May 29, 1934. G. A. STACEY 1,960,856

TEMPERATURE CONTROLLED SWITCH DEVICE

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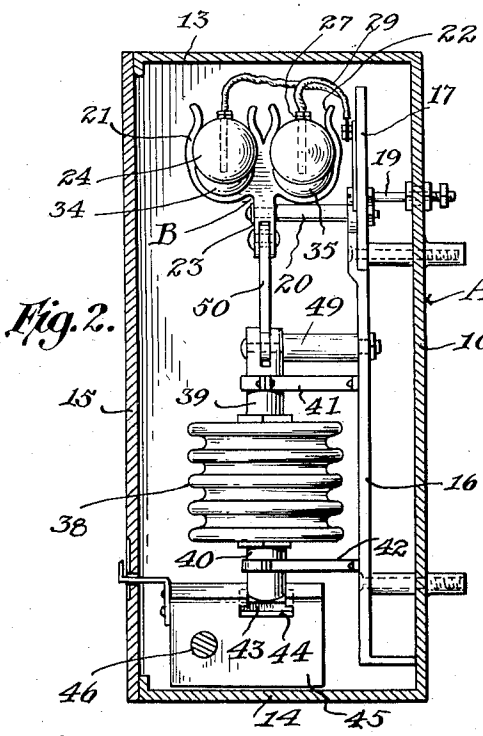


Fig. 2.

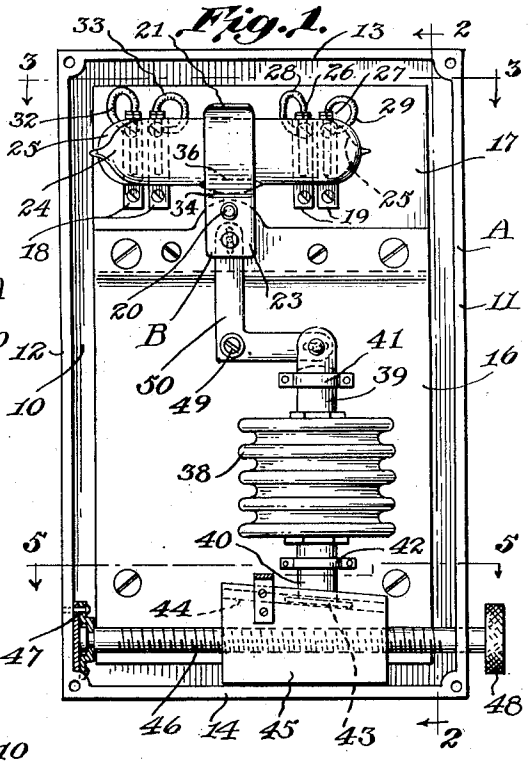


Fig. 1.

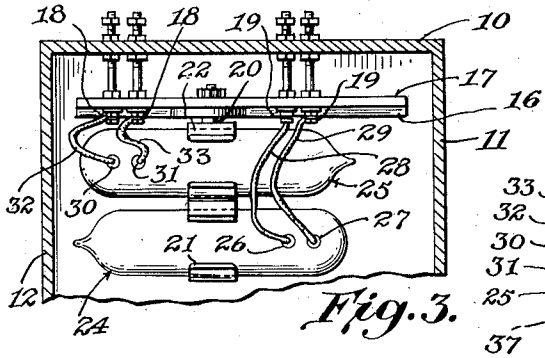


Fig. 3.

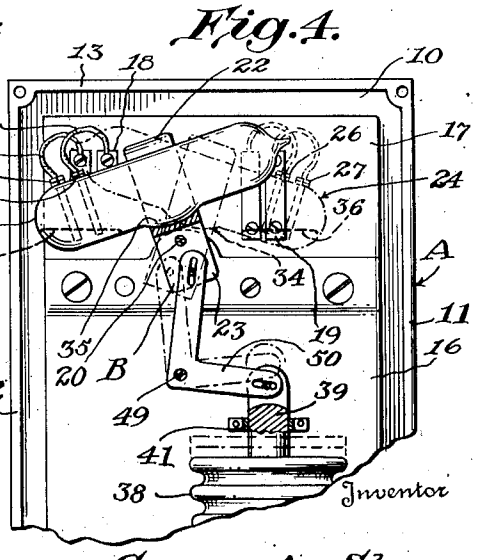


Fig. 4.

