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C. R. SCHMIDT

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SIGNALING MEANS FOR ELECTRIC IRONS

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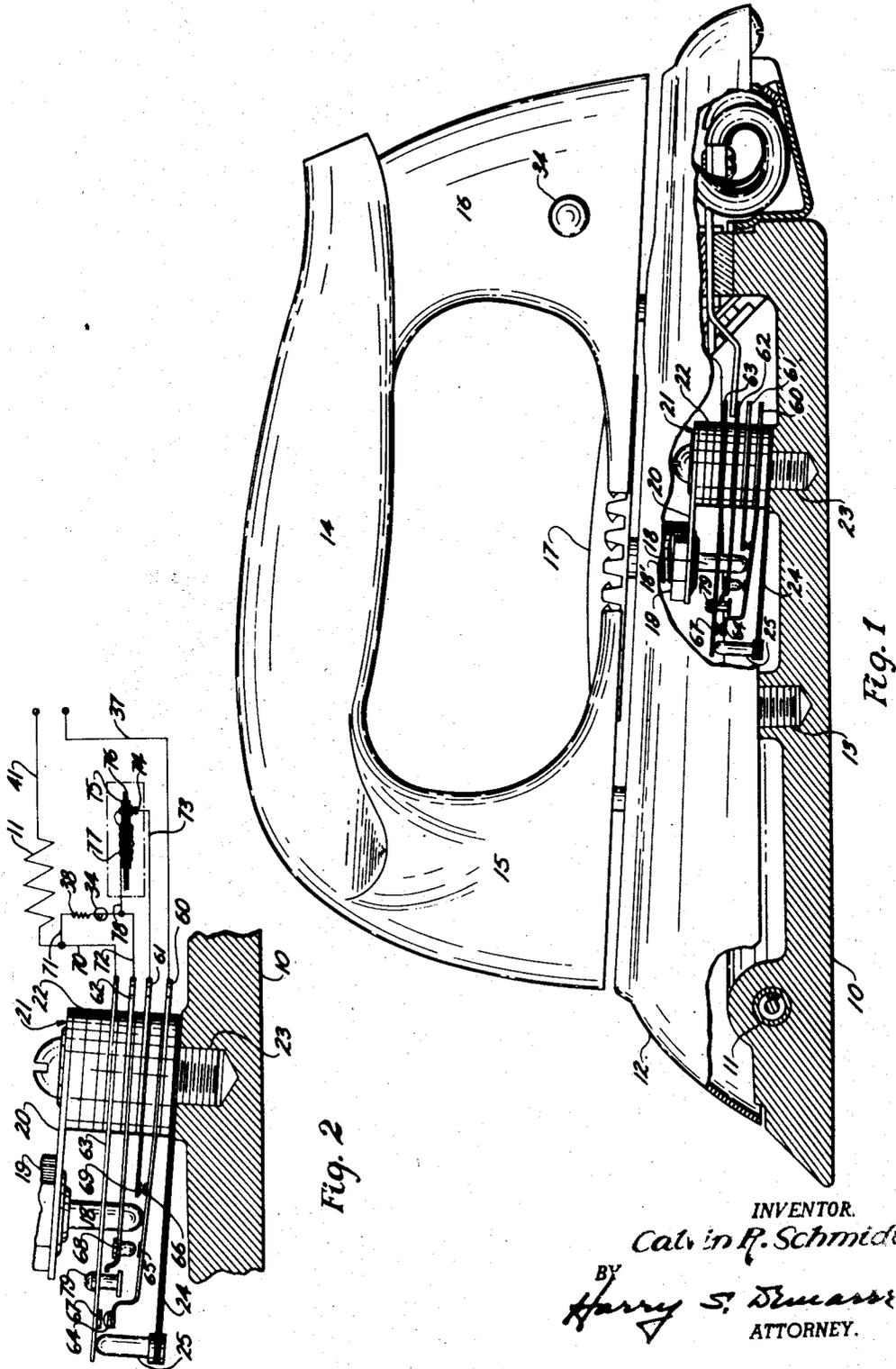


Fig. 2

Fig. 1

INVENTOR.
Calvin R. Schmidt
BY
Harry S. Demassé
ATTORNEY.

