

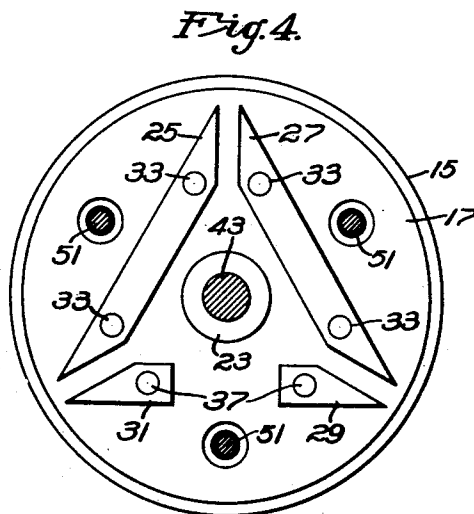
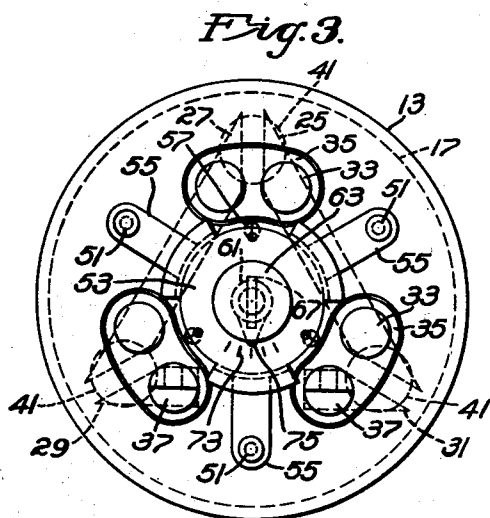
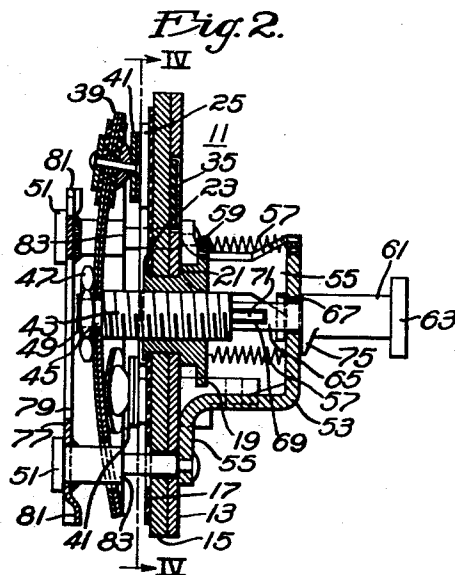
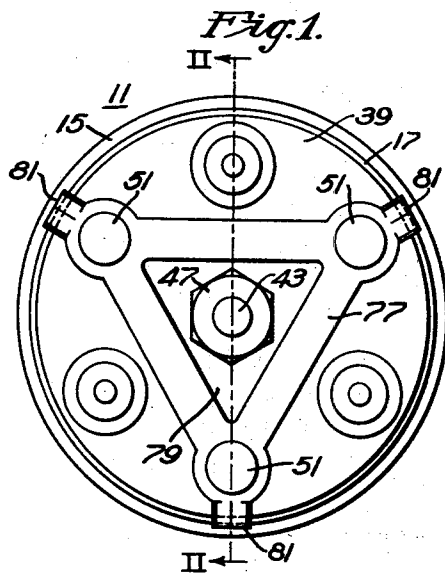
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P. R. LEE

2,032,136

MANUAL RESET THERMOSTAT

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WITNESSES:

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2,032,136

MANUAL RESET THERMOSTAT

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5 Claims. (Cl. 200—139)

My invention relates to temperature control and particularly to thermally actuatable temperature-limiting devices.

An object of my invention is to provide a relatively simple temperature-limiting device having means for reclosing the same manually only.

Another object of my invention is to provide means which may be easily and quickly added to a standard thermal relay to provide a manually reclosable temperature-limiting device.

