June 30, 1942. N. T. ALMQUIST ET AL 2,288,175

SADIRON

Filed Nov. 12, 1940 2 Sheets-Sheet 1

Fig. 1

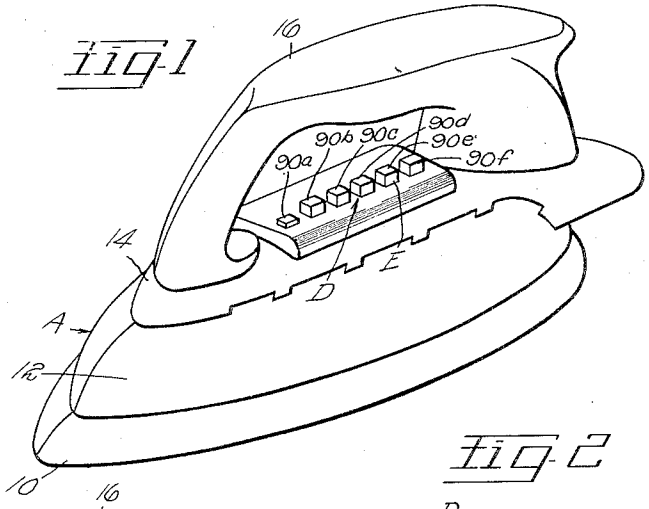


Fig. 2

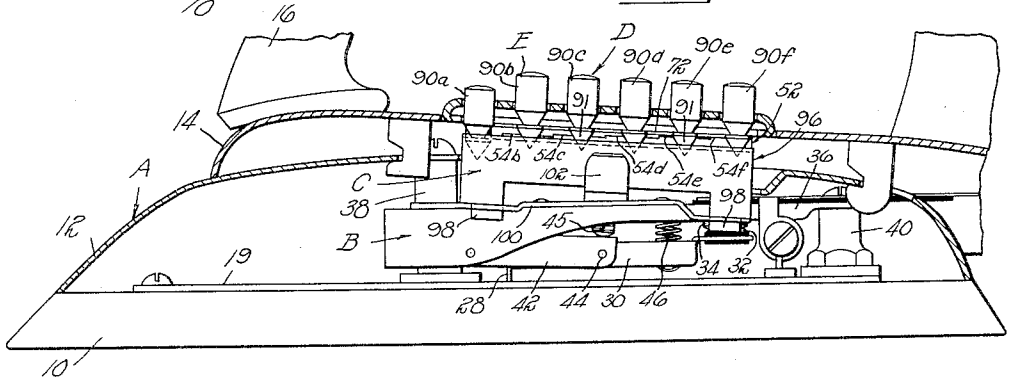


Fig. 3

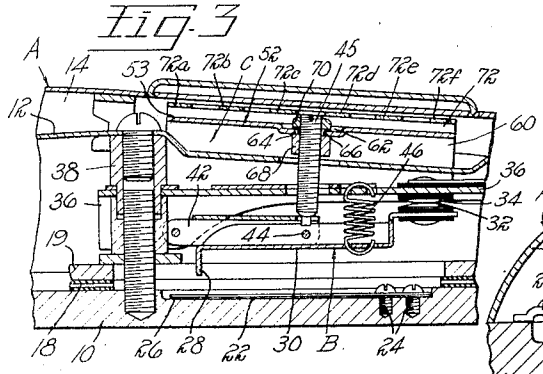
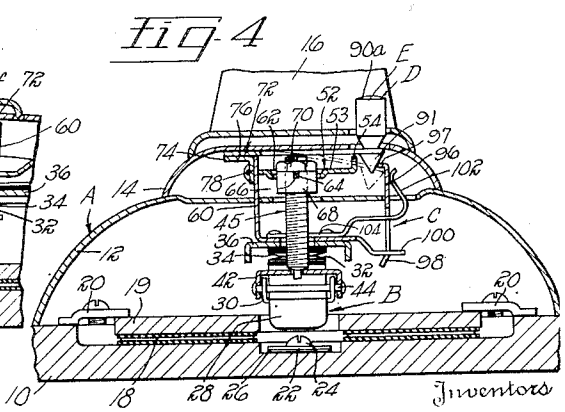