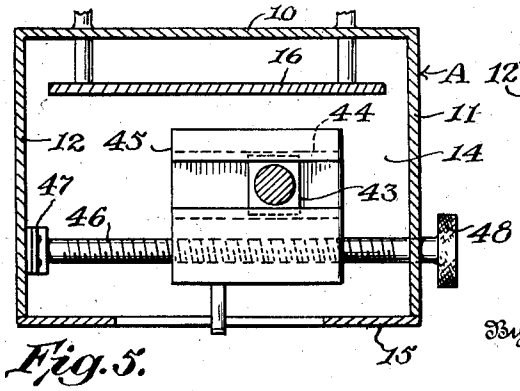


Fig. 5.

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TEMPERATURE CONTROLLED SWITCH DEVICE

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2 Claims. (Cl. 200—83)

My invention relates to a temperature controlled switch device.

It is the purpose of my present invention to provide a device of the type specified which will operate at a predetermined degree of temperature to close one circuit and at another predetermined degree of temperature to close another circuit, both circuits remaining open at all degrees of temperature between said predetermined degrees. The instant device is particularly adapted for use in connection with the control system set forth in my prior application for air conditioning apparatus Serial Number 622,511. However, it will be understood that the device is in no way limited to such use as many of the features can be embodied with advantage in switches of the general type which are adapted to control only a single circuit.

I will describe my invention in the best form known to me at present, but it will be apparent that the same is susceptible to changes in form and proportions and to desirable additions with the exercise of only ordinary mechanical skill without departing from the scope of the invention. In the drawing chosen to illustrate my invention the scope whereof is set forth in the appended claims

Figure 1 is a view in elevation, of my invention with the cover of the casing removed and both switches in a circuit open position and positioned in a standard setting;

Figure 2, a section on the line 2—2 of Figure 1;

Figure 3, a section on the line 3—3 of Figure 1;

Figure 4, a view of a fragment of Figure 1 with the low temperature switch shown in full lines in a circuit closed position and the high temperature switch shown in dotted lines in a circuit closed position; and

Figure 5, a section on the line 5—5 of Figure 1.

Referring to the drawing my invention is shown as comprising a casing A which includes a back 10, sides 11 and 12, top 13, bottom 14 and a removable cover 15. Secured to the back 10 in parallel spacement to the latter is a panel 16, the upper end of which is formed by a plate of insulation 17. Mounted on the plate 17 are the lead-in terminals 18 of one circuit and also the lead-in terminals 19 of another circuit. A stud 20 is carried by and projects from the panel 16 on the side of the latter remote from the back 10. Pivoted on this stud is a bracket B formed on one side of its pivot to provide clips 21 and 22 both disposed in a common plane at right angles to the plane of pivotal movement of the bracket. The bracket B is extended on that side of its pivot remote from the clips 21 and 22 to form an arm 23. Mounted in the clips 21 and 22 are high and low temperature circuit closers respectively, embodying closed elongated receptacles 24 and 25 respectively, said receptacles being formed preferably of glass. Secured in the receptacle 24 adjacent one end of the latter are terminals 26 and 27 connected by flexible conductors 28 and 29 with terminals 19 respectively. Secured in the receptacle 25 adjacent the end thereof remote from terminals 26 and 27 are terminals 30 and 31 connected by flexible conductors 32 and 33 with terminals 18 respectively. The receptacles 24 and 25 have the centers of their bottom portions dished as at 34 and 35 rsspectively for a purpose that will presently appear. Disposed in the receptacles 24 and 25 are pools of liquid conductor 36 and 37 respectively. By reference to Figure 1 it will be apparent that if the bracket B is pivoted to the right both receptacles will be tilted to the position occupied by the receptacle 24 in Figure 4 and in which position the pool of liquid conductor 36 will be located in connecting relation to the terminals 26 and 27, while the pool of liquid conductor 37 will be located out of connecting relation to the terminals 30 and 31. Should the bracket B be pivoted to the left in Figure 1 the receptacles will be tilted to the position occupied by the receptacle 25 in Figure 4 and the terminal connecting status of the pools of liquid conductor 36 and 37 will be the reverse of that previously described. As the tilted position of the receptacles is changed from one extreme to the other the pools of liquid conductors 36 and 37 in their travel from one end of their related receptacles to the other end will enter the dished portions 34 and 35 respectively and their movement to connecting relation in respect to their related terminals accordingly delayed. By this delayed movement of the pools 36 and 37 I increase the range of temperature between the circuit closing actions of the two liquid contact circuit closers.

