

Dec. 1, 1931.

E. BLETZ

1,834,375

CLOSE CONTROL THERMOSTAT

Filed Dec. 19, 1930

*Fig. 1.*

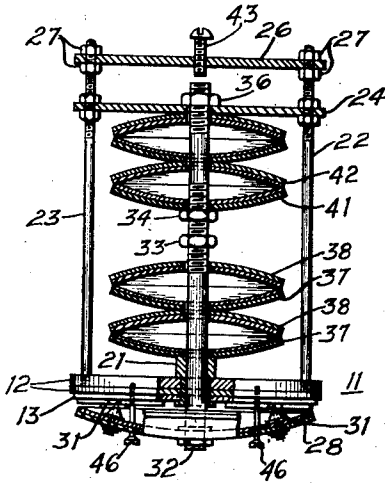


*Fig. 2.*

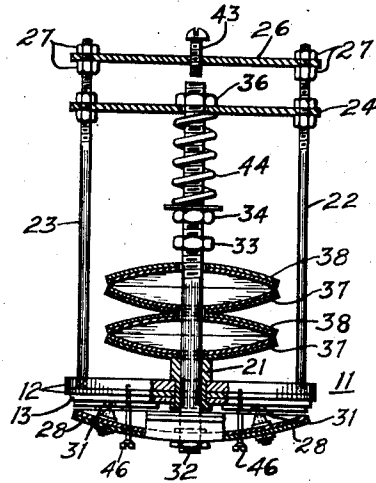


*Fig. 3.*

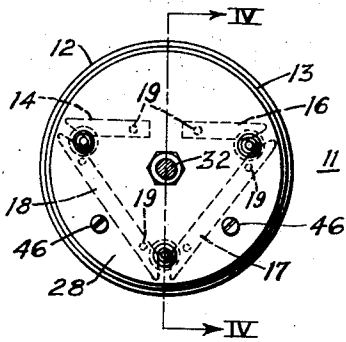


*Fig. 4.*

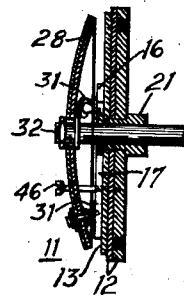
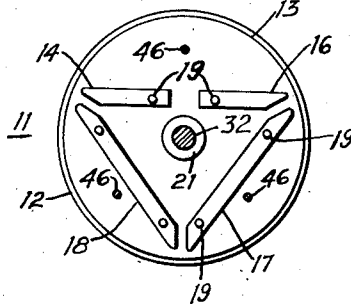


*Fig. 5.*



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## UNITED STATES PATENT OFFICE

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## CLOSE CONTROL THERMOSTAT

Application filed December 19, 1930. Serial No. 503,437.

My invention relates to thermal devices, and particularly to thermally actuated switches.

5 An object of my invention is to provide a thermally-actuable switch having an actuating element which has a normally large temperature differential of operation between its two extreme positions with means that shall tend to reduce the temperature differential of operation.

10 In practicing my invention, I provide a snap-acting disc of the general kind disclosed and claimed in Patent No. 1,448,240 to J. A. Spencer, with thermally-actuable means for shifting the position of the mounting of the disc relatively to its base.

In the single sheet of drawings:

20 Figure 1 is a view, partially in side elevation and partially in section, of a device embodying my invention,

Fig. 2 is a view, partially in side elevation and partially in vertical section, through a modified form of device embodying my invention,

25 Fig. 3 is a bottom plan view of the device shown in Fig. 1,

Fig. 4 is a sectional view of the device embodying my invention taken on the line IV—IV of Fig. 3, and

30 Fig. 5 is a bottom plan view of the base of a device embodying my invention, the disc being removed.

Referring first to Fig. 1 of the drawings, I have there illustrated a substantially circular base assembly 11 which may be of substantially the kind disclosed and claimed in Patent No. 1,697,886 to J. A. Spencer, including, more particularly, one or more metal discs 12 and a disc 13 of electric-insulating material, such as mica, secured against its outer face, and four fixed terminal and contact members 14, 16, 17 and 18 which are suitably secured against the outer surface of the mica sheet 13 by a plurality of insulated rivets 19.

45 The sheet of mica 13 and the discs 12 of metal are secured together by a tubular rivet 21 which extends beyond the inner face of the base in order to constitute a guide.

50 A pair of rods 22 and 23 have correspond-

ing ends in screw-threaded engagement with the base 11 and have a pair of cross-bars 24 and 26 adjustably mounted on their upper ends to be held in any adjusted position by cooperating nuts 27.

55 A snap-acting bimetal disc 28, of the kind disclosed and claimed in Patent No. 1,448,240 to J. A. Spencer, has three contact bridging members 31 insulatedly mounted thereon, which are adapted to engage the ends of the fixed contact terminals 16, 17, 17, 18, and 18, 14. The disc 28 is adjustably supported by a central stud 32, a portion of which moves within the tubular rivet 21, the disc 28 being loosely supported on the stud or rod 32. At its upper end, the rod 32 is provided with screw threads for receiving a plurality of adjusting nuts 33, 34 and 36.

