

Feb. 11, 1947.

L. J. KOCI

2,415,795

SADIRON

Filed Oct. 3, 1941

4 Sheets-Sheet 1

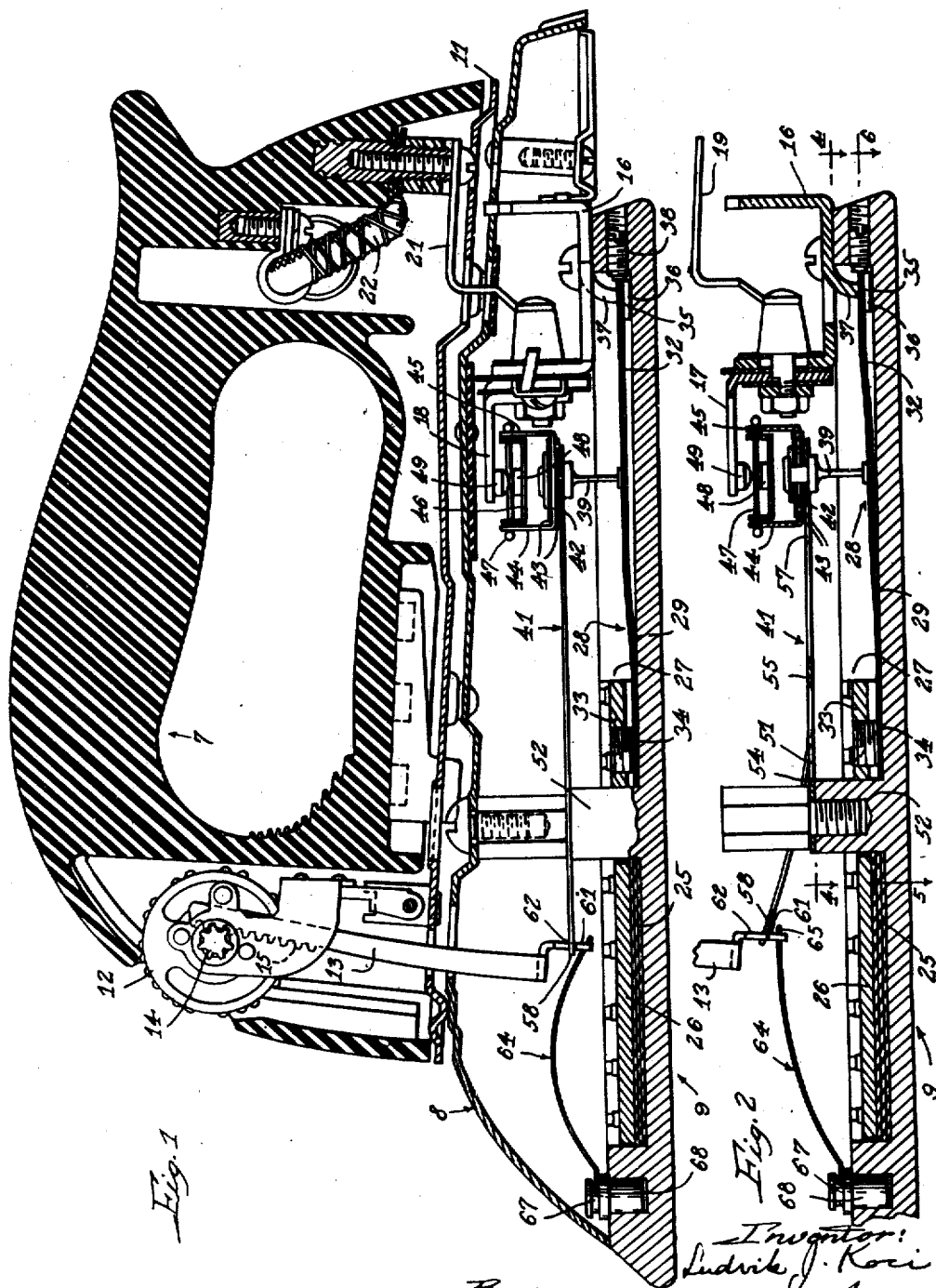


Fig. 1

Fig. 2

Inventor:
Ludvik J. Koci
By McGraw, Wintercom & Horsbach

Atty.

Feb. 11, 1947.

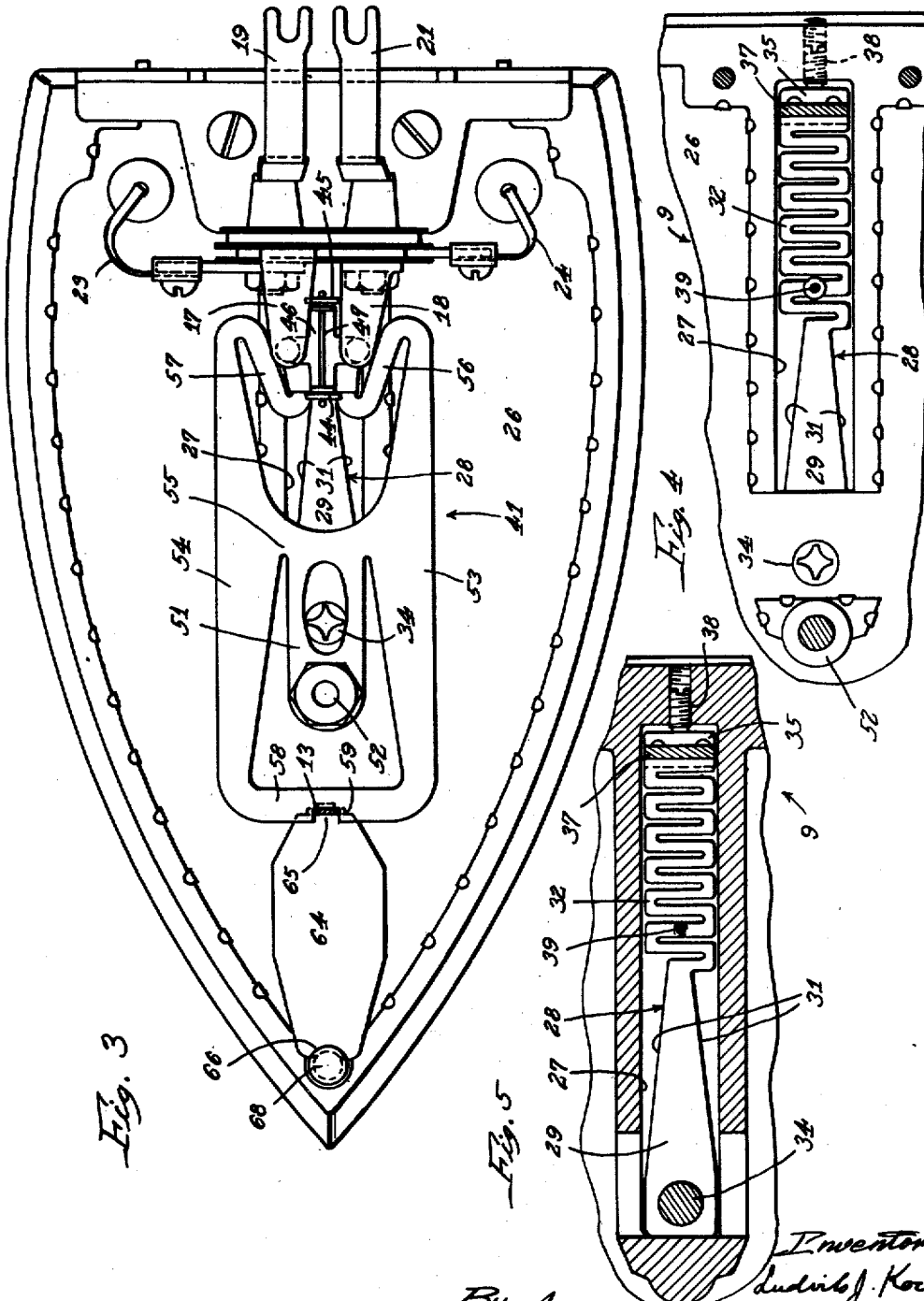
L. J. KOCI

2,415,795

SADIRON

Filed Oct. 3, 1941

4 Sheets-Sheet 2



Inventor:
Ludwig J. Koci
By McCanna, Wintercorn & Morrell
Attys.

