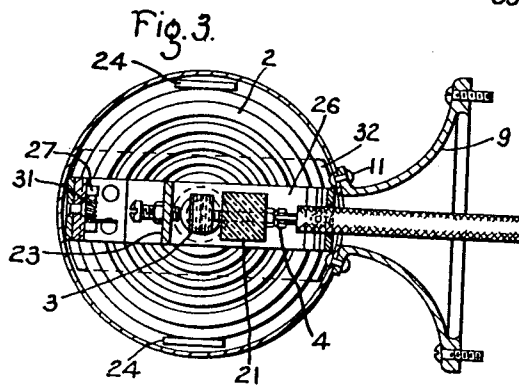
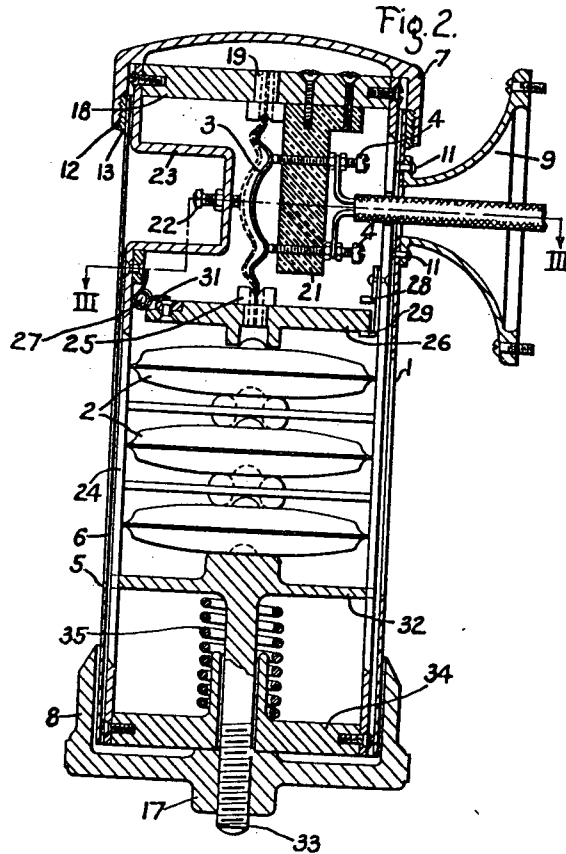
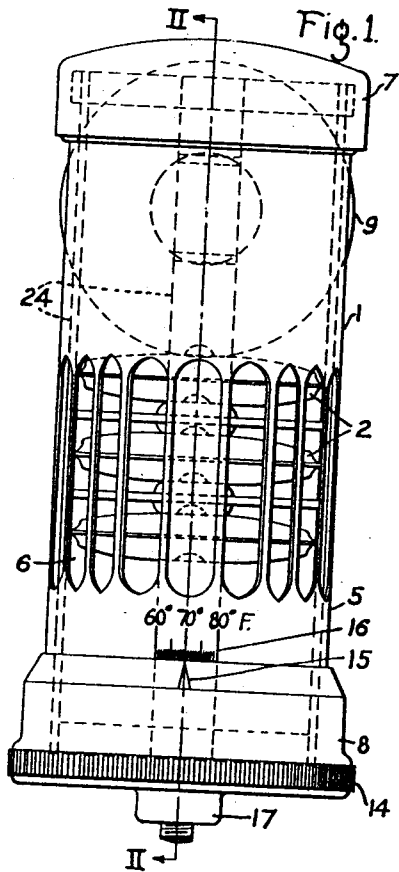


Aug. 14, 1928.

A. J. MOTTLAU
THERMOSTATIC REGULATOR

1,680,428

Filed April 25, 1924



WITNESSES:

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Patented Aug. 14, 1928.

1,680,428

UNITED STATES PATENT OFFICE.

AUGUST J. MOTT LAU, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

THERMOSTATIC REGULATOR.

Application filed April 25, 1924. Serial No. 708,915.

My invention relates to temperature controlling devices and particularly to thermostatic regulators.

One object of my invention is to provide a thermostatic regulator that shall be responsive to small changes in temperature.

