Sept. 15, 1931. J. E. BRITT 1,823,345

THERMOSTATIC SWITCH

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Fig. 1.

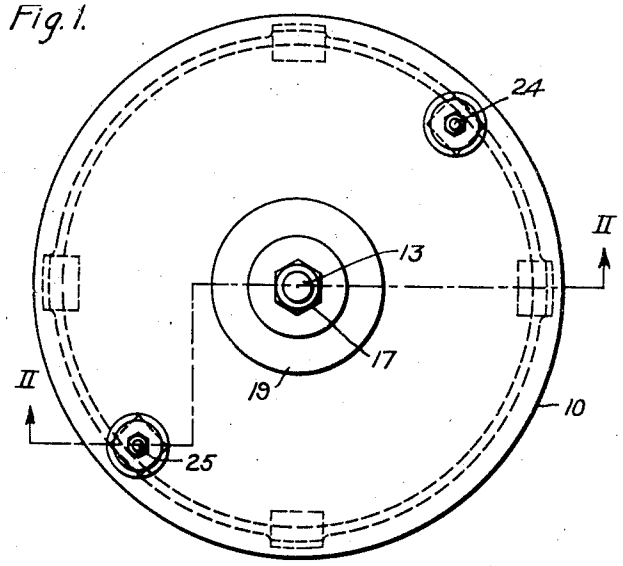


Fig. 2.

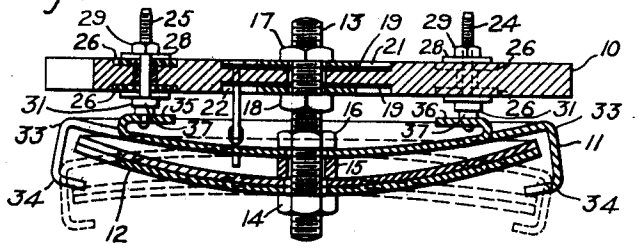
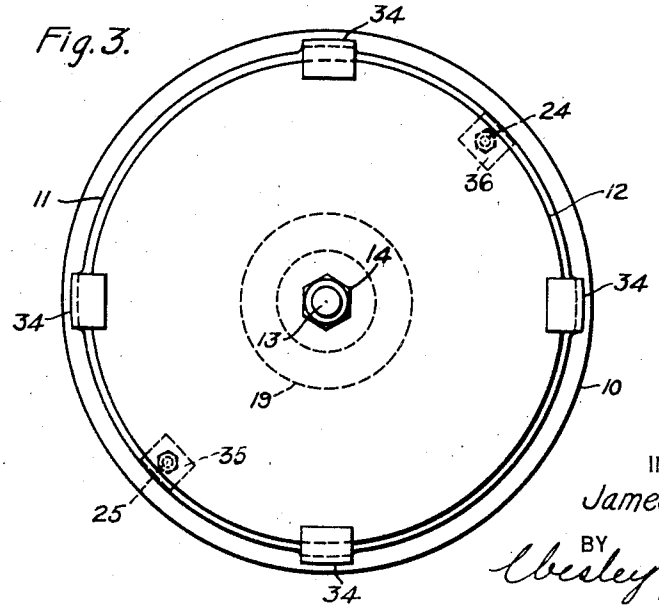


Fig. 3.



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Fig. 4.

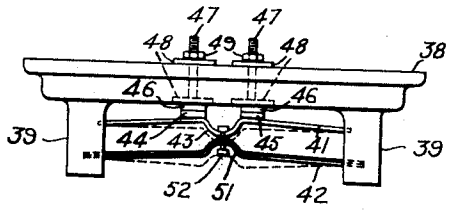


Fig. 5.

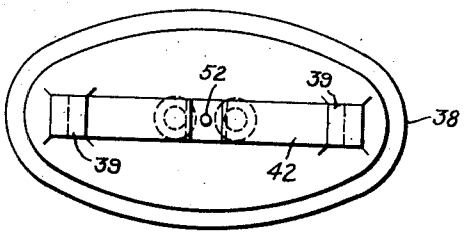


Fig. 6.