Feb. 11, 1947.

L. J. KOCI

2,415,795

SADIRON

Filed Oct. 3, 1941

4 Sheets-Sheet 4

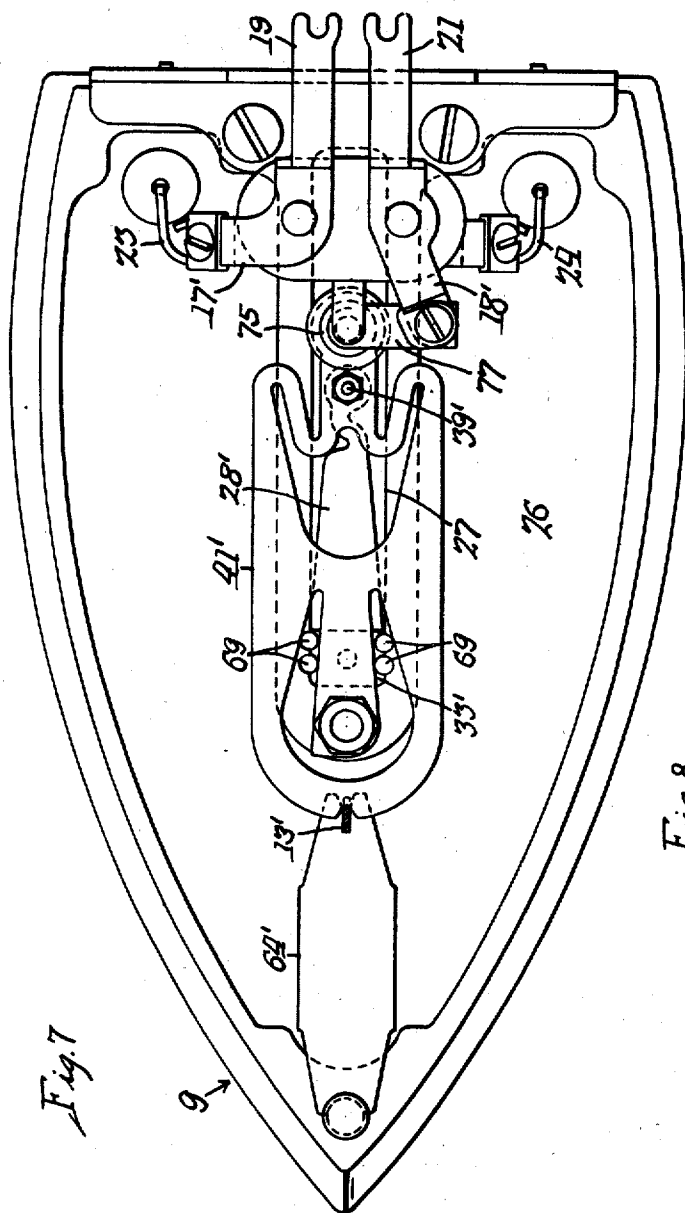


Fig. 7

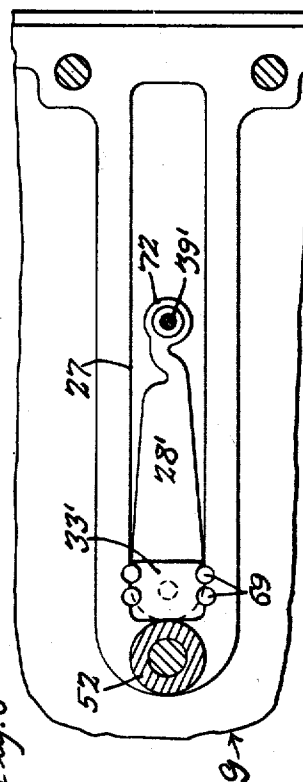


Fig. 8

Inventor:
Ludwik J. Koci
By McCame, Wintercorn & Morshed
Attys.

UNITED STATES PATENT OFFICE

2,415,795

SADIRON

Ludvik J. Koci, Chicago, Ill., assignor to Sunbeam Corporation, Chicago, Ill., a corporation of Illinois

Application October 3, 1941, Serial No. 413,571

18 Claims. (Cl. 219—25)

1

This is a continuation in part of my application Serial No. 357,722, filed September 21, 1940, for sadiron.

The invention relates to sadirons, and has special reference to an electric sadiron of the so-called automatic type.

During the past few years the electric sadiron has developed from a relatively low wattage device to a high wattage structure in which heat is generated in the iron at a very rapid rate. This has required considerable improvement in the temperature controls therefor, which improvement has, however, been inadequate to provide an iron with the nicety and accuracy of control required to prevent complications from arising in the use of the iron. These complications are in general undesirable variations in the temperature of the iron due to improper operation of the thermostat mechanism which in turn is due primarily to uneven heat distribution in the iron. The problem of proper heat distribution, it will be recognized, is a particularly difficult one in a sadiron due to the fact that the iron is essentially a heat transfer mechanism, heat being generated at one point and dissipated at another, that time is required to transfer heat through the mass, and that the object to be controlled is essentially a surface, that is, the ironing surface of the sole plate, rather than a solid or fluid volume, the temperature of which must be controlled as a body.

One of the difficulties arising in high wattage irons and due to slow or uneven heat distribution is an overshoot in temperature occurring when the iron is first heated up, that is, when the iron is cold and is connected to a source of electrical energy. Under these circumstances the sole plate heats up rapidly, in fact so rapidly that other portions of the iron, including the thermostat, lag behind so that the supply of electrical energy to the heating element continues to flow after the ironing surface has reached the temperature for which the thermostat would nominally be set. Thereafter, as the iron reaches uniformity in temperature, the make and break of the contacts will occur at a substantially lower sole plate temperature. The result is that if the operator uses the iron too soon after placing it in service, an excessive temperature may be present at the sole plate, causing burning or scorching of the fabric.

One well known type of sadiron has employed for control purpose a strip of thermostatic metal located in heat transfer relation to the sole plate and forming the main temperature control, to-

2

gether with a secondary thermostat element acting between the main thermostat and the electrical contacts for the purpose of modifying the movement of the contacts by the main thermostat in response to temperature lag.

While this form of control structure can be made to eliminate the initial overshoot of the iron which is essentially due to the temperature lag of the thermostat upon increasing temperature, it tends to produce defective operation when the thermostat becomes highly heated and the lag occurs in decreasing temperature, as, for example, when the iron is being used in heavy service and there is a great heat drain from the ironing surface. Under these circumstances, the secondary thermostat becomes highly heated and reaches a higher temperature than would be the case if used for light service, for the reason that the heating element is on for a greater period of time and the secondary thermostat is so located as to be appreciably affected by the heating element temperature. If, under these circumstances, the iron is put aside, the temperature of the sole plate will overrun because the main thermostat must be heated to a much higher temperature to overcome this additional or over-compensation by the secondary thermostat. The result is that the sole plate will reach a higher temperature than that for which the control is set, and if used for ironing at this time may cause damage to the material.

In another well known iron a supplementary heating element is employed to act on the thermostat element to effect partial compensation. This construction, however, results in what I have termed poor regulation in the iron. By regulation I mean that property of the sole plate to maintain uniform temperatures under varying amounts of heat withdrawal. Thus, by good regulation is meant that the temperature of the sole plate will vary but little under varying amounts of heat withdrawal; in other words, the thermostat control will tend to maintain the same average temperature of the sole plate under full load as under idling or partial load. An iron with poor regulation tends to maintain a sole plate temperature much lower than that for which the iron is set when operating under a condition of heavy heat withdrawal.

All of these prior art devices are, however, mere approximations for the reason that the compensating device is located away from the main thermostat and in different heat transfer relationship with the sole plate, and are therefore subjected to temperature changes which may be

3

and frequently are different in magnitude and in direction from those to which the main thermostat may be subjected.

I have found that this and other objectionable characteristics of prior art irons are due to two factors, one being due to lag or differences in temperature between the main and secondary thermostat structures due to their difference in location and mounting, and the second being temperature lag due to the mass of the thermostat itself, that is, due to the slower rate at which the heat is disseminated through the thermostat structure.

An important object of the invention is the provision of a sadiron so constructed as to substantially eliminate the initial temperature overshoot thereof.

