March 25, 1941. F. KUHN ET AL 2,235,893

THERMOSTAT

Filed April 1, 1940

FIG.1.

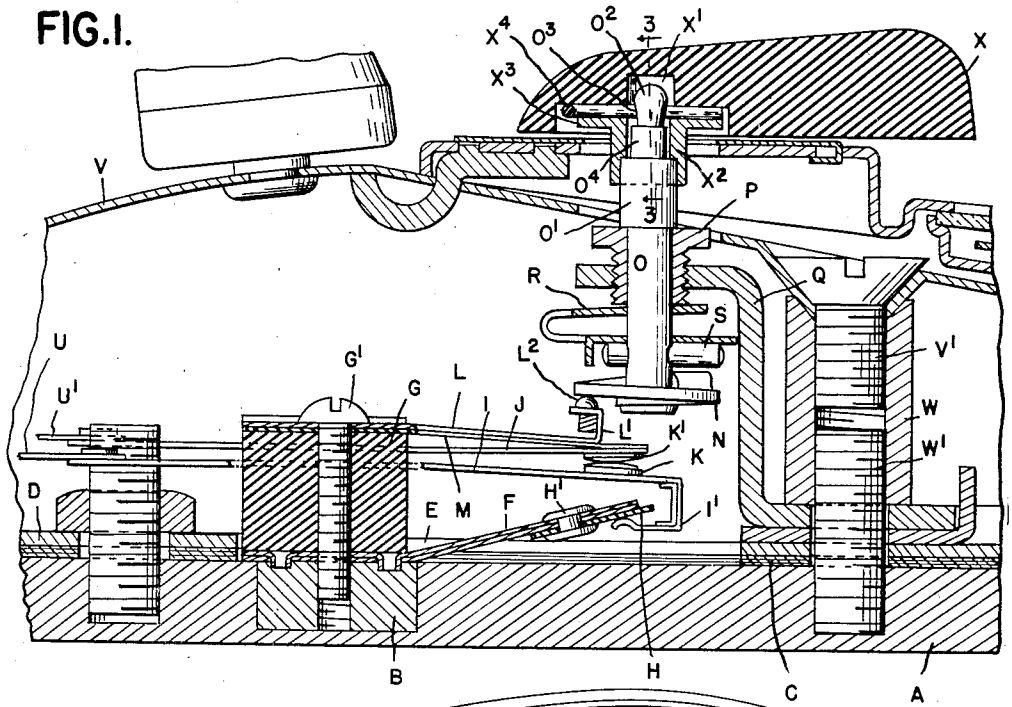


FIG.2.

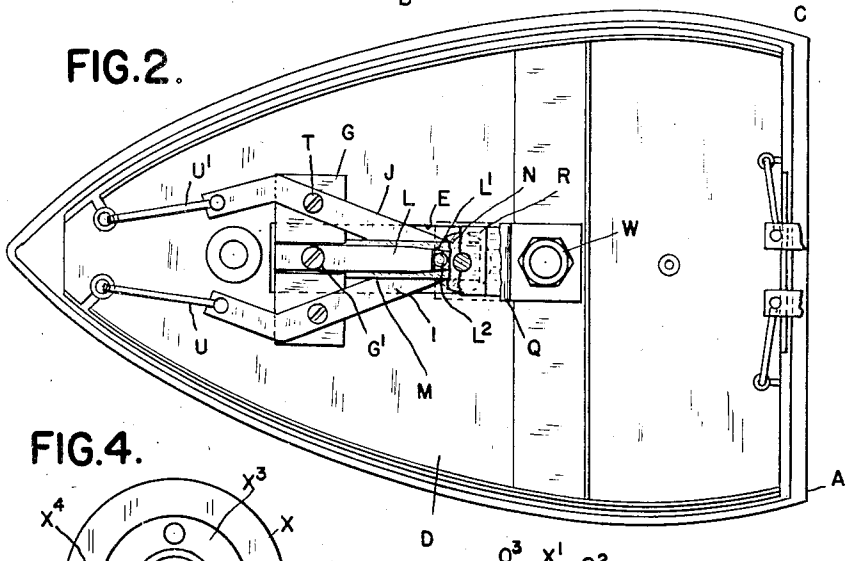
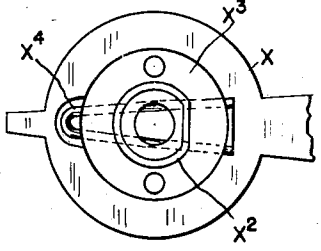


FIG.4.