Fig. 4



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Fig. 5

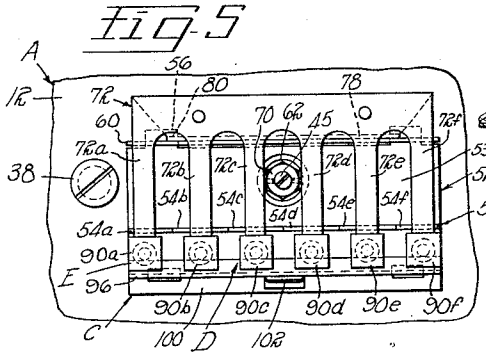


Fig. 6

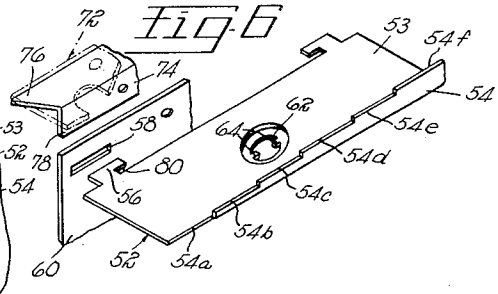


Fig. 7

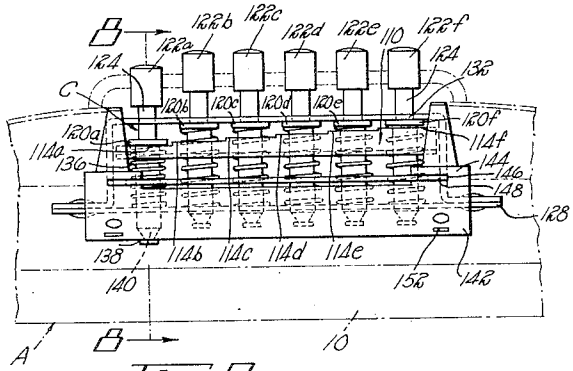


Fig. 8

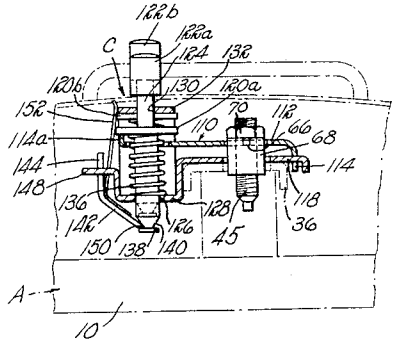


Fig. 9

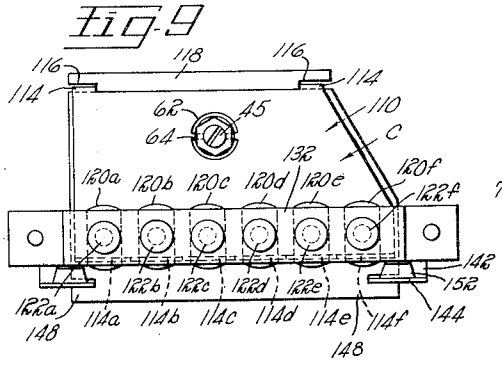
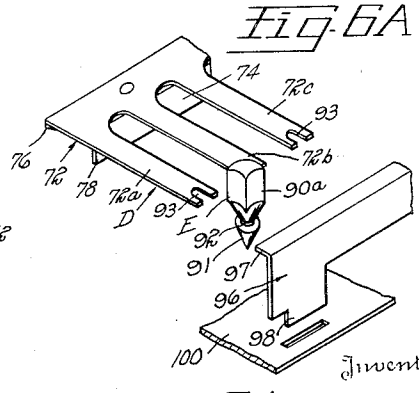


Fig. 6A



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UNITED STATES PATENT OFFICE

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SADIRON

Nils T. Almquist and Paul J. Kircher, New Britain, Conn., assignors to Landers, Frary & Clark, New Britain, Conn., a corporation of Connecticut

Application November 12, 1940, Serial No. 365,278

19 Claims. (Cl. 200—138)

The present invention relates to electric irons and more particularly to those of the household type including a thermal operated switch adapted to make and break the circuit through the heating unit and thus control the temperature of the iron.

