Sept. 22, 1942. J. T. CARLSON 2,296,704

TEMPERATURE REGULATING SYSTEM

Filed July 2, 1940

Fig. 1

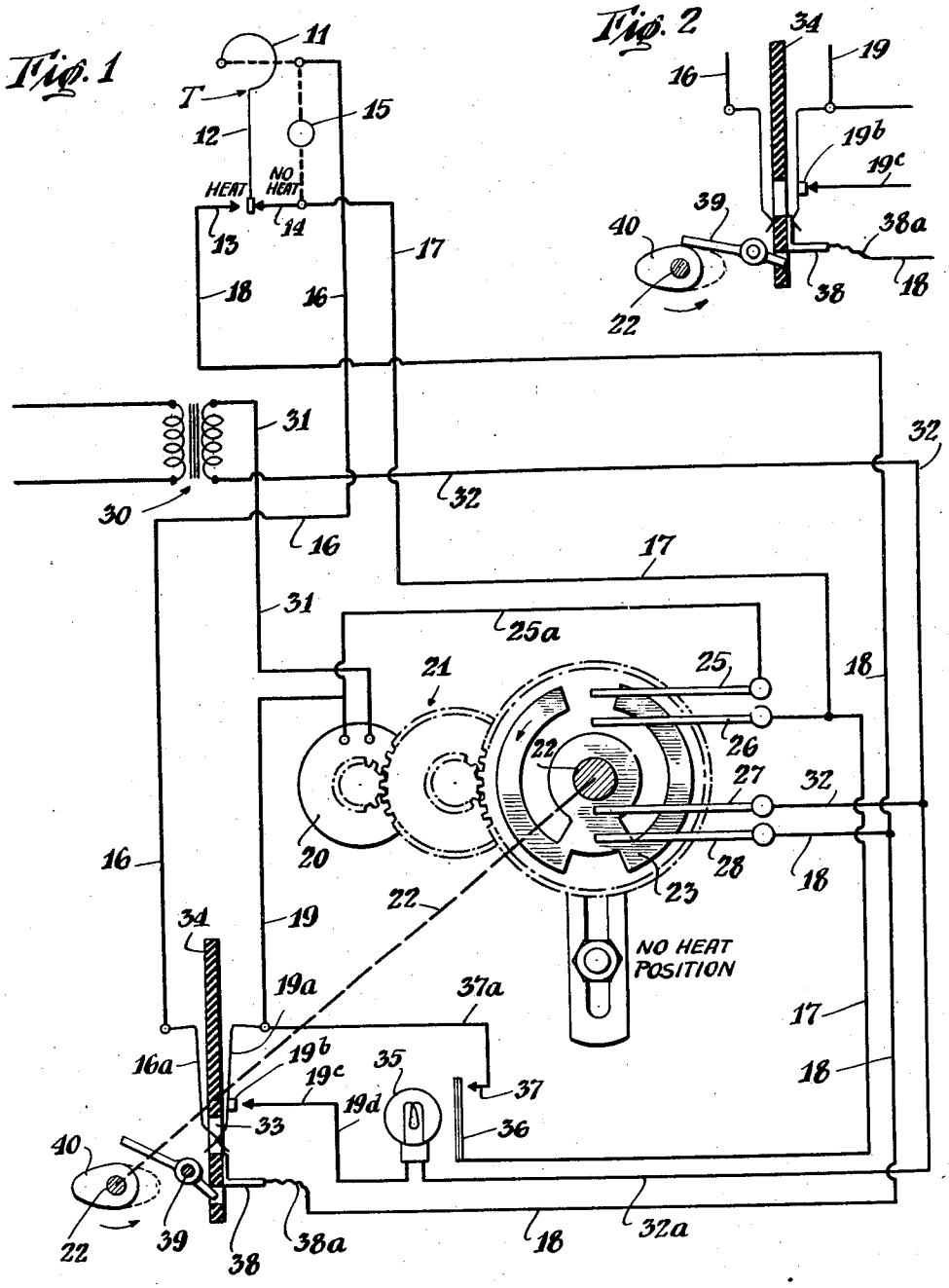

Fig. 2

INVENTOR
John T. Carlson
BY A. A. Hicks
Merrill & Ames
ATTORNEYS

Patented Sept. 22, 1942 2,296,704

UNITED STATES PATENT OFFICE

2,296,704

TEMPERATURE REGULATING SYSTEM

John T. Carlson, Dayton, Ohio, assignor to The Master Electric Company, a corporation of Ohio

Application July 2, 1940, Serial No. 343,543

3 Claims. (Cl. 236—74)

This invention relates to improvements in temperature regulating systems and has for an object to improve such systems by providing a basement switch so constructed and arranged that it will be automatically restored to normal position after a predetermined time.

