Feb. 6, 1934. W. B. GRIFFITH 1,945,808

THERMOSTATIC SWITCH

Filed Nov. 3, 1932

FIG. 1.

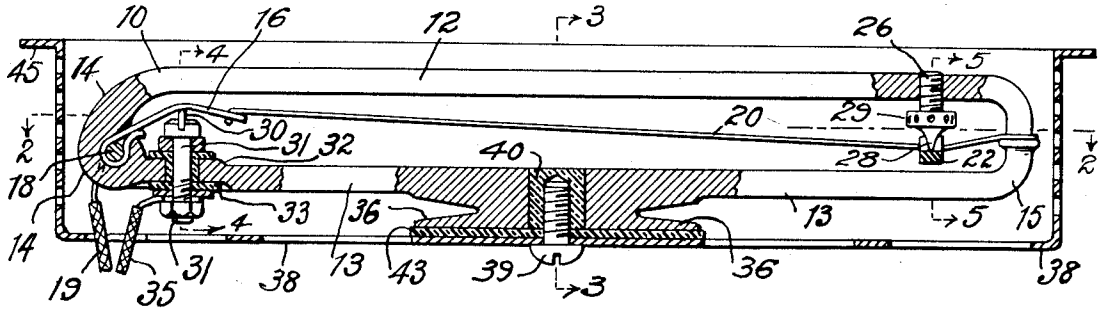


FIG. 2.

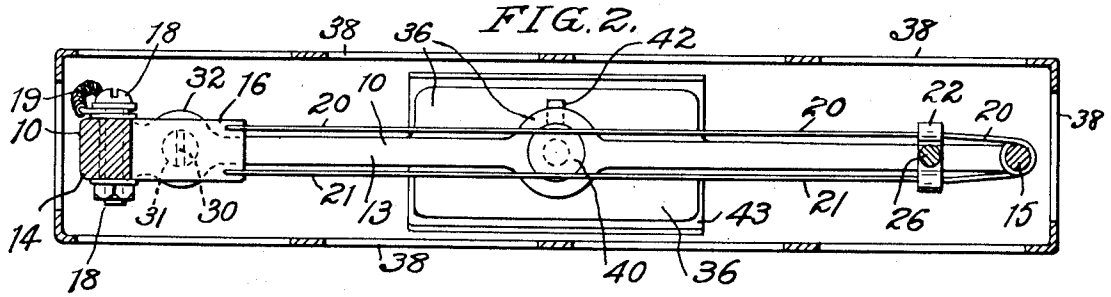


FIG. 3.

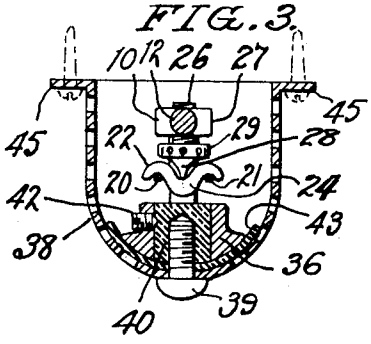


FIG. 4.

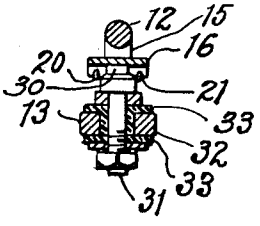


FIG. 5.

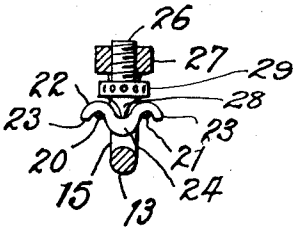


FIG. 6.