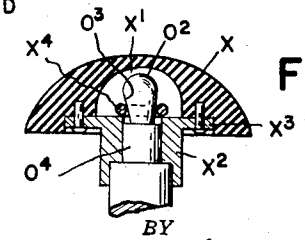


FIG.3.

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THERMOSTAT

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Application April 1, 1940, Serial No. 327,308

5 Claims. (Cl. 219—25)

The invention relates to thermostats more particularly designed for use in controlling the heat generation in an electric laundry iron, and the invention consists in certain novel features of construction as hereinafter set forth.

In the drawing:

Figure 1 is a side elevation of our improved thermostat as applied to a laundry iron;

Figure 2 is a plan view thereof;

Figure 3 is an enlarged cross section on line 3—3 of Figure 1;

Figure 4 is a bottom plan view thereof.

It is the object of the invention to obtain a construction which is simple and easily manufactured, both as to the individual elements thereof and the assembly of the same. It is a further object to facilitate the mounting of the thermostat in a laundry iron and to avoid interference with the assembly or disassembly of other parts of said iron. Still further, it is an object to obtain a construction which is sensitive in its operation and is easily adjusted for maintaining different temperatures.

Our improved thermostat is preferably mounted in the laundry iron so as to directly respond to changes in temperature in the working surface thereof. To this end we preferably form the base or sole plate A of the iron with a recess therein extending down to within a short distance from the bottom or working surface. In this recess is an insert B which is formed of material having a relatively high coefficient of thermal conductivity as for instance, copper. The upper surface of this insert is substantially flush with the upper surface of the base A against which latter the electrical heating unit C is pressed by a clamping plate D. This clamping plate and also the unit C are cut away to form an open slot E extending over a portion of the insert B and rearward therefrom. F is a bimetallic thermostatic bar one end of which is clamped down upon the insert B, preferably through the medium of an insulator block G and a screw G' passing through said block and the thermostatic bar and engaging a threaded aperture in the insert. Beyond its area of contact with the insert, the bar F is bent to extend rearward at an upward inclination, and at its free end is provided on its underside with mica or other insulation H secured by a rivet H'. The block G extends laterally on opposite sides of the insert B and forms a mounting for a pair of flexible resilient strips I and J, which latter in plan view are arranged at an oblique angle to each other so that while the portions on the block are separated, the free ends thereof are superposed. Contact members K and K' are attached to these portions in registration with each other. The outer end of the strip I with its contact member K is beneath the strip J and its contact member K'. The strip I also has a return-bent portion I' which extends beneath and in contact with an insulating strip H on the thermostatic bar F. Thus, when the bar F is warped downward it will draw with it the strip I, separating the contact K from its cooperating contact K'. Arranged centrally of the block G is a resilient strip L which is heavier and of greater tension than the strips I and J. Beneath the strip L is a strip of mica or other insulating material M which electrically insulates it from the strip J while maintaining mechanical contact therewith. The strip L together with the insulator strip M are clamped to the top of the block G by the same screw G', which secures this block and the thermostatic bar F to the insert B. At its outer end the strip L has an upwardly extending return-bent portion L' which carries a rounded bearing L^2. This bearing cooperates with a rotary cam N which is secured to the lower end of a vertically extending shaft O. This shaft is mounted in a bearing P which has a threaded engagement with a bracket Q secured to and rising from the base A. The upper portion O' of the shaft O is enlarged to form a shoulder resting upon the bearing P and beneath the bearing there is sleeved upon this shaft a spring R, specifically shown as a return-bent resilient strip. The lower end of the spring engages a pin S extending transversely through the shaft while its upper end engages the lower face of the bearing P. Thus, the tension of the spring is exerted to hold down the shaft O and to maintain the shoulder on the portion O' in contact with the bearing P. This bearing may, however, be vertically adjusted by reason of its screw engagement with the bracket Q so that the cam N may be raised or lowered in relation to the bearing L^2 on the resilient strip L. Also, the rotation of the shaft and spiral cam N will raise or lower the strip L and through it the strip J to move its contact K' toward or from the cooperating contact K. The strips I, J and L are located in grooves in the upper face of the insulator block G, which retain them in position, and the strips I and J are secured to the block by screws T.

