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2,880,531

FLATIRON

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2 Sheets-Sheet 1

FIG. 1.

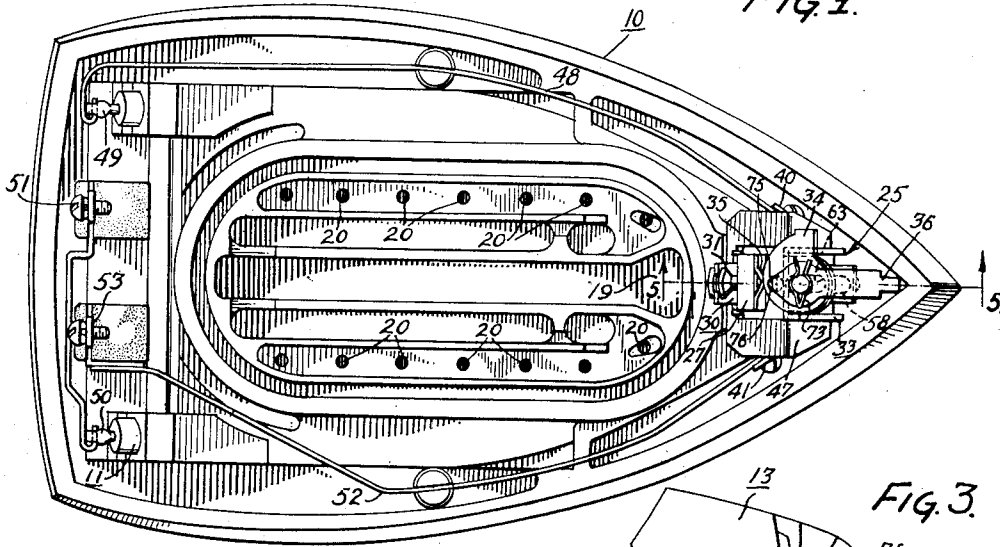


FIG. 2.

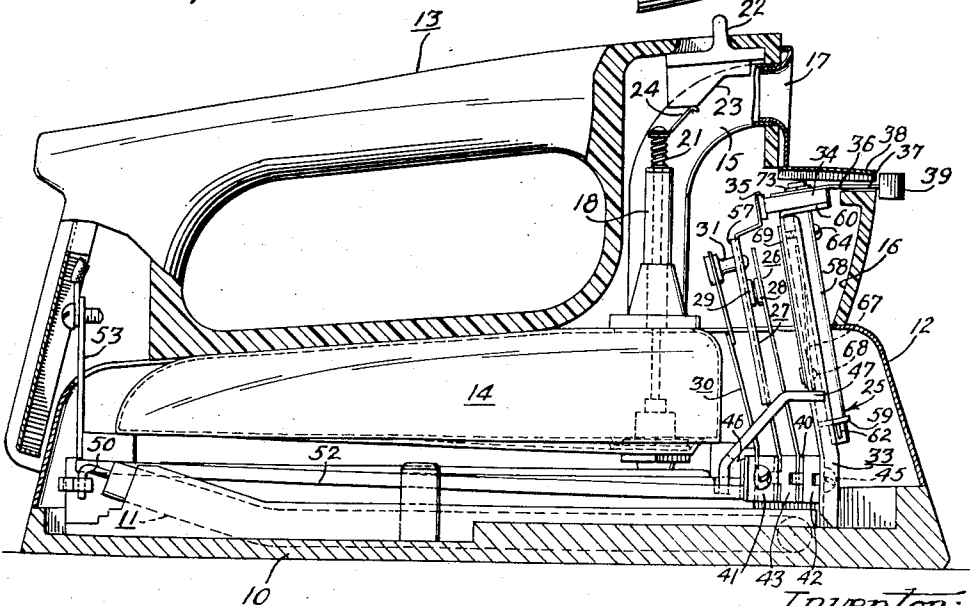


FIG. 3.

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1

2,880,531

FLATIRON

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Application October 10, 1955, Serial No. 539,592

6 Claims. (Cl. 38—82)

This invention relates to flatirons employing adjustable thermostatic control means, and while applicable generally to flatirons, the invention is useful to greatest advantage in steam irons and will be described with particular reference thereto.