I have also aimed to provide a sadiron having improved temperature control characteristics including a rapid rise to the temperature for which the iron is set and uniform control of the temperature within a defined range with variation in the ironing conditions.

Another object of the invention is the provision of a novel sadiron construction wherein the iron is constructed to have a minimum of capacity for storing heat consistent with satisfactory strength and rigidity of the parts to thereby reduce to a minimum the lag in temperature change throughout the iron, and wherein this lag becomes sufficiently small as to be capable of compensation by a novel form of thermostat mechanism without the use of secondary thermostats and similar mechanisms heretofore associated with such thermostatic devices and to combine therewith a thermostat structure inherently capable of compensating for such lag so as to maintain a uniform ironing temperature under varying conditions of use.

A further object of the invention is the provision of a sadiron structure in which the thermostat element is maintained in close or good heat conducting relation to the sole plate and maintained in said relationship under all possible conditions of use, as described hereinafter, and wherein the switch is actuated by relatively small thermostat movement.

A further object of the invention is the provision of a sadiron structure in which the compensating means is located in close proximity and substantially unvarying relation to the object to be controlled so as to be subjected to substantially the same temperature influences as the main thermostat, and thereby effectuate good regulation of the iron and elimination of temperature overshoot under all conditions of use.

A further object of the invention is the provision of a sadiron of the character above described in which the compensating thermostat means may be incorporated either in a snap-acting or a slow-acting (as hereinafter defined) thermostat structure and switch control.

A still further object of the invention is the provision, as one species, of a sadiron wherein the temperature is controlled by a snap-acting thermostat operating through a very small amplitude, and wherein the center line of the thermostatic strip is so located with respect to the surface of the sole plate that operation of the contacts occurs close to the center line with most of the movement of the strip occurring on the opposite side of the center line from the contacts, whereby to open the contacts with maximum acceleration.

A still further object of the invention is the

4

provision, as another species, of a sadiron wherein the temperature is controlled by a so-called slow-acting thermostat and in which the construction and arrangement promotes greater simplicity and economy in cost of manufacture while still maintaining the desirable features of compensation.

More particularly, my invention aims to provide a new combination of elements in a sadiron having characteristics adapted for light-weight and high wattage construction, together with reduced scorching hazard without loss in ironing speed. This is accomplished by a structure possessing inherent characteristics of perfect compensation along with good regulation. This structure enables the maintenance of the main thermal response element in close and substantially unvarying heat transfer relation to the ironing surface under all conditions of temperature of the latter, thus reducing to a minimum the need for compensating action. This is attained in my invention with minimum friction loss, and consequently with freedom from erratic characteristics.

I have also aimed to provide a sadiron having a thermostat structure wherein improved manually controlled means operate on the thermostat to vary the temperature of operation, and in which such means function in the compensation of the thermostat.

A still further object of the invention is the provision of a sadiron structure having a snap-acting thermostat wherein the temperature differential between the make and break of the contacts can be adjusted from the exterior of the iron.

I have further aimed to provide a sadiron construction in which novel means function for manually adjusting the temperature of operation thereof, and wherein novel spring means is provided for maintaining the adjusted position of said means.

Other objects and advantages will appear from the following description and the accompanying drawings, in which—

Figure 1 is a longitudinal section through a sadiron embodying my invention having a snap action thermostat, showing the contacts and thermostat in closed position and the adjusting means set for operation of the thermostat at a high temperature;

Fig. 2 is a fragmentary section similar to Figure 1 showing the thermostat and contacts in open position and the control mechanism in the "Off" position;

Fig. 3 is a top view of the sole plate and attached mechanism, the cover being removed;

Fig. 4 is a view on the line 4—4 of Fig. 2;

Fig. 5 is a section on the line 5—5 of Fig. 2;

Fig. 6 is a longitudinal section through a sadiron embodying my invention, having what may be termed a slow-acting thermostat, showing the contacts and adjusting means set as in Fig. 1;

Fig. 7 is a top view of the sole plate and attached mechanism of the slow-acting embodiment, the cover being removed;

Fig. 8 is a view substantially on the line 8—8 of Fig. 6;

Fig. 9 is a top view of the thermostat strip of the slow-acting embodiment, removed from the iron;

Fig. 10 is a side view of the thermostat strip of Fig. 9, showing the shape to which it is formed before it is applied in the iron;

Fig. 11 is a top view of another form of slow-

5

acting thermostat strip adapted for use in the Fig. 6 embodiment; and

Fig. 12 is a side view of a further modified form of slow-acting thermostat adapted for use in the Fig. 6 embodiment.

The invention is herein shown as embodied in a sadiron of the general structure described and claimed in Bisley Patent No. 2,277,034, granted March 24, 1942, entitled "Sadiron," and includes a handle designated generally by the numeral 7 of molded plastic material, a cover 8 and a sole plate 9 having the structure therein described. Interposed between the handle 7 and the cover 8 is plate 11 serving to permit circulation of air between the handle and the cover. Positioned in the forward end of the handle is a wheel 12 adapted upon its rotation to move a bar 13 in an up and down direction, depending upon the direction of rotation of the wheel 12, the bar being moved by a pinion 14 connected to the wheel and a rack 15 formed on the bar 13, movement of the bar being effectual for the purpose of determining the normal operating temperature of the iron and for the purpose of shifting the switch mechanism, presently to be described, to an "Off" position. As described in said application, the sole plate has a bracket 16 carrying a pair of contact bars 17 and 18 (Fig. 3) connected through fingers 19 and 21 to the ends of an appliance cord 22 (Figure 1) for the transfer of electrical energy to the contact bars 17 and 18. These bars are connected through conductors 23 and 24 to a heating element 25 seated in the sole plate 9 and retained in position by a plate 26. Extending longitudinally of the sole plate is a thermostat well designated generally by the numeral 27. The manually operable wheel adjustment and the sole plate structure shown in the present embodiment, together with certain related features, are claimed in Jepson Patents 2,266,708 and 2,277,439, granted December 16, 1941, and March 24, 1942, respectively.

According to the present invention, a thermostat embodying the principles shown in my co-pending application Serial No. 327,255, filed April 1, 1940, entitled "Thermostat," now Patent No. 2,332,518, is employed including a bimetallic strip 28 having the shape characteristics shown in Figs. 1 and 5 and comprising a portion 29 having its edges tapering inwardly toward the central portion thereof as shown at 31, and a portion 32 of serpentine configuration is seated in the well 27, the end of the portion 29 being confined against the bottom of the well by a plate 33 and a screw 34 which presses the strip firmly into contact with the bottom surface of the well and prevents movement thereof. The top side of the strip is the high expansion side of the metal. The opposite end of the strip terminates in an end portion 35 which seats upon a shoulder 36 at the opposite end of the well, this end portion being confined thereagainst to prevent angular movement by means of an arm 37, in this instance integral with the bracket 16. A screw 38 threaded into the sole plate and projecting into the well bears against the end of the strip 28, stressing the same longitudinally in order to cause the strip to move with a snap action. In this instance the strip is given an arcuate curve at atmospheric temperature such that the strip would curve upwardly toward the end 35 if that end were released, and the strip is stressed by drawing the end 35 down to the position shown in the drawings. The strip is initially curved in this manner in order to increase the range of temperature within which

6

the strip may operate without set, a wide range of temperature operation being necessary for sadiron purposes.

This drawing of the end 35 down acts to put maximum bending stress on the strip at atmospheric temperature. Under this condition increase in temperature of the strip would reduce said bending stress. The thermostatic strip carries a pin 39 riveted thereto adjacent its mid-point and projecting upwardly, the upper end thereof being riveted to the end of a spring designated generally by the numeral 41. The end of the spring also carries a yoke 42 fixedly attached thereto and insulated therefrom by insulating disks 43, the yoke having spaced arms 44 and 45 to which a contact plate 46 is pivotally attached by a pin 47. The contact plate 46 carries a pair of spaced contacts 48 adapted to cooperate with spaced contacts 49 carried on the contact bars 17 and 18 for the purpose of controlling the flow of current through the heating element 25.