The electrical heating unit C is preferably formed in two sections arranged upon opposite sides of the center of the base A, and the forward

terminals U and U' of these sections are connected respectively to the strips I and J. Thus, whenever the contacts K and K' are closed, the electrical circuit through the heating unit, is established, while the separation of the contacts will break the circuit. The usual hood V is provided above the base A for enclosing the heating unit and thermostatic switch. As shown, this hood is clamped to the base by a screw V' engaging the upper portion of a clamping nut W, which latter in cooperation with a threaded stud W' serves as a means for clamping the bracket Q and plate D to the base. The shaft O passes upward through an aperture in the hood V and is provided at its upper end with an adjusting lever X. This lever preferably has a snap-on engagement with the shaft O, which permits of quick attachment or detachment and facilitates assembly of the parts. Preferably, the means forming this snap-on engagement consists of a knob O^2 at the upper end of the shaft O with a downwardly tapering portion O^3 between the knob, and a portion O^4 which engages the lever. The lever is preferably formed of molded non-metallic material having a recess X' therein for receiving the knob O^2 and also provided with a metallic portion X^2 having a hub for fitting over the portion O^4 of the shaft. Torque is transmitted from the lever to the shaft by a flat on one side of the portion O^4 and a corresponding flat in the hub. The member X^2 has a disk portion X^3 surrounding the hub portion and fitting in a recess in the underside of the lever. There is also a longitudinally extending recess in the lever adjacent to this disk in which recess is located a resilient U-shaped member X^4. The arrangement is such that when the lever is placed on the shaft O and pressed downward, the knob O^2 will spread apart the arms of the U-shaped resilient member so as to pass between the same, whereupon the tension of these arms engaging the tapering portion O^3 will draw the lever downward and hold it from accidental detachment.

The thermostat constructed as above described is extremely sensitive to temperature changes in the working surface of the iron. It also can be easily and quickly adjusted to maintain different temperatures in the working surface by rotation of the lever X. The original setting of the thermostat for predetermined temperatures is accomplished by rotation of the bearing B which through its screw engagement with the bracket Q will raise or lower the shaft O and cam N. The reenforcing resilient strip L follows movements of the cam, thereby relieving the flexible conducting strip J from mechanical stresses other than to move the contact member K'. An advantageous feature of the construction is that the several elements of the thermostat are sufficiently spaced from each other to avoid interference during assembly. Attention is directed particularly to the manner of mounting the resilient strips I, J and L and the thermostatic bar F. The strips I and J may first be secured to the block G by the screws T and as these strips engage grooves in the block, this will correctly position the same. The oblique angular arrangement of said strips separates all portions thereof excepting the free ends which carry the contacts K and K'. The strip L and mica strip M also engage a groove in the top of the block G, while the thermostatic bar F engages a groove in the bottom of the block. All of these parts together with the block itself, are secured by the single screw G' which threadedly engages the insert B. Another advantageous feature is the arrangement of the thermostatic bar F so that a rise in temperature will warp the bar downward. This we have found makes a more sensitive construction than the opposite arrangement where the bar warps upward with increase in temperature, and the arrangement is also advantageous in that it avoids interference with the adjustment for different temperature settings. Thus, the resilient member L is free to follow the cam N when the latter is adjusted, and the strip J is free to follow the strip L. The whole construction is one which can be manufactured at relatively low cost and assembled with the minimum of labor.

What we claim as our invention is:

1. The combination with an electrically heated base plate having its working surface on the underside thereof, of an insert in said base plate extending into proximity to said working surface and formed of material of relatively high thermal conductivity, an insulator block above said insert and extending on opposite sides thereof, a thermostatic bar having an end portion thereof in contact with said insert beneath said block and extending outward therefrom at an upward inclination being provided with insulation on the underside of its free end, said bar being adapted to be warped downward by increase in temperature, a pair of flexible resilient conductor strips secured to opposite sides of the upper face of said block and converging therefrom into vertically spaced registration at their outer ends, the lower strip having a return bend at its outer end for hooking beneath the insulated lower face of said thermostatic bar, cooperating contacts on the adjacent faces of the registering portions of said strips, and means for clamping said block and thermostatic bar against said insert.