UNITED STATES PATENT OFFICE

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SIGNALING MEANS FOR ELECTRIC IRONS

Calvin R. Schmidt, Detroit, Mich., assignor to The Hoover Company, North Canton, Ohio, a corporation of Ohio

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16 Claims. (Cl. 177—311)

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This invention relates to electric smoothing irons and more particularly to a control therefor which will automatically indicate to the user whether the iron is at the proper temperature for ironing the particular fabric for which the control is set.

The invention is particularly useful when a plurality of different types of fabrics are being ironed in succession. It is also useful in informing the user when the iron has reached its proper temperature at the beginning of any ironing operation.

The normal household ironing may consist of silks, rayons, cottons, wools, and linens. Controls have been provided which can be set so that the iron will be held at the proper temperature for ironing any of the foregoing fabrics. However, if an attempt is made to iron any particular fabric before the iron is hot enough futile effort is expended by the user. If the control is set at the proper temperature for ironing one particular fabric and is changed to the proper temperature for ironing another fabric some time will elapse before the iron temperature will reach the proper temperature corresponding to the new setting.

If the control is changed from a high temperature setting to a low temperature setting while the iron is hot, immediate use of the iron will scorch the fabric having a lower ironing temperature.

Conversely, if the control is moved from a low temperature setting to a high temperature setting, immediate use of the iron will result in wasted effort by the user because the iron is not immediately hot enough for ironing the higher temperature fabric.

In either case, according to this invention, the user is constantly informed as to whether or not the iron is at the proper temperature for ironing any particular fabric for which the control is set.

More particularly according to this invention a single signal light is provided which is off or unilluminated when the iron is at too low a temperature for ironing the particular fabric for which the control is set. When the temperature of the iron is at the proper temperature for which the control is set the signal light will be illuminated in a distinctive manner to indicate that the iron is at the proper temperature. However, if the control is moved from a high temperature setting to a lower temperature setting while the iron is still hot the signal light will be illuminated in another distinctive manner to indicate to the user that the iron is too hot for ironing the fabric for which the control is set.

This application is a species of the generic invention disclosed and claimed in an application by Edward A. Weiland, Serial No. 47,876 filed concurrently herewith. In the Weiland application a single signal light is provided which is so con-

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trolled so as to remain off whenever the iron temperature is below that indicated by the control setting, to give one type of active distinctive signal when the iron temperature is at that indicated by the control setting and to give another type of active distinctive signal when the iron temperature is above that indicated by the control setting.

According to the present invention a single signal light is so connected in the control circuit as to remain off when the iron is below the temperature indicated by the control setting, to blink slowly in unison with the oscillation of the control thermostat when the iron temperature is at that indicated by the control setting and to blink rapidly when the iron temperature is above that indicated by the control setting.

Specifically, according to this invention, three pairs of contacts are closed when the control is moved from its off position to any particular on position. One pair of contacts closes a circuit in which the heater is connected directly across the line so as to be energized to its maximum extent. The second pair of contacts closes a circuit normally in shunt with the first contacts. The second circuit includes a signal light in series with a resistance so that the light will remain inactive when the first circuit is closed. The third pair of contacts closes a circuit, normally in shunt with parts of the first and second circuits. The third circuit includes a blinker heater in heating relationship to a blinker thermostat. The arrangement is such that when either the first or second circuits or both are closed the blinker heater and blinker will remain inactive.

The arrangement is such that until the iron reaches the temperature indicated by the control setting the first pair of contacts will remain closed so that both the light and blinker heater will be shunted out of circuit, both will remain inactive and the light will remain off. When the iron reaches the temperature for which the control is set the main thermostat will open the first pair of contacts to open the first circuit. This will connect the signal light with its resistance directly across the line so that the light will be illuminated. The blinker heater will remain shunted so that a blinker bimetal will remain inactive. The main thermostat will then oscillate back and forth to maintain the iron at the proper ironing temperature and to intermittently activate the light in unison therewith to indicate that the iron is at the proper ironing temperature.