Another object of my invention is to provide a single means to adjust and reset or reclose a thermally actuatable switch.

Other objects of my invention will either be specifically pointed out hereinafter in the course of a description of one form of device embodying my invention, or will be apparent without further description.

My device relates more particularly to those thermal relays or thermally actuatable switches which are so designed and constructed as to open or interrupt an electric circuit in which they are connected, upon the occurrence of an unduly high temperature and to remain open until manually reclosed by an operator.

In practicing my invention, I provide a base, fixed contacts thereon, a snap-acting bimetallic disc supported from the base by a central stud having screw threaded engagement with the base, and a plurality of headed stop pins supported by a dished shell-like member and movable axially relatively to the base. A plate of skeleton form is mounted on and supported by the headed stop pins to operatively engage the actuated bimetallic disc. The shell is yieldingly urged toward the base by springs and a single member in the form of a knob is provided in operative engagement with the shell and the stud to adjust the position of the stud on the base and to move the shell, the headed stop pins, and the resetting plate.

In the accompanying single sheet of drawing, Figure 1 is a view in front elevation of a device embodying my invention;

Fig. 2 is a view in section therethrough taken on the line II—II of Fig. 1;

Fig. 3 is a view in rear elevation of the device of Fig. 1; and

Fig. 4 is a view in section therethrough taken on the line IV—IV of Fig. 2.

A thermal relay or thermally actuatable switch 11 includes a base comprising an outer metal disc 13, an inner metal disc 15 and a disc of electric-insulating material 17 disposed next to the disc 15 and which may be made, for instance, of mica. A metal bushing 19 extends through a

center opening in the discs 13, 15 and 17 and is provided with a shoulder portion 21 intermediate its ends, while the outer end thereof may be headed over as shown at 23 in order to hold the three discs in proper operative positions relatively to each other, namely, in close engagement as is shown more particularly in Fig. 2 of the drawing. It may be here noted that the bushing 19 is provided with a central screw threaded opening therethrough for a purpose to be hereinafter referred to. While I have shown two metal discs 13 and 15, I do not desire to be limited thereto, as I may use a single metal disc and the disc 17 of electric-insulating material.

A plurality of fixed contact members insulatedly mounted against the inner face of mica disc 17 include two contact members 25 and 27 and two contact terminals 29 and 31. Contact plates 25 and 27 are suitably secured or held in place by a pair of rivets 33, the inner ends of which are suitably insulated from disc 15 by smaller sheets or plates 35 of mica, the rivets 33 having portions thereof which are headed over against the outer surface of the respective plates 35. A substantially similar construction is utilized for holding the contact terminals 29 and 31, terminal rivets 37 being provided one for each of the contact terminals which are so shaped as to permit of connecting thereto circuit leads not shown specifically in the drawing.

A snap-acting dished bimetallic disc 39 of the kind disclosed and claimed in Patent No. 1,448,240 to J. A. Spencer is provided and is preferably made of such material and so designed and constructed that it will open or be actuated from its initial position to its open position upon a certain change in its temperature but that it will not reclose or return to its initial position by reason of a change of temperature to substantially the original value.

A plurality of contact bridging members 41 are insulatedly mounted on and supported by the disc 39 in a manner now well known in the art. One of the three contact bridging members 41 engages terminal member 31 and one end of terminal plate 25, the second bridging member engages adjacent ends of the respective terminal plates 25 and 27, while the third bridging member engages the other end of contact plate 27 and contact terminal 29. The bimetal disc 39 is shown in its normal position which it occupies while the temperature is normal or has not reached a critical value at which the disc will move with a snap action from the position shown in Fig. 2 of the drawing to the oppositely dished

position, when the contact bridging members 41 will have been moved out of engagement with the fixed contact plates and contact terminals.

Means for adjustably supporting the bimetallic disc 39 from the base is provided in the form of a stud 43 having screw threads on its outer surface engaging the screw threads in the central opening in the member 19. The outer end of stud 43 has a reduced portion as shown at 45 in Fig. 2 of the drawing, a thin nut 47 being secured thereon, as by riveting over or upsetting the end of portion 45 as shown at 49, so that the disc 39 is loosely mounted on the reduced portion 45, whereby it can snap freely from one to the other of its two opposed limiting positions.