Heretofore it has been common with such irons to provide means for varying the setting of the thermal operated switch; these means being operable from the exterior of the iron and usually comprising a manually rotatable member which when rotated to various indicated positions would, through interconnecting mechanism, vary the setting of the switch.

It is known that the usual household type of iron is rather consistently used for specific types of materials; those materials, more specifically, being rayon, silk, wool, cotton, and linen, and, considering them in the order named, each material requires a successively higher heat. The rotatable control member heretofore used is graduated to adjust the switch to obtain such successively higher heats, but the difficulty is that the rotatable member cannot be adjusted to any fixed predetermined setting for each heat, and thus if the control member was set for silk it might be so positioned that the temperature would be either on the low or high side thereof, and thus best ironing results would not be obtained. Another difficulty of the above-indicated arrangement of manual control member is that during the assembly of the iron or in use thereafter it may not be accurately positioned, and thus incorrect indications will result and proper heats will not be obtained.

The object of the present invention is to provide manually operated control means for the thermal operated switch which can be accurately preset when the iron is manufactured to give a predetermined adjustment to the switch and thereafter remains set in the predetermined adjusted position.

A still further object is an iron having a thermal operated switch which may be set to a predetermined setting for each desired type of material upon which the iron is to be used and including control means for accurately positioning the switch to that setting.

Another object is to provide an iron including a plurality of independently operable manual controls on the exterior of the iron operable through common connecting mechanism within the iron to set the thermal switch at any predesired setting and wherein upon operation of any one of the plurality of independent manual controls any previously set control is returned to an inoperative position.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawings:

Figure 1 is a perspective view of an iron embodying the invention herein;

Fig. 2 is a view with the structure of the iron partially in section to show the control means and thermal switch;

Fig. 3 is a sectional view showing details of construction of the control means and thermal switch;

Fig. 4 is an end sectional view also showing details of the control means and thermal switch;

Fig. 5 is a fragmentary plan view of the control means with the shell of the iron removed;

Fig. 6 is a perspective exploded view of the graduated lever of the actuating means and means for pivotally assembling it;

Fig. 6A is a perspective exploded view of one of the manual control elements and associated parts;

Fig. 7 is a side view of another embodiment of the control means;

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 7; and

Fig. 9 is a plan view of Fig. 7.

Referring to the drawings, the invention comprises generally an electrically heated iron A having a thermal operated switch means B for controlling the temperature thereof, adjusting means C located within the iron for varying the setting of the switch means B, and manually operable means D located exterior of the shell for actuating the adjusting means, and including a plurality of independently operable push buttons E. As indicated, the push button E may project through the top of the iron for convenient manipulation, and each is adapted upon being depressed to give a predetermined setting to the switch means C, while simultaneously releasing any previously depressed button.

More particularly, the iron A has a sole plate 10, a shell 12, a superdeck 14, and a handle 16. Positioned within a recess formed in the sole plate is a heating unit 18 underlying a thin cover plate 19 secured in place by clamping members 20. The details of construction and the specific

means for securing the iron structure together is shown in the copending application of Howard H. Schott, Serial No. 357,217, filed September 18, 1940, entitled "Flat iron construction," and will not be further described except when necessary to an understanding of the invention herein.

Referring now to the thermal switch means C, it includes an operating member comprising a thermally responsive bimetallic strip 22 located in the sole plate recess and having one end secured to the sole plate by suitable screws 24 and its other end 26 free to move upwardly upon application of heat thereto. Located in the path of the moving end 26 of the strip 22 is a tongue 28 depending from one end of a pivoted U-shaped lever 30; said lever carrying at its other end an insulated contact 32 adapted upon pivoting of lever 30 to be moved into and out of engagement with a second contact 34 for making and breaking the circuit through the iron heating element 18.

