March 30, 1937. E. C. HORTON 2,075,614

ELECTRIC SWITCH

Filed May 10, 1933

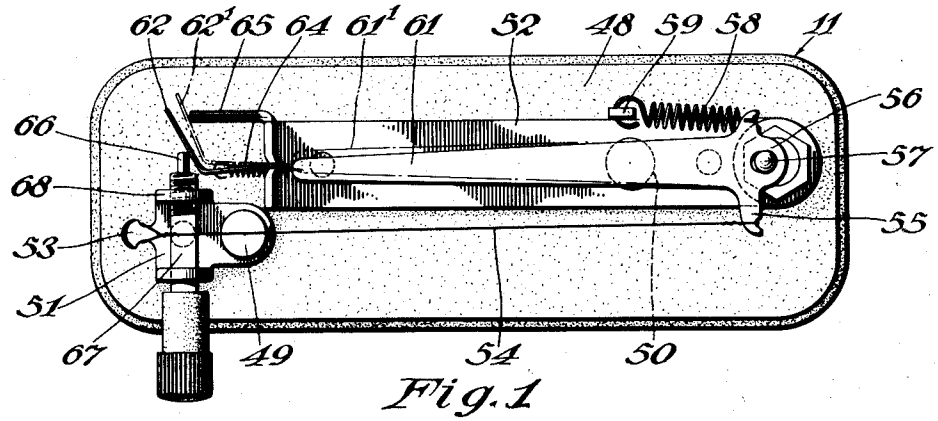


Fig. 1

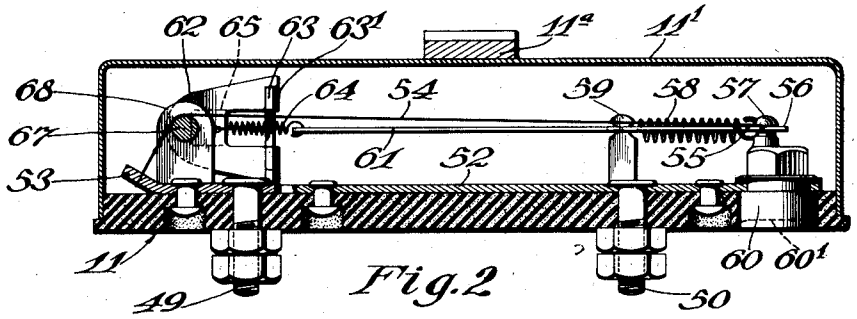


Fig. 2

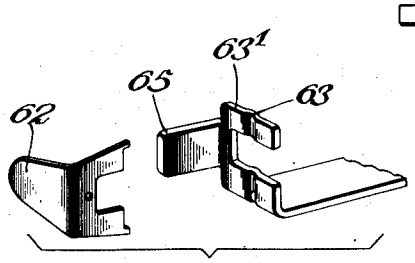


Fig. 4.

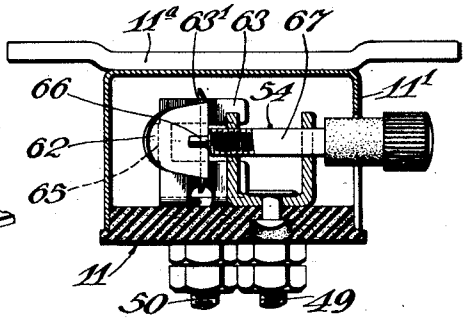


Fig. 3

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Patented Mar. 30, 1937 2,075,614

UNITED STATES PATENT OFFICE

2,075,614

ELECTRIC SWITCH

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Application May 10, 1933, Serial No. 670,356

10 Claims. (Cl. 200—113)

This invention relates to a switch especially adapted for causing an intermittent flashing or flickering of a signal light, such as the stop light of a motor vehicle signalling system. The invention has to do more particularly with that type of switch wherein a thermostatic action is provided for causing a repeated making and breaking of the signal circuit.

Thermostatic switches heretofore designed have comprised bi-metallic elements which, when subjected to an electric current, caused a breaking of the circuit. The constructions heretofore designed have caused more or less arcing of the current across the switch points during the breaking of the circuit, and also because of their fabrication they have been of impractical design.

The object of the present invention is to provide a simple and practically designed make and break switch suitable for use in motor vehicle signalling systems, though not restricted to such use, and one wherein the making and breaking of the circuit is affected in a definite positive manner.

In the drawing

Fig. 1 is a plan view of the switch for effecting the intermittent opening and closing of a circuit, the casing cover having been removed.

Fig. 2 is a longitudinal section through the switch, with the cover in position.

Fig. 3 is a transverse section therethrough.

Fig. 4 is a detailed perspective of a portion of the snap-over action of the switch, the parts shown being separated.

