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(54) **Electric iron with a synchronizing temperature display**

(57) An electric iron (1) includes a control panel (12), a circuit board (14), and a temperature sensor (16) provided on a soleplate (10). The temperature sensor (16) is connected to the circuit board (14) which is in turn connected to the control panel (12). The control panel (12) includes a synchronizing temperature display (18),

a temperature setting button (22), and a plurality of temperature setting indicators (24,26,28,30). The temperature setting button (22) is employed to set a desired temperature, and the synchronizing temperature display (18) is employed to indicate the actual temperature at the soleplate (10) during ironing.

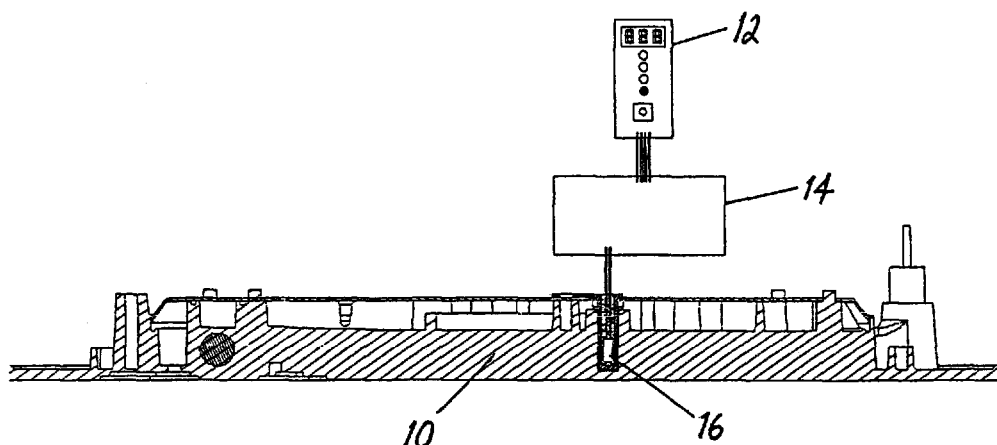


FIG. 2

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims benefit of U.S. Provisional Application No. 61/167,865 filed on April 8, 2009, the entire content of which is hereby incorporated by reference.

FIELD OF PATENT APPLICATION

[0002] The present patent application relates to an electric iron with a synchronizing temperature display.

BACKGROUND

[0003] Conventional electric irons have rotatable temperature-setting dials for setting different temperatures for ironing clothing made of different materials. When an ironing temperature needs to be set either from low to high or from high to low during ironing, a user can rotate the dial from one position to another position. However, these conventional electric irons are not provided with any means for showing the user exactly how long it would take for the soleplate to reach the set temperature. The user does not have any clue what is the actual current temperature at the soleplate and whether it is ready to start ironing. Hence, the user may tend to start ironing when in fact the soleplate temperature may be still too high or too low. Ironing with inappropriate soleplate temperature can definitely cause damage to the clothing to be ironed.

[0004] There is a need to provide an improved electric iron that can show the actual current temperature at the soleplate and allow the user to immediately start ironing once the set temperature is reached.

[0005] The above description of the background is provided to aid in understanding the electric iron with a synchronizing temperature display disclosed in the present patent application, but is not admitted to describe or constitute pertinent prior art.

[0006] According to one aspect, there is provided an electric iron including:

- a soleplate;
- a heating element mounted on the soleplate;
- a temperature sensor for measuring temperature of the soleplate; and
- a temperature display coupled to the temperature sensor for synchronously displaying the temperature at the soleplate;

wherein the soleplate has a collar extending upwardly from an inner surface of the soleplate and encompassing the temperature sensor, and the heating element is extending on the soleplate between an edge of the soleplate and the collar wherein at least a portion of the heating element is disposed proximate to the collar.

[0007] In one embodiment, the heating element includes a first section extending between a first edge of the soleplate and one side of the collar, and a second section extending between a second edge of the soleplate and an opposite side of the collar, and wherein a middle portion of each of the first and second sections of the heating element bends towards the collar.

[0008] In one embodiment, the collar is generally oval in shape.

[0009] In one embodiment, the electric iron further includes a circuit board connecting between the temperature display and the temperature sensor.

[0010] In one embodiment, the circuit board comprises a microcontroller unit for controlling the temperature at the soleplate and the synchronous display of the temperature on the temperature display.