As it is desired to return the disc 39 from its actuated position to its original position by manual means, I provide a plurality of headed plural-diameter stop pins 51, here shown as three in number, which extend loosely through the base and also loosely through the bimetallic disc 39. Means for holding the three stop pins includes a dished shell 53 disposed on the outer face of base 13 and having three radially extending legs 55 into which the reduced end portions of the stop pins 51 extend and against which they are riveted in the manner shown in Fig. 2 of the drawing. Means for yieldingly urging the shell and the stop pins to the position shown in Fig. 1 of the drawing includes a plurality of springs 57 having one end thereof secured to a flange 59 on member 19 while the other end thereof is secured to the central portion of shell 53 in substantially the manner shown in Fig. 2 of the drawing. These springs urge the shell and the stop pins fixedly mounted thereon toward the left, as seen in Fig. 2 of the drawing, so that the stop pins will permit of the bimetallic disc 39 moving to its oppositely dished position to interrupt a circuit controlled by the device.

Means for returning or momentarily moving the shell and the stop pins in such direction as to cause the bimetallic disc to reclose its controlled circuit includes a stud 61 having a knob 63 thereon, stud 61 having a reduced portion 65 extending through an opening in the central part of shell 53 and being held by a laterally-extending pin 67 so that the stud 61 can be turned relatively to the shell but can also be used to pull the shell axially of the thermal switch. The inner end of reduced portion 65 is provided with a lateral slot 69 therein adapted to fit over a tongue 71 provided on stud 43, so that turning movement of stud 61 by head 63 thereon will vary the position of stud 43 relatively to the base, thereby varying the critical temperature of the bimetallic disc 39 at which it will snap to its open position. Scale indications 73 may be provided on the shell and the stud 61 may have a pointer 75 associated therewith to indicate the operating temperatures corresponding to the different positions of stud 61. The axial depth of slot 69 and of tongue 71 is made such that stud 61 and shell 53 can be moved to the right as seen in Fig. 2 of the drawing without disengagement of the tongue 71 from slot 69.

While it is possible to utilize the headed stop pins 51 to engage the disc 39 directly to cause the disc to return to the position shown in Fig. 2 of the drawing, I have found it advisable to provide a skeleton plate 77 fixedly mounted on and supported by the headed stop pins 51. This skeleton plate may be of substantially triangular form having a central cutout portion 79, shown more particularly in Fig. 1 of the drawing, in order to

reduce its thermal mass. The plate 77 is provided with three end portions 81 which are bent laterally out of the plane of the plate and toward the disc 39 so that these deformed end portions only will engage the disc at its outer periphery when an operator pulls upon the knob 63 to cause reclosing of the switch.

The temperature at which the disc 39 will move from the position shown in Fig. 2 of the drawing to its oppositely dished position depends not only upon the material of the disc and the heat treatment previously given to the disc, but also upon the amount of dish which the disc may have. A bimetallic snap-acting disc of this kind may have a characteristic such that if it is to open a circuit upon increase of temperature of the disc 39, it will operate, when not mounted in a thermal switch, at, say, 200° F. By adjusting the stud 43 upon which it is mounted to reduce this initial dish, the temperature at which it will open may be reduced to, say, 150° F. It is to be noted that these values are not to be considered as limiting my invention in any way but are merely for illustrative purposes. I further design and construct the bimetallic disc 39 so that the lower temperature at which it would normally return to the position shown in Fig. 2 of the drawing is well below any temperature to which the device will be subjected under ordinary operating conditions.