Another object is to provide a basement switch which when moved from normal ineffective position to effective position remains in such effective position together with automatic means for restoring said switch after a predetermined time.

Another object is to provide such a device in which the restoring is initiated by thermal means.

Another object is to provide a signal light to indicate when the switch is in effective position.

Another object is to provide such a signal light so associated with a thermoresponsive switch restoring means that heat therefrom will cause the restoration of the basement switch.

Other objects will appear from the following descriptions of two illustrative embodiments of the invention taken together with the attached drawing wherein:

Fig. 1 shows more or less schematically a heat regulator system showing one manner of embodying the invention; and

Fig. 2 shows the basement switch parts proper in effective position.

Referring to Fig. 1 of the drawing, the letter T represents a thermostat of any known or suitable form, the one illustrated being of the type shown in Allen A. Dicke Patent 1,854,786 granted April 19, 1932. In the drawing, the numeral 11 indicates any suitable thermo-responsive element such as a coil of bi-metal operating a contact blade 12 playing between the "heat" contact 13 and the "no-heat" contact 14, it being understood that when contact 13 is engaged, the regulator motor, which is usually located in the basement adjacent the furnace or other heat supply device, is actuated to call for heat so that the draft damper is opened and the check damper closed, whereas when contact 14 is engaged the motor is operated to the no-heat position in which the drafts are closed and the check damper open.

15 indicates a signal lamp so associated with the thermal element 11 as to give a heat anticipating effect, as will be clearly understood from said Patent 1,854,786.

Three conductors 16, 17, and 18 lead respectively from the thermal element, the no-heat contact 14 and the heat contact 13. The heat regulator motor proper comprises an electric motor 20 which through suitable connections including gearing designated 21 serves to operate a shaft 22 which through the usual crank or cranks serves to control the dampers or otherwise effect control of the heating plant. Rotating with said shaft 22 is a commutator 23 which may be of the form shown. Associated with said commutator are brushes 25, 26, 27, and 28. The numeral 30 designates generally a source of current such as a transformer or battery.

The basement switch proper may consist of switch blade 16a engaging with blade 19a connected through conductor 19 with one side of the driving motor 20, the other side of which is connected by means of conductor 31 to one side of the transformer or battery 30, the other side of which is connected by means of conductor 32 with brush 27. The ends of said blades are shown as contained in an opening 33 in a slidable insulating member 34, one end of which may extend outside of the casing of the furnace regulator mechanism for manual operation, said insulating member being moved upwardly to the position shown in Fig. 2 to make the basement switch effective.

Brush 25 is connected by means of conductor 25a with one side of the motor 20. Brush 26 is connected with conductor 17 which leads to the no-heat contact 14. The grounding brush 27 is connected with conductor 32 leading from the transformer, and brush 28 is connected through conductor 18 with the heat contact 13.

The switch blade 19a is formed with a contact 19b which may engage contact 19c connected through conductor 19d with the lamp 35. Adjacent said lamp is mounted a thermo-responsive switch which may consist of bi-metal 36 movable into engagement with a contact 37 upon increase in temperature, which contact 37 is connected through conductor 37a with conductor 19 and switch blade 19a. The thermo metal bar 36 is connected with the conductor 17. Carried by the insulator 34 is a contact 38 which may be L-shaped as shown, which contact through flexible connection 38a is connected with the conductor 18.

39 indicates a lever one end of which interengages with an opening in switch member 34 and the other end of which is positioned for operation by a cam 40 driven by and preferably mounted upon shaft 22.

In the position of the parts shown in Fig. 1, the furnace regulating mechanism is in the no-heat position, i. e., with the draft damper closed and the check damper open. If the temperature should fall to an extent where blade 12 of the

thermostat engages contact 13, a circuit will be established to cause the motor 20 to rotate the shaft 22 one-half turn. This circuit is as follows:

From the transformer via conductor 31 to the electric motor 20, conductor 19, switch blade 19a, switch blade 16a, conductor 16, thermo metal 11, blade 12, contact 13, conductor 18, brush 28, commutator 23, brush 27, conductor 32, back to the transformer. It will be noted that the said circuit through the thermostat need be maintained only long enough for the commutator 23 to engage with brush 25 whereupon the half turn operation is completed even if the thermostat should interrupt the circuit at contact 13. The circuit for this purpose is as follows: Transformer 30, conductor 31, motor 20, conductor 25a, brush 25, commutator 23, brush 27, and conductor 32, back to the transformer 30.