[0011] In one embodiment, the electric iron further includes a control panel which includes a temperature setting button for setting a plurality of temperature ranges, and a plurality of temperature setting indicators for indicating the modes of the temperature setting.

[0012] In one embodiment, the plurality of temperature ranges includes a temperature range of about 90-120°C suitable for ironing silk, a temperature range of 120-150°C suitable for ironing polyester, a temperature range of about 150-200°C suitable for ironing cotton, and a temperature range of about 200-230 °C suitable for ironing linen.

[0013] In one embodiment, the temperature sensor is disposed in a bore formed on an inner surface of the soleplate at a center thereof.

[0014] In one embodiment, the temperature sensor is a negative temperature coefficient temperature sensor.

[0015] In one embodiment, the temperature display is a LED display.

[0016] According to another aspect, there is provided an electric iron including:

- a soleplate;
- a temperature sensor for measuring temperature of the soleplate; and
- a temperature display coupled to the temperature sensor for synchronously displaying the temperature at the soleplate.

[0017] In one embodiment, the soleplate has a collar extending upwardly from an inner surface of the soleplate and encompassing the temperature sensor.

[0018] In one embodiment, the electric iron further includes a heating element extending on the soleplate between an edge of the soleplate and the collar, wherein at least a portion of the heating element is disposed proximate to the collar.

[0019] In one embodiment, the heating element includes a first section extending between a first edge of the soleplate and one side of the collar, and a second section extending between a second edge of the soleplate and an opposite side of the collar, and wherein a

middle portion of each of the first and second sections of the heating element bends towards the collar.

[0020] In one embodiment, the collar is generally oval in shape.

[0021] In one embodiment, the electric iron further includes a circuit board connecting between the temperature display and the temperature sensor.

[0022] In one embodiment, the circuit board comprises a microcontroller unit for controlling the temperature at the soleplate and the synchronous display of the temperature on the temperature display.

[0023] In one embodiment, the electric iron further includes a control panel which includes a temperature setting button for setting a plurality of temperature ranges, and a plurality of temperature setting indicators for indicating the modes of the temperature setting.

[0024] In one embodiment, the plurality of temperature ranges includes a temperature range of about 90-120°C suitable for ironing silk, a temperature range of 120-150°C suitable for ironing polyester, a temperature range of about 150-200°C suitable for ironing cotton, and a temperature range of about 200-230 °C suitable for ironing linen.

[0025] In one embodiment, the temperature sensor is disposed in a bore formed on an inner surface of the soleplate at a center thereof.

[0026] In one embodiment, the temperature sensor is a negative temperature coefficient temperature sensor.

[0027] In one embodiment, the temperature display is a LED display.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] Specific embodiments of the electric iron with a synchronizing temperature display disclosed in the present patent application will now be described by way of example with reference to the accompanying drawings wherein:

FIG. 1 is a perspective view of an electric iron with a synchronizing temperature display;

FIG. 2 is a cross sectional view of a soleplate of an electric iron with a synchronizing temperature display according to an embodiment disclosed in the present patent application;

FIG. 3 is a top plan view of the synchronizing temperature display of the electric iron;

FIG. 4 is a top plan view of the synchronizing temperature display of the electric iron, similar to FIG. 3, showing a different setting of temperature;

FIG. 5 is a perspective view of a soleplate with a temperature sensor and the synchronizing temperature display;

FIG. 6 is a perspective view of a soleplate with the temperature sensor; and

FIG. 7 is a perspective view of a soleplate with a heating element.

DETAILED DESCRIPTION

[0029] Reference will now be made in detail to a preferred embodiment of the electric iron with a synchronizing temperature display disclosed in the present patent application, examples of which are also provided in the following description. Exemplary embodiments of the electric iron with a synchronizing temperature display disclosed in the present patent application are described in detail, although it will be apparent to those skilled in the relevant art that some features that are not particularly important to an understanding of the modular tool system may not be shown for the sake of clarity.

[0030] Furthermore, it should be understood that the electric iron with a synchronizing temperature display disclosed in the present patent application is not limited to the precise embodiments described below and that various changes and modifications thereof may be effected by one skilled in the art without departing from the spirit or scope of the appended claims. For example, elements and/or features of different illustrative embodiments may be combined with each other and/or substituted for each other within the scope of the appended claims.

