Dec. 26, 1939. E. C. HORTON 2,184,699

THERMOSTATIC SWITCH

Filed April 24, 1936

Fig. 1.

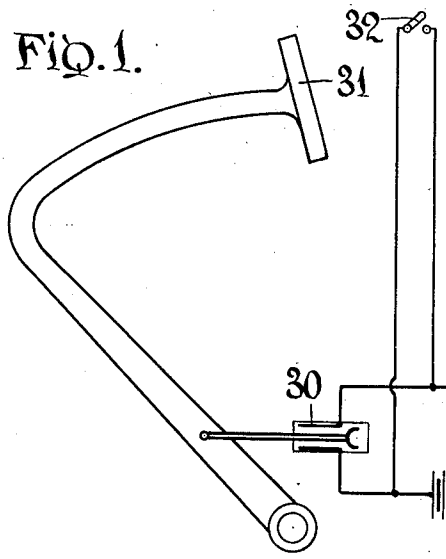


Fig. 6.

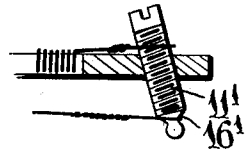
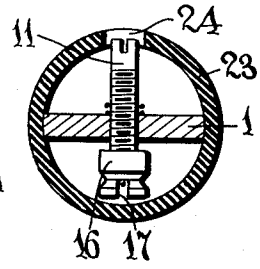


Fig. 5.



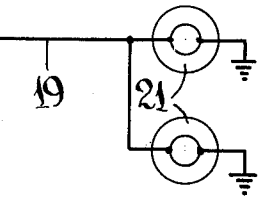


Fig. 2.

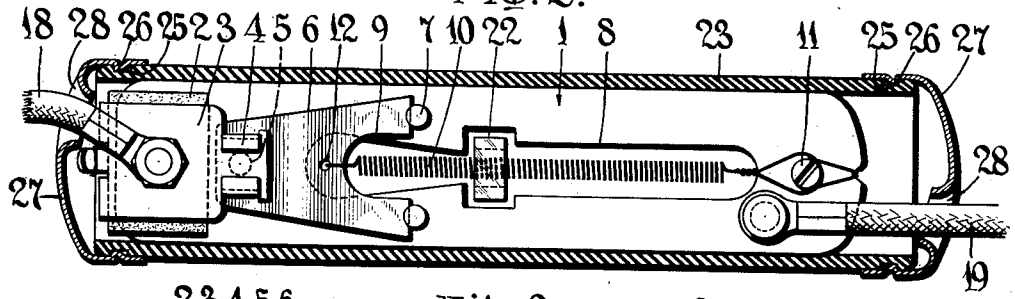


Fig. 3.

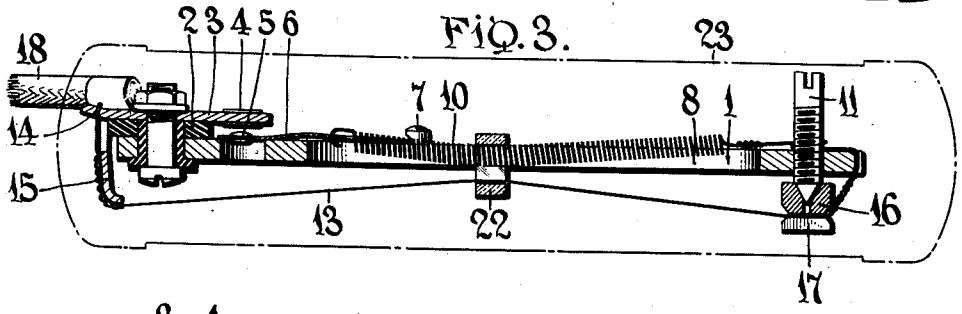
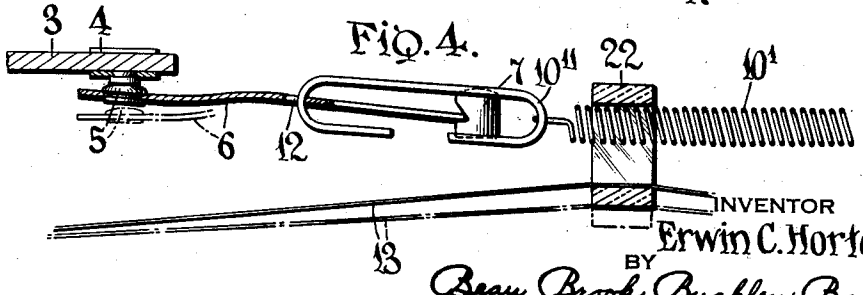


Fig. 4.