If thereupon the temperature rises, the electric motor 20 will be caused to operate sufficiently to rotate shaft 22 another half turn, the circuit being the same with the exception that brush 26, conductor 17, and contact 14 will complete the circuit instead of brush 28, conductor 18, and contact 13.

If, with the parts in the position shown, (the draft damper closed, check damper open), the user desires to fire the furnace, he will grasp the member 34 and pull it upwardly from the position shown in Fig. 1 to the position shown in Fig. 2. Thereby, the switch blades 16a and 19a will be separated. However, movement of the blade 19a will cause its contact 19b to engage the contact 19c and the upward movement of contact 38 will cause it to engage switch blade 19a. In the meantime, the lever 39 will have been forced to the position shown in Fig. 2.

The movement of the insulating member 34 therefore completes a circuit as follows:

From transformer 30 through conductor 31, motor 20, conductor 19, switch blade 19a, contact 38, conductors 38a and 18, brush 28, commutator 23, brush 27, conductor 32, back to the transformer. The motor 20 will therefore be caused to operate until the shaft 22 has rotated one-half turn, causing the draft damper to open and the check damper to close, establishing a proper condition for firing the furnace.

During this time the cam 22 has moved from the full line position to the dotted line position.

It will be noted that the engagement of contact 19b with contact 19c has established another circuit from the transformer through conductor 31, motor 20, conductor 19, blade 19a, contacts 19b and 19c, conductor 19d, lamp 35, conductors 32a and 32, back to the transformer, causing the lamp 35 to be illuminated. Heat therefrom will, after a certain time, cause the bi-metal 36 to engage contact 37, thus completing a circuit for causing the furnace regulating device to move to the "no-heat" position, this circuit being as follows:

From the transformer through conductor 31, motor 20, conductors 19 and 37a, contact 37, bi-metal 36, conductor 17, brush 26, commutator 23, brush 27, conductor 32, back to the transformer.

The motor 20 will operate therefore to rotate the shaft 22 one-half turn. During this time, the cam 40 is moved from the dotted line position to the full line position, rocking lever 39 which causes the switch member 34 to be pulled inwardly.

It will thus be seen that a convenient arrangement has been provided whereby if the user should forget to push in the switch member 34, it will be pulled in automatically by means the operation of which is initiated by heat from the lamp 35.

Instead of having the switch blade 19a engage the two contacts 19c and 38, it is obvious that one of these may be omitted, in which case, the left contact of the lamp 35 will be connected with conductor 18.

The invention is not intended to be limited to the form shown, which is to be understood as illustrative only and not as limiting, as various changes in construction and arrangement may be made, all coming within the scope of the claims which follow.

I claim:

1. In a heat regulating system, an electrically operated furnace damper controlling mechanism, a thermostat for controlling the actuation of said mechanism, a manually operated basement switch which when operated causes the furnace controlling mechanism to move the draft damper to open position and also closes a circuit including a resistance heater, a thermo-switch closed by heat from said resistance heater so connected as to cause the electric damper controlling mechanism to move to closed draft position and means actuated by said damper controlling mechanism only while moving from draft closed to draft open position to restore said basement switch to original position.

2. In a heat regulating system, an electric motor, a furnace damper controlling mechanism operated thereby, a thermostat for controlling the operation of said motor, a manually operated basement switch which when operated causes the motor to operate to cause the furnace controlling mechanism to move the draft damper to open position and also closes a circuit including a resistance heater, a thermo-switch closed by heat from said resistance heater so connected as to cause the electric motor to drive the damper controlling mechanism to closed draft position and means actuated by said damper controlling mechanism only while moving from draft closed to draft open position to restore said basement switch to original position.

3. In a heat regulating system, an electric motor operated furnace damper controlling mechanism, a thermostat for controlling the actuation of said mechanism, a manually operated basement switch which when operated breaks the circuit through the thermostat and establishes a circuit which causes the furnace controlling mechanism to move the draft damper to open position and which switch also closes a circuit including a resistance heater, a thermo-switch closed by heat from said resistance heater so connected as to cause the electric damper controlling mechanism to move to closed draft position and means actuated by said damper controlling mechanism only while moving from draft closed to draft open position to restore said basement switch to original position.

JOHN T. CARLSON.