Sept. 8, 1931. L. R. TEEPLE 1,822,605

MERCURY SWITCH THERMOSTAT

Filed May 20, 1929

FIG. 1

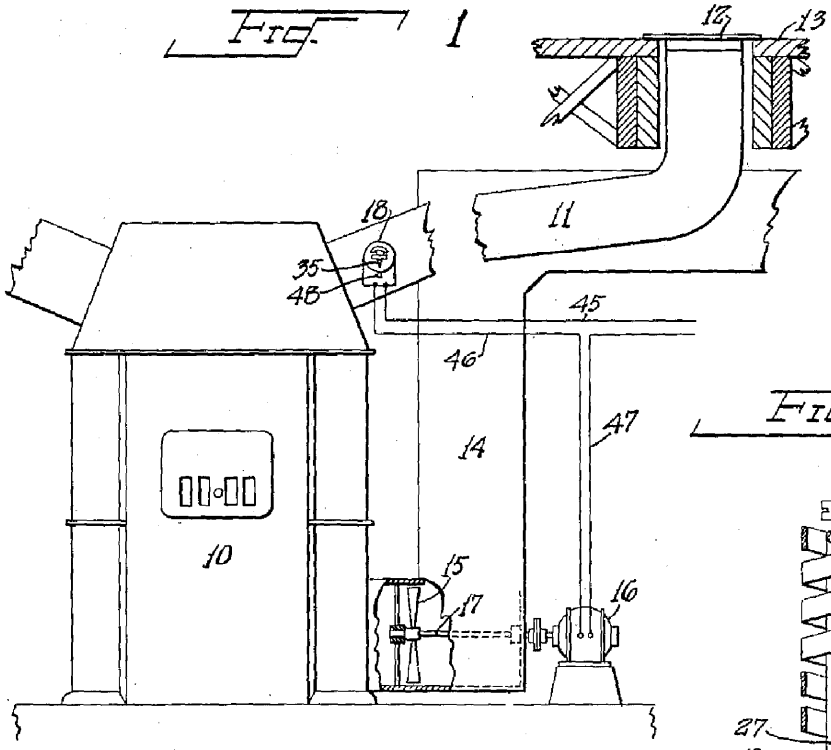


FIG. 5

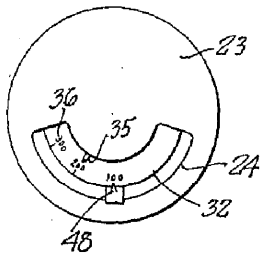


FIG. 3

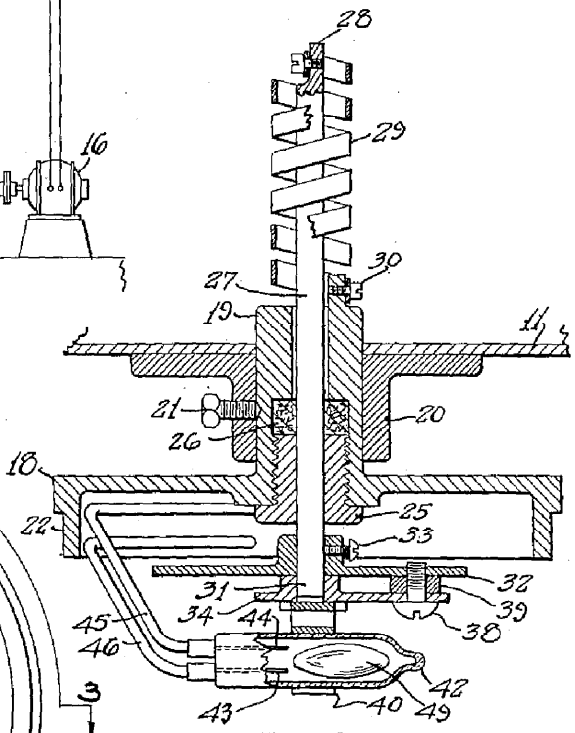


FIG. 2

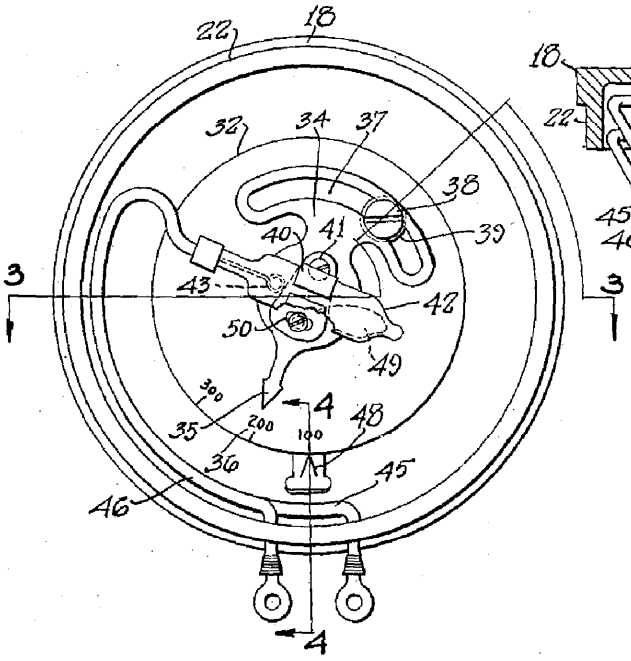
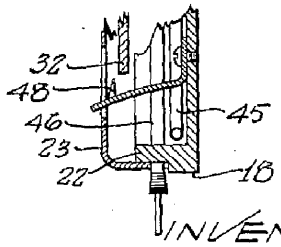


FIG. 4



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MERCURY SWITCH THERMOSTAT

Application filed May 20, 1929. Serial No. 364,518.

This invention relates generally to thermostats, and particularly to the use of a thermostatic element for actuating a mercury switch.

The main object of this invention is to provide an exceedingly simple and efficient form of mercury switch thermostat which will be exceedingly simple in construction, reliable in operation and long of life.

The second object is to produce a thermostat which will also function as a thermometer.

The third object is to provide a mercury switch thermostat and thermometer combined which will be readily adjustable with relation to its support as well as with relation to its thermostatic element, its switching element and the setting between its switch element and thermometer.

I accomplish these results in the manner set forth in the following specification as illustrated in the accompanying drawings, in which:

Figure 1 is a somewhat diagrammatic view showing the relation of the device to a warm air heating system and the motor of an air circulating fan. Figure 2 is a side elevation of the device with the cover removed. Figure 3 is a longitudinal section through the device taken along the line 3—3 in Figure 2. Figure 4 is a section taken along the line 4—4 in Figure 2. Figure 5 is a front elevation of the device showing the thermometer window.

Similar numbers of reference refer to similar parts throughout the several views.

Referring in detail to the drawings, there is shown the ordinary form of a warm air furnace 10 whose warm air pipe 11 discharges upwardly through the register 12 in the floor 13. In the cold air duct 14 of the furnace is placed a circulating fan 15 which is driven by a motor 16 through the shaft 17.