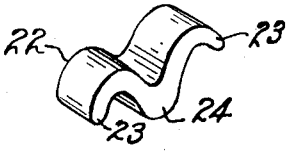
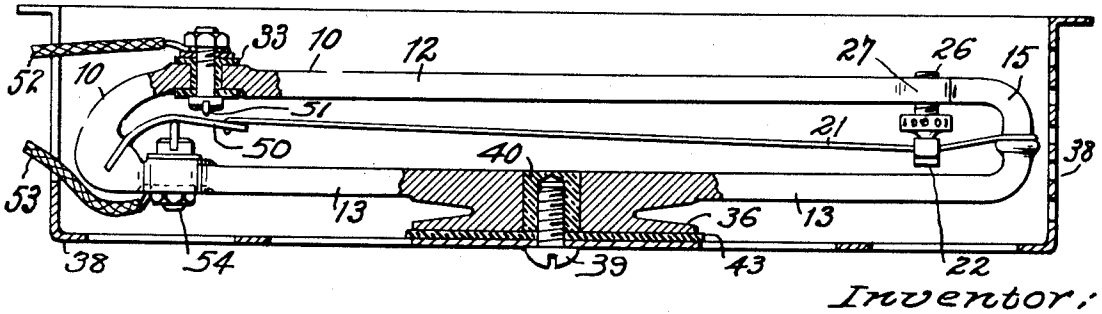


FIG. 7.



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Patented Feb. 6, 1934 1,945,808

UNITED STATES PATENT OFFICE

1,945,808

THERMOSTATIC SWITCH

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Application November 3, 1932. Serial No. 640,923

6 Claims. (Cl. 200—137)

My invention relates to improvements in a thermostatic switch, and particularly relates to a switch for controlling an electric circuit for giving an alarm upon an increase of temperature of the air in the event of a fire within the zone in which the switch is located.

The object of my invention is to provide a switch which will be actuated by a sudden rate of rise of temperature and which also will be operated at a fixed temperature.

A further object is to construct a switch having relatively movable thermal elements, actuated by a sudden rise of temperature, and also having actuating means in the form of a part formed of metal, fusible at a predetermined temperature, which will insure the operation of the switch, in the event of the failure of the relatively movable thermal elements to operate the switch, when the rate of rise of temperature is gradual, or slow, due to a smouldering fire.

A further object is to employ a thermal element in the form of a wire, and place the wire under tension, by means of a metal strut fusible at a predetermined temperature.

A further object is to employ a thermal element in the form of two parallel wires and provide a strut, in the form of a yoke, for equalizing the tension upon the wires.

A further object is to provide adjustable means for applying tension upon one of the thermal elements, through an adjustable strut, or yoke.

A further object is to provide switching means in the form of a resilient member, which is flexed from a normal position by a wire under tension, and also provide means fusible at a predetermined temperature, and forming a strut, or bridge, for deflecting the wire out of a straight line, whereby the melting of the strut, or bridge, will release the tension upon the wire and allow the resilient member to return to its normal position for operating the switching means.

My invention provides a device which is operable as a rate of rise of temperature switch and also as a fixed temperature switch.

Referring to the accompanying drawing, Fig. 1 is a vertical, longitudinal sectional view of a switch embodying my invention, and showing the parts arranged for normally opening an electric circuit. Fig. 2 is a horizontal section on line 2—2 Fig. 1. Fig. 3 is a transverse, vertical section on line 3—3 Fig. 1. Fig. 4 is a transverse, vertical section on line 4—4 Fig. 1. Fig. 5 is a transverse vertical section on line 5—5 Fig. 1. Fig. 6 is a perspective view of the strut, formed of fusible material, detached. Fig. 7 is a view similar to Fig. 1, showing the switching means arranged for normally closing an electric circuit.

In the drawing, in which like reference characters refer to like parts, 10 represents a frame, in the form of an elongated loop, consisting of upper and lower longitudinal bars 12 and 13 and end members 14 and 15.

A resilient member in the form of a plate spring 16, has one end thereof secured in the end member 14 of the frame. Said end member 14 is provided with a transverse recess to receive the end of the plate 16, which latter encircles a bolt 18, mounted in said recess of the frame. The bolt 18 forms a terminal, or binding post, for the connection of an electric conductor 19, as shown in Fig. 1.

The bars 12 and 13 of the frame form one of the thermo elements of the switch. The other thermo element of the switch consists of an extremely fine wire, or wires, which will increase in length relatively to the bars of the frame, when subjected to a sudden rise of temperature.

The wires 20 and 21, shown in the drawing, form one of the thermo elements. Said wires are attached to the free end of the resilient member 16, and they are also attached to the end member 15 of the frame.

The wires 20 and 21 form tension members, as they are placed under sufficient tension to flex the resilient member 16 from a normal position into the flexed position, shown in the drawing, by means of a strut 22. Said strut forms a bridge which holds the wires out of alignment between the points of attachment for the ends of the wires.