Referring more particularly to the drawing, the flicker switch 11, embodying the present invention and adapted to be connected to the signalling or other circuit for effecting the intermittent actuation of the signal, is depicted herein as comprising a base 48, a pair of terminal members 49 and 50, which may be in the form of binding posts, an anchor plate 51 to which the binding post 49 is electrically connected, a second plate 52 to which the binding post 50 is likewise connected, and means for making and breaking circuit connections between the two terminal members. The anchor plate 51 is provided with a lug 53 to which one end of a resistance element or wire 54 is anchored, the opposite end of the wire being connected to an arm 55 of a lever 56. The resistance element will lineally expand, when heated from the current passing therethrough, and contract or shorten as it cools when the current is reduced or interrupted. The lever is pivoted on a fulcrum pin 57 and is in electrical connection with the plate 52 and carried by a shaft 60 journaled therein. The pin is mounted eccentrically on this shaft so that by turning the latter, as with a screw driver engaged in the exteriorly accessible kerf 60', the position of the lever pivot may be varied to obtain adjustment of the interval of darkness in a manner hereinafter referred to. A spring 58, interposed between the lever and a post 59, acts to urge the lever in a counter-clockwise direction for holding the resistance wire 54 under tension.

The lever is provided with an arm 61 comparatively longer than the arm 55 so that any movement imparted to the latter will be enlarged at the outer end of the arm 61. Such amplified movement is utilized to actuate a circuit making and breaking or circuit shunting member 62. This breaker or shunting member is pivoted in seats 63 on a bracket 63' and is connected to the free outer end of the long arm 61 by a coil spring 64. The coiled spring is moved back and forth across a median or "dead center" position by the arm 61 so that the breaker member 62 will likewise be moved from one to the other of its two limit positions as determined by the two limit stops 65 and 66. The limit stop 66 is adjustably mounted on the plate 51, being carried on the outer end of an adjusting screw 67 which is mounted in a pair of upstanding ears 68, and being in electrical connection with said plate such limit stop 66 actually constitutes a switch contact point through which the electric current passes to the breaker member 62 when engaged therewith.

Therefore, when the parts are in the full line position of Fig. 1 the electric current passes from plate 51 through contact point 66 and breaker member 62 to plate 52. When the parts are disposed in the dotted or broken line position of Fig. 1, wherein the breaker member 62 is spaced from the contact point 66 and is engaged against the companion stop member 65, as indicated at 62', this path for the current is interrupted so that all of the current passes through the resistance element 54. In this position of the parts the longer arm 61 of the lever has moved substantially to the position 61' so as to dispose the spring 64 on the opposite side of the median position of the breaker member.

The resistance wire may be passed over the screw 67 to provide a drag or friction sufficient to hold it against unauthorized turning. A casing cover 11' encloses the switch mechanism, when desired, and a bracket 11a provides a convenient means for mounting the same.

The operation of the flicker switch is as fol-

lows: Assuming that the parts are in the dotted position depicted in Fig. 1, with the breaker member 62 disposed against the stop 65 so as to necessitate the entire current flow passing through the resistance element 54, the latter will become heated and expand in a linear direction. This expansion releases the lever 56 for limited counter-clockwise movement under the urge of the spring 58 so that the longer arm 61 is moved to bring the spring 64 to the opposite side of its median position and snap the breaker member 62 to its full line position against the contact point 66. Immediately upon the breaker member 62 engaging the contact point 66 the flow of current will follow the path of lesser resistance through contact point 66 and breaker member 62, thereby permitting the resistance element 54 to cool and lineally shorten or contract. This contraction of the resistance element exerts a pull on arm 55 and swings the lever in a clockwise direction against the tension of spring 58 so as to move the longer arm substantially to the position indicated by the dotted showing 61'. During this arm movement the spring 64 is moved across the median position to snap the breaker member 62 away from the contact point 66 and thereby again break the current path therethrough. Consequently, the entire current flow will again pass through the resistance element to lineally expand the same, and the cycle of operation just described will again be repeated.

With the current passing through the contact or breaker member 62, the latter being held against the fixed contact or shoulder 66 to which position said member 62 is constantly urged by the spring means composed of the two springs 58 and 64 with the interposed or connecting lever arm 61, the current will then be of sufficient strength to illuminate the signal, such as an incandescent light bulb (not shown). Consequently, the flicker switch will operate the signal intermittently, or during those intervals when the main current is passing through the contacting parts 62 and 66, during which intervals the thermostatic element 54 is cooling. When such element has cooled sufficiently to shorten or contract to such an extent as to constrain and counteract the normal urge of the spring means 58, 61, 64, to hold the contact member 62 against the contact or stop shoulder 66, the line of spring force of such spring means which acts upon the contact member 62 will be shifted by the cooling thermostatic wire to the opposite side of the pivotal mounting of such contact member 62 and cause the parts 62 and 66 to separate with a snap action. Such spring means will hold the member 62 against the stop shoulder 65, as above stated.