The spring 41, face view of which is shown in Fig. 3, comprises a strip of spring metal having a central tongue 51 fixed to a post 52 (Figure 1) forming one of the connections between the sole plate and the cover 8, and side members 53 and 54 to which the tongue connects substantially at their mid-point as shown at 55. The side members 53 and 54 each terminate in a relatively narrow band of metal in the form of a reverse bend as shown at 56 and 57, the ends of these strips being integrally connected and forming the rear end of the spring 41 and being fixedly attached to the pin 39. The forward ends of the side members 53 and 54 are connected by a transverse strip 58 which has a slot 59 in its forward edge adapted to receive the lower end of the bar 13 therein, the bar having spaced upper and lower shoulders 61 and 62 adapted to bear on opposite sides of the spring, whereby longitudinal movement of the bar will cause the end of the spring to be moved up or down, thus, when the end 58 of the spring is moved upward the opposite end of the spring applies a downward pressure on the thermostat strip through the pin 39. This serves to reduce the contact pressure and thus provides a condition wherein a smaller temperature rise of the thermostat 28 is necessary to open the contact points. This then, serves as a means of lowering the temperature setting of the sadiron. Inversely, downward movement of the end 58 would result in the iron operating at a higher temperature. The serpentine configuration of the spring portions 56-57 reduces restraint to angular motion of this end at the point where the pin 39 is fastened and that serves to give the above mentioned action to a degree approaching that which would be had if there were a pivotal connection between this end of the pin and the spring. One of the advantages of this spring construction as compared with a conventional pivotal lever construction is the elimination of friction and the uncertainties of operation which accompany such friction. Also, simplicity of this construction promotes economy in cost of manufacture.

The thermostat strip and its mounting inherently functions to compensate for lag due to the mass of the thermostat and due to the location of the thermostat with respect to the ironing surface of the sole plate. This compensation is incorporated in the thermostat through its thermostatic strip, the manner of its mounting and its shape characteristics. The strip may be considered functionally to consist of the parts 29 and

32, though as will be obvious from the drawings, the strip functions as a unit in producing snap action and the thermostatic action incidental to this snap action, the serpentine configuration of the portion 32 providing the necessary softness or resiliency necessary for good snap action. However, the portion 29 may be looked upon as being the main thermostat confined at one end by the screw 34, the opposite end thereof being free to move but being restrained in its angular movement by the portion 32 and the pin 39. It will be seen by reference to my Patent No. 2,332,518, that if the end of the portion 29 connected to the portion 32 is restrained against angular movement, but is free to impart longitudinal movement to the pin 39, this end portion will act, thermostatically, in a direction opposite to that of the main part of the portion 29. Therefore, upon rapid increase in temperature of the strip under conditions in which the junction between the portions 29 and 32 lags behind the end portions of the strip, it is necessary for the portion 29 to attain a higher temperature to cause the strip to snap than would be the case if the strip were of uniform temperature from end to end. For this reason, upon rapid rise of temperature in the sole plate, the movable end of the thermostat portion 29 will act to compensate for its own lag in temperature. Where the temperature of the movable end is higher than that of the fixed end, the opposite effect will obtain and proper compensation result. The amount of this angular restraint can be varied by varying the flexibility of the portion 32 at the side of the pin 39 adjacent to the portion 29, thereby varying the additional energy which must be generated by the main body of the portion 29 in order to snap through center. The pin 39 itself is restrained from angular movement, that is, from motion other than longitudinal, by means of its fixed connection to spring 41. Because of this fixed connection the spring 41 has provided the bands 56 and 57 which are so shaped as to flex freely upon movement of the pin.

It will be seen that when the wheel 12 is rotated to a position to elevate the bar 13 and materially distort the spring 41, the spring will exert a substantial downward pressure on the bar which may tend to rotate the wheel and change the adjustment of the iron in response to the vibration occasioned by handling of the iron in service. In order to remove this thrust I have provided a second spring designated generally by the numeral 64. The spring 64 has the form shown in Figs. 1 to 3, inclusive, one end of the spring having a tongue 65 arranged to project into an opening in the lower end of the lever 13 and the opposite end thereof having an arcuate configuration as shown at 66 receivable in a groove 67 of a pin 68 seated in the forward end of the sole plate. It will be seen that this arrangement is such that as the bar 13 is moved upward, the vertical component of the pressure from the spring 64 increases, which increase is substantially equal in magnitude to the downward pull of the spring 41, whereby the position of the bar 13 and the wheel 12 is substantially stabilized, regardless of the elevation of the bar and of the downward pull exercised by the spring 41. This construction provides a toggle action in which forces are applied to the bar 13 which are substantially equal and opposite except for a slight excess of force in one direction used to take up whatever play may exist in the linkage.

Attention is directed to the novel sadiron and

thermostat structure and to the novel structure of the strip 28 and the manner in which it is incorporated into the sole-plate. It will be seen that the structure is such as to practically perfectly compensate for the temperature lag due to the mass of the thermostat itself, because of the fact that a large portion of greatest primary thermostatic effectiveness, i. e., that portion 29 adjacent to the attached end of the strip, is maintained at all times in approximate contact with the top surface of the well or sole plate to which the strip is attached. The remaining portion of the strip (mainly the compensating portion) being slightly farther spaced from said top surface but maintained in substantially unvarying relationship thereto, will exhibit some lag in response to the temperature of said surface, although ultimately responsive to only the temperature of said surface. In Figs. 1 and 2, this spacing of the compensating thermostat portion above the top surface of the well or sole plate is somewhat exaggerated for the purpose of clarity, and in actual practice I have used such a spacing that the distance between the bottom of the compensating portion of the strip and said top surface of the well directly below the pin 39 is approximately .025 to .030 of an inch when the strip is in the upper or contact making position. Furthermore, by properly controlling the forces on the strip, the lag in the temperature change of the thermostat with respect to the temperature change at the ironing surface of the sole plate can be compensated for in an ideal manner. By properly controlling the forces on the strip I mean control of the amount of restraint to angular motion at the free portion of the strip effected either by variation in width and shape and therefore resistance to bending along the length of the strip or by variation in resiliency of the pin 39 with respect to bending. As previously stated, the greater the degree of this angular restraint the greater will be the degree of compensation. In addition to providing compensation for lag in temperature of the thermostat with respect to the immediate portion of the sole plate to which it is mounted, it is possible to also compensate for the lag in temperature which exists between that portion of the sole plate to which the thermostat is fastened and that portion of the sole plate whose temperature it is desired to control. This is particularly advantageous in a sadiron because here it is not feasible to mount the thermostat directly on the ironing surface which temperature it is desired to control. This introduces a secondary lag existing between the point where the thermostat is mounted and a remote point on the ironing surface whose temperature is to be controlled, which lag is also compensated for by the structure here disclosed.

Furthermore, the strip is supported in such fashion as to obtain maximum heat transfer to the strip and yet allow the contacts to be opened and closed with an adequate range of movement. To obtain a desirable small temperature differential between "cut in" and "cut off" of the snap-acting thermostat the screw 38 is adjusted so as to obtain only a very limited degree of snap-acting energy. To obtain maximum acceleration of contact break commensurate with this small degree of snap-acting energy the structure is designed so that the portion of the thermostat strip adjacent to the pin 39 is at or close to the center line connecting the opposite end portions when the thermostat is in its "contacts on" position. This corresponds to a position wherein

the thermostat strip is under maximum compressive stress and is the position shown in Fig. 1. With this structure I obtain to the fullest degree these advantages incident to snap action operation, viz., reduced frequency of contact make and break resulting in reduced contact wear and radio interference, without the accompanying disadvantage of large temperature differential between "cut in" and "cut off."

According to the present invention the thermostat strip is mounted in such close and substantially unvarying relationship to the sole plate that the main thermostat portion 29 and the compensating thermostat portion in the region of the pin 39 are primarily and ultimately responsive to the sole plate temperature but with the compensating thermostat portion lagging behind the main thermostat portion. By reason of this new interrelationship between the novel thermostat structure and the sadiron I obtain in a high wattage iron the combined advantages of good regulation above defined and effective elimination of temperature overshoot under all conditions of operation. This appreciably reduces the hazards of scorching without impairing speed of ironing under normal variations and particularly under heavy load ironing.

I also desire to direct particular attention to the novel structure of the spring 41 and the functions resulting therefrom, as previously described. Another advantage of the invention lies in the co-operative action between the spring 64, the spring 41 and the bar 13, whereby the setting of the iron is stabilized against accidental changes.