Cooperating bimetallic discs 37 and 38 are strung on the rod 32 immediately above the tubular rivet 21 and between it and nut 33 which is out of engagement with the uppermost disc 38 at room temperatures. The discs 37 and 38 have the high-expansion component located on the outside of the dished disc so that, upon temperature increase of the disc, it will bow in such manner as to increase the depth or the amount of dish thereof.

Between nut 34 and cross-bar 24, similar sets of dished bimetallic discs 41 and 42 are provided, except that the low-expansion component thereof is on the outside of the dished disc and the high-expansion component is on its inside.

85 A stop 43 is provided, in the form of an adjustable screw extending through cross-bar 26 and normally out of engagement with the upper end of stud 32.

Referring to Fig. 2 of the drawings, I have there shown a device similar to that shown in Fig. 1 of the drawings, except that a spring 44 is utilized instead of the dished bimetal discs 41 and 42. In all other respects, the device is the same as was described in connection with Fig. 1 of the drawings.

95 Stop screws 46 extend through the disc 28 and into the base 12 in order that it may be possible to vary the value of the other operating temperature, as will be hereinafter set forth.

In the assembly and adjustment of the device, after the dished discs 37, 38, nuts 33 and 34 and dished discs 41, 42 having been located in substantially the positions shown in the drawings, the initial adjustment is made by turning nut 36 to such an extent as to effect an initial engagement between contact-bridging members 31 and the fixed terminal members on the base. Nut 34 is then turned toward nut 36, and bar 24 and nut 33 are adjusted to substantially the positions shown in the drawings.

It is obvious that it is impossible to give dimensions in inches, as the operating characteristics of disc 28 and of discs 37, 38, 41 and 42 may, and will, vary and also the desired operating temperature values may be different.

The operation of the device is substantially as follows: upon an increase of the temperature of the ambient air or other material surrounding the device, the snap-acting disc 28 will undergo slow initial deformation which, if the temperature change is continued, will ultimately cause it to snap over into the oppositely dished shape. The discs 41 and 42, which are not snap-acting, will contract, and discs 37 and 38 will expand so that the uppermost disc 38 will engage nut 33 and cause axial movement of stud 32. Axial movement of stud 32 will cause a decreased dishing of bimetal disc 28, thereby varying its operating characteristic at its upper limit of operation. That is, as the disc 28 is flattened, not only by the effect of its two components because of the variation of temperature thereof but also by the increased flattening caused by the floating support, the disc 28 will snap over sooner, that is, at a lower temperature than would be the case otherwise.

If it is desired to greatly reduce this upper temperature limit of operation, the nut 33 will be moved close to the uppermost disc 38, and screw 43 will be moved away from the end of stud 32. If, however, it is not desired to greatly reduce the temperature differential of operation, screw 43 will be initially set with a small gap between its end and the adjacent end of stud 32, and nut 33 will be moved initially away from uppermost disc 38.

If it be assumed that the disc 28 has been actuated to its opposed dished shape, and that the temperature now decreases, the discs 37 and 38 will flatten, and the discs 41 and 42 will increase in depth, thereby forcing the stud 32 downwardly and, as the stop screws 46 operate to limit the dish of disc 28 in the other direction, it will be evident that the disc 28 will snap back to the position shown in the drawings at a higher temperature than would otherwise be the case.

It is obvious that I may use a single metal spring 44 instead of the discs 41 and 42 and

still obtain the same general operation of the device.

The device embodying my invention thus provides a relatively simple and efficient device, including a snap-acting bimetal disc provided with a thermally controlled floating support to effect a reduction in the temperature differential of operation, in which both operating temperature values are changed, the device being entirely automatic in its operation.

Various modifications may be made in 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 a thermal switch including a base, contact members thereon, a snap-acting bimetal disc and contact members thereon cooperating with the contact members on the base, a thermally-controlled floating supporting means for said disc.

2. In a thermal switch including a base, a contact member thereon, a snap-acting bimetal disc normally having a relatively large temperature differential of operation, and a contact member on said disc cooperating with the contact member on the base, a thermally-controlled floating supporting means for the disc to reduce the temperature differential of operation.

3. In a thermal switch including a base, a contact member thereon, and a snap-acting bimetal disc operatively engaging and disengaging the contact member with a snap motion and normally having a relatively large temperature differential between its operation from one extreme position to another, means for reducing the temperature differential of the bimetal disc, said means including a thermally-actuable floating support for the bimetal disc effective to vary the position of the disc relatively to the base and the contact member thereon.

In testimony whereof, I have hereunto subscribed my name this 26 day of November, 1930.

EDWARD BLETZ.