If the iron temperature is above that indicated by the control setting, for example, when the control is moved from a high temperature setting to a lower temperature setting both the first and second pair of contacts will be open whereby the signal light will be connected directly across the line in series with the blinker heater so that both

the light and blinker heater will become active. Heat from the blinker heater will cause the blinker bimetal to rapidly oscillate back and forth to open and close a fourth pair of contacts to cause the light to blink rapidly to indicate that the iron is too hot for ironing the particular fabric for which the control is set.

Other objects and advantages of this invention will become apparent as the description proceeds when taken in connection with the accompanying drawings in which:

Figure 1 is a skeleton view of an iron with the parts broken away to show the control and the signal light of this invention; and

Figure 2 is a detail view of the control according to this invention showing how the various parts are connected in circuit.

Referring to the drawings the reference numeral 10 represents a sole plate heated by an electric heater 11 of any suitable character. A cover shell 12 is secured to the sole plate 10 in any suitable manner such as by a bolt 13. A handle 14 having front and rear legs 15 and 16 is secured to the cover shell 12 in spaced relationship thereto as shown in Fig. 1. A control dial 17 is positioned over the cover shell 12 between the front and rear legs 15 and 16 of the handle 14. A signal light 34 is located in the rear leg 16 of the handle 14.

Drivingly attached to the dial 17 is a control shaft 18 screw threaded into a nut 19 secured to a bracket 20, supported from the sole plate 10 by a post 21 made up of a plurality of insulating washers 22. The control shaft 18 is held against inadvertent rotation by a compression spring 18'. Positioned against the sole plate 10 by the washers 22 is a bimetallic element 24 carrying an insulating button 25 at its free end. Above the bimetal 24, separated therefrom and from each other by the insulating washers 22, are spring arms 60, 61, 62 and 63. The spring arm 60 carries contacts 64, 65, and 66 which cooperate with a contact 67 carried by the free end of spring arm 63, contact 68 carried by the free end of spring arm 62 and contact 69 carried by the free end of spring arm 61 respectively. A headed insulating pin 79 cooperates with the end of the spring 62 in a manner which will be explained hereinafter.

The nut 19 and shaft 18 have cooperating stops whereby rotation of the shaft 18 and the dial 17 is limited to less than a complete revolution. The arrangement is such that when the dial 17 is rotated to its limit in one direction the lower end of the shaft 18 will press the spring arm 60 downwardly sufficient to completely separate the contacts 66-69, 65-68, and 64-67 when the dial is in its off position and the iron is cold.

The dial 17 carries indicia about its edge such as "off," "rayon," "silk," "cotton," "wool," and "linen" in the order named so that when the dial is rotated to near its maximum extent from its "off" position the dial will indicate a "linen" setting and the lower end of the shaft 18 will be positioned near its upper limit.

The control shaft 18 extends downwardly through openings in the spring arms 62 and 63 so as to contact with the upper side of the spring arm 60 while the bottom 25 is adapted to contact the free end of spring arm 63 on its underside.

As shown in Fig. 2, the heater 11 is electrically connected to spring arm 63 by a conductor 70. A signal light 34 and resistor 38 are electrically connected to the spring arm 62 by conductors 71 and 72. Spring arm 61 is electrically connected

by conductor 73 to a contact 74 which cooperates with a contact 75 carried by the free end of a blinker bimetal 76. The contact 75 is electrically connected to a blinker heater 77 wrapped about the bimetal 76 and it in turn is electrically connected to conductor 72 by conductor 78. A conductor 37 is connected to spring arm 60. The heater 11 is connected by conductor 41 to one side of the power line and the conductor 37 is connected to the other.

Operation

Assume that the control is set at a high temperature setting. The bimetal 24 will be cold and below the position shown, and the contacts 64, 67 will be closed. The heater 11 will be connected in circuit as follows: Conductor 41, heater 11, conductor 70, spring arm 63, contacts 67, 64, spring arm 60, and conductor 37. While the contacts 65, 68 and 66, 69 will also be closed, little current will flow through the lamp 34 or blinker heater 77 because they are connected in a shunt circuit including the resistance 38. Accordingly, they will remain inactive.