My improved structure is such as to give practically ideal regulation in the iron, and such that the initial overshoot in temperature common to thermostatically controlled irons as well as subsequent over-shoots caused by extreme variations in the operating conditions of the iron are practically eliminated.

It will also be observed that in this snap action embodiment the construction is such that both the operating temperature of the iron and the differential may be set from the exterior of the iron, the operating temperature being regulated by means of the wheel 12 and the differential between the closed position of the contacts, and the open position thereof being determined by the stress applied to the strip through the screw 38.

In Figs. 6 to 10, inclusive, I have shown another embodiment of my invention characterized by what I have termed a slow-acting thermostat action as contrasted with snap action in the embodiment previously described. In these figures like reference numerals are used to designate generally similar parts in the description of the snap action embodiment. This slow-acting thermostat embodiment employs use of the same principle as in the snap action embodiment, of obtaining compensation within the main thermostat itself by imposing restraint to angular motion of its free portion and of mounting the thermostat strip with its main and compensating portions in such close proximity to the sole plate as to be primarily and ultimately responsive thereto and practically independent of variations in load condition but with the compensating thermostat portion lagging behind the main thermostat portion. As shown in Fig. 6 this restraint to angular motion is accomplished through the pin connection 39' between the thermostat strip 28' and the control spring 41'. This connection is accomplished by riveting the pin 39' at its

lower end to thermostat 28' and by a threaded fastening between its upper end and the control spring 41'. In this case the thermostat strip is mounted in the same position in the well 27 in the sole plate and is rigidly fixed therein by a plate 33' which is firmly pressed into position and retained therein by small staked projections 69. It will be noted from Fig. 9 that the sides of the thermostat strip are tapered towards decreasing width at the free end and merged into a serpentine configuration 71 terminating in an enlarged flat end portion 72 to which the pin 39' is riveted. As in the snap acting embodiment the proper degree of restraint to angular motion of the free end is determined by trial to achieve proper degree of compensation. In the particular embodiment shown, a thinner thermostat strip is used than in the snap acting embodiment shown. A thinner thermostat gives more thermostatic lag, and this condition was found to require a greater degree of compensation than was necessary in the snap acting embodiment. For this purpose I have employed in actual practice a thermostat strip 28' of approximately .020" as compared with a thermostat strip of approximately .025" in the snap acting embodiment previously described. These dimensions are given for purpose of illustration in a sadiron structure of the kind shown in the drawings, and not for limitation. In the snap acting embodiment it is possible to obtain a desired long cycle of "on" and "off" operation by adjustment of the snap acting energy of the thermostat. In the slow acting case frequency of thermostat operation is controlled by the intentional introduction of lagging thermostatic response by the use of thinner material and by including in the thermostat strip a step or offset 73 shown in the modified form, Figs. 11 and 12. This step serves to remove the major portion of the thermostat strip to a position slightly more remote from the sole plate and this results in a more lagging response of the thermostat with respect to the sole plate. As a consequence of this increased lag more compensation is necessary to prevent initial overshoot of the iron temperature when heating from cold. This greater compensation is achieved by introducing more restraint to angular motion of the free end by using a thermostat construction shown in plan in Fig. 11. As is apparent from a comparison of Figs. 9 and 11, the portion 74 of Fig. 11 offers greater resistance to bending than the portion 71 of Fig. 9. That the step 73 is effective in producing the desired result is indicated by the fact that a cycle period of slightly less than 2 minutes is obtained with the thermostat of Fig. 9 and a cycle period of approximately 2½ minutes is obtained with the thermostat shown in Fig. 11. From a consideration of all factors involved a cycle period of about 2½ minutes has been regarded as most desirable. This cycle period is also obtained in the snap acting embodiment.

As previously mentioned, the frequency of thermostat action in the snap acting embodiment is controlled by adjusting the amount of snap acting energy by means of screw 38 which is accessible from the outside of the iron. In both manufacturing and servicing such an iron this is a distinct advantage. On the other hand, in the case of the slow-acting thermostat embodiment I have found it desirable to intentionally introduce a lagging response of the thermostat relative to the sole plate temperature as by means of the offset 73 in the thermostat strip 70 previously described, to obtain the desirable long

cycle period of contact operation. More particularly, it is characteristic of a snap acting thermostat to "cut off" at a given temperature and "cut in" at a given lower temperature, this differential between the two being dependent on the degree of snap energy in the device. On the other hand, a simple slow-acting thermostat "cuts in" at the same temperature that it "cuts off." It should be noted that we are referring here to temperature of the thermostat strip itself. By virtue of the fact that the thermostat strip is never in perfect heat relationship with the sole plate surface its temperature will lag more or less behind the temperature of the sole plate surface, and as a consequence, the temperature of the sole plate surface itself will be lower at the instant of thermostat "cut in" as compared with its (the sole plate surface) temperature at the instant of thermostat "cut off," the difference in this case being proportional to the degree of lag of thermostat temperature behind sole plate temperature. As an obvious accompanying consequence of this lag, the frequency of thermostat operation will be reduced as this lag is increased.

In this slow-acting embodiment I have employed a single set of contact points 75 and 76 with the movable contact point 75 connected into the circuit by means of a very thin and flexible strip of silver 77 approximately .0015" in thickness, this conductor connecting the movable point 75 with the line terminal bar 18'. This flexibility is desirable to permit virtually unrestricted motion of the contact point 75. The contact points are located off center relative to the pin 39', but there is no functional reason for this other than that it lends itself to more economical manufacture. The spring member 41' is in principle the same as spring 41 above described. Also, the spring 64' functions in the same manner as the spring 64. The difference in shape of the connection between the bar 13 and the springs 41' and 64' as compared with that shown in the snap acting embodiment does not change the operation but permits economy in cost of manufacture.

As shown in Figs. 10 and 12, the thermostat strips in the slow-acting modifications are performed in a manner similar to and for the reason previously described in connection with the pre-forming of the strip 28 of the snap acting construction.

Attention is now directed to an important factor dealing with the novel relationship of the thermally responsive means and the sole plate. In this relationship the major length of the primary thermostat portion is always in close and consequently very good thermal relation to the ironing surface. Furthermore, this relationship is maintained substantially unvarying throughout all conditions of use of the iron as distinguished from prior art sadirons in which the main thermal element deflects to a position considerably removed from the influence of the ironing surface of the sole plate particularly at the high temperature settings. According to the present invention various temperature settings are obtained by applying greater or less pressure acting against the tendency of the thermostat to move upon a rise in its temperature. Thus, instead of permitting the main thermostat to freely deflect through a distance corresponding with a high temperature setting, as in the prior art, I have in this invention provided a thermostat structure coacting with the sole plate in such manner as to be maintained in a close

and substantially unvarying relation to the ironing surface throughout the entire rise in temperature from room temperature to the selected temperature until when the final temperature is reached the thermostat by virtue of said temperature change exhibits sufficient force to overcome the previously applied pressure and only then exhibits movement to open the electrical circuit to the heating element. This condition applies in both the slow acting and snap acting embodiments of the invention herein illustrated. Thus, it is observed that the entire length of the main thermostat will remain in substantially the same close thermal relationship to the ironing surface when operating under all temperature settings as it does at room temperature. Under this relationship the main thermostat exhibits far less lag in response to change of temperature in the ironing surface and thus requires considerably less compensating effect than if the thermostat were allowed to freely deflect as in the prior art sadirons. Furthermore, with this new relationship is combined the location of a secondary thermostat in a region where it is primarily and ultimately responsive to the temperature of the sole plate rather than to the varying and unpredictable temperatures associated with the space between the sole plate structure and the shell.

By providing an automatic sadiron which effectively eliminates overshoot and also embodies the characteristic of good regulation, I provide a sadiron which appreciably reduces the hazard of scorching without impairing its speed of ironing when used under heavy load. In other words, a structure such as I have here disclosed can be set in practical ironing to maintain a temperature of value sufficiently low to effectively reduce scorching hazard. Because of the compensating feature disclosed, the sole plate temperature will not be permitted to rise above this value at any time, which factor becomes important when folding or pressing material previously freed of most of its moisture and thus in a condition where it may be easily scorched. And because of the feature of good regulation, the sole plate temperature will not be permitted to drop appreciably below the above set value when ironing under a condition of heavy heat withdrawal (assuming that the available electrical input is adequate), which condition is met when beginning the operation of ironing of a fully dampened cloth.