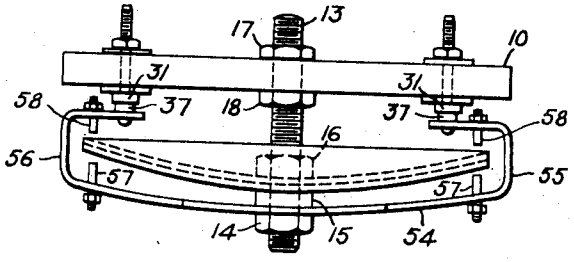
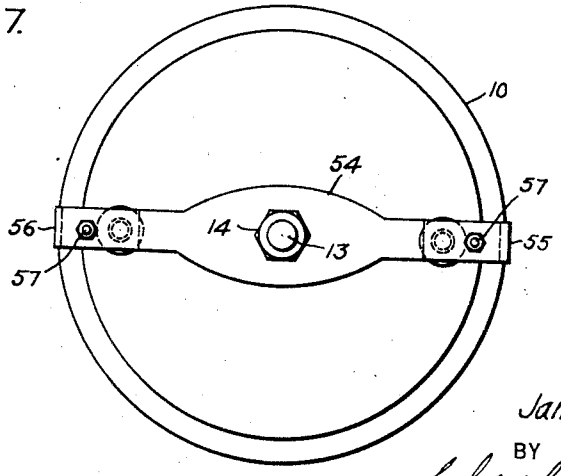


Fig. 7.



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UNITED STATES PATENT OFFICE

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THERMOSTATIC SWITCH

Application filed July 30, 1927. Serial No. 209,415.

My invention relates to thermostatic devices and particularly to thermostatic switches of the quick-make-and-break type.

An object of my invention is to provide a thermostatically actuable switch that shall be rigid, compact and simple in construction.

Another object of my invention is to provide for quick break and make of the contacts of a switch structure by causing a snap-acting thermostatic member to actuate resilient contact-actuating means.

And a further object of my invention is to provide a thermostatic switch in which positive contact pressure is maintained between the contact members until the instant of disengagement.

In practicing my invention, I provide a switch that comprises, in general, a resilient contact member, a thermostatic snap-acting member, a support for said members and means for causing the snap-acting member to impart a snap movement or motion to the resilient member.

For a fuller understanding of my invention reference may be had to the following description, taken in conjunction with the accompanying drawings, in which,

Figure 1 is a top plan view of one embodiment of my invention.

Fig. 2 is a view, in section, taken on lines II—II of Fig. 1.

Fig. 3 is a bottom plan view of the same device.

Fig. 4 is a view, in front elevation, of the modification of the device embodying my invention.

Fig. 5 is a bottom plan view thereof.

Fig. 6 is a view, in front elevation, of a still further modification of the device embodying my invention, and

Fig. 7 is a bottom plan view of the same device.

In Figs. 1 to 3 is illustrated a thermostatic switch that comprises a base 10, a resilient member 11, and a snap-acting bimetallic disc 12. The resilient member and the disc may be secured to the base by a bolt 13 and cooperating nuts 14 to 18, inclusive. The bolt 13 may be insulated from the base by means of washers 19 of insulating material located in recesses 21 and 22 provided in the base.

The base is provided with terminal bolts 24 and 25 that extend therethrough and are insulated therefrom by washers 26 of suitable insulating material located in recesses provided in the top and bottom sides of the base. The terminal bolts may be held securely in place by means of washers 28 and nuts 29. As shown, the heads 31 of the bolts are located on the bottom side of the base and form the stationary contacts for the switch, the body portion of the bolts extending above the nuts 29 and forming the terminals of the switch.

The resilient disc 11 may be made from a blank of such metal as monel, nickel-steel or other suitable material. The rim of the blank may be provided with two substantially right-angle bends 33 and 34 to form a section of substantially L shape (see Fig. 2). As shown, a portion of the rim of the disc extends inwardly towards the bolt 13 from the right-angle bend 34.

