Jan. 11, 1938. F. W. CARPENTER 2,104,970

AUTOMATIC TEMPERATURE CONTROLLER FOR ELECTRIC FLATIRONS, ETC

Filed Nov. 18, 1935

Fig 1

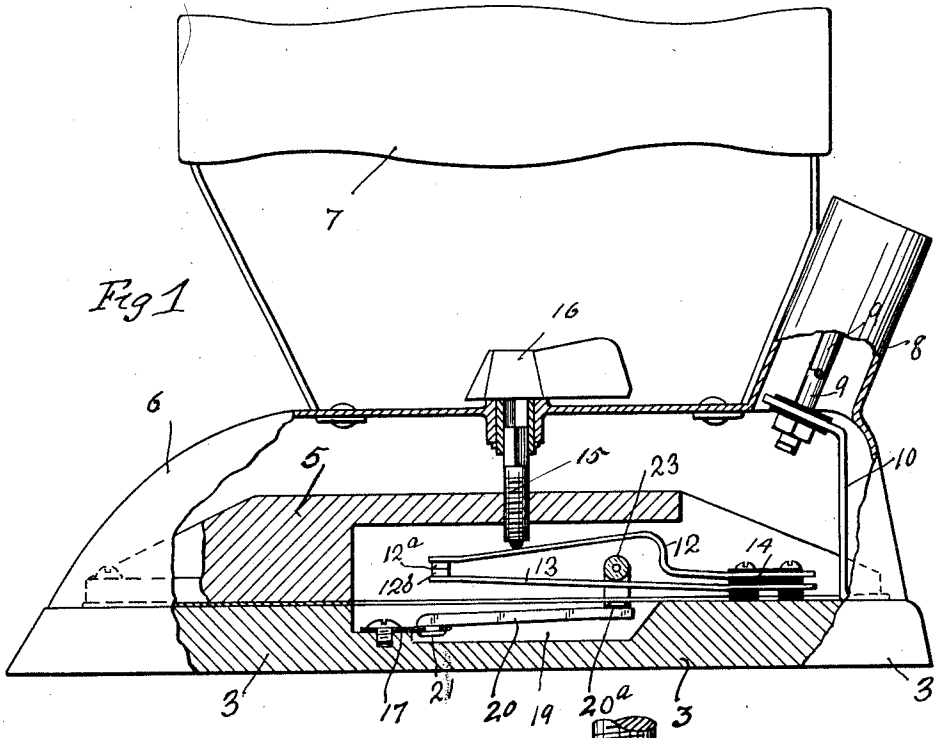


Fig. 2

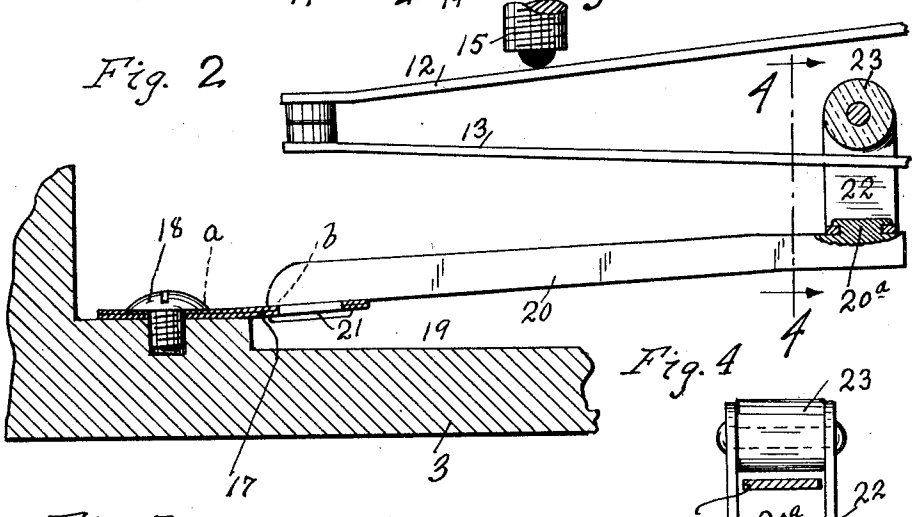


Fig. 3

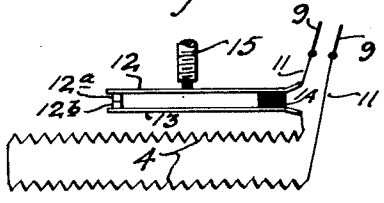


Fig. 4

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AUTOMATIC TEMPERATURE CONTROLLER FOR ELECTRIC FLATIRONS, ETC.