Experience has shown that the scorching tendency of organic materials (particularly cloths) is critically related to temperature. Thus little or no scorching will occur at temperatures below 350° F. even when subjected to such temperature for an almost infinite period of time. As the temperature is raised to 450° F., scorching is more likely to occur, but under a still abnormal period of exposure. However, at temperatures above 450° F. scorching occurs under an exposure period of but a few seconds, and at 600° F. it occurs practically instantaneously. These figures are significant when it is borne in mind that many present day automatic irons reach temperatures of 600° F. and sometimes higher under certain conditions of use, such high temperatures being invariably due to overshoot and poor regulation, which last circumstance compels the manufacturer to adjust the sadiron to maintain such a given high temperature under idling in order to obtain fast ironing under heavy load.

On the other hand, my experience has demonstrated that an iron of conventional design, size

13

and shape is capable of delivering a heat input into dampened material of over 1500 watts, with its sole plate surface maintained by this heavy withdrawal of heat at a temperature of only 350° F. and in the hands of a fast operator. It follows, then, if such an iron were provided with a perfect thermostatic control which would maintain the sole plate surface at a fixed temperature of approximately 350° F. under all conditions of possible use (assuming an available electrical input greater than the maximum instantaneous demand), there would exist an iron of greater possible ironing speed than that achieved with the present 1000 watt irons, and yet possessing the very desirable characteristic of providing essential freedom from the possibility of scorching. I believe that my invention provides the closest approach to this ideal using a bimetallic thermostat strip in the thermostat control.

It is believed that the foregoing conveys a clear understanding of my invention and while I have shown several embodiments it will be understood that I do not wish to be limited thereto since many modifications may be made, and I therefore contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

I claim:

1. In an automatic sadiron characterized by a sole plate structure provided with a heating element, a bottom ironing surface, and an upper surface the temperature of which is closely related to the temperature of the ironing surface, a shell structure enclosing a space above said sole plate structure, and a control for the heating element having means for selective temperature settings and including a ply metal responsive means adapted to maintain said ironing surface at a selected temperature irrespective of variations in rate of heat withdrawal from the bottom ironing surface and in consequence whereof said space is characterized by substantial increase in temperature in response to increase in load demand the combination described in which the thermally responsive means comprises a primary ply metal thermostat strip having one end portion mounted in contact with said upper surface and having its remaining length in approximate contact with said upper surface to provide close thermal coupling thereto, means constraining said strip from movement to a position of less favorable thermal coupling with respect to said upper surface whereby to maintain said close thermal coupling under all conditions of operation and whereby said primary thermostat strip exhibits a minimum of lag in response to change in temperature of the ironing surface, and a secondary or compensating ply metal thermostat strip acting in the opposite direction from the primary thermostat strip to compensate for residual lag in response of the main thermostat strip, said secondary thermostat strip being located so as to exhibit a lagging response to temperature change of said upper surface but nevertheless ultimately responsive only to temperature of said upper surface rather than to temperature of said shell space.

2. In an automatic sadiron characterized by a sole plate structure provided with a heating element located intermediate its bottom ironing surface and its top surface, a shell structure enclosing a space above said top surface, and a control for the heating element including a switch in the heating surface and means for selective temperature settings and including a ply metal ther-

14

mally responsive means adapted to maintain said ironing surface at a selected temperature irrespective of variations in rate of heat withdrawal from the bottom ironing surface and in consequence whereof said space is characterized by large variations in temperature in relation to variations in rate of heat withdrawal from said ironing surface, the combination described in which the thermally responsive means comprises a primary ply metal thermostat strip maintained in close and substantially unvarying thermal relationship to said ironing surface and exhibiting a minimum of lag with respect to change in temperature thereof, and a secondary or compensating ply metal thermostat acting in the opposite direction from the primary thermostat to compensate for unavoidable lag in response of the main thermostat, said secondary thermostat being located so as to exhibit a lagging response to temperature change of said ironing surface but nevertheless ultimately responsive mainly to temperature of said ironing surface rather than to temperature of said space, said control means including a control member adapted to be set for said selected temperatures, means operative between said control member and said thermally responsive means to apply pressure which serves to restrain motion of said thermally responsive means tending to operate the switch, the value of said pressure being determined by the setting of said control member to thereby maintain said thermally responsive means in unvarying and close thermal relationship to said ironing surface irrespective of the temperature of the latter.

3. In an automatic sadiron characterized by a sole plate structure provided with an electric heating element, a bottom ironing surface, and an upper surface the temperature of which is closely related to the temperature of the ironing surface, a shell structure enclosing a space above said top surface, and a control for the heating element having means for selective temperature settings and including a ply metal thermally responsive means located in communication with said space and adapted to maintain said ironing surface at a selected temperature irrespective of variations in load condition incident to removal of heat from the bottom ironing surface when ironing and in consequence whereof said space is characterized by substantial increase in temperature in response to increase in load demand, the combination described in which the thermally responsive means comprises a strip of thermostatic metal having end portions, an intermediate portion of decreasing graduated rigidity extending from one end portion to the region of the other end portion, and a portion of high flexibility connecting the part of said intermediate portion of lowest flexibility to said other end portion, means for fixedly attaching said one end portion in face contact with said upper surface, the remaining length of the thermostat strip being in approximate contact with said upper surface to provide close thermal coupling thereto, means for preventing substantial angular movement of said other end portion with change in temperature of said strip to impart restraint to angular movement to said intermediate portion of lowest rigidity, said intermediate portion of lowest rigidity being located in such close thermal coupling to said upper surface as to be primarily and ultimately responsive to the sole plate temperature and practically independent of variations in load conditions but lagging behind said intermediate portion of decreasing graduated rigidity, station-

15

ary and movable contacts for controlling the flow of current through said heating element, and means disposed between said movable contact and said strip in the region of the part of said intermediate portion of lowest rigidity for moving said movable contact in response to movement of said strip, said selective temperature setting means being arranged to operate through the last described means to apply to the thermostat strip a degree of pressure according to the setting desired, said pressure acting to maintain the intermediate portion of graduating rigidity in said approximate contact with said upper surface of said well under all conditions of settings and sole plate temperatures.

4. In an automatic sadiron characterized by a sole plate structure provided with a heating element, a bottom ironing surface, and an upper surface the temperature of which is closely related to the temperature of the ironing surface, a shell structure enclosing a space above said upper surface, and a control for the heating element having means for selective temperature settings and including thermally responsive means adapted to maintain said ironing surface at a selected temperature irrespective of variations in rate of heat withdrawal from the ironing surface and in consequence whereof said space is characterized by substantial increase in temperature in response to increase in load demand, the combination described in which the thermally responsive means comprises a thermostatic strip, said strip comprising a main thermostat portion of relatively low flexibility terminating in a compensating portion of greater flexibility, said main thermostat portion being fixedly mounted at one end to said upper surface and having its remaining length in approximate contact with said upper surface to provide close thermal coupling thereto, and means constraining said strip from movement to a position of less favorable thermal coupling with respect to said upper surface whereby to maintain said close thermal coupling under all conditions of operation and whereby said primary thermostat strip exhibits a minimum of lag in response to change in temperature of the ironing surface, said compensating portion of greater flexibility being ultimately responsive only to the temperature of said upper surface rather than to temperature of said shell space and lagging in such response behind the main thermostat portion, and means acting against the end of said strip to stress the same longitudinally and cause said strip to move with a snap action.

