material screw 8, is adjustable transversely of the bar and the inner end of this screw forms the relatively fixed switch point or contact 4. The suitably-arched switch contact-carrying bar 2, is arranged parallel with bar 1, and at its ends laps the inner side edges of the two lugs *b*, and is fixedly secured thereto by clamping bolts or screws 9, extending outwardly through the bar ends and lugs. At its central or arched portion this bar 2, is formed or provided with the relatively-movable switch point or contact 3, in circuit with said bar and facing and arranged to move into and from circuit closing engagement with point 4. The bar 2 is surrounded by the electrical resistance or heating coil 5, and intervening insulating material. When current is passed through said coil the heat thereby generated will cause expansion of bar 2, and consequent lateral deflection of the central portion thereof in a direction to move switch point 3, from contact with point 4, thereby breaking the circuit through said points. As bar 2, cools down it will contract until it assumes normal position with said two switch points in contact and the circuit closed therethrough whereupon the resistance coil will again start heating and the operation described will be repeated.

The heating coil 5, can have one end electrically secured to the bar, and its other end electrically connected to a binding post 10, through which said coil is connected with one side of the light or other circuit 11, controlled by the thermal switch. The opposite side of said circuit is connected with bar 1, through binding post 12, formed by one of the clamping screws 7, and hence said circuit is open and closed by the expansion and contraction of bar 2, as hereinbefore described. In this arrangement, it will be noted, that the movable switch point 3, is arranged at the concaved side of the arched bar and hence that when said bar is heated expansion thereof will separate the switch points and that said points are in contact when the arched bar is cool, when the circuit through the heating coil is broken and both arched bars are of approximately the same temperature. By this arrangement the flow of current through circuit 11, will be stopped and started to alternately darken and flash the light or lights L controlled thereby. However, the thermal switch and its heating coil might be otherwise arranged and coupled into the light (or other) circuit controlled thereby. For instance, in Figs. 3 and 4, I show the movable switch point 3^a, arranged at the convexed side of its arched expanding bar 2^a, so that the two switch points 3^a and 4, are separated when bars 2^a, and 1, are of the same temperature, and hence the circuit through said points is normally broken. When the bar 2^a, is heated by the heating coil 5^a, thereon the center of said bar moves laterally toward fixed bar 1, and the switch points are brought together and the circuit is closed therethrough. When the bar 2^a, cools and contracts the circuit through said points is broken. In this arrangement, the heating coil 5^a, is at one end electrically secured to its expansion bar 2^a, while its opposite end is electrically connected or secured to the opposite bar 1, at 5^b. In this arrangement, a light or other circuit 11^a, can have one side connected to bar 1, through binding post 12^a, and its other side connected to bar 2^a, through binding post 10^a.

Whenever the expansion bar 2^a, is contracted and the switch points are out of contact, current is flowing through the resistance 5^a, and heating up the expansion bar. When said bar expands and brings points 3^a, 4, together the current, following the course of least resistance, will pass from bar to bar through the contact points and the resistance will be cut out and the expansion bar allowed to cool. The expansion bar will then contract and separate the contact points, whereupon the current will flow through the resistance and again heat up the expansion bar. A lamp or lamps L in the circuit 11^a, will be lighted or brilliant when the switch points are in contact and will be dim when the resistance is thrown in.

In Figs. 1 and 4, the main line wires or other sources of electrical supply for the particular light circuits shown are indicated by the reference letters A, B.

In thermal switches, the adjustable point, for instance, the one carried by screw 8, is adjusted with respect to the movable point, that is, the point carried by the expansion bar, to cause operation of the switch to bring about certain intervals of light and dark, certain intervals between the flashes, but in practice it has been found that this adjustment is interfered with by changes in temperature of the atmosphere in which the switch is located or by accumulation of heat in parts engaging the expansion bar. I have overcome these defects in prior devices by providing a support for the fixed, adjustable point, that expands and contracts under atmospheric conditions uniformly with the expansion member whereby the relative adjustment of the switch point will be maintained

under varying atmospheric conditions to produce the intervals between the flashes for which the switch was originally adjusted, barring of course, wear or other abnormal conditions.

My invention is applicable to thermal switches controlling one or more lights or other electrical devices, and directly included in the circuit therewith, and is also applicable to thermal switches controlling electric motors that actuate or control light or other circuits including series of lamps or other electrically operated devices.

It is evident that various changes, variations, and modifications might be resorted to in the forms, constructions, and arrangements of parts described without departing from the spirit and scope of my invention, and hence I do not wish to limit myself to the exact disclosure hereof but consider myself entitled to all such changes as fall within the spirit and scope of my invention.

What I claims is;—

1. A thermal switch comprising a pair of approximately similar arched expansion and conducting bars, at their central portions provided with switch points, one of said points being adjustable with respect to its bar toward and from the other point, and an electrical heating coil arranged on one of said bars.

2. A thermal switch comprising an insulated base, a pair of approximately similar parallel spaced arched conducting bars of expanding material at their ends held to said base against longitudinal movement, said bars being provided with opposing switch contacts brought into and out of electrical engagement by the lateral movement of one of said bars under expansion and contraction and means for periodically heating said last mentioned bar.

3. A thermal switch comprising an insulating base, an arched expansion bar at its ends fixed to said base against longitudinal movement and at its central portion having a contact, an electrical resistance coil on said bar, and an approximately similar and parallel bar at its ends fixed to said base against longitudinal movement and at its central portion carrying the opposing contact of the switch.

4. A thermal switch comprising a base having separated lugs at its ends, a pair of parallel approximately similar arched conducting bars arranged longitudinally of the base and spaced apart and at their ends confined to said lugs, said bars having opposing switch contacts, and one of said bars having an electrical resistance coil thereon.

5. A thermal switch comprising an insulating block formed with several pairs of projecting lugs, an expansion member secured to the lugs of one pair and provided with a movable switch point, a relatively fixed switch point opposing said movable switch point, a support for said fixed point expanding and contracting approximately uniformly with said expansion member under temperature changes to which both members are subjected, said support being secured to lugs of another pair, and electric heating means for said expansion member.

6. A thermal switch having a movable switch point controlled by and provided with an expansion member, a relatively fixed switch point opposing said movable point, a support for said fixed point expanding and contracting approximately uniformly with said expansion member under all temperature changes to which both members are subjected, one of said points being carried by and provided with a longitudinally adjustable screw, and electric heating means for said expansion and in constant electric circuit with said support.

7. A thermal switch comprising opposing contacts, approximately similar expanding and contracting arched conducting supports for said contacts having approximately the same co-efficient of expansion and contraction whenever both are subjected to the same atmospheric temperature and each secured at both ends, and electric heating means controlling the relative positions of said supports for causing said contacts to electrically engage and separate, substantially as described.

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

MICHAEL C. RYAN.

Witnesses:

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