2. The combination with an electrically heated base plate having its working surface on the underside thereof, of an insert in said base plate extending into proximity to said working surface and formed of material of relatively high thermal conductivity, an insulator block above said insert and extending on opposite sides thereof, a thermostatic bar having an end portion thereof in contact with said insert beneath said block and extending outward therefrom at an upward inclination being provided with insulation on the underside of its free end, said bar being adapted to be warped downward by increase in temperature, a pair of flexible resilient conductor strips secured to opposite sides of the upper face of said block and converging therefrom into vertically spaced registration at their outer ends, the lower strip having a return bend at its outer end for hooking beneath the insulated lower face of said thermostatic bar, cooperating contacts on the adjacent faces of the registering portions of said strips, a flexible resilient strip extending from the center of the upper face of said insulator block over the registering portions of the aforesaid strips, an insulating strip beneath said last mentioned strip, a screw extending through registering apertures in said last mentioned strip, insulator block and thermostatic bar into engagement with the threaded aperture in said insert to simultaneously clamp all of these members, and means engaging the outer end of said last mentioned strip for variably depressing the same to alter the relation between said cooperating contacts.

3. The combination with an electrically heated base plate having its working surface on its underface, of an insert in said base plate extending

into proximity to the working surface thereof and formed of material having a high thermal conductivity, an insulator block above said insert and extending on opposite sides thereof, said block having grooves on its upper and underfaces, a thermostatic bar extending into the groove on the underface of said block to contact with the upper face of said insert and having an outwardly extending portion inclining upward, the outer end of said bar having insulation on its undersurface and said bar being adapted to be warped downward with increase in temperature, flexible resilient conductor strips engaging grooves in the upper face of said block at opposite sides of the center thereof, said grooves being at an oblique angle to each other to direct the outer end portions of said strips into vertically spaced registration with each other, cooperating contacts on the adjacent faces of said strips, a return bend at the outer end of the lower strip for hooking beneath the insulated face of said thermostatic bar, a flexible resilient bar extending from a central groove in the upper face of said insulator block above the registering portions of said strips, an insulator strip between said bar and the upper conductor strip, a screw engaging registering apertures in said bar, insulator strip, insulator block and thermostatic bar and engaging a threaded aperture in said insert, said screw forming a common means for clamping all of said parts to said insert, a bracket rising from said base and extending above said bars and strips, a rotary shaft journaled in said bracket, a cam on said shaft for engaging said flexible bar to variably depress the same, and a lever for rotating said shaft.

4. The combination with an electrically heated base plate having its working surface on the underside thereof, of an insert in said base plate extending into proximity to said working surface and formed of material of relatively high thermal conductivity, an insulator block above said insert and extending on opposite sides thereof, a thermostatic bar having an end portion thereof in contact with said insert beneath said block and extending outward therefrom, a pair of flexible resilient conductor strips secured to opposite sides of the upper face of said block and converging therefrom into vertically spaced registration at their outer ends, cooperating contacts on the adjacent faces of the registering portions of said strips, an operating connection between said thermostatic bar and one of said resilient conductor strips, and means for clamping said block and thermostatic bar against said insert.

5. The combination with an electrically heated base plate having its working surface on the underside thereof, of an insert in said base plate extending into proximity to said working surface and formed of material of relatively high thermal conductivity, an insulator block above said insert and extending on opposite sides thereof, a thermostatic bar having an end portion thereof in contact with said insert beneath said block and extending outward therefrom, a pair of flexible resilient conductor strips secured to opposite sides of the upper face of said block and converging therefrom into vertically spaced registration at their outer ends, cooperating contacts on the adjacent faces of the registering portions of said strips, an operating connection between said thermostatic bar and one of said resilient conductor strips, and a single screw passing through said insulator block and engaging a threaded aperture in said insert forming a means for securing said block in position and clamping said thermostatic bar in thermal contact with said insert.

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