5. In an automatic sadiron characterized by a sole plate structure provided with a heating element located intermediate its bottom ironing surface and its top surface, a shell structure enclosing a space above said top surface, and a control for the heating element having means for selective temperature settings and including a ply metal thermally responsive means adapted to maintain said ironing surface at a selected temperature irrespective of variations in rate of heat withdrawal from the bottom ironing surface and in consequence whereof said space is characterized by large variations in temperature in relation to variations in rate of heat withdrawal from said ironing surface, and in which said control means includes a switch having contacts one of which is movable for controlling the flow of current through the heating element, the combination described in which the thermally responsive means comprises a thermostatic strip positioned to actuate said movable contact, said strip com-

16

prising a main portion of relatively low flexibility extending inward from one end of said strip and a portion of relatively high flexibility having a serpentine configuration extending inwardly from the opposite end of said strip and joining said main portion, means for clamping the ends of said strip into good thermal contact with said plate and for retaining said ends against angular movement to cause said portion of high flexibility to yieldingly restrain the adjoining end of said main portion against angular movement with change in temperature and thereby compensate the action of said strip for lag of temperature in the thermostat and plate, the thermostat strip being mounted in such close substantially unvarying relationship to the sole plate that the main thermostat portion and the compensating thermostat portion are primarily and ultimately responsive to the sole plate temperature and practically independent of variations in load conditions but with the compensating thermostat portion lagging behind the main thermostat portion, the adjoining ends of said portions acting to actuate said movable contact, and means acting against the end of said strip to stress the same longitudinally and cause the strip to move with a snap action.

6. In an automatic sadiron characterized by a sole plate structure provided with a heating element located intermediate its bottom ironing surface and its top surface, a shell structure enclosing a space above said top surface, and a control for the heating element having means for selective temperature settings and including a ply metal thermally responsive means adapted to maintain said ironing surface at a selected temperature irrespective of variations in rate of heat withdrawal from the bottom ironing surface and in consequence whereof said space is characterized by large variations in temperature in relation to variations in rate of heat withdrawal from said ironing surface, and further characterized by the provision of a thermostat well in the top of said sole plate structure in which well said thermally responsive means is disposed, the combination described in which the thermally responsive means comprises a strip of thermostatic metal of substantially uniform thickness, said strip having a main thermostat portion tapering inwardly from one end toward the other end thereof and terminating in a serpentine curve formed by cutting notches in opposite sides of said strip to give flexibility thereto through torsional movement of the components thereof, means for fixedly supporting the first-mentioned end of said strip in face contact with the bottom of said well to be heated thereby, an upright member rigidly attached to said strip at a point between the tapered portion thereof and said other end and extending at right angles to the face of said strip, a strip of spring metal disposed in a position approaching parallelism with said thermostatic strip and rigidly connected to said upright member to restrain angular movement of said upright member and the adjacent portion of said thermostatic strip with temperature responsive warpage of said thermostatic strip to cause said thermostatic strip to be responsive to variations in temperature between said one end and the point of attachment of said upright member, the portion of the strip in the region of said point of attachment constituting a compensating thermostat portion, the thermostat strip being mounted in such close substantially unvarying relationship to the sole plate that the main thermostat portion and the com-

pensating thermostat portion are primarily and ultimately responsive to the sole plate temperature and practically independent of variations in load conditions but with the compensating thermostat portion lagging behind the main thermostat portion, and contacts actuated by movement of said strip to control the flow of current through said heating element.

7. In an automatic sadiron characterized by a sole plate structure provided with an electric heating element located intermediate its bottom ironing surface and its top surface, a shell structure enclosing a space above said top surface, and a control for the heating element having means for selective temperature settings and including a ply metal thermally responsive means located in communication with said space and adapted to maintain said ironing surface at a selected temperature irrespective of variations in load condition incident to removal of heat from the bottom ironing surface when ironing and in consequence whereof said space is characterized by large variations in temperature in relation to variations in heat demand from said ironing surface even though the ironing surface itself may not vary in temperature, and further characterized by the provision of a thermostat well in the top of said sole plate structure in which well said thermally responsive means is disposed, the combination described in which the thermally responsive means comprises a strip of thermostatic metal of substantially uniform thickness throughout its length, one end thereof being a main thermostat portion attached in face contact with the bottom of said well, said strip tapering inwardly from said one end to a point adjacent the center of said strip, the remainder of said strip to a point adjacent the opposite end thereof having a serpentine configuration in the plane of the strip formed by cutting notches alternately in the side edges of said strip to provide longitudinal and lateral flexibility through torsional movement of the components thereof, means for holding said opposite end of said strip against lateral and angular movement and for supporting the thermally responsive portion of the strip in closely spaced substantially unvarying relation to the bottom of said well and for stressing said strip longitudinally to cause the same to move with a temperature compensated snap action, an upright pin rigidly positioned on the serpentine portion of said strip for actuating said contacts, spring means for preventing angular movement of said pin and the portion of said strip to which said pin is attached, and said control means manually operable for applying lateral pressure to said strip through said pin and said spring to adjust the temperature range of said thermostat.

8. In an automatic sadiron characterized by sole plate structure provided with a heating element located intermediate its bottom ironing surface and its top surface, a shell structure enclosing a space above said top surface, and a control for the heating element having means for selective temperature settings and including a ply metal thermally responsive means adapted to maintain said ironing surface at a selected temperature irrespective of variations in rate of heat withdrawal from the bottom ironing surface and in consequence whereof said space is characterized by large variations in temperature in relation to variations in rate of heat withdrawal from said ironing surface, the combination described in which the thermally responsive means comprises a bimetallic thermostat strip fixed at one

end in heat conducting relation to the sole plate and constructed and arranged to provide a main thermal response portion and a compensating thermal response portion acting in a direction opposite from that of the main thermal response portion, and motion transmitting means connected to the compensating thermal response portion of the strip for transmitting the resultant thermostat movements for control of the heating means, said motion transmitting means serving to restrain said thermostat strip from angular movement with respect to the attachment of said fixed end of the strip to effect compensation for lag in the thermostat temperature with respect to the ironing surface of the sole plate, the thermostat strip being mounted in such close substantially unvarying relationship to the sole plate that the main thermal response portion and the compensating thermal response portion are primarily and ultimately responsive to the sole plate temperature and practically independent of variations in load conditions but with the compensating thermal response portion lagging behind the main thermal response portion, the thermostat strip being clamped at its fixed end flat against the sole plate and the remaining portion of the strip being offset from the plane of said clamped end.

9. In an automatic sadiron characterized by a sole plate structure provided with a heating element located intermediate its bottom ironing surface and its top surface, a shell structure enclosing a space above said top surface, and a control for the heating element having means for selective temperature settings and including a ply metal thermally responsive means adapted to maintain said ironing surface at a selected temperature irrespective of variations in rate of heat withdrawal from the bottom ironing surface and in consequence whereof said space is characterized by large variations in temperature in relation to variations in rate of heat withdrawal from said ironing surface, the combination described in which the thermally responsive means comprises a bimetallic thermostat strip having end portions, an intermediate portion of decreasing graduated rigidity extending from one end portion to the region of the other end portion, and a portion of high flexibility connecting the part of said intermediate portion of lowest flexibility to said other end portion, means for fixedly attaching the first named end portion in face contact with the sole plate, and means for preventing substantial angular movement of said other end portion with change in temperature of said strip to impart restraint to angular movement to the part of said intermediate portion of lowest rigidity, whereby to effect compensation for temperature lag of the thermostat strip with respect to the ironing surface of the sole plate, the thermostat strip being mounted in such close and substantially unvarying relationship to the sole plate that the first described intermediate portion and the second described intermediate portion are primarily and ultimately responsive to the sole plate temperature and practically independent of variations in load conditions but with the second described intermediate portion lagging behind the first described intermediate portion.

10. In an automatic sadiron characterized by a sole plate structure provided with a heating element located intermediate its bottom ironing surface and its top surface, a shell structure enclosing a space above said top surface, and a

control for the heating element having means for selective temperature settings and including a ply metal thermally responsive means adapted to maintain said ironing surface at a selected temperature irrespective of variations in rate of heat withdrawal from the bottom ironing surface and in consequence whereof said space is characterized by large variations in temperature in relation to variations in rate of heat withdrawal from said ironing surface, the combination described in which the thermally responsive means comprises a ply metal thermostat strip fixed at one end in heat conducting relation to the sole plate and shaped to provide portions of greater and of lesser flexibility, and motion transmitting means connected to said portion of greater flexibility to impart restraint to angular movement thereof with respect to said portion of lesser flexibility to effect compensation for temperature lag of the thermostat strip with respect to the ironing surface of the sole plate, the thermostat strip being mounted in such close and substantially unvarying relationship to the sole plate that said portions of greater and lesser flexibility are primarily and ultimately responsive to the sole plate temperature and practically independent of variations in load conditions but with the portion of greater flexibility lagging behind the portion of lesser flexibility, whereby to effect substantially uniform temperature cycles without material overshoot starting from cold or after any given load condition.