The purpose of the fan 15 is to increase the circulation in the pipe 11 when the temperature in the warm air pipe 11 exceeds a predetermined maximum. To accomplish this object there is provided a special form of thermostat 18 provided with a cylindrical shank 19 which extends through the flange 20 which is secured to the warm air pipe 11. The shank 19 is held against rotation within the flange 20 by means of the set screw 21. Around the outside of the body of the thermostat 18 is formed a flange 22 which supports a cover 23 and which contains a curved slot 24, for reasons which will be explained later.

Within the thermostat 18 is threaded a packing nut 25 which holds the packing 26 around the rock shaft 27 which passes loosely through the shank 19 and projects a considerable distance beyond the end of same. To the extreme end 28 of the shaft 27 is secured one end of a helical thermostatic element 29 whose opposite end is secured by means of a screw 30 to the shank 19. Near the opposite end 31 of the shaft 27 is secured a thermometer dial 32 by means of a set screw 33.

Rotatable with relation to the end 31 of the shaft 27 and placed thereon just outside of the dial 32, is a switch holder 34 provided with an indicating arm 35 pointing toward the characters 36 on the thermometer dial 32. The characters 36 represent degrees Fahrenheit, or other values deemed preferable.

In the switch holder 34 is formed a curved slot 37 through which passes a clamping screw 38 which passes through the washer 39 behind the switch holder 34 and then threads into the thermometer dial 32. On the switch holder 34 are secured the clamping lugs 40 by means of the screws 41. The lugs 40 support a mercury tube 42 containing a pair of electrodes 43 and 44 to which are connected the flexible cables 45 and 46 which project through the flange 22 of the thermostat 18. The cable 45 connects with the line and the cable 46 connects with the motor 16 whose opposite side is connected by the wire 47 to the line.