As indicated, the contact 34 is carried by, but insulated from, a plate 36 secured forwardly on the sole plate and shell securing means 38 and rearwardly on a standard 40. The plate 36 is further provided with a depending side arm on which one end of an inverted U-shaped lever 42 is pivoted; said lever being pivotally connected at its other end to the contact carrying lever 30. As indicated, the pivot 44 for the contact lever 30 is located intermediate of the ends thereof, and the lever 30 is positioned between the depending side arms of lever 42 to form therewith a breakable toggle. The toggle comprising the levers 30 and 42 is normally maintained in straightened position by a spring 46 (see Fig. 3) having one end secured to the contact carrying plate 36 and its other end to lever 30 intermediate of the pivot 44 and contact 32. In this manner, spring 46 will hold contact 32 in engagement with contact 34, and upon any pivoting of lever 30 the spring will always tend to return the contact to closed position. It is evident, however, that in order to obtain such pivoting the toggle must be broken and that by varying the spacing between the thermal element 22 and the tongue 28 of lever 30 the cycle of making and breaking the circuit through the heating element may be controlled and this in turn will control the temperature of the sole plate.

In accordance with the invention herein, adjustment of the thermal switch is accomplished through the actuating means within the iron which includes a stop member 45 so positioned that its lower end is associated with the lever 42 above the toggle pivot 44, whereby any lowering of the stop 45 will break the pivot and likewise vary the adjustment between the tongue 28 of lever 30 and the thermal element 22. The stop 45 is in turn vertically adjustable by operation of a graduated lever 52. More specifically, the stop 45 is suspended from the lever 52, which lever comprises an elongated rectangular plate 53 having an upturned edge 54 cut to provide six successively higher steps, designated 54*a* to 54*f*, inclusive. The opposite edge of plate 53 is provided with laterally extending tongues 56 which project through enlarged slots 58 in a vertical supporting wall 60 secured to and extending upwardly from the contact carrying plate 46. With the plate 53 so mounted, it may be pivoted with the side wall 60 as a fulcrum to raise or lower the stop 45.

To suspend the stop 45, the graduated lever 52 has formed therein a central depressed opening 62 into which there extends radially opposed ears 64. The ears 64 are receivable in opposed grooves 66 (see Figs. 3 and 4) of a collar 68 underlying plate 53 and into which the stop 45 is threaded with its upper end projecting through the plate opening 62 to receive a securing nut 70. With the parts so constructed, the spring 46 will also function through stop 45 to normally hold the graduated lever 52 in a predetermined position. This position may be set at the factory by adjusting stop 45 in collar 66, and will thereafter remain set, whereby any pivoting of lever 52 through the extent of any graduated step thereon will always result in a like adjustment of the thermal switch.

To pivot the lever 52 downwardly, there is arranged above same a plate 72 having six projecting spring fingers 72*a* to 72*f*, inclusive; each finger overlying and having its free end extending beyond the corresponding letter designated step of lever 52, whereby when the finger is depressed it will engage a corresponding step and pivot the lever 52 downwardly. To secure the fingers in proper relation to the steps, the finger carrying plate 72 is secured to the lateral leg 74 of an angle piece 76 having its depending leg 78 mounted on the side wall 60 and also extending through slots 80 cut in the tongues 56 of lever 52 to thus hold the lever 52 in assembled position.

The operation of any spring finger is accomplished by depressing an associated manually operable element or push button D. As indicated, there are six push buttons, designated as 90*a* to 90*f*, inclusive, and each push button cooperates with the correspondingly lettered spring finger and stop of the graduated lever 52, whereby when a button is depressed the graduated lever 52 will be pivoted a predetermined amount as measured by the depth of the steps thereon. To obtain the cooperation between the push buttons and spring fingers, the lower end 91 of each button has an inverted conical shape and at the base of the cone is a groove or shoulder 92 insertable between the split tip 93 of the spring fingers. With the button so held, upon depressing same the spring finger will be fulcrumed at and joined with plate 70, and as the finger extends across the stepped edge of lever 52, it will engage the underlying step and cause a downward pivoting movement of the lever. The pivoting of lever 52 will also force the stop 45 downwardly to lower the toggle pivot 44 and move tongue 28 of the contact lever 32 closer to the thermal element 22. It is thus obvious that the distance tongue 28 is moved will depend upon which button is pushed and that the spacing so obtained will control the heat of the iron. In the embodiment illustrated, when the button 90*a* is depressed, a minimum movement of tongue 28 results and the period before the thermal element 22 contacts it will be a minimum, thus giving high heat and temperature. On the other hand, as each successive button is depressed, the lever 52 is pivoted through a greater distance, thus increasing the lowering of the tongue 28, resulting in a more rapid engagement with the element 22 and thus gradually stepping down the heat and temperature at each successive stage. In order to have an "off" position even when the iron is plugged in, the pivotal movement obtained by the depressing of the button 90*f* is such that the stop member 45 will lower the lever 42 to such an extent that the tendency of the spring 46 to pivot the contact