The intervals of illumination and darkness of an illuminated signal may be varied when desired. For varying the interval of illumination, or the interval of electrical operativeness of the signals, the screw 67 is threaded outwardly to withdraw the contact 66. This permits the breaker member 62 to move farther away from its median position and thereby require a greater movement of the free end of arm 61 to bring the spring 64 across dead center. For varying the interval of darkness, the eccentric mounting of the fulcrum pin 57 permits adjustment of the lever pivot by turning the shaft 60 in either direction. By such adjustment of the pin 57 an increased tension will be placed on the resistance wire, and also, during this adjustment, the lever will move clockwise to dispose the free end of the arm 61 further from the median position of the breaker 62.

This disposition of the free end, at a greater distance from such median position, will require a greater return movement of the arm to bring the spring 64 back across the dead center or median position. Consequently, the interval of darkness, or the interval of inoperativeness of the signal, will be increased.

What is claimed is:

1. An intermittently operating switch for electric circuits comprising spaced stop members, a circuit connection with one of said members, a contact member movable back and forth between said stop members for opening and closing a circuit through the specified one of said stop members, an oscillatable actuator, means for pivotally mounting the actuator for back and forth movement, resilient means connecting the contact member to said actuator and movable by the latter back and forth beyond a median position to dispose the resilient means at opposite sides of such median position for effecting the back and forth movements of said contact member, means for adjusting the pivotal axis of said actuator, thermally expansive means connected to said actuator for moving the latter in one direction of oscillation, circuit connections for such thermally expansive means, and means for urging the actuator in the opposite direction of oscillation when permitted by said thermally expansive means.

2. An intermittently operating switch for electric circuits comprising spaced stop members, a circuit connection with one of said members, a contact member movable back and forth between said stop members for opening and closing a circuit through the specified one of said stop members, an oscillatable actuator, means for pivotally mounting the actuator for back and forth movement, resilient means connecting the contact member to said actuator and movable by the latter back and forth beyond a median position to dispose the resilient means at opposite sides of such median position for effecting the back and forth movements of said contact member, means for adjusting the pivotal axis of said actuator, thermally expansive means connected to said actuator for moving the latter in one direction of oscillation, circuit connections for such thermally expansive means, and means for urging the actuator in the opposite direction of oscillation when permitted by said thermally expansive means, the other of said stop members being in electrical connection with said thermally expansive means, and said contact member being in electrical connection with said thermally expansive means for establishing a shunt circuit about said thermally expansive means when said contact member is in abutting relation with said other stop member.

3. An intermittently operating switch for electric circuits comprising spaced stop members, a circuit connection with one of said members, a contact member movable back and forth between said stop members for opening and closing a circuit through the specified one of said stop members, an oscillatable actuator, means for pivotally mounting the actuator for back and forth movement, resilient means connecting the contact member to said actuator and movable by the latter back and forth beyond a median position to dispose the resilient means at opposite sides of such median position for effecting the back and forth movements of said

contact member, said actuator adjacent its pivotal mounting having oppositely extending arm portions, a thermally expansive element connected to one of said arm portions for moving the actuator in one direction of oscillation, a spring means connected to the other of said arm portions for urging the actuator in the opposite direction of oscillation when permitted by said thermally expansive element, and means for adjusting the pivotal axis of said actuator to vary the responsiveness of said actuator to said thermally expansive element.

4. A switch for signalling systems, comprising spaced contact members, means for making and breaking the circuit therebetween, said means including a breaker element, a snap action for moving the breaker element back and forth between an open circuit position and a closed circuit position, said snap action including a member movable back and forth between two positions, a resistance element for providing an alternate path of flow for the electric current between said contact members when said breaker member is moved to open circuit position, said resistance element being thermally expansible and contractible, and an operative connection between said movable member and said resistance element whereby the latter will effect movement of said movable member in one direction.

5. A switch for flickering signal lights and the like, comprising spaced terminal member, a thermal expansion element electrically connected to one terminal member, a movably mounted actuator in electrical connection with the companion terminal member and to the opposite end of said thermal expansion element for being moved in one direction thereby, said actuator being resiliently urged in the opposite direction and movable in such direction when permitted by said thermal expansion element, said element and said actuator being in a constantly closed circuit between said terminal members, and a normally open shunt circuit about said thermal expansion element, said shunt circuit including a movable switch contact member movable by said actuator during thermal expansion of said element for closing such normally open shunt circuit and thereby shunting the circuit about said element to permit the cooling of the latter and the return of said actuator, means supporting said contact member for operation to opposite sides of a dead center position, and means automatically urging the contact member into contacting relation upon movement of said member beyond dead center position in either direction.