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2 Claims. (Cl. 219—25)

My invention provides an extremely simple and highly efficient automatic temperature controller for electric flatirons and other electrically heated devices; and, generally stated, the invention consists of the novel devices, combinations of devices, and relative arrangement of parts hereinafter described and defined in the claims.

In the first instance this invention will be described in its application to electrically heated flatirons wherein electric coils or other electrical heat radiators are applied to or in-corporated in the sole plates thereof. In a flatiron it is, of course, important that the sole plate, and particularly the bottom or exposed portion thereof, be maintained at a predetermined desired temperature. To accomplish this the electrically-actuated or influenced element must be subject only to the temperature of the sole plate itself and not to any appreciable extent influenced by the temperature of the air in the oven or enclosed air space of the iron, in which latter, the cut out switch, which is controlled by the thermally influenced element, is generally located. Hitherto relatively long bi-metallic or thermally influenced warp bars have been attached to the sole plate and extended into the oven or air space where the major portions of the bi-metallic strip or warp bar are much influenced by the temperature of the air in the oven or air space; and it has been found that the desired accuracy of control can not be accomplished where the air space temperature, as well as the sole plate temperature, materially influence the control. It has also been found that a very short bi-metallic strip or warp bar, which is maintained in extremely close association with the sole plate, will not give such relatively large movement as required to actuate a cut-out or current controlling switch.

I have found that the problem can be solved, to wit: the accuracy of control obtained in the relatively short warp bar in close association with the sole plate, and the relatively large movement required to actuate the switch, by providing such short warp bar with a relatively long non-warping motion-increasing extension. In this new arrangement the short warp bars maintained in the closest possible association with the sole plate and the switch-actuating movement is produced entirely by the warping movements thereof, while the non-warping extension, that is or may be extended into the air space of the oven and performs only the function of multiplying or increasing the switch-actuating movement, is unaffected by the varying temperatures of the air space.

By a "warping bar" is meant a bar that will warp under varying temperatures and by "non-warping bar" is meant a bar that will not warp under varying temperatures.

In the accompanying drawing, which illustrates the invention in-corporated in an electric flatiron:

Fig. 1 is a view partly in side elevation but with parts broken away and with parts shown in vertical axial section;

Fig. 2 is an enlarged fragmentary longitudinal section taken centrally through the sole plate of the flatiron;

Fig. 3 is a diagram showing the wiring of the device; and

Fig. 4 is a section on the line 4—4 of Fig. 2.

Of the parts of the flatiron, the numeral 3 indicates the sole plate in which is in-corporated electrical heating coils or heat radiators 4; the numeral 5 indicates the customary or any shoe secured on the sole plate; the numeral 6 indicates the cover plate; and the numeral 7 the handle of an electric flatiron. At the rear of this flatiron is shown the customary plug socket 8 and contact pins 9, which latter are secured to but insulated from a bracket 10 secured on the heel of the sole plate.

The current to the heating coils 4 is supplied thereto from the contact pins 9 through wires 11 in which is incorporated a switch made up of spring contact leaves 12 and 13. These contact leaves 12 and 13 are insulated from each other and from the sole plate at 14 and at their free ends they are provided with contact points 12*a* and 12*b*. The contact leaf 12 under its own spring tension tends to move upward and its upward position is adjustably limited by an adjusting screw 15 that works with threaded engagement through the top of the shoe 5 and has an insulated point 16 that engages the said leaf 12 as a stop. The adjusting screw 15 is shown as arranged to be rotated by a head 16, the stem of which is rotatively mounted in the top of the cover plate 6 and has sliding angular engagement with the upper end of said screw.