The resilient disc may be provided with contact-supporting members 35 and 36 that may be formed by punching and bending in any manner well known in the art. The members 35 and 36 are provided with contact buttons or tips 37 that co-operate with, and normally engage, the stationary contacts 31. In order that the disc or resilient member 11 may cause the contact members 37 to normally engage the stationary contacts 31 and, in order that the member may have two opposed limiting positions, it may be drawn or pressed into a saucer or cup-like structure; that is, the surface from the right-angle bend 33 towards the center of the disc may be made slightly spheroidal, as shown in Fig. 2.

As shown, in Fig. 2 of the drawings, the bimetallic disc 12 is located directly beneath the spheroidal portion of the resilient member 11 and is of such dimensions that the periphery thereof will engage the portion extending inwardly from the right-angle bend 34, when the disc 12 is actuated to its opposed limiting position, illustrated by the broken lines of Fig. 2.

The disc 12 may be of the type disclosed in the patent to Spencer No. 1,448,240 the characteristics of which are such that, when the disc is normally cool, it assumes one limiting position, illustrated by the full-line position of Fig. 2, and an opposed limiting position, illustrated by the broken-line position of the same figure when heated to a temperature of a predetermined value.

When the disc 12 is below a predetermined temperature, the resilient member 11 is in the position shown in Fig. 2 of the drawings so that engagement is effected between the contacts 31 and 37. If the disc is heated to a predetermined temperature of a higher value, it will be caused to deflect to the broken-line position with a snap motion, causing the resilient member 11 to be actuated to its broken-line position by impact between the periphery of the disc 12 and the portion extending inwardly from the right-angle bend 34. Thus, disengagement of the contacts 37 from the co-operating stationary contacts 31 is effected with a positive snap movement.

Since the resilient member 11 is provided with a substantially spheroidal surface, the member will remain in its broken-line position, and the contacts will be held in a disengaged or open-circuit position. Re-engagement of the contact members may be effected when the disc 12 is cooled to the first-named temperature, at which temperature the disc will be caused to make impact with the resilient member 11 to thereby actuate it with a snap movement to the full-line position, in which position the contact members are in engagement.

In Fig. 4 of the drawings, a modification of the thermostatic switch illustrated in Figs. 1 to 3 is shown that comprises a base 38 having depending lug portions 39 a resilient contact-actuating member 41, and a thermostatic member 42.

The resilient member 41 comprises a strip of single-metal material having a deformed middle portion 43 of substantially U-shape. The resilient member may be provided with contacts 44 and 45 located one on each side of the portion 43. As shown, the member 41 is bowed upwardly so that the contacts 44 and 45 normally engage a pair of stationary contacts 46 having terminal bolts 47 secured thereto. The bolts 47 extend through the base and are secured thereto and insulated therefrom by means of insulating washers 48 and nuts 49.

The thermostatic member 42 comprises a strip having a deformed middle portion 51 substantially like the portion 43 of the strip 41 and may be made from bimetal having suitable thermal expansion characteristics. The thermostatic member is supported by the lug members 39 and is disposed in complementary relation to the member 41, so that, normally, the portions 51 and 43 may be substantially in engagement with each other, if so desired.

In order that the contact members 44 and 45 may be disengaged from the stationary contacts 46, when the thermostatic member 42 has been heated to a temperature of a predetermined value, a connecting lost-motion link 52 is provided. The connecting link 52 comprises a pin having a body portion and head portions located at each end thereof, the latter being located one on each side of the strips 41 and 42.

When the member 42 has been heated to a temperature of a predetermined value, it is caused to deflect downwardly to the position shown by the broken lines with a snap motion, causing the middle portion 51 to impact with the lowermost head of the link 52, thereby causing the strip 41 to be actuated downwardly with a sudden positive motion to effect disengagement of the contact members. When the strip 42 is cooled to a temperature of a predetermined value, it is caused to deflect upwardly to effect re-engagement of the contact members by impact of the portion 51 with the portion 43 of the resilient strip 41.

In Figs. 6 and 7 parts similar to those of Fig. 1 are illustrated by like numerals. In these figures, a resilient member 54 comprises a strip of resilient spring steel or other suitable material having end portions 55 and 56 of substantially L-shape. As shown, an enlarged middle portion 55 thereof is secured to the bolt 13 beneath the thermostatic disc 12. The strip may be of such shape that the contact members 37 normally engage the stationary contacts 31.