Another object of my invention is to provide a thermostatic regulator that shall operate with a snap movement when subjected to a given accumulation of potential thermal energy.

It is also an object of my invention to provide a thermostatic regulator that combines the positive action obtained by using "sylvphon" cells with the snap movement obtained by using a pre-shaped spring contacting device.

In my copending application, Serial No. 704,989, filed April 8, 1924, I have shown and described a thermostatic regulator that is characterized by having a pre-shaped resilient member, or spring contactor that moves with a snap action when subjected to longitudinal pressure. In the present invention, I have adapted the spring contactor for use with sylphon cells.

In the accompanying drawings,

Figure 1 is an elevational view of a thermostatic regulator embodying my invention.

Fig. 2 is a view, partially in elevation and partially in section, of my thermostatic regulator taken along the section line II—II of Fig. 1.

Fig. 3 is a view, partially in cross section along the line III—III of Fig. 2, and partially in elevation, of my thermostatic regulator.

My invention comprises, in general, a casing 1 in which are mounted a plurality of thermal expansive "sylvphon" wafers or cells 2 that are constructed of flexible metal members filled with an expansible fluid, such as ether, and a spring contactor 3 that is actuated by movement of the "sylvphon" cells for the purpose of making and breaking an electrical circuit between contact members 4.

The casing 1 comprises a cylindrical member 5 of suitable material, such as brass, that is provided with a plurality of ventilating slots 6, a cap member 7, a bottom or end member 8 and a supporting flange 9 secured thereto by rivets 11. The flange 9 may be mounted on a wall or panel board and projects outwardly a sufficient distance to pro-

vide an air space entirely around the body portion of the casing 1. The cap member 7 is provided with threads 12 that engage threads 13 on the casing member 1 for the purpose of securing the members together.

The bottom portion 8 is provided with a knurled surface 14, an indicator 15 that cooperates with a scale 16 on the body portion 1 and a threaded boss 17 for a purpose hereinafter described. The cap member 7 supports a strap 18 in the center of which is inserted an insulating bushing 19. Secured to the underside of the strap 18 and extending downwardly therefrom is an insulating block 21 that carries and supports the contact members 4.

One end of the spring 3 rests in the bushing 19 and the axis thereof extends downwardly parallel with the face of the insulating block 21 and at right angles to the contact members 4. The contact members 4 are so threaded that their positions in the insulating block 21 and relative to the spring 3 may be adjusted. The configuration of the spring 3 is such that upon the application of longitudinal pressure thereto, it is caused to jump or snap outwardly into the position shown in broken lines in Fig. 2, thereby interrupting the circuit between the contact members 4. Outward movement of the spring 3 is limited by an adjustable stop screw 22 that is carried by a strap 23 secured to the strap 18 and to a framework 24 hereinafter referred to.

The lower end of the spring 3 is mounted in an insulating bushing 25 that is similar to the bushing 19 and is supported by a member 26 that is hingedly supported, as at 27. Stops 28 and 29, carried by the frame 24, limit the movement of the member 26. A coil spring 31 is wound about the pivot 27 for the purpose of retarding upward movement of the member 26 and for accelerating downward movement thereof.

The frame 24 heretofore referred to, supports the sylphon cells 2 in alignment with the casing 1 in such manner that the upper cell rests against the lower surface of the member 26. The several cells are placed one above the other in such manner that their movements produce accumulative movement of the member 26. The frame 24 also acts as a guide for a base or supporting member 32 for the lower sylphon cell 2.

A threaded projection 33 extends longitudinally of the casing 1 and outwardly through the threaded boss 17. A base member 34 for the frame 24 is provided with an aperture through which the extension 33 passes without frictional contact therewith. A coiled spring 35 is mounted about the extension 33 between the supporting member 32 and the base member 34 in such manner that the supporting member 32 is biased upwardly into engagement with the lower sylphon cell 2 and the inner face of the boss 17 is drawn inwardly against the outer face of the base plate 34.