In any flatiron, whether adapted for dry or steam ironing or both, the provision of adjustable thermostatic control means is a practical necessity. Such control means comprises a thermostatic switch mechanism which is manually adjustable for operation of the flatiron at different temperature levels, and which responds to the temperature of the sole plate and controls the energization of the heating element so as to maintain the desired temperature level. Preferably such control means embodies compensating means to compensate for ambient temperature. It is desirable that the control means shall be simple in construction, efficient in operation so as to effect precise and accurate control of the operating temperature, and easy to adjust. In the case of a steam iron, it is also desirable that the control means shall not detract from available space for the water reservoir and the steam chamber, and that the control means shall be free of any adverse effect or influence of water leakage or spillage. As most steam irons are also usable as dry irons, it is further desirable that the thermostatic control means shall function efficiently during both dry and steam ironing.

Prior thermostatic control arrangements in flatirons generally and in steam irons particularly have not been entirely satisfactory for one reason or another. The general trend has been toward location of the manual adjusting means in the vicinity of the front column of the handle, and the mechanisms employed have usually involved mechanical linkages that have added to their complexity and cost. Other arrangements have resulted in thermostat locations that have sacrificed performance of the iron when used either as a steam iron or as a dry iron.

One object of the present invention is to overcome the objections of prior thermostatic control arrangements in flatirons, and to provide a thermostatic control arrangement which has all of the desirable features above mentioned.

Another object of this invention is to provide a thermostatic control arrangement which permits easy adjustment from the front column of the handle, is ideally located as regards performance, and is free of any costly and complex linkage.

A further object of the invention is to provide a control arrangement which is easily adjustable to correlate the adjustment cam properly with the thermostatic switch so as to assure proper setting of the switch for any particular adjustment of the cam.

Other objects and features of the invention will be apparent from the following detailed description.

According to this invention, a thermostatic control mechanism of simple construction is mounted at the forward part of the sole plate of a flatiron and extends up-

2

ward from the sole plate into the front column of the handle, said column being made at least partially hollow to accommodate at least part of the control mechanism. In the preferred form of the invention as applied to a steam iron of the flash boiler type, the thermostatic control mechanism is mounted on the sole plate in proximity to the point of water inlet to the steam generating chamber and also in proximity to the front portion of the heating element, so as to respond quickly to temperature changes of the sole plate during both steam ironing and dry ironing. The control mechanism is easily adjustable from the front column of the handle and is also easily adjustable to correlate the adjustment cam and the switch.

The invention may be fully understood by reference to the accompanying drawings, wherein

Fig. 1 is a plan view of a steam iron embodying the present invention, with the cover, handle and reservoir removed;

Fig. 2 is a sectional view taken longitudinally and centrally through the iron;

Fig. 3 is a partial plan view of the forward portion of the handle structure;

Fig. 4 is a front elevational view of the steam iron;

Fig. 5 is a fragmentary sectional view taken along line 5—5 of Fig. 1, showing more clearly the mounting of the thermostatic control mechanism; and

Fig. 6 is an exploded perspective view of the thermostatic control mechanism showing the various parts thereof.

Referring particularly to Figs. 1 and 2, the illustrated steam iron comprises a sole plate 10 equipped with a suitably embedded heating element 11, a cover 12, and a handle 13. The construction of the iron is substantially similar to that described and claimed in the co-pending application of Daniel E. Clapp, Serial No. 539,515, filed October 10, 1955.

Within the cover 12 and above the sole plate 10 is a water reservoir 14 to which water may be supplied through a filling spout 15 which extends within the hollow front column 16 of the handle and has a forwardly-facing entrance 17. The on-off valve 18, when open, permits water to drop into the steam generating chamber of the sole plate at 19 (see Figs. 1 and 5) where it is converted into steam which is discharged through apertures 20 provided in the sole plate. The on-off valve 18 is of the spring-biased plunger type, being biased by spring 21 toward the open position and being controlled by the slidable manual element 22 which has a cam surface 23 engaging a finger 24 connected to the upper end of the valve plunger.

In accordance with the present invention, the thermostatic control mechanism, designated generally by reference numeral 25, is constructed and mounted as now to be described. It will be noted that this mechanism is mounted in the forward portion of the iron, and the elements thereof extend upwardly into the hollow front column 16 of the handle. This mechanism, as shown in Figs. 2, 5 and 6, comprises spring arms 26 and 27 carrying cooperative contacts 28 and 29 respectively, a thermomotive member 30 carrying an insulating projecting pin 31 which extends through an aperture 32 in blade 27 to engage blade 26, and a rigid supporting member 33 which serves to support the adjusting cam 34 through which the thermostatic switch is adjusted for different operating temperature levels. Cam 34 is formed of insulating material and it engages a projection 35 at the top of blade 27 to effect positional adjustment of the normally stationary contact 29. The cam is rotationally adjusted by a manual element 36 which extends through a slot 37 formed by a cover 38 and the front portion of the handle column 16. The manual element 36 is operable by means of a knob 39 at the forward end thereof.