11. In an automatic sadiron characterized by a sole plate structure provided with a heating element located intermediate its bottom ironing surface and its top surface, a shell structure enclosing a space above said top surface, and a control for the heating element having means for selective temperature settings and including a ply metal thermally responsive means adapted to maintain said ironing surface at a selected temperature irrespective of variations in rate of heat withdrawal from the bottom ironing surface and in consequence whereof said space is characterized by large variations in temperature in relation to variations in rate of heat withdrawal from said ironing surface, and in which said control means includes a switch for controlling the flow of current through the heating element, the combination described in which the thermally responsive means comprises a bimetallic thermostat strip having a main thermostat portion fixed at one end to the sole plate diminishing in width therefrom and having a compensating thermostat portion, a flat spring fixed to the sole plate in substantially parallel relation with the thermostat strip having a free end arranged for actuating the switch, and a fixed connection between the free end of the spring and said compensating portion for imposing angular restraint thereto, the thermostat strip being mounted in such close and substantially unvarying relationship to the sole plate that the main thermostat portion and the compensating thermostat portion are primarily and ultimately responsive to the sole plate temperature and practically independent of variations in load conditions but with the compensating thermostat portion lagging behind the main thermostat portion.

12. An automatic sadiron as set forth in claim 11, in which the compensating portion terminates the thermostat strip at the end thereof opposite from the fixed end of the main thermostat portion for slow action opening and closing switch operations.

13. In an automatic sadiron characterized by a sole plate structure provided with a heating element located intermediate its bottom ironing surface and its top surface, a shell structure enclosing a space above said top surface, and a control for the heating element having means for selective temperature settings and including a ply metal thermally responsive means adapted to maintain said ironing surface at a selected temperature irrespective of variations in rate of heat withdrawal from the bottom ironing surface and in consequence whereof said space is characterized by large variations in temperature in relation to variations in rate of heat withdrawal from said ironing surface, and in which said control means includes a switch for controlling the flow of current through the heating element, the combination described in which the thermally responsive means comprises a thermostat strip having a main thermostat portion fixed to the sole plate and a compensating thermostat portion, in such close and substantially unvarying relationship to the sole plate as to be primarily and ultimately responsive to the sole plate temperature but lagging behind the main thermostat portion, a flat spring above the thermostat strip having a central longitudinal tongue fixed with respect to the sole plate and longitudinal side portions joined by a front transverse portion and a rear transverse portion, a connection between the rear transverse spring portion and said temperature responsive portion of the thermostat strip serving to restrain angular movement of said portion but to permit said compensating switch control movement thereof, and said control means including manually operable means connected to the front transverse portion of the spring adjustable to impose variable tension against the thermostat strip to change the temperature setting.

14. An automatic sadiron as set forth in claim 13, in which the manually operable means includes a member extending upwardly and connecting to a finger operable member for changing the temperature setting, and spring means acting against the front transverse portion of the flat spring to impose opposite pressure against the same.

15. In an automatic sadiron characterized by a sole plate structure provided with a heating element located intermediate its bottom ironing surface and its top surface, a shell structure enclosing a space above said top surface, and a control for the heating element having means for selective temperature settings and including a ply metal thermally responsive means adapted to maintain said ironing surface at a selected temperature irrespective of variations in rate of heat withdrawal from the bottom ironing surface and in consequence whereof said space is characterized by large variations in temperature in relation to variations in rate of heat withdrawal from said ironing surface, and in which said control means includes a switch for controlling the flow of current through the heating element, the combination described in which the thermally responsive means comprises a thermostat strip having a main thermostat portion fixed to the sole plate and a compensating thermostat portion in such close and substantially unvarying relationship to the sole plate as to be primarily and ultimately responsive to the sole plate temperature and practically independent of variations in load conditions but lagging behind the main thermostat portion, a flat spring above the thermostat strip having a central longitudinal tongue

fixed with respect to the sole plate and longitudinal side portions joined by a front transverse portion and a rear transverse portion, and a connection between the rear transverse spring portion and said temperature responsive portion of the thermostat strip serving to restrain angular movement of said portion but to permit said compensating switch control movement thereof.

16. In combination with a heater, a body to be heated thereby, and means for controlling the application of heat from the heater to said body to maintain the body at a preselected temperature, of thermostatic means included in said control means constructed and arranged to provide a main thermostat portion and a compensating thermostat portion, the main thermostat portion being in good heat conducting relation to said body and exhibiting minimum lag in response to temperature change thereof, the compensating portion being in such close and substantially unvarying relationship to said body as to be primarily and ultimately responsive to the temperature thereof and so that the temperature of said compensating portion at any instant is essentially a function of the temperature of said body and time alone and practically independent of the variation in average rate of heat output from said heater imposed by variation in load conditions, the compensating thermostat portion having lag behind the main thermostat portion to compensate for the said minimum lag associated with the main thermostat portion, said thermostatic means being restrained from movement under all conditions of temperature of said body except at said preselected temperature whereby to maintain the described thermal relationship between said thermostatic means and said body under all conditions of use.

17. In an automatic sadiron characterized by a sole plate structure provided with a heating element located intermediate its bottom ironing surface and its top surface, a shell structure enclosing a space above said top surface, and a control for the heating element having means for selective temperature settings and including a ply metal thermally responsive means adapted to maintain said ironing surface at a selected temperature irrespective of variations in rate of heat withdrawal from the bottom ironing surface and in consequence whereof said space is characterized by large variations in temperature in relation to variations in rate of heat withdrawal from said ironing surface, the combination described in which the control includes thermostatic means constructed and arranged to provide a main thermostat portion and a compensating thermostat portion, the main thermostat portion being in good heat conducting relation to the sole plate, the compensating portion being

in such close and substantially unvarying relationship to the sole plate as to be primarily and ultimately responsive to the temperature thereof and so that the temperature of said compensating portion at any instant is essentially a function of the temperature of the sole plate and time alone and practically independent of the variation in average rate of heat output from said heater imposed by variation in load conditions, the compensating thermostat portion having lag behind the main thermostat portion, the combined action of the main and the secondary thermostat portions being by reason of said relationship so closely responsive to the temperature of the sole plate as to substantially eliminate temperature overshoot under succeeding cycles of operation whether starting from room temperature or after any given load condition.

18. In an automatic sadiron characterized by a sole plate structure provided with a heating element, a bottom ironing surface, and an upper surface the temperature of which is closely related to the temperature of the ironing surface, and a control for the heating element having means for selective temperature settings and including thermostatic means adapted to maintain said ironing surface at a selected temperature irrespective of variations in rate of heat withdrawal from the ironing surface, the combination described in which the thermostatic means comprises a thermostat strip having one end portion mounted in contact with said upper surface and having its remaining length in close and substantially unvarying relation to said upper surface to provide close thermal coupling thereto, means constraining said strip from movement to a position of less favorable thermal coupling with respect to said upper surface whereby to maintain said close thermal coupling under all conditions of operation, and in which said control includes means for varying the constraining pressure to obtain said selective temperature settings.

LUDVIK J. KOCI.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,146,992	Saunders et al.	Feb. 14, 1939
2,233,615	Kuhn et al.	Mar. 4, 1941
2,277,439	Jepson	Mar. 24, 1942
2,332,518	Koci	Oct. 26, 1943
2,128,869	Winborne	Aug. 30, 1938
2,266,708	Jepson	Dec. 16, 1941
1,976,842	Eskin	Oct. 16, 1934
1,743,073	Simmons	Jan. 7, 1930
2,228,522	Johnson	Jan. 14, 1941

Certificate of Correction

Patent No. 2,415,795.

February 11, 1947.

LUDVIK J. KOCI

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows: Column 13, line 74, claim 2, for "surface" read *circuit*; column 16, lines 71 and 72, claim 6, for "constituing" read *constituting*; column 21, line 58, claim 17, for "themostat" read *thermostat*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of August, A. D. 1947.

[SEAL]

LESLIE FRAZER,
First Assistant Commissioner of Patents.