July 14, 1931. C. C. BRADBURY 1,814,585

HYGRO THERMOSTAT

Filed Oct. 6, 1920

Fig. 1

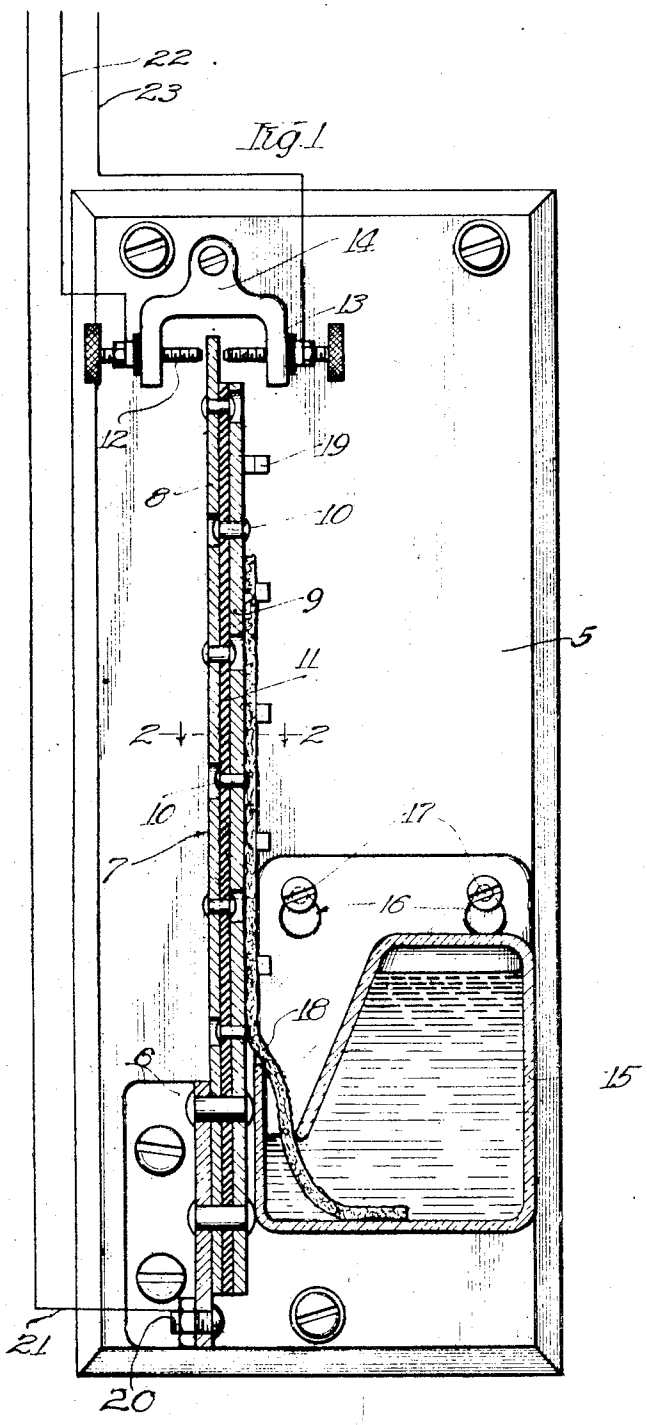
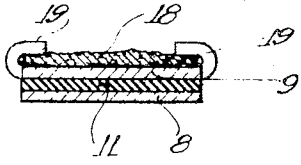


Fig. 2



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HYGRO-THERMOSTAT

Application filed October 6, 1920. Serial No. 415,130.

My invention relates to a combined hygrostat and thermostat; more conveniently designated a hygro-thermostat.

While the invention is capable of wide adaptations, it is particularly designed for use in connection with the regulation of the temperature of a dwelling in accordance with the humidity of the atmosphere. It is well known that with the atmosphere quite humid, a temperature of say 65° F. produces the same degree of comfort as is produced by a temperature of say 75° F., when the atmosphere is dry, that is, that for substantially 10% increase in humidity, there should be, for similar comfort, 1° F. decrease of temperature, and likewise for substantially 10% decrease in humidity, there should be, for similar comfort, 1° F. increase of temperature. My invention, therefore, is for the purpose of causing a temperature regulation which varies with the humidity of the atmosphere, so as to produce at all different degrees of humidity substantially the same degree of comfort.

The invention will be better understood from the following description by reference to the accompanying drawings, wherein.

Figure 1 is a view partly in section, and partly in elevation of the instrument of my invention, and

Figure 2 is a sectional detail taken on line 2—2 of Figure 1, looking in the direction indicated by the arrows.