lever 32 upwardly will cause the latter to bind against the lever 42 and prevent closing of the contacts 32 and 34, and thus the circuit through the iron will remain open. The depressing of the button 90f will, in addition to cutting off the circuit, release all previously depressed buttons. It thus becomes evident that five predetermined ranges of heat may be obtained and that each setting will always be accurate inasmuch as the lever 52 will always be positively moved through a predetermined amount measured by the height of the step associated with the depressed button. In this way, all chances of approximate settings are eliminated, and, in order to have a cutoff without disconnecting the iron, the sixth button is added for that purpose.

Means are further provided to maintain the switch in its last adjusted position and maintaining the last depressed button in its depressed position and also releasing any previously depressed button upon depressing another button. To accomplish this, there is provided (see Figs. 2, 4, and 6A) a longitudinally extending holding lever 96 associated with the manually operable elements. The lower edge of lever 96 has spaced depending tongues 98 pivotally mounted in slots provided in a bracket 100 extending laterally from and secured on the contact carrying plate 36. The top edge of lever 96 has an inwardly turned lip 97 normally engaging the cones 91 of the push buttons 90 just above the tips thereof, and is normally urged to such position by the vertical arms of a spring 102 bearing against the side of the lever remote from the buttons; the horizontal arm 104 of the spring being secured to plate 36.

With the lever 96 so held, it will be seen that upon depressing any button the cone 91 will cam lever 96 outwardly until the lip 97 aligns with the push button groove 92, whereupon spring 102 will pivot the lip into the groove and restrain the button and also hold the switch in its last adjusted position. Simultaneously, any other depressed button will be released, for in depressing one button the lip 97 will be moved out of the groove of a previously depressed button, whereupon the spring finger associated therewith will raise the button to inoperative position. From this the operator will always know by the depressed button the heating condition of the iron.

Referring now to Figs. 7 to 9, there is shown another type of means C for controlling the setting of the thermal operated switch means. As the iron structure is the same as in the previous embodiment, only such parts have been shown in these figures as are necessary for an understanding of the control means. Herein the graduated lever 110 comprises a plate 112 provided on one edge with downwardly turned tongues 114 and at its other edge is turned upwardly to provide six successive steps 114a to 114f, inclusive. The graduated lever 110 is pivoted by positioning the depending tongues 114 in slots 116 provided in a plate 118 secured to the contact carrying plate 36. As in the previous embodiment, the stop 45 is suspended on the graduated lever 110 intermediate of the side edges thereof and in like manner to that previously described. Cooperating with the steps 114a to 114f are a plurality of levers 120a to 120f, inclusive, which in this embodiment are directly connected to the push buttons 122a to 122f, inclusive. Thus upon the depression of any push button, the corresponding lettered lever and step of the graduated lever is simultaneously actuated.

Herein the push buttons 122 each includes an elongated stem 124 having its lower end extending through an opening 126 provided in a plate 128 secured to the plate 118 and having their upper ends, just below the manually operable portion, extending through an opening 130 provided in the base 132 of an inverted U-shaped bracket having its depending legs secured to the plate 128. As indicated, the levers 120a to 120f are positioned on the stems 124 and are positioned immediately beneath the bracket base 132, and to hold the levers in uppermost position there is mounted on each stem a spiral spring 136 positioned between the lever and the bottom plate 128. As in the previous embodiment, upon depression of any push button the lever associated therewith will engage and pivot the graduated lever a distance corresponding to the depth of the engaged step, thus pivoting the stop 44 and varying the setting of the thermal switch.