The bracket B is pivoted by temperature responsive means which embodies a diaphragm 38 of the bellows type having end extensions 39 and 40 slidably engaged respectively in eye members 41 and 42 fixed to the panel 16. This diaphragm 38 has sealed therein a suitable fluid adapted to expand and contract upon increase and decrease of temperature respectively. A block 45 is mounted to slide transversely of the casing A on the bottom of the latter and such sliding movement is effected by rotating a screw 46 threaded through the block and having one end rotatably supported in a bearing 47 mounted on the inner

face of the casing side 12, while the other end extends through the casing side 11 and has an operating knob 48 formed thereon exteriorly of the casing. The block 45 is provided in its top side with an inclined groove 44 having an enlarged bottom portion. The free end of the extension 40 has a square enlargement 43 which is slidably engaged in the enlarged bottom portion of the groove 44. It will be apparent from the described connection between the extension 40 and block 45 that movement of the block back and forth will slide the diaphragm 38 up and down owing to the inclination of the groove 44. Pivoted on a stud 49 carried by the panel 16 is an angle lever 50, one arm of which is connected to the arm 23 of bracket B while the other arm thereof is connected to the free end of the extension 39.

From the foregoing and by reference to Figures 1 and 4 it will be apparent that the block 45 supports the diaphragm 38 at all times and that upon a predetermined increase in temperature the diaphragm 38 will expand and operate through the angle lever 50 to pivot the bracket B to the position shown in dotted lines in Figure 4. In this position of the bracket the receptacle 24 will be tilted a sufficient distance to cause the pool of liquid conductor 36 to connect the terminals 26 and 27 and close one circuit. Upon predetermined decrease in temperature the diaphragm 38 will contract and operate through angle lever 50 to pivot the bracket B to the position shown in full lines in Figure 4. In this position of the bracket the receptacle 25 is tilted to cause the pool of liquid conductor 37 to connect the terminals 30 and 31 and thereby close another circuit. The setting of the device shown in Figure 1 is desirable when used in connection with the control system shown in my prior application for air conditioning apparatus Serial Number 622,511 and particularly during the spring and fall seasons wherein extreme changes of temperature occur which render it necessary to operate the heating elements of my aforesaid air conditioning apparatus upon predetermined drop in temperature and in turn operate the air cooling elements of said apparatus upon predetermined rise in temperature. In the setting shown in Figure 1 both the low and high temperature circuit closers are horizontal and the bracket B vertical so that predetermined movement of the bracket in one direction from the vertical will close one circuit and equal movement of the bracket from the vertical in the opposite direction will close another circuit. In the severe winter seasons only the low temperature circuit closer would be effective as no rise in temperature sufficient to operate the high temperature circuit closer would occur. In the warm summer season only the high temperature circuit closer would be effective as no drop in temperature sufficient to operate the low temperature circuit closer would occur. Should it be desired during the warm summer season to advance the operation of the high temperature circuit closer the block 45 would be moved to adjust the diaphragm 38 upwardly and on the other hand, in the winter season, should it be desired to advance the operation of the low temperature circuit closer the block 45 would be moved to adjust the diaphragm downwardly.

I claim:

1. A temperature controlled switch comprising a closed receptacle mounted to move about a fixed pivot, a pair of terminals mounted in the receptacle, a pool of liquid conductor in said receptacle movable to connect and disconnect said terminals, temperature responsive means operable to move the receptacle about said pivot, said means including an expansible and contractable diaphragm mounted for sliding movement independently of its contraction and expansion, a screw member having its axis of rotation disposed transverse the direction of the sliding movement of the diaphragm, and means operable in response to rotation of the screw member to impart sliding movement to the diaphragm.

2. A temperature controlled switch comprising a closed receptacle mounted to move about a fixed pivot, a pair of terminals mounted in the receptacle, a pool of liquid conductor in said receptacle movable to connect and disconnect said terminals, temperature responsive means operable to move the receptacle about said pivot, said means including an expansible and contractable diaphragm mounted for sliding movement independently of its contraction and expansion, said last named means comprising a block having an inclined groove of inverted T-shape form transversely, a projection on the diaphragm having a portion shaped correspondingly to the groove and slidably engaged in the latter, and a screw threaded through the block for adjusting the block relatively to the diaphragm to impart sliding movement to the latter.

GEORGE A. STACEY.