Referring to the drawings, the reference numeral 5 designates a panel board which may be secured in any suitable manner on the wall of a room, and on which is mounted a bracket 6, to which is secured by means of rivets the thermostat indicated generally by the reference numeral 7. This thermostat comprises the metal strips 8 and 9, having different coefficients of expansion, the strips 8 being preferably of molybdenum, and the strip 9 of aluminum. These strips are secured by means of rivets 10—10 to an intermediate strip of hard rubber or any other suitable heat insulating material 11. It will be seen that the heads of the rivets which secure one metal strip to the intermediate heat insulating strip project into holes provided in the other metal strip, to prevent the conduction of heat from one metal strip to the other. The free end of the metal strip 8 is disposed between the two contacts 12 and 13, and is arranged to engage one of these contacts when the pair of strips is deflexed, first in one direction and then in the other, depending upon the temperature of the room. The contacts 12 and 13 are adjustably mounted in the bracket 14, and are suitably insulated therefrom. At 15 is indicated a removable water container the back of which is provided with the elongated slots 16—16, through which the screws 17 on the panel board 5 project. The lower ends of the elongated slots 16 are enlarged to permit passage of the heads of the screws 17 therethrough when removing the container 15 to refill the same. A wick 18 extends from the water container and lies in contact with the strip 9, which has the greater coefficient of expansion of the two metal strips. The strip 9, as shown most clearly in Figure 2, is provided with the inwardly bent lugs 19, which serve to hold the wick 18 into intimate contact with the strip 9. By this construction, it is possible to move the wick 18 along the strip so as to contact different lengths of it, depending upon the degree in change of temperature desired for different degrees of atmospheric humidity. Secured upon the bracket 6 is an electrical contact 20, with which is connected the conductor 21. Conductors 22 and 23 are electrically connected with the adjustable contacts 12 and 13 respectively. The three conductors 21, 22 and 23 form a three-way circuit for a furnace or heater controller of any one of the well known types, which may alternately be put into and out of operation, to effect regulation of the room temperature.

The operation of the device is as follows:

Let us assume that the heater controller has been operated so that the furnace is caused to produce a rise in temperature of the room. The metal strips 8 and 9 expand due to this rise in temperature. The strip 9, expanding at a greater rate than the strip 8, causes a flexure of the pair of

elements to the left (see Figure 1) whereby an electrical circuit is completed through the conductor 22, contact 12, metal strip 8, bracket 6, contact 20, conductor 21, to the furnace controller. The controller may be of any convenient form and is preferably of that type which, when the circuit is initially closed therethrough, is caused to operate for a predetermined interval to cause a certain definite operation of the controller. After the controller has thus been caused to operate, to regulate the draft of the furnace, for example, the temperature of the room drops, thereby causing the metal strips 8 and 9 to contract. The strip 9 contracting at a faster rate than the strip 8, causes a flexure of the pair of thermostatic elements to the right (see Figure 1) thereby breaking the circuit above described. If the room temperature falls low enough, the strips contract to such an extent that the flexure is sufficient to cause the free end of the strip 8 to engage the contact 13. A new circuit is thus completed, through the conductor 23, contact 13, metal strip 8, bracket 6, contact 20, conductor 21, to the furnace or heater controller. The controller is thereby caused to operate substantially as before to open the draft, for example, whereby to cause a renewed operation of the furnace to produce a rise in temperature of the room. It will be understood that the device may be so adjusted as to close the electrical connection with the controller to cause operation of the furnace at a temperature of say 70° F., in an atmosphere of average humidity. In the event that the atmosphere is less saturated the evaporation of the moisture in the wick will be more rapid, so that the metal strip 9, with which the wick contacts, on account of the insulating strip 11, will be maintained a greater degree cooler than the strip 8, which, of course, is not wet by the wick, wherefore the deflection of the thermostatic pair to a given position will require a greater degree of heat than under normal conditions of humidity. In the event that the atmosphere contains more moisture than that for which the thermostat has been adjusted, the rapidity with which the water evaporates from the wick will be less. The strip 9, which contacts with the wick, will therefore remain more nearly at the same temperature as the surrounding atmosphere and the deflection of the thermostatic pair to a given position will occur therefore at a lower temperature. The contacts 12 and 13 are conveniently adjusted so that the contact 13 engages the strip 8 when the temperature of the room falls below a predetermined amount, and so that the contact 12 engages the strip 8 when the temperature rises above a predetermined amount. The wick 18 is movable up and down on the strip 9 between the lugs 19—19, to vary the length of contact depending upon the degree in change of temperature desired, for different degrees of atmospheric humidity. By the use of this device, a temperature regulation is secured, which varies with the humidity of the atmosphere, so as to produce practically the same degree of comfort at all different degrees of humidity.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patents is:

1. The combination in a device of the class described of a thermostat comprising a pair of elements adapted to deflex subject to a rise and fall in temperature of the atmosphere, and a saturated hygro-static wick, contacting with the element of said pair having the greater coefficient of expansion, the moisture of said wick being subject to evaporation depending upon the relative humidity of the atmosphere, said wick being adjustable lengthwise of said thermostatic element whereby to alter the degree in change of temperature obtained for different degrees of atmospheric humidity.