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Patented Dec. 26, 1939 2,184,699

UNITED STATES PATENT OFFICE

2,184,699

THERMOSTATIC SWITCH

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Application April 24, 1936, Serial No. 76,187

9 Claims. (Cl. 200—113)

This invention relates to a thermostatic switch which is especially adapted for repeatedly interrupting an electric circuit, such as might be useful in the intermittent flashing or flickering of one or more lights for attracting attention. In the particular field of use illustrated, by way of example, a circuit breaker is utilized for causing a flickering or repeated flashing of a signal light on a motor vehicle to direct the attention of the traffic to the proposed change in the movement of the vehicle contemplated or about to be made.

The invention has for its object to provide a circuit breaker which is practical and efficient in operation and one which will prolong the period of usefulness of the light with which it is connected. The invention further resides in a thermostatic switch which is of simple and durable construction wherein the parts are few in number and readily formed and assembled in a most economical manner.

In complying with the requirements of the patent laws, one embodiment of the present invention has been illustrated and for a clear understanding of the same, reference is made to the accompanying drawing wherein

Fig. 1 is a diagrammatic view of a motor vehicle equipped with a traffic signalling circuit, showing one application of the present invention;

Fig. 2 is a view in longitudinal cross section through the circuit breaker;

Fig. 3 is a similar view taken on a plane at right angles to the plane of section of Fig. 2;

Fig. 4 is an enlarged fragmentary view, slightly modified, more clearly depicting the operation of the circuit breaker;

Fig. 5 is a transverse sectional view of the circuit breaker; and

Fig. 6 is a fragmentary enlargement depicting a modified mounting for the thermostatic wire.

Referring more particularly to the drawing, the numeral 1 designates the body member of the switch or circuit breaker, which may be in plate like form and of suitable dimensions to permit the same being formed by a stamping or molding operation. The body plate may be conductive or not, and when of metal, a contact member 3 having a contact point 4 is insulated therefrom by a spacer 2 and disposed in the path of movement of a movable contact point 5. This latter point is supported for movement by a shifting carrier or arm 6, the preferable mounting being of the pivotal type and to this end the arm is fulcrumed on posts 7, one on each side of a slot 8, formed in the body 1. The carrier 6 is cut away between the posts 7, as indicated at 9, to receive a spring 10 which operates in the body slot or opening 8. One end of the spring is anchored at a suitable point, such as on the pin 11, while the opposite end of the spring finds anchorage in the pivoted arm at 12. This pivoted arm is movable back and forth under spring tension within the limits determined by the fixed contact point 4 and the body portion over which it hangs, as is clearly depicted in Fig. 3, and preferably the line of spring force normally is to hold the two contact points together.

Means are provided for repeatedly shifting the line of spring force back and forth across the pivotal axis of the carrier and thus alternately make and break the circuit through the points. Such shifting means is of a thermostatic character and preferably operable to maintain constant circuit connection, whether shunted by the engaged points 4 and 5 or not. The thermostatic element may be of an approved form, but that herein depicted is in the form of a resistance wire 13 which lineally expands under heat and is connected electrically at one end to the contact point 4, as at 14, and at its opposite end through the body plate 1 to contact point 5. For convenience the wire may be passed about the anchor pin 11, as a means of grounding it in the body plate. Adjacent each end the wire is elevated or spaced from the body plate by props 15 and 16, the former being conveniently bent from the fixed arm 3, while the latter prop 16 is adjustable to vary the tension on the wire 13. The pin 11 is provided with threaded engagement in the body plate 1 and protrudes therethrough to provide support for the prop 16. The projecting end of the pin 11 may be tapered for centering engagement in a correspondingly shaped socket in the prop, such engagement being maintained by the tensioned wire 13 which rests in a transverse groove 17 of the prop. Other suitable means may be employed for adjusting this tension, but that herein depicted provides an ideal construction which facilitates the assembling of the switch parts.