[0031] FIG. 1 is a perspective view of an electric iron 1 with a synchronizing temperature display 2 provided on a handle 3. FIG. 2 is a cross sectional view of a soleplate 10 of the electric iron 1, a control panel 12 and a circuit board 14 according to an embodiment disclosed in the present patent application. The control panel 12 may be provided on the handle 3 or a body of the electric iron readily visible by a user during ironing. The soleplate 10 can be provided with a negative temperature coefficient (NTC) temperature sensor 16 or other suitable temperature sensors. The NTC temperature sensor 16 can be disposed in a bore formed on an inner surface of the soleplate 10 at a center thereof. The NTC temperature sensor 16 can be electrically connected to the circuit board 14 by electrical wires 15, which is in turn electrically connected to the control panel 12.

[0032] The control panel 12 may include a synchronizing temperature LED display 18 or any other suitable display, a power indicator 20, a temperature setting button 22, and a plurality of temperature setting indicators 24, 26, 28, 30. The synchronizing temperature LED display 18 is employed to indicate to the user the actual current temperature at the soleplate 10 during ironing. The temperature setting button 22 can be employed to set a desired temperature range at the soleplate 10. According to the illustrated embodiment shown in FIGS. 3 and 4, there are four temperature setting indicators 24, 26, 28, 30 for indicating four temperature ranges respectively.

[0033] When power is supplied to the electric iron 1, the electric iron is in a stand-by mode. At this stand-by mode, the power button 20 is lit and the word "OFF" may be displayed on the LED display 18.

[0034] A user can press the temperature setting button 22 in order to set a desired temperature range. For example, when the temperature setting button 22 is pressed once, the first temperature setting indicator 24 may start blinking and the temperature can be set at a range of 90-120°C suitable for ironing silk. When the temperature setting button 22 is pressed one more time, the second temperature setting indicator 26 may start blinking and the temperature can be set at a range of 120-150°C suitable for ironing polyester. When the temperature setting button 22 is pressed again, the third temperature setting indicator 28 may start blinking and the temperature can be set at a range of 150-200°C suitable for ironing cotton. When the temperature setting button 22 is pressed one more time, the fourth temperature setting indicator 30 may start blinking and the temperature can be set at a range of 200-230°C suitable for ironing linen. When the temperature setting button 22 is pressed one more time, the first temperature setting indicator 24 may start blinking again and the temperature can be set at a range of 90-120°C suitable for ironing silk, and so on.

[0035] After the desired temperature range is set, a microcontroller unit (MCU) on the circuit board 14 may start detecting the temperature at the NTC temperature sensor 16 on the soleplate 10. It is understood that the NTC temperature sensor 16 is located at a lower portion of the soleplate 10 such that the temperature of the NTC temperature sensor 16 can be the same as the temperature on the lower surface of the soleplate 10 on which the clothing to be ironed is contacted.

[0036] When the temperature of the NTC temperature sensor 16 is lower than the set temperature range, the temperature setting indicator 24, 26, 28 or 30 corresponding to the set temperature range may start blinking slowly. The actual current temperature at the soleplate 10 can be displayed on the synchronizing temperature LED display 18. Electric circuit of a heating element 40 can be connected, and heat can be generated by the heating element 40 to heat up the soleplate 10.

[0037] When the temperature at the NTC temperature sensor 16 reaches the set temperature range, the temperature setting indicator 24, 26, 28 or 30 corresponding to the set temperature range may stop blinking and remains lit, and the actual current temperature at the soleplate 10 can be displayed on the synchronizing temperature LED display 18.

[0038] When the temperature at the NTC temperature sensor 16 is higher than the set temperature range, the temperature setting indicator 24, 26, 28 or 30 corresponding to the set temperature range may start blinking quickly. The actual current temperature at the soleplate 10 can be displayed on the synchronizing temperature LED display 18. Electric circuit of the heating element 40 is disconnected and the generation of heat can be

stopped.

[0039] For example, as illustrated in FIG. 3, the temperature range is set at 120-150°C for ironing polyester. Since the actual current temperature at the soleplate 10 is 106°C, as indicated on the synchronizing temperature LED display 18, the temperature setting indicator 26 starts blinking slowly. This tells the user that the soleplate