2. The combination in a device of the class described of a thermostat comprising a pair of elements adapted to deflex subject to a rise and fall in temperature of the atmosphere, and a saturated hygro-static wick, contacting with the element of said pair having the greater coefficient of expansion, the moisture of said wick being subject to evaporation depending upon the relative humidity of the atmosphere.

3. The combination in a device of the class described of a thermostat comprising a pair of elements adapted to deflex subject to a rise and fall in temperature of the atmosphere, a saturated hygro-static wick, contacting with the element of said pair having the greater coefficient of expansion, the moisture of said wick being subject to evaporation depending upon the relative humidity of the atmosphere, and alternate electrical contacts closed by the flexure of said thermostatic pair to cause the operation of a heater controller whereby to effect a regulation of the temperature of a room.

4. A hygro-thermostat for heat control comprising a pair of elements of differing temperature coefficients of expansion, each of said elements being comparatively flat and lying parallel to one another, heat insulating material lying between said elements, the two elements and the heat insulating material being firmly attached together to form a flexing unit, and means to moisten one of said elements so that the rate of evaporation from said element will influence the temperature at which the unit is flexed to a predetermined position.

5. A hygro-thermostat comprising a pair of elements of differing coefficients of ex-

pansion, and a member interposed between said elements having a poor heat conductivity, and means to moisten one of said elements to influence the deflection of the pair according to the humidity of the atmosphere.

6. In a hygro-thermostat for temperature regulation, means affected by temperature changes and means affected by humidity changes, said means being united into one instrument and conjointly controlling a movable member whereby said member will respond differently to changes in temperature for different degrees of atmospheric humidity for automatically altering the temperature responsive to changes in humidity.

7. A member movable responsive to changes in room temperature, said member being also movable responsive to changes in atmospheric humidity, controlling means for said member said means being so proportioned that the movable member will be moved from a predetermined position either by a rise in temperature or an increase in atmospheric humidity, but will remain in an unchanged position upon a drop in temperature and a simultaneous predetermined increase in atmospheric humidity, whereby the movement of said member may be utilized for regulating atmospheric temperature to correspond with changes in atmospheric humidity.

8. In mechanism for automatically regulating the temperature of a room, a control circuit for increasing or decreasing the heat supply for said room, a circuit changer operably responsive to temperature changes, means responsive to changes in atmospheric humidity for modifying the operation of said circuit changer, said means and circuit changer being so proportioned and co-related that the said circuit changer will be modified from a predetermined state, either by an increase in atmospheric humidity or by a rise in temperature, but will remain in its unmodified predetermined state upon an increase in atmospheric humidity accompanied by a predetermined fall in temperature or, conversely, that said circuit changer will be modified from said predetermined state either by a decrease in atmospheric humidity or by a fall in temperature but will remain in its unmodified predetermined state upon a decrease in atmospheric humidity accompanied by a predetermined rise in temperature, the degree of change in temperature brought about by said mchanism being such as to result in a constant feeling of comfort to the human body through variations in atmospheric humidity in said room.

9. In mechanism for automatically regulating the temperature of a room, a control circuit for increasing and decreasing the heat supply for said room, a circuit changer therefor operative in response to changes of temperature to maintain substantially constant temperature of the air in said room when the humidity of the air in said room is constant, and means responsive to changes in humidity for automatically modifying the actuation of the circuit changer so that a lower temperature of air is maintained in said room for higher humidity of the air in said room and a higher temperature of air is maintained in said room for a lower humidity of air in said room, the temperature operated circuit changer and the means responsive to changes in humidity being so proportioned and co-related that ten per cent increase in humidity produces approximately the same effect upon the circuit changer as is produced by 1° F. increase in temperature and that ten per cent decrease in humidity produces approximately the same effect upon the circuit changer as is produced by 1° F. decrease in temperature.

In witness whereof, I hereunto subscribe my name this 1st day of October, 1920.

CLIFFORD C. BRADBURY.