When the temperature of the sole plate reaches its proper temperature the bottom 25 will raise spring arm 63 upwardly and separate the contacts 64, 67. The heater 11 will remain energized by conductor 41, heater 11, conductor 71, resistor 38, light 34, conductor 72, spring arm 62, contacts 68, 65, spring arm 60, and conductor 37, but its heating rate will be materially reduced because of the resistor 38 being connected in series therewith. Since the light 34 is connected in series circuit sufficient current will flow to energize it.

The bimetal 24 will then oscillate back and forth to hold the sole plate 10 at its proper temperature and the light 34 will be periodically illuminated and extinguished at a comparatively slow rate to indicate that the sole plate 10 is at its proper temperature.

If the control is moved to a lower temperature setting the shaft 18 will move the arm 60 downwardly to positively separate the contacts 64, 67. The free end of the spring arm 62 will follow the arm 60 until its end engages the stop 79 at which time contacts 65, 68 will also be separated.

All of the circuits will then be open except the following: Conductor 41, heater 11, conductor 71, resistor 38, signal light 34, conductor 78, blinker heater 77, contacts 75, 74, conductor 73, spring arm 61, contacts 66, 69, spring arm 60, and conductor 37. Thus, both the signal light 34 and the blinker heater 77 will be energized and the heating effect of heater 11 will be materially reduced. Since the circuit is a series circuit, sufficient current will pass to illuminate the signal light 34 and to heat the bimetal 76 by the current passing through the blinker heater 77. The blinker heater 77 will quickly heat the bimetal 76 to cause it to move upwardly to separate the contacts 74, 75 and extinguish the light 34. The bimetal 76 will then cool and reclose the contacts 74, 75 to again energize light 34. This action will continue until the sole plate 10 has cooled sufficiently for the bimetal 24 to move downwardly to again reclose contacts 64, 67. Thus, the light 34 will blink rapidly to indicate to the user that the sole plate 10 is too hot for ironing the fabric for which the control is set.

When the contacts 65, 68 close the light 34 will again blink at a slow rate as previously described

to indicate that the sole plate is at the proper ironing temperature.

If the control is again moved to a higher temperature setting the contacts 64, 67 will remain closed until the sole plate 10 again comes up to temperature. During that interval the light 34 will be inactive and indicate that the sole plate 10 is below the proper ironing temperature.

If the control is moved to the off position all of the contacts will be separated and the entire iron will be inactive.

From the foregoing it can be seen that this invention provides a control and signal light for an electrically heated smoothing iron in which the signal light is off when the iron temperature is too low, blinks slowly when the iron temperature is correct and blinks rapidly when the iron temperature is higher than that of the control setting, thus continuously informing the user of the temperature condition of the iron relative to the control setting no matter what the control setting may be.

While I have shown but a single embodiment of my invention it is to be understood that this embodiment is to be taken as illustrative only and not in a limiting sense. I do not wish to be limited to the particular structure shown and described but to include all equivalent variations thereof except as limited by the scope of the claims.

I claim:

1. An electric iron comprising; a sole plate; an electric heater therefor, a signal light; auxiliary current control means; switching means; conductors connecting said heater, light, auxiliary control means and switching means to a power line in such manner as to form a plurality of circuits; said switching means being connected in said circuits to connect said heater directly across the line in one position with said light and auxiliary current control means out of circuit, to connect said light in circuit in a second position with said auxiliary current control means out of circuit and said heater inoperative and to connect said light and auxiliary current control means in circuit in a third position with said heater inoperative and thermostatic means positioned to actuate said switching means to control current flow through said circuits so as to continuously activate said heater when the sole plate temperature is below a set value, to intermittently activate said heater when the sole plate temperature is at said value so as to maintain said sole plate at said value, to simultaneously intermittently activate and deactivate said light so that said light blinks on and off slowly when the sole plate temperature is maintained at said value and to deactivate said heater and activate and deactivate said light rapidly when the sole plate temperature is above said value.