When the thermostatic wire becomes heated, it will lengthen and this characteristic of the wire is utilized for permissively shifting the line of spring force from its normal position to the opposite side of the pivotal mounting of the arm 6, connection being provided between the wire and the spring 10 by a link 22 of insulating material, so that normally the wire will hold the spring to such opposite side and away from its normal position. In the disclosure the spring is illustrated in Fig. 3 as being pulled within the

body opening 8 and, therefore, as the wire becomes heated and lineally expands or extends, the tensioned spring 10 will move toward its normal position, wherein the line of spring force is at the opposite side of such pivotal mounting 7. Consequently, as the spring moves toward its normal position, as permitted by the heating wire, the arm 6 will rock to bring its contact point 5 into electrical connection with the contact point 4. This provides a path of lesser resistance to the electric current through the points while preferably maintaining the path of higher resistance through the wire to avoid arcing between the contact points 4 and 5, as the circuit therethrough is successively made and broken. The electric current being thus shunted away from the thermostatic element 13 reduces the flow of current through the latter to such an extent as to permit cooling and contraction of the latter and a consequential pulling on the spring to shift its line of force to the near side of the pivotal mounting 7 for rocking arm 6 away from contact point 4. While this constant flow of current through the thermostatic element is not essential for a practical functioning spring action thus described, it is preferable, since it prolongs the life of the filament in the signal light by maintaining it heated, though not to incandescence, when the points are separated. The reference herein to the interruption of the circuit will, therefore, include either a complete break or one partial in reality, though sufficient to effect the desired signaling.

The adjustable prop may be simplified by connecting the wire directly to the adjusting screw 11', which latter is inclined, for bracing against the pull exerted by the wire, and shaped to form a seat 16' to receive the wire terminal loop, as illustrated in Fig. 6.

In the modification depicted in Fig. 4, the spring 10' is shortened to terminate at or adjacent the link 22 and is then joined to the pivoted contact arm by a pivoted extension or link 10''. This composite resilient member 10' and 10'' avoids bending the spring through the link 22 and enables a finer adjustment by confining the spring tensioning primarily to that portion between said link 22 and the point of spring anchorage 11 or 11'.

The flasher switch is conveniently housed within a casing 23, and in this connection it is preferred to have the casing of tubular form with an inside diameter substantially equal to the width of the body plate 1, so that the latter may be inserted within the tube and supported therein by frictional engagement with the inner wall thereof without the necessity of other fastening means. The tube may be formed of insulating material and provided with an opening 24 opposite the head of the pin 11 through which a screw driver may be inserted for adjusting the tension on the thermostatic element 13 and thereby determining the duration of the light and dark intervals in the given signal. The ends of the tube are provided with peripheral grooves 25 into which may be sprung locking detents 26 carried by the closure caps 27, the latter being provided with openings 28 through which pass the circuit wires 18 and 19 from the battery 20 to the signal 21.

A control switch 30 may be located in an accessible position for closing the signal circuit. When the signal is in the nature of a stop light, as shown, the switch 30 will be connected to the brake pedal 31. If it is desired to use the flashing signal while the vehicle is standing, a second switch 32 may be provided to shunt the switch 30. This will be useful when making repairs along the road.

It is obvious from the foregoing that the thermo-responsive element positively shifts the line of spring force to separate the contact points and permissively shifts the same for closing the points. While the disclosure has been made in great detail, it is not the intention thereby to restrict the invention, since obviously the inventive principles herein involved are capable of ready embodiment in other physical forms without departing from the spirit or scope of the invention as set forth in the appended claims.

What is claimed is:

1. A thermostatic switch comprising a fixed contact, a second contact movable into and out of electrical connection with the fixed contact, a shifting member movable back and forth between two positions and connected to the second contact for so moving the same into and out of such electrical connection, a resilient member fixed at one end and having its opposite end connected to said shifting member for normally holding the latter in one position, said resilient member being adapted for disposition to move the shifting member away from such normal position, a member electrically connected at one end to the fixed contact and at its opposite end to the second contact and thermally expansible when conducting a predetermined current and contractible in the absence of such current, and insulating means connecting said thermally responsive member directly to the resilient member between the ends of the latter and normally distorting the latter to hold the shifting member away from such normal position whereby when the thermally responsive member expands the distortion of the resilient member is relieved to permit the latter returning to its normal position for urging the shifting member to its normal position.

2. A thermostatic switch comprising a fixed contact, a second contact movable into and out of electric connection with the fixed contact, a shifting member movable back and forth between two positions and connected to the second contact for moving the same into and out of such electric connection, a lineally expansible thermostatic member electrically connected at one end to the fixed contact and at its opposite end to the second contact and supported under tension, a resilient member normally tending to hold the shifting member in one of its two positions and intermediately displaceable to dispose the line of spring force for urging the shifting member to its other position, and insulating means connecting the thermostatic member to the intermediate portion of the resilient member and normally displacing the same for disposing the line of spring force to hold the shifting member in its other position.