The strut, or yoke 22 is formed of metal fusible at a predetermined temperature, and when melted will release the wires and the resilient member 16 from the tension, thus allowing the member 16 to operate the switching means controlling an electric circuit for giving an alarm.

The strut, or yoke 22, shown detached in Fig. 6, comprises end members or arms 23, which rest upon the wires 20 and 21, and a depending central portion 24, provided for spreading the wires, as shown in Figs. 2 to 5.

An adjusting screw 26 is threaded in an aperture formed through an enlarged boss 27 formed upon the upper bar 12 of the frame. The screw 26 is provided with a point 28 which engages the central portion of the yoke 22. An enlarged head 29 upon the screw 26 provides means for turning the same for placing sufficient tension upon the wires to flex the member 16 and also deflect the wires 20 and 21 out of a straight line. By means of this novel construction, the wires may be placed

under equal tension, as the tilting of the strut or yoke 22 upon the point of the screw 26 will equalize the tension upon the wires.

A fulcrum part 30 is formed upon a screw 31, secured in an enlarged boss 32 formed upon the bar 13 of the frame. The screw 31 is of the fillister head type, and the part 30 consists of a flat plate secured in the slot formed in the head of the screw. The screw 31 is electrically insulated from the frame by insulating material 33. Said screw 31 forms a terminal, or binding post, for the connection of the electrical conductor 35.

The fulcrum part 30 forms a contact point with which the member 16 makes contact when flexed, as shown in Fig. 1, and completes an electric circuit between the conductors 19 and 35.

The fulcrum part 30 forms a bridge over which the member 16 is flexed by the tension placed upon the wires 20 and 21 by the strut 22, which latter also forms a bridge for deflecting the wires between the fulcrum part 30 and the end 15 of the frame.

The switching means, shown in Fig. 1, forms a closed electric circuit between the conductors 19 and 35 when the resilient member 16 is flexed by the tension upon the wires 20 and 21. When the tension upon the wires is released the member 16 moves toward its normal position and out of contact with the plate 30 on the screw 31, thus opening the circuit.

The lower bar 13 of the frame is provided with an enlarged lug forming a base 36, for the attachment of a casing 38. The casing 38 is attached to said base by means of a screw 39, which engages a sleeve 40, formed of insulating material, and secured in an aperture formed in the base 36, by a set screw 42, shown in Figs. 2 and 3. The base 36 is also insulated from the casing by a sheet of insulating material 43.

The lower surface of the base 36 is formed with a cylindrical surface corresponding to the shape of the casing 38, as shown in Fig. 3. By this construction the frame 10 is self centering within the casing 38, and they may be secured together by means of one screw, thus making the casing readily detachable from the frame.

The casing 38 is provided with flanges 45 by which it may be secured to a ceiling, or wall. The casing is formed of metal having perforations for the free circulation of air, whereby any changes in the temperature of the surrounding air will affect the thermal elements.

The switching means shown in Fig. 7, is constructed for maintaining an open electric circuit. A resilient member 50 has one end thereof secured in the end of the frame 10. When the free end of the member 50 is flexed by the tension upon the wires 20 and 21, it is held out of contact with the terminal 51, thus opening the circuit. When the tension is released the member 50 moves toward its normal position and makes contact with the terminal 51, which latter is electrically insulated from the frame, and is connected with the conductor 52 of the electric circuit. The other conductor 53 is electrically connected with the frame by means of the bolt 54, which latter is not insulated from the frame. The member 50 is electrically connected with the conductor 53 through the frame as well as through the bolt 54.

The longitudinal bars 12 and 13 of the frame 10 are of large diameter so that sudden changes in the temperature of the surrounding air will act slowly upon the frame and will not increase its length within a short period of time. The wires 20 and 21 are extremely small in diameter and will be quickly increased in length when a rapid rise in temperature in the surrounding air takes place.

The frame 10, and the wires 20 and 21, form relatively movable thermal elements, which will hold the resilient member 16 in the flexed position during slow changes in the temperature of the air. In the event of fire the air will be increased in temperature, and should the rate of rise in temperature be sudden the thermal element, comprising the wires 20 and 21, will expand rapidly, relatively to the frame, and release the tension of the wires upon the resilient member, which latter will move toward its normal position and actuate the switching means for controlling the electric circuit for giving an alarm.