2. An electric iron according to claim 1 including a manually actuatable control coacting with said switching means and said thermostatic means for varying said temperature value; the arrangement being such that when said control is moved from a high temperature setting to a lower one said light will be activated and deactivated rapidly to cause said light to blink on and off rapidly until the sole plate temperature drops to the new temperature setting and when said control is moved from a low temperature setting to a higher one said light will be deactivated until the sole plate temperature rises to the new temperature setting and in either case said light and heater will be activated and de-

activated slowly when the sole plate temperature reaches a new temperature setting.

3. An electric iron comprising; a sole plate; an electric heater therefor, a signal light, a blinker switch; switching means; conductors connecting said heater, light, blinker switch and switching means to a power line in such manner as to form a plurality of circuits; said switching means being connected in said circuits to connect said heater directly across the line in one position with said light and blinker switch out of circuit, to connect said light in circuit in a second position with said blinker switch out of circuit and said heater inoperative and to connect said light and blinker switch in circuit in a third position with said heater inoperative; and thermostatic means responsive to sole plate temperature positioned to actuate said switching means to control current flow through said circuits so as to continuously activate said heater and deactivate said light and blinker switch when the sole plate temperature is below a set value, slowly activate and deactivate said heater and light and maintain said blinker switch inactive when the sole plate temperature is at said value and to deactivate said heater and activate said light in series with said blinker switch when the sole plate temperature is above said value to cause said light to blink rapidly by the action of said blinker switch.

4. An electric iron according to claim 3 including a manually actuatable control coacting with said switching means and said thermostatic means for varying said temperature value; the arrangement being such that when said control is moved from a high temperature setting to a lower one said light will be activated in series with said blinker switch so as to blink on and off rapidly until the sole plate temperature drops to the new value and when said control is moved from a low temperature setting to a higher one said heater will be activated and said light deactivated until the sole plate temperature rises to the new value and in either case when the sole plate temperature reaches the new value said heater and light will be activated and deactivated slowly to cause said light to blink on and off slowly.

5. An electric iron comprising; a sole plate; an electric heater therefor; a signal light; a blinker switch; a resistance; multiple position switching means for controlling the operation of said light, blinker switch, resistance and heater; said switching means being connected to said heater, light, blinker switch and resistance to connect said heater directly across the line in one position with said light, blinker switch and resistance out of circuit, to connect said heater, light, and resistance in circuit in a second position with said blinker switch out of circuit and to connect said heater, light, blinker switch and resistance in circuit in a third position; and thermostatic means coacting with said switching means to move it to its various positions; said thermostatic means and switching means being so constructed and arranged as to activate said heater and deactivate said light when the sole plate temperature is below a set value, to intermittently activate said heater when the sole plate temperature reaches said value to maintain the sole plate at said temperature value, to simultaneously activate and deactivate said light to cause it to blink slowly as the sole plate is being maintained at said value and to completely deactivate said heater and rapidly activate and deactivate said light to cause

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it to blink rapidly when the sole plate temperature is above said value.

6. An electric iron according to claim 5 including a manually actuatable control coacting with said switching means and said thermostatic means for varying said temperature value; the arrangement being such that when said control is moved from a high temperature setting to a lower one said light will be activated and deactivated rapidly to cause said light to blink on and off rapidly until the sole plate drops to the new value and when said control is moved from a low temperature setting to a higher one said light will be deactivated until the sole plate temperature rises to the new value and in either case when the sole plate temperature reaches the new temperature value said heater and light will be activated and deactivated slowly to maintain said sole plate at the new value and to cause said light to blink on and off slowly.

7. An electric iron comprising; a sole plate; an electric heater therefor; a signal light; a blinker switch; a resistance; a multiple position switching means for controlling the operation of said heater, light, resistance and blinker switch; said switching means being connected to said heater, light, blinker switch and resistance to connect said heater directly across the line in one position with said light, blinker switch and resistance out of circuit, to connect said heater, light and resistance in circuit in a second position with said blinker switch out of circuit and to connect said heater, light, blinker switch and resistance in circuit in a third position; and a thermostat responsive to sole plate temperature coacting with said switching means to move it to its various positions; said thermostat and switching means so constructed and arranged as to activate said heater and deactivate said light and blinker switch when the sole plate temperature is below a set value, to intermittently activate said heater when the sole plate temperature reaches said value to maintain said sole plate at said value to simultaneously activate and deactivate said light while maintaining said blinker deactivated as the sole plate is being maintained at said value and to completely deactivate said heater and activate said light in series with said blinker switch to cause said light to blink rapidly when the sole plate temperature is above said value.