The thermally responsive switch actuator, as its primary element, involves a short bi-metallic strip or warp bar 17 and a very considerable portion of which is directly and securely anchored to the top of the sole plate by suitable means, such as a screw 18, with a considerable but relatively small portion thereof projecting and free for warping action. To bring this bi-metallic strip or warp bar as closely as possible to the very bottom surface of the sole plate, the latter is shown as recessed at 19 so that the entire warp bar is located in a narrow depression formed in the body of the

sole plate where it never gets into the major portion of the oven or heated air space of the flatiron. Here it may be stated that the metallic portions of the bar 17 are such that said bar will straighten out or move towards a straightened condition under increasing temperatures, and will warp or spring upward under cooling temperatures.

To the projected or free end portion of this short warp bar 17, a relatively long non-warping and very rigid extension bar 20, preferably of steel, is rigidly anchored or attached. This attachment is best accomplished by providing said bar 20 with a riveted rib 21 that is passed through a slot on the free end of the warp bar. With this arrangement, the warping movement of the warp bar 17, insofar as it is effective to move the non-warping bar 20, will take place between the points marked *a* and *b* on Fig. 2. It will thus be observed that that portion of the warp bar that affects the movement of the bar 20 is within a very short range of distance and is chiefly in complete contact with the sole plate and, as an entirety, completely and closely associated with the sole plate where it is subjected to substantially the same temperature as the bottom of the sole plate and is not appreciably affected or influenced by the changing conditions of the air in the main body of the oven or heated air chamber.

At its free end the bar 20 is shown as provided with an upset flange 20*a* that is passed through and rigidly anchored to the base of a yoke 22. This yoke 22 straddles the lower contact 13 with clearance and is provided with a roller 23 of insulating material, such as porcelain, and which is engageable with the top of the contact 13. Here it should be stated that while the spring contact 12 is under its own spring tension to maintain engagement with the stop 16 the spring contact or leaf 13 is under its own spring tension to move upward and hold the contact points 12*a* and 12*b* engaged.

When the iron is cold or at low temperature, the non-warping bar 20 under the action of the warp bar 17 will hold the roller 23 above and clear of the contact 13, thereby closing the supply circuit to the heating coil 4, if and when, of course, the circuit is then closed by primary circuit controlling means such as a supply plug contacted with the pins 9.

By adjustments of the stop screw 15 and its insulated contact 16, the switch controller may be arranged to receive and permit separation of the contacts 12*a* and 12*b* and hence opening of the circuit at the maximum temperature at which it is desired the sole plate of the iron should be heated. This maximum temperature at which the switch will open and cut off the supply of current may, of course, be varied by adjustments of the stop screw 15. Obviously, the farther the stop 16 is set downward, the higher will be the temperature of the sole plate required to cause the switch actuator to permit the switch to open. Also it is evident that with the arrangement described, very little warping movement of the warp bar itself is required to impart a relatively great movement to the free end of the non-warping bar 20 required to operate the switch. The warp bar changes its distance and its close association with the sole plate very slightly in performing the switch operating movements and hence very great accuracy in the maintenance of desired temperature of the flatiron is obtained.

The device has been specifically described and it is admirably adapted for the control of heat of flatirons, but is capable of much more general use. In the application of the invention, for example, to waffle irons or cooking utensils, the controller would be brought into substantially the relation to the heat-radiating plate that it is in the above described instance applied to the sole plate. In fact, the sole plate of a flatiron is the heat-radiating plate of that device.

From the foregoing, it will be understood that the invention is capable of various modifications and relative arrangement of parts within the scope of the disclosure herein made and of the appended claims.

What I claim is:

1. In a device of the kind described, the combination with a heat radiating plate having an electrical heat radiator associated therewith, of a supply circuit for said electrical heat radiator including a switch, and a switch actuator involving a short warp bar directly anchored to said radiating plate and provided with a relatively long non-warping extension arranged to control the opening and closing movements of said switch under varying temperatures of said radiating plate, said extension serving to multiply the angular warping movement of said warp bar and extending into the open space out of contact with said heat radiator plate in its varying switch operating movements.

2. In a flatiron, the combination with the sole plate thereof equipped with an electrical heater, of a supply circuit for said electrical heater including a switch, and a switch actuator involving a short warp bar directly anchored to said radiating plate and provided with a relatively long non-warping extension arranged to control the opening and closing movements of said switch, under varying temperature of said sole plate, said extension serving to multiply the angular warping movement of said warp bar and extending into the open space out of contact with said sole plate in its varying switch operating movements.

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