The operation of the device is as follows: The arm 35 is first set to the actual temperature within the pipe 11 under the control of the screw 38. The second step is to set the indicator hand 48 to the actual temperature within the pipe 11 under the control of the screw 33. The third step is to rotate the en-

tire thermostat under the control of the screw 21 until the mercury 49 within the tube 42 just touches both the electrodes 43 and 44. The last step is to set the arm 35 to the desired temperature, or one that is not to be exceeded within the pipe 11.

It will now be seen that the closing of the mercury switch will start the motor 16 and through the fan 15 cause a circulation of air past the air warming elements of the furnace 10, thereby carrying away their heat and delivering same to the room being warmed, which is of course the purpose of the furnace itself and furthermore safeguarding the furnace from over-heating.

It is a well known fact that after a furnace has been fired for a considerable length of time, and especially after the basement of the house has become warm, that the circulation of air through the furnace is retarded, naturally detracting from the heat absorbing capacity of the air being warmed. With this device as soon as the temperature of the air delivered by the furnace rises above a desired maximum the circulation is automatically increased thereby carrying off the over-supply of heat, as stated.

While one manner of setting this device has been described, it is clear that the same results can be arrived at in different ways, the particular method of setting the thermostat depending somewhat upon whether a thermometer is used to obtain the comparison or whether it is set by the correct "feel", as is ordinarily the case, in which event the order of the steps must of course be varied.

It will be noted in Figure 5 that with the cover 23 in place there is nothing visible of the working parts except the stationary indicator 48, the rotatable thermometer dial 32 and the indicating arm 35 which is adjustably fixed with relation to the dial 32. Looking through the slot 24 one can readily see the actual temperature of the air passing out of the furnace, as well as the maximum setting, at which point circulation will be mechanically induced by means of the fan 15.

In order to prevent an undersirable number of making and breaking of the contacts due to the influence of the fan 15 and the relation between the thermostatic element and the mercury tube, it is desirable to provide a slot 50 in the clamp 40 which will permit a slight amount of lost motion between the mercury tube 42 and the member 34. The precise manner of accomplishing this result is of little importance as long as a limited amount of lost motion is provided between the elements referred to, and it is preferable in some instances to accompany this action with a slight frictional resistance in the form of a washer under the head of the screw in the slot 50.

I claim:

1. A mercury switch thermostat having in combination a rotatably adjustable base, a shaft passing through said base, a helical thermostatic element having one end fastened to said shaft and the other end to said base, a thermometer dial adjustably mounted on said shaft, a switch holder mounted on said dial, means for adjusting said holder with relation to said dial, and a mercury tube on said holder having a pair of electrodes therein.

2. The combination of a base, a shaft journaling in said base, a helical thermostatic element having one end fastened to said shaft and the other end to said base in a manner to impart rotary motion to said shaft with variations in the temperature of said thermostatic element, a thermometer dial and indicator movable with relation to each other interposed between the end of said shaft and said base, and means for adjusting the relation between said shaft and said indicator.

3. In a thermostat the combination of a support, a base rotatably adjustable with relation to said support, a shaft journaling in said base projecting through opposite ends thereof, a helical thermostatic element secured to one end of said shaft and to said base adapted to transmit rotary movement to said shaft as its temperature changes, a thermometer dial adjustably fixed on the opposite end of said shaft having graduations around the outer portion thereof, a mercury switch holder adjustably mounted on said dial, said holder having an indicator arm registering with said graduations, a mercury tube in said holder having a pair of electrodes therein across which a current can flow when the mercury in the tube is caused to flow into contact with said electrodes, and an indicator on said base registering with said graduations adapted to indicate actual temperatures.

4. In a mercury switch thermostat the combination of a support, a base rotatably mounted on said support on a horizontal axis, a shaft journaling in said base along its axis, a thermostatic element between said shaft and base adapted to rock said shaft with temperature changes, a thermometer dial fixed on said shaft, an indicator arm adjustably mounted on said dial, a mercury switch adjustably held on said indicator arm, and a stationary indicator on said base registering with said dial for indicating actual temperatures.

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