In order to maintain the buttons in their depressed position, there is provided adjacent the lower end of the stems a groove 138 and a conical portion 140, the wall of which tapers upwardly and outwardly from the groove 138. Cooperating with the groove 138 is a longitudinally extending holding lever 142 having a vertical portion 144 provided with a slot 146 for pivotally mounting the lever on a tongue 148 extending outwardly from the plate 128. The holding lever 142 inclines downwardly and inwardly from the lower edge of the vertical portion 144, and to maintain the lowermost lip or edge 150 thereof in the path of movement of the push button stems 124, there is provided a spring 152 having its upper end abutting against the plate 132 and its lower end abutting against the inner face of the holding lever 144 to fulcrum it inwardly.

With the parts so arranged, upon depressing any push button, the lower end thereof will force the lip 150 of the holding lever outwardly against the tension of the spring 152 until the lip is aligned with the groove 138, whereupon the holding lever will be pivoted inwardly to secure the push button in its depressed position. In like manner to the first embodiment, the depressing of any push button will release any previously depressed push button, for the lower end of a second pressed button will initially pivot the holding lever out of the groove of a previous button, whereupon the spring 136 will urge the button upwardly to its inoperative position.

From the foregoing it will be noted that in both embodiments the structure is such that each manually operable control or push button is depressable an equal amount, although a different setting of the thermal switch is obtained upon the depressing of any button. Although but six buttons have been shown, it is apparent that the graduated lever in each embodiment could have any desired number of steps and any desired number of control push buttons could be associated therewith.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of

the scope of the invention which, as a matter of language, might be said to fall therebetween.

We claim as our invention:

1. In an electric iron, thermal responsive means, a switch actuated by said thermal responsive means, means for adjusting said switch relative to said thermal responsive means and comprising a plurality of independently operable manual control elements exterior of the iron, and means interior of the iron operable upon the operation of any one of said elements to adjust said switch.

2. In an electric iron, thermal responsive means, a switch actuated by said thermal responsive means, means for adjusting said switch relative to said thermal responsive means and comprising a plurality of independently operable manual control elements exterior of the iron, means interior of the iron operable upon the operation of any one of said elements to adjust said switch, and means operable by the operated control element for restraining said switch in adjusted position.

3. In an electric iron having a thermal operated adjustable switch, means for adjusting said switch comprising a plurality of independently operable manual control elements on the exterior of the iron, means interior of the iron operable upon the operation of any one of said elements to adjust said switch, and means operable upon the operation of any one of said elements for releasing any previously operated element for restraining the last operated element and switch means in adjusted position.

4. In an electric iron having a thermal operated adjustable switch, a plurality of independently operable manual control elements on the exterior of the iron, a graduated lever pivotally mounted within the iron and adapted upon pivotal movement to adjust said switch, and cooperating means between each of said elements and said graduated lever for pivoting said graduated lever upon manipulation of any one of said elements.

5. In an electric iron, thermal responsive means, a switch actuated by said means, means for adjusting said switch relative to said thermal responsive means and comprising a graduated lever pivotally mounted in said iron, means interconnecting said lever and said switch, whereby pivotal movement of said lever will adjust said switch, and means exterior of the iron for pivoting said lever through a predesired range of movement.

6. In an electric iron having a thermal operated adjustable switch, a lever pivotally mounted in said iron, means interconnecting said lever and said switch, whereby upon pivoting of the lever the switch will be adjusted, a plurality of steps on said lever, a plurality of adjusting elements exterior of the iron, each of said elements cooperating with one of the steps on said lever, whereby upon operation of any one element said lever is pivoted through a predetermined degree to adjust said switch.

7. In an electric iron, thermal responsive means, a switch, means for adjusting said switch relative to said thermal responsive means and comprising a plurality of independent control elements exterior of the iron, and means operable upon operation of any selected elements to adjust said switch to a corresponding selected adjustment.