In the event of a slow smouldering fire, the rate of rise of the temperature of the air surrounding the device may be so slow that the thermal elements will not have sufficient relative movement to allow the resilient member to move into the operative position, in which event the strut 22, which is made of metal fusible at a predetermined temperature, will melt and release the tension upon the wires 20 and 21 and thus allow the resilient member to move toward its normal position and operate the switching means for giving an alarm.

My novel thermostatic switch will operate as a rate of rise of temperature device for giving an alarm in the event of a fire causing a sudden increase of temperature and will also operate as a fixed temperature device when the temperature is slowly increased to a predetermined temperature.

I claim:—

1. A thermostatic switch having in combination a resilient member normally assuming one position and adapted to be flexed from its normal position, switching means controlled by said member when the latter is in its normal and flexed positions, relatively movable thermal members operatively associated with said resilient member and arranged for holding the latter in the flexed position under normal temperatures and for permitting the resilient member to assume its normal position upon a sudden rise in temperature, and actuate the switching means, and a part formed of metal fusible at a predetermined temperature aranged for applying tension to one of said thermal members at temperatures below said predetermined temperature and for releasing the tension upon said last mentioned thermal member upon the fusing of said part.

2. A thermostatic switch having in combination a resilient member normally assuming one position and adapted to be flexed from its normal position, switching means controlled by said member when the latter is in its normal and flexed positions, a thermal tension member responsive to a sudden rise of temperature, said tension member connected with said resilient member and arranged for holding said resilient member in the flexible position under normal temperatures and for permitting the resilient member to assume said normal position upon a sudden rise in temperature, and a strut formed of metal fusible at a predetermined temperature arranged for deflecting said tension member from a normal position at temperatures below said predetermined temperature and for releasing the tension upon said tension member upon the fusing of the strut.

3. A thermostatic switch having in combina-

tion a resilient member normally assuming one position and adapted to be flexed from its normal position, switching means controlled by said member when the latter is in its normal and flexed positions, a thermal tension member responsive to a sudden rise of temperature, said tension member connected with said resilient member and arranged for holding said resilient member in the flexed position under normal temperatures and for permitting the resilient member to assume said normal position under a sudden rise in temperature, a strut formed of metal fusible at a predetermined temperature, and means adjustably mounting said strut relatively to the tension member arranged for applying tension to the tension member at temperatures below said predetermined temperature and for releasing the tension upon said tension member upon the fusing of the strut.

4. A thermostatic switch having in combination, a frame, a resilient member mounted upon the frame and adapted to be flexed from its normal position, switching means controlled by said member when the latter is in its normal and flexed positions, a thermal responsive member connected with said resilient member and forming a thermal element movable relatively to the frame and responsive to a sudden rise of temperature, and a part formed of metal fusible at a predetermined temperature mounted upon the frame and arranged for applying tension to said thermal member at temperatures below said predetermined temperature, and for releasing the tension upon said thermal member upon the fusing of said part.

5. A thermostatic switch comprising a frame formed of longitudinal bars and end members connecting said bars, a resilient member secured in one of said end members, wires attached to said resilient member and to the opposite one of said end members, a strut formed of metal fusible at a predetermined temperature, said strut located upon the wires and forming a bridge located between the opposite points of attachment of said wires, means adjustably mounted upon the frame and engaging said strut for applying tension to the wires, and contact members mounted upon the frame and located in operative relation with said resilient member.

6. A thermostatic switch comprising a frame formed of longitudinal bars and end members connecting said bars, a resilient member secured in one of said end members, wires attached to said resilient member and to the opposite one of said end members, a strut formed of metal fusible at a predetermined temperature, said strut located upon the wires and forming a bridge located between the opposite points of attachment of said wires, means adjustably mounted upon the frame and engaging said strut for applying tension to the wires, contact members mounted upon the frame and located in operative relation with said resilient member, a base formed upon said frame, a casing enclosing the frame and fastening means detachably securing the casing to the frame.

WILLIAM B. GRIFFITH.