6. A switch for flickering signal lights and the like, comprising a support, a pair of stop shoulders, a contact member movable back and forth between said stop shoulders, an actuator movable back and forth, resilient means connecting the contact member to said actuator and movable by the latter back and forth beyond a median position to dispose the resilient means at opposite sides of such median position to effect the back and forth movements of the contact member between the respective stop shoulders, thermally expansive means connected to said actuator for moving the latter in one direction, and spaced terminal members electrically connected through said thermally expansive means for the passage of current through the latter to effect expansion thereof, one of said stop shoulders being in electrical connection with one of said terminal members, said contact member being in electrical connection with the other of said terminal members for establishing a shunt circuit about the thermally expansive element when said contact member is in abutting relation with said specified stop shoulder.

7. A switch for flashing signal circuits, and the like, comprising a support, a pair of stop shoulders, a contact member movable back and forth between said stop shoulders for making and breaking a shunt electric circuit through one shoulder, resilient means normally acting to urge the contact member toward such one shoulder to a circuit closing position and including a spring adapted to have its line of spring force shifted to move the contact member away from said one shoulder and toward the companion shoulder for breaking the circuit, and thermally expansible means connected to said resilient means for controlling the operation thereof and normally acting therethrough to hold the contact member toward said companion shoulder for breaking the circuit, said thermally expansible means being electrically connected at one end portion to said one shoulder and at its opposite end portion to said contact member in a permanently closed circuit paralleling the shunt circuit through the contact member and one shoulder, said thermally expansible means expanding in the presence of a broken shunt circuit to permit said resilient means functioning in establishing the shunt circuit.

8. A switch for flashing signal circuits, and the like, comprising a support, a pair of stop shoulders, a contact member movable back and forth between said stop shoulders for making and breaking a shunt electric circuit through one shoulder, resilient means normally acting to urge the contact member toward such one shoulder to a circuit closing position and including a spring adapted to have its line of spring force shifted to move the contact member away from said one shoulder and toward the companion shoulder for breaking the circuit, thermally expansible means connected to said resilient means for controlling the operation thereof and normally acting therethrough to hold the contact member toward said companion shoulder for breaking the circuit, said thermally expansible means being electrically connected at one end portion to said one shoulder and at its opposite end portion to said contact member in a permanently closed circuit paralleling the shunt circuit through the contact member and one shoulder, said thermally expansible means expanding in the presence of a broken shunt circuit to permit said resilient means functioning in establishing the shunt circuit, and means for adjusting the responsiveness of said thermally expansible means.

9. A switch for flashing signal circuits, and the like, comprising a support, a pair of stop shoulders, a contact member movable back and forth between said stop shoulders for making and breaking a shunt electric circuit through one shoulder, resilient means normally acting to urge the contact member toward such one shoulder to a circuit closing position and including a spring adapted to have its line of spring force shifted to move the contact member away from said one shoulder and toward the companion shoulder for breaking the circuit, and thermally expansible means connected to said resilient means for controlling the operation thereof and normally acting therethrough to hold the contact member toward said companion shoulder for breaking the

circuit, said thermally expansible means being electrically connected at one end portion to said one shoulder and at its opposite end portion to said contact member in a permanently closed circuit paralleling the shunt circuit through the contact member and one shoulder, said thermally expansible means expanding in the presence of a broken shunt circuit to permit said resilient means functioning in establishing the shunt circuit, said resilient means serving to resiliently support said thermally expansible means, and one of said means being adjustable to vary the responsiveness of said thermally expansible means.

10. A switch for flashing signal circuits, and the like, comprising a support, a pair of stop shoulders, a contact member movable back and forth between said stop shoulders for making and breaking a shunt electric circuit through one shoulder, resilient means normally acting to urge the contact member toward such one shoulder to a circuit closing position and including a spring adapted to have its line of spring force shifted to move the contact member away from said one shoulder and toward the companion shoulder for breaking the circuit, and thermally expansible means connected to said resilient means for controlling the operation thereof and normally acting therethrough to hold the contact member toward said companion shoulder for breaking the circuit, said thermally expansible means being electrically connected at one end portion to said one shoulder and at its opposite end portion to said contact member in a permanently closed circuit paralleling the shunt circuit through the contact member and one shoulder, said thermally expansible means expanding in the presence of a broken shunt circuit to permit said resilient means functioning in establishing the shunt circuit, said support having a bearing and said contact member being detachably and pivotally mounted in the bearing for such back and forth movement, and said spring being connected directly to said contact member and acting to hold the latter in the bearing.

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