8. In an electric iron, thermal responsive means, a switch actuated by said thermal responsive means, and means for adjusting said switch relative to said thermal responsive means and including a member associated with said switch for changing the adjustment thereof, a plurality of independently operable manual control elements exterior of the iron, and means connecting each of said elements with said adjusting member, the means connecting any one element with said adjusting member having a different range of movement than the means connecting any other element to said member.

9. In an electric iron, a thermal operated switch, a member associated with said switch, a pivoted lever from which said adjusting member is suspended, a plurality of graduated steps provided on said lever, and means exterior of the iron and comprising a plurality of independently operable manual control means, each of said means cooperating with one of the steps of the lever, whereby upon operation of any selected element said switch is given a predetermined adjustment.

10. In an electric iron, thermal responsive means, a switch actuated by said thermal responsive means, means for adjusting said switch relative to said thermal responsive means comprising a plurality of independently operable manual control elements exterior of the iron, common means interior of the iron operable upon operation of any one of said elements to adjust said switch, and means intermediate each control element and said common means whereby a predetermined fixed adjustment will be obtained upon operation of any selected element.

11. An electric iron, thermal responsive means, a switch actuated by said thermal responsive means, and means for adjusting said switch relative to said thermal responsive means and comprising a plurality of independently operable manual control elements exterior of said iron for adjusting said switch, and means intermediate of each control element and said switch for providing a different switch adjustment for each of said control elements.

12. In an electric iron, thermal responsive means, a switch operated by said thermal responsive means, means for adjusting said switch relative to said thermal responsive means and comprising, a plurality of independently operable control elements exterior of the iron, and means interconnecting each element with said adjusting means for adjusting same through a different range of movement.

13. In an electric iron, thermal responsive means, a switch actuated by said thermal responsive means, and means for adjusting said switch relative to said thermal responsive means and comprising a graduated lever for adjusting said switch to a plurality of different positions corresponding to the number of graduations on said lever, and means for operating the lever at any selected graduations.

14. In an electric iron, a thermal operated adjustable switch, a member associated with said switch for adjusting same, a pivoted lever carrying said adjusting member, said lever including a plurality of graduated steps, a plurality of independent manually controlled elements exterior of the iron and equal in number to the graduated steps, and means connecting each element with an associated step, whereby upon operation of a selected element it will pivot the lever to

lower said adjustment member through a range corresponding to the associated step.

15. In an electric iron, a thermal operated adjustable switch, a member associated with said switch for adjusting same, a pivoted lever carrying said adjusting member, said lever including a plurality of graduated steps, a plurality of independent manually controlled elements exterior of the iron and equal in number to the graduated steps, means connecting each element with an associated step whereby upon operation of a selected element it will pivot the lever to lower said adjustment member through a range corresponding to the associated step, and means operative upon the operation of any one of said control elements to restrain said lever and control element in adjusted position.

16. In an electric iron, a thermal operated switch, a member associated with said switch for adjusting same, a pivoted lever for carrying said member, a push button for operating said lever, means for restraining said push button and lever in depressed position, a second push button adapted upon being depressed to move said lever through a greater range of movement than said previous push button, and means carried by said push button for releasing said restraining means from said first push button upon depression of the second push button, and for restraining said second push button, and spring means for returning said first push button to normal position.

17. In an electric iron, a thermal operated adjustable switch, means for adjusting said switch, a pair of push buttons exterior of the iron, means connecting one of said push buttons to said adjusting means for moving it through a predetermined range of movement, means connecting the second push button to said adjusting means for moving it through a greater range of movement, means operative upon actuation of either of said push buttons to restrain same in actuated position, and means operative upon actuation of either of said push buttons to release the previously actuated push button.

18. In an electric iron, a thermal operated adjustable switch, means for adjusting said switch, a pair of push buttons operable from the exterior of the iron, means connecting one of said push buttons to said adjusting means for moving it through a predetermined range of movement, and means connecting the second push button to said adjusting means for moving it through a greater predetermined range of movement.

19. In an electric iron, thermal responsive means movable through a predetermined range of movement, a switch including a member lying in the path of movement of said thermal responsive means and adapted to be engaged thereby to open said switch, and a plurality of independently operable means exterior of the iron operatively connected to said member for adjusting said member to different positions in the path of movement of said thermal responsive means.

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