8. An electric heater according to claim 7 including a manually actuatable control coacting with said switching means and said thermostat for varying said temperature value; the arrangement being such that when said control is moved from a high temperature setting to a lower one said light is activated in series with said blinker switch to cause said light to blink rapidly until the sole plate temperature drops to the new value and when said control is moved from a low temperature setting to a higher one said light and blinker switch will be completely deactivated until the sole plate temperature rises to the new value and in either case when the sole plate reaches the new value said heater and light will be activated and deactivated slowly and said blinker switch will be deactivated to maintain said sole plate at the new temperature setting and to cause said light to blink on and off slowly.

9. An electric iron comprising; a sole plate; a heater therefor; a signal light; a resistance; a blinker switch; switching means; conductors connecting said heater, light, resistance, blinker switch, and switching means to a power line so as

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to form a plurality of circuits; the arrangement being such that said heater may be connected directly across the line with said light, resistance and blinker switch in shunt circuit, connected in series circuit with said light and resistance with said blinker switch in shunt circuit or connected in series circuit with said light, resistance, and blinker switch; the resistance values being such that when said heater is connected across the line with said light, resistance and blinker switch in shunt circuit said heater will be active and said light and blinker switch inactive, when said heater is connected in series circuit with said light and resistance with said blinker switch in shunt circuit said heater and blinker switch will be inactive and said light active and when said heater is connected in series circuit with said light, resistance and blinker switch said heater will be inactive and said blinker switch will be active and said light intermittently active by the action of said blinker switch; and a bimetallic element responsive to sole plate temperature positioned to actuate said switching means in such manner that when the sole plate temperature is below a set value said heater will be connected across the line with said light, resistance, and blinker switch in shunt circuit, when the sole plate temperature is at said value said heater will be intermittently connected in series circuit with said light and resistance with said blinker switch in shunt circuit so that said heater will be intermittently activated to maintain said sole plate at said value and said light will blink on and off slowly and when the sole plate temperature is above said value said heater will be connected in series circuit with said light, resistance and blinker switch whereby said light will blink on and off rapidly by the action of said blinker switch.

10. An electric iron according to claim 9 including a manually actuatable control cooperating with said switching means and said bimetallic element for varying said temperature value; the arrangement being such that when said control is moved from a high temperature setting to a lower one said heater will be connected in series circuit with said light, resistance and blinker switch whereby said light will blink rapidly until the sole plate temperature drops to the new value and when said control is moved from a low temperature setting to a higher one said heater will be connected directly across the line with said light, resistance and blinker switch in shunt circuit whereby said light will be deactivated until the sole plate temperature rises to the new value and in either case when the sole plate temperature reaches the new value said heater will be intermittently connected directly across the line and connected in series circuit with said light and resistance with said blinker switch in shunt circuit whereby said sole plate will be maintained at the new value and said light will blink slowly.

11. An electric iron comprising; a sole plate; an electric heater therefor; a signal light; a resistance; a blinker switch; a bimetallic element positioned to be responsive to sole plate temperature and carrying a button at its free end; a first spring arm having its free end positioned to be contacted by said button and carrying a headed pin near its free end; a second spring arm positioned between said first spring arm and said bimetallic element and having its free end positioned to be engaged by said headed pin; a third spring arm positioned between said second spring arm and said bimetallic element; a fourth spring