The thermostatic switch assembly further comprises terminal elements 40 and 41 which respectively engage the contact blades 26 and 27, and insulating spacers 42, 43 and 44, which interlock with each other and with the metal components to hold the latter in electrically isolated relation to each other. The various elements are held as a unit by means of a single bolt 45 (see Fig. 5) which extends through an apertured lug or extension 46 formed integrally with the sole plate 10. As may be seen in Figs. 5 and 6, the various elements of the assembly and the mounting lug 46 have interfitting recesses and projections to index and retain the elements in proper position. The mounting lug is located in proximity to, and approximately equidistant from, the water inlet point 19 and the front or nose portion of the heating element 11. The thermomotive member 30 engages the lug 46 and receives heat therefrom. The bolt 45 threadedly engages a U-shaped nut plate 47 which serves not only as a nut but also embraces and rigidifies the entire switch assembly, while permitting free movement of the elements.

The switch comprising contact blades 26 and 27 is connected in series circuit with the heating element 11. As may be seen in Fig. 1, the switch terminal 40 is connected to a bus member 48 which extends along one side of the iron and is connected to one terminal 49 of the heating element. The other terminal 50 of the heating element is connected to one of the main terminals 51 of the iron. The switch terminal 41 is connected to a bus member 52 which extends along the opposite side of the iron and is connected to the other main terminal 53. The supply conductors of the service cord 54 (see Fig. 4) are connected to the two main terminals.

During operation of the iron, the thermomotive member 30 flexes toward the right, as viewed in Fig. 2, until the projecting finger 31 engages and moves contact blade 26 to open the switch contacts, whereupon the thermomotive element cools and permits the contacts to reclose. Preferably, the thermomotive member 30 comprises a lower bimetal element 55 which is the primary element, and an upper bimetal element 56 which is the secondary or compensating element. The primary element 55 flexes toward the right when heated, while the secondary or compensating element 56 flexes toward the left. As will be well understood, this latter element compensates for the ambient temperature, and as the ambient temperature rises, it effectively subtracts from the motion of the primary element. The operating temperature at which the switch contacts open is determined by the adjusted position of the normally stationary contact 29. The adjustable blade 27 which carries this contact is rigidified over a substantial portion of its length by side flanges 57. The lower spring portion of this blade permits flexing at said portion and also serves to bias the contact 29 in the direction of the cooperating contact 28. The latter contact is biased by the spring action of its supporting blade 26 into engagement with contact 29.

Referring now to the adjustable mounting of the cam 34, the cam and its actuating element 36 are rotationally supported at the top of the rigid supporting member 33 by means of a rod or shaft 58 which extends through apertured lugs 59 and 60 on said member. The lower lug 59 is turned out from the member 33, and the rod 58 extends through the aperture 61 of said lug and has stop extensions 62 below said lug. The lug 59 serves to retain the lower end of the rod and effectively serves as a pivot or fulcrum. The upper lug 60 has an ovate aperture 63 therein through which the upper portion of rod 58 extends and which permits forward and rearward adjustment of said upper portion. A screw 64 extends through an aperture 65 in rod 58 and threadedly engages an aperture 66 in member 33. A leaf spring element 67 has its lower portion riveted to member 33 at 68, and this spring engages rod 58 and urges it against the head of screw 64. A flat insulating element 69 has

its lower end secured to member 33 by means of the rivet 68, and has a recess 70 in its upper end to engage the protruding end of screw 64. The purpose of this element is simply to prevent engagement of contact blade 26 with the metallic supporting member 33 upon excessive movement of blade 26.

The cam 34 has an aperture 71 through which the upper portion of rod 58 extends. The actuating element 36 also has an aperture 72 through which the upper portion of rod 58 extends. Both the cam and its actuating element are supported on flange 60 and are rotatable about the rod 58, and are retained by means of a spring clip 73 (Fig. 1) which engages a groove 74 (Fig. 6) at the upper end of the rod 58. The actuating element 36 is locked to the cam by means of a detent projection 75 thereon which engages a recess 76 in the cam. If desired, however, a one-piece metal cam and actuator may be employed, in which case the cam follower 35 may be formed of insulating material.