3. A thermostatic switch comprising a fixed contact, a second contact, a shifting member movable back and forth between two positions and connected to the second contact for moving the same into and out of electrical connection with the fixed contact, a thermostatic member electrically connected at one end to the fixed contact and at its opposite end to the second contact, means resiliently tending to hold the shifting member in a normal position wherein the contacts are together and displaceable against its resilient urge to move the shifting member in

its other position when said contacts are separated, and insulating means connecting the thermostatic member to the resilient means independently of the shifting member for so displacing the resilient means whereby the resilient urge of the latter will hold the shifting member in its other position for separating the contacts, and means for varying the tension placed on said thermostatic member by said connecting means.

4. A thermostatic switch comprising a fixed contact, a second contact, a shifting member movable back and forth between two positions and connected to the second contact for moving the same in and out of electrical connection with the fixed contact, a thermostatic member electrically connected at one end to the fixed contact and at its opposite end to the second contact, means resiliently acting to hold the shifting member in a normal position wherein the contacts are together, and a link of insulating material connecting the thermostatic member directly to the resilient means and independently of the shifting member for tensioning the thermostatic member and abnormally displacing the spring action of the resilient means to hold the shifting member in its other position when the contacts are separated.

5. A flasher switch comprising a body plate having a fixed contact thereon and insulated therefrom, a shifting member carrying a contact and movable toward and from a position in which the two contacts engage, a resilient member fixed at one end to the plate and at the opposite end to the shifting member and normally acting on the latter to hold the contacts engaged, and a thermally responsive member anchored at both ends and electrically connected at one end to the first contact and at its opposite end to the second contact and when cold directly acting on the intermediate portion of the resilient member to hold it against its tension in a position to separate the contacts, said thermally responsive member expanding when hot to relieve the tension on the resilient member to permit its assuming its normal position.

6. A flasher switch comprising a body plate having a fixed contact thereon and insulated therefrom, a shifting member carrying a contact and movable toward and from a position in which the two contacts engage, a coiled spring anchored at one end to the plate and at its opposite end to the shifting member and normally urging the contacts together, and a thermostatic wire anchored at both ends and having its intermediate portion mechanically connected to the intermediate portion of the spring, said wire being held taut by the spring and normally serving to hold the spring biased to one side to separate the contacts, the wire when hot releasing the spring to return to a position for bringing the contacts together and thereby permit a cooling of the wire, the opposite end portions of the wire being adapted for circuit connection paralleling that of the two contacts.

7. A flasher switch comprising a body plate having a fixed contact thereon and insulated therefrom, a shifting member carrying a contact and movable toward and from a position in which the two contacts engage, a resilient member fixed at one end to the plate and at the opposite end to the shifting member and normally acting on the latter to hold the contacts engaged, a thermally responsive member anchored at both ends and electrically connected at one end to the first contact and at its opposite end to the second contact, and directly acting normally to hold the resilient member biased to one side to move the shifting member to a position to separate the contacts, and a tubular housing for the parts aforesaid, the housing having a diameter substantially equal to the width of the plate and frictionally holding the same, said housing having end closures.

8. A switch having a snap action for opening and closing a circuit and including a coiled spring anchored at one end and connected at its other end to a movable contact; said contact being movable back and forth across a dead center position and held normally to one side of such position by said spring and a thermostatic member connected to the spring intermediate the ends of the spring and when cold acting laterally thereon to bias the spring for disposing the line of spring force to the opposite side of such position for moving the contact from its normal position.

9. A flasher switch comprising a fixed contact, a movable contact shiftable toward and from a position in which the two contacts engage, a coil spring anchored at one end, a pivotally mounted member connected to the opposite end of the coil spring and connecting the latter to the movable contact, and a thermostatic wire supported at both ends and having its intermediate portion mechanically connected to the intermediate portion of the spring, said wire acting normally to distort the spring laterally under tension to place it in a position to separate the contacts, the thermostatic member when hot releasing the spring to return to a position for bringing the contacts together and thereby permitting cooling of the thermostatic member, the opposite end portions of the thermostatic member being adapted for subsequent connection paralleling that of the two contacts.

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