arm positioned between said third spring arm and said bimetallic element and having its free end extending beyond the free ends of said second and third spring arms to adjacent the end of said first spring arm; a manually actuatable control having an axially movable shaft extending through said first and second spring arms into contact with said fourth spring arm beyond the end of said third spring arm; a first pair of coacting contacts carried by and between the free ends of said first and fourth spring arms; a second pair of coacting contacts carried by and between the second and fourth spring arms; a third pair of coacting contacts carried by and between said third and fourth spring arms; first conductors connecting said first spring arm to said heater and said heater to one side of a power line, second conductors connecting said fourth spring arm to the other side of the power line; third conductors connecting said second spring arm to said resistance and light and said resistance and light to said first conductors between said first spring arm and heater; fourth conductors connecting said third spring arm to said blinker switch and said blinker switch to said third conductors between said second spring arm and said resistance and light; the resistance values being such that when said resistance and light are connected in shunt circuit with said heater said heater will be active and said light inactive, when said blinker switch is connected in shunt circuit with said heater, resistance, and light said blinker switch will be inactive, when said heater is connected in series circuit with said resistance and light said heater will be inactive and said light active and when said heater is connected in series circuit with said resistance, light, and blinker switch said light and blinker switch will be active; the arrangement being such that when the sole plate temperature is below the set value all three pairs of coacting contacts will be closed so that said heater will be connected across the line with said resistance, light and blinker switch in shunt circuit, when the sole plate temperature reaches said value said button will contact said first spring arm to open and close the first pair of coacting contacts to intermittently cause said heater to be connected in series circuit with said resistance and light with said blinker switch in shunt circuit causing said heater and light to be intermittently activated to maintain the sole plate temperature at said value and cause said light to blink slowly and when the sole plate is above said value said button will engage said first spring arm and flex it to open the first pair of contacts, engage the headed pin with the second spring arm and open the second pair of contacts whereby said heater will be connected in series circuit with said resistance, light, and blinker switch to cause said light to blink rapidly by the action of said blinker switch.

12. An electric iron according to claim 11 characterized in that movement of said control from a high temperature setting to a lower one will move said shaft to flex said fourth spring arm to open the first pair of contacts, permit the second spring arm to follow and engage said headed pin and open said second pair of contacts to connect said heater, resistance, light and blinker switch in series circuit until the sole plate temperature drops to the new value and movement of said control to its off position will continue the flexure of said fourth spring arm until the third pair of contacts are open to deenergize the entire iron.

13. An electric iron according to claim 12 further characterized in that movement of said control from a low temperature setting to a higher one will release pressure on said fourth spring arm to close all three pairs of contacts until the sole plate temperature rises to the new value.

14. An electric iron according to claim 13 further characterized in that when the sole plate temperature reaches the new temperature setting whether it be higher or lower than the original setting the bimetallic element will flex the first spring arm to intermittently open and close the first pair of contacts.

15. An electric iron comprising, a sole plate, a heater therefor; a signal light; a blinker switch; switching means including first and second pairs of coacting contacts; first conductors connecting said heater across a power line with said first contacts in circuit; second conductors connecting said heater and light in series circuit with said second contacts in circuit; third conductors connecting said blinker switch in series circuit with said heater and light shunting said second contacts; and a bimetallic element responsive to sole plate temperature and coacting with said switching means for intermittently opening and closing said first contacts to activate and deactivate said heater and maintain the sole plate temperature at a set value; the arrangement being such that when the sole plate temperature is below said value said first contacts will be closed and said light will be inactive, when the sole plate temperature is at said value said first contacts will be opened and closed by the oscillations of said bimetallic element whereby said light will be activated in unison with the oscillations of said bimetallic element, and when the sole plate temperature is above said value both pairs of contacts will be open whereby said blinker switch will be energized in series with said light to cause said light to blink rapidly by the action of said blinker switch.

16. An electric iron according to claim 15 including a manually actuatable control coacting with said switching means and said bimetallic element to vary said temperature value; the arrangement being such that when said control is moved from a high temperature setting to a lower one both pairs of contacts will be open and said light will blink rapidly by the action of said blinker switch until the sole plate temperature drops to the new value and when said control is moved from a low temperature setting to a higher one said first contacts will be closed and said second contacts open whereby said light will remain inactive until the sole plate temperature rises to the new value and in either event when the sole plate temperature reaches the new value said first and second contacts will be intermittently opened and closed whereby said light will blink on and off slowly.

CALVIN R. SCHMIDT.

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