When the temperature of the thermostatic disc 12 reaches a predetermined value, it deflects in such direction that the curvature thereof is reversed, thereby causing the rim portion of the disc to so impact with adjustable lugs 56 secured to the strip 54 that disengagement is effected between the contacts 37 and 31, substantially in the manner hereinbefore set forth for the device illustrated in Figs. 1 to 3. When the disc 12 has cooled to a temperature of a predetermined value it deflects to the position illustrated in Fig. 6 causing the upper side of the disc to impact with adjustable lugs 58 that are secured to the strip 54 adjacent to the contacts 31 and 37.

By my invention, I have provided a thermostatic switch that comprises a resilient contact-actuating member and a snap-acting thermostatic member for causing the resilient contact-supporting member to be actuated from one position to another with a positive snap motion in such manner that positive engagement and disengagement may be effected between the contacts actuated thereby and co-operating stationary contacts.

Various modifications may be made in the

device embodying my invention without departing from the spirit and scope thereof. I desire, therefore, that only such limitations shall be placed thereon as are imposed by the prior art and the appended claims.

I claim as my invention:

1. A thermostatic circuit-controlling device comprising a support, a resilient member carried thereby, contact members carried by said resilient member and thermostatic means having a snap-action motion characteristic for controlling the position of said resilient member.

2. A thermostatic circuit-controlling device comprising a support, a resilient member carried thereby, contact members carried by said resilient member and a thermostatic element having a snap-action motion characteristic carried by said support, and means cooperating with said element and resilient member for causing said resilient member to be actuated with a snap motion from one position to another.

3. A thermally-actuable circuit-controlling device comprising a support, a resilient metal member carried thereby, contact members carried by said resilient member, a snap-acting bimetallic element carried by said support, said element being adapted to move between two limiting positions with a snap motion and means for imparting motion to said resilient member from said bimetallic element whereby the positions of said contact members may be controlled.

4. A thermally-actuable device comprising a support, a snap-acting metal element carried thereby, contact members carried by said element, a snap-acting bimetallic member supported in close proximity to said metal element, and means carried by said metal element and located in the path of movement of the bimetallic member for causing movement of said contact members from one position to another in response to impacts between the bimetallic member and said means.

5. A thermostatic switch comprising a metal snap-acting disc, contact members actuable thereby, a snap-acting bimetallic disc and a common support for said discs, said bimetallic disc being adapted to effect movement of the metal disc by impact therewith.

6. A thermostatic switch comprising a base, contact members secured thereto, a resilient member supported from said base, said member having contact members thereon normally engaging said first named contacts and a snap-acting bimetallic disc located in close proximity to said resilient member for causing movement thereof by impact therewith, whereby disengagement of said contact members may be effected with a snap motion.

7. The combination with a base, contact members insulatedly mounted thereon and a resilient snap-acting metal member supported from said base, said member being provided with contact members normally engaging said insulatedly mounted contact members, of a snap-acting bimetallic disc supported from said base for impacting with said resilient member to effect disengagement of said contact members with a snap motion when one temperature obtains in the said disc and for reengaging said contact members when another temperature obtains therein.

8. A quick make-and-break switch comprising a support, contact members secured to said support, a primary snap-acting thermostatic element carried by said support, a secondary snap-acting element, contact members carried thereby for cooperating with said first named contact members, said thermostatic element being adapted to actuate said secondary element from one position to another with a sudden snap motion.

9. A quick make-and-break switch comprising a support, a primary thermostatic element capable of assuming either one of two extreme stable positions in response to predetermined thermal conditions, means for securing said element to said support and a secondary element adapted to assume either one of two extreme stable positions, said primary element being operable to actuate said secondary element from one stable position to another.

10. In a thermostatic switch, a primary snapping element thermally actuated, a secondary snapping element adapted to be actuated by said thermally actuated primary element, contact members carried by said secondary element, a support for said snapping elements, and contact members carried by the support for cooperating with said first named contact members.

In testimony whereof, I have hereunto subscribed my name this 22nd day of July, 1927.

JAMES E. BRITT.