In the operation of my thermostatic regulator, the end member 8 is turned until the indicator 15 co-operates with the proper index number on the scale 16. This movement lengthens or shortens the distance between the supporting member 32 and the base plate 34, thereby raising or lowering the normal position of and pressure against the several cells 2 and the hinged member 26. The position of the hinged member 26 determines the initial longitudinal pressure on the spring 3. The contact members 4 and the adjusting screw 22 are then set to their proper positions relative to the spring 3. Further turning movement of the member 8 causes the extension 33 to compress or permit the elongation of the spring 35, as desired for other temperature settings.

As the temperature of the air or other medium passing through the slot 6 increases or decreases, the sylphon cells 2 expand or contract, as the case may be, thereby causing movement of the pivoted member 26 upwardly or downwardly. Upward movement of the pivoted member 26 is opposed by the spring 31, while downward movement of the same is accelerated thereby. When a sufficient amount of energy has been stored in the several sylphon cells 2 to overcome the spring 31 and the spring 3, the pivoted member moves upwardly, thereby compressing the spring 3. The spring 3 thereupon buckles outwardly into the dotted line position shown in Fig. 2 and away from the contact members 4 whereby the electrical circuit therebetween is interrupted. If the contact members 4 are connected to a source of thermal energy (not shown) that supplies thermal energy to the several sylphon cells 2, it may be assumed that the source of thermal energy is shut off, whereupon the cells 2 begin to cool and contract.

Contraction of the cells 2 permits the pivoted member 26 to move downwardly, thereby removing the longitudinal pressure from the spring 3 and it snaps back into its original position completing the electrical circuit between the contact members 4. This cycle of operation continues indefinitely and the thermostatic regulator needs no atten-

tion unless it is desired to change the adjustment thereof, which operation is performed by turning the end member 8 to the right or left, as the case may be.

The members 28 and 29 limit the movement of the member 26 to an amount sufficient to effect actuation of the resilient member 3, and, as hereinbefore set forth, the spring 31 tends to delay the upward movement of the member 26 and to accelerate its downward movement. As the spring 3 is deformed in substantially the manner shown in Fig. 2, it will be actuated to the position shown by the broken lines in Fig. 2, only after the longitudinal pressure thereagainst exceeds a predetermined amount. Hence, a predetermined amount of energy is stored in the spring when in its "open circuit" position, and the temperature of the device must drop an appreciable amount before it will again move into the position shown by the full lines in Fig. 2. This means that the temperature differential between the two positions is relatively large and the spring 31 tends to reduce this differential, thereby making it possible for the device to operate within closer temperature limits.

It will thus be seen that I have provided a thermostatic regulator that is characterized by having a pre-shaped resilient member actuated by sylphon cells in such manner that it makes and breaks an electrical circuit with a positive action within relatively small limits of temperature changes.

I do not wish to be restricted to the specific circuit connections or arrangement of parts herein set forth, as various modifications thereof may be effected without departing from the spirit and scope of my invention. I desire, therefore, that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. In a thermostat, a casing, a removable threaded end member therefor, a contact spring and a thermally-responsive actuating means therefor mounted in the casing, adjusting means for the thermally-responsive member comprising the removable end member, a threaded member extending therethrough and engaging the thermally-responsive device, and a resilient member biasing the threaded member into engagement with the thermally-responsive device.
2. In a thermostat, a casing, a removable threaded end member therefor, a contact spring and a thermally-responsive actuating means therefor mounted in the casing, adjusting means for the thermally-responsive member comprising the removable end member, a threaded member extending therethrough and engaging the thermally-responsive device, and a resilient member

biasing the threaded member into engagement with the thermally-responsive device, circumferential movement of the end member serving to vary the pressure exerted by the resilient member on the thermally-responsive member.

3. In a thermostat, a casing, a movable end member therefor, a resilient contactor and a thermally-responsive actuating means therefor mounted in the casing, adjusting means for the thermally-responsive member comprising the movable end member, a

member co-operating therewith and engaging the thermally-responsive device, and means for biasing the co-operating member into engagement with the thermally-responsive device, movement of the end member serving to adjust the thermal value at which the thermostat operates. 15

In testimony whereof, I have hereunto subscribed my name this 17th day of April, 1924.

AUGUST J. MOTT LAU.