It is, therefore, evident that when the ambient temperature, or more particularly the temperature of the bimetallic disc 39, has reached a predetermined value, in this case say 150° F., the disc 39 will move to its opposite limiting position and will remain there even though the temperature be reduced to the initial normal lower value. In order to reclose the switch, it is necessary for an operator to pull on the knob 63, whereby the portions 81 of plate 77 will engage the disc 39 and cause it to snap to the position shown in Fig. 2 of the drawing. The movement of knob 63 and of the parts associated therewith may be limited by shoulders 83 on the stop pins 51, which shoulders abut against one face of base plate 15 when moved by an operator as described.

It is further obvious that the bimetallic disc 39 can be so designed and constructed that it may be used in a refrigeration device, that is, where it will open a circuit when a predetermined lower temperature has been reached and I desire to have it understood that the device embodying my invention can be used for either general purpose.

The knob 63 and the stud 61 constitute a single means for not only varying the position of the central portion of the disc 39 relatively to the base, whereby the operating temperature of the disc or switch is adjusted, but also constitutes a means for resetting the bimetallic disc to its initial position in which the circuit controlled thereby is closed.

The device embodying my invention thus provides a relatively simple piece of apparatus effective for the desired purpose, namely, to provide a relatively simple construction embodying a minimum number of parts to constitute a thermally openable and manually reclosable switch.

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

I claim as my invention:

1. In combination with a base, fixed contacts 76

thereon, a snap-acting bimetal disc having contacts thereon cooperating with the fixed contacts, means supporting the disc centrally thereof from the base, a plurality of stop pins extending through the disc and the base, a member adjacent to the base at that side opposite to the disc and having the stop pins secured thereto, and spring means to yieldingly hold said member against the base, whereby said member together with said stop pins may be moved as a unit against the pull of the spring means.

2. In a thermally actuatable switch, in combination with a base, fixed contacts at one side of the base, a stud extending through the base, a snap-acting bimetal disc supported axially thereof on the stud, and contact members on the disc cooperating with the fixed contacts, of a plurality of headed stop pins extending through the disc and slidable in the base, a dished shell adjacent to the base on the side opposite to the disc and having one end of the respective stop pins fixedly secured thereto, springs normally yieldingly urging the shell against the base and the heads of the headed pins away from the base and the bimetal disc, and a knob on the shell to manually move it and the stop pins against the pull of the springs.

3. In a thermally actuatable switch, in combination with a base, fixed contacts thereon, a stud extending through the base and in engagement therewith, a bimetal disc supported on the stud at one end thereof by its central portion and contact members on the disc cooperating with the fixed contacts, a plurality of headed stop pins extending through the disc to limit its movement away from the base and movable relatively to the base, a plate mounted on and supported by the stop pins and a manually-actuatable means secured to the stop pins and yieldingly urged in one direction to move the stop pins and the plate toward the base.

4. In a thermally actuatable switch, in combination with a base, fixed contacts thereon, a stud extending through the base and having screw-threaded engagement therewith, a bimetal disc supported on the stud at one end thereof by its central portion, and contact members on the disc cooperating with the fixed contacts, of a plurality of headed stop pins extending through the base and the disc to limit the movement of a part of the disc away from the base, a shell located on the side of the base away from the disc and having the stop pins secured thereto, springs urging the shell against the base and a stud-adjusting and shell-moving knob operatively associated with the stud and the shell.

5. In a thermally actuatable switch, in combination with a base, fixed contacts thereon, a stud extending through the base and having screw-threaded engagement therewith, a snap-acting bimetal disc supported at its central part on the stud and having its peripheral part adapted to move away from the base, and contact members on the disc cooperating with the fixed contacts on the base, of a plurality of headed stop pins extending through the base and the disc, a plate loosely mounted on the headed stop pins adjacent their ends and supported thereby and having deformed edge portions adapted to engage the outer edge portion of the disc, a shell having the other ends of the stop pins secured thereto to support the same, springs connecting the shell and the base to yieldingly urge the shell and the stop pins in one direction, and a knob operatively associated with the shell having a turning movement relatively thereto and having a tongue and slot connection with the stud to effect adjustment of the operating temperature of the disc by a turning movement of the stud and to cause the plate on the studs to engage the disc and return it to its initial position.

PAUL R. LEE.