From the foregoing description, it will be seen that adjustment of rod 58 through the medium of screw 64 effects positional adjustment of the cam 34 either forwardly or rearwardly. The purpose of this adjustment is to enable correlation of the cam with the switch to insure proper operation of the thermostatic switch mechanism at the temperature levels selected by rotary adjustment of the manual element 36. This is intended to be a factory adjustment which will be made before the iron leaves the factory and which usually will not be changed thereafter, although readjustment can be made by a serviceman if it should become necessary. This adjustment is made by removing cover 38 and by using an L-shaped screw driver to adjust the screw 64.

The construction of thermostatic control mechanism and its disposition and arrangement, as hereinbefore described, have important advantages. The mechanism is entirely free of any complicated linkage system such as those employed in many prior devices. By virtue of the generally vertical arrangement of the mechanism in the nose portion of the iron, it does not detract space from the water reservoir or steam chamber. This arrangement also enables easy adjustment of the temperature level to be made from the front column of the handle structure. It also prevents accumulation of arc products or other particles on the contacts, and it thus helps to insure continuous operation. It also locates the switch contacts and the adjustment cam mechanism away from the intensely heated body of the iron, and it locates the parts away from places of possible water leakage. Further still, the thermostatic control mechanism is simple in construction and is easily assembled, having only one mounting screw. In the case of a steam iron as illustrated, the mounting of the control mechanism on a lug extending from the sole plate in proximity to the point of water inlet is also highly advantageous, as the thermomotive member responds quickly to the temperature of the sole plate in the immediate vicinity of said point. The lug is quickly responsive to temperature changes caused by the incoming water and directly influences the thermomotive member accordingly. The location of the lug approximately equidistant from said point and the nose portion of the heating element also causes the thermomotive member to be quickly responsive during dry ironing.

While a preferred embodiment has been illustrated and described, the invention is not limited thereto but contemplates such modifications and other embodiments as may occur to those skilled in the art.

I claim:

1. In a flatiron, a soleplate, a handle constructed of heat insulating material and having a substantially vertical, hollow front column therein, adjustable thermostatic switch means for controlling the temperature of said flatiron and having first and second cooperating contacts mounted, respectively, on first and second contact

5

carrying members extending upwardly into said column with the contacts on each of said members at the upper portion thereof and in an elevated position within said column well above said soleplate, said switch means including a thermomotive bimetal element mounted substantially vertically on said soleplate at the forward portion thereof and adjacent said contact carrying members for actuating said first contact carrying member to vary the position of the contact thereon with respect to the contact on said second contact carrying member, said bimetal element also extending upwardly into said column, adjusting means for said switch means including a rotatable cam member within said column engaging said second contact carrying member to actuate the same to vary the position of the contact thereon with respect to the contact on said first contact carrying member, and manually operable means associated with said cam member for effecting rotation of said cam member.

2. A flatiron according to claim 1 wherein said cam member is supported for rotation by a rigid member attached to said sole plate.

3. A flatiron in accordance with claim 1 wherein adjusting means are provided for bodily moving said cam member to vary the position thereof with respect to said second contact carrying member.

4. A flatiron in accordance with claim 3 wherein said adjusting means for bodily moving said cam member includes a spring which serves to maintain said cam member in firm contact with said second contact carrying member

6

in all positions of adjustment of said cam member with respect to said second contact carrying member.

5. In a flatiron, a soleplate, a handle having a hollow front column, a thermostatic switch mechanism mounted on said soleplate at the forward portion thereof and extending upwardly into said column, said mechanism comprising a normally stationary contact blade extending upwardly within the column, a cam within the column having an active surface in contact with the blade for adjusting said blade, a movable contact blade extending upwardly within the column arranged cooperatively with the first blade, a thermomotive member arranged to actuate said movable blade, and manual means forming a mechanically integral assembly with said cam essentially in the plane of said cam extending to the exterior of said column for adjusting said cam by rotation of the assembly.

6. A flatiron in accordance with claim 5 wherein adjustment means is provided to permit adjustment of the position of said cam in relation to said normally stationary contact blade and including a spring to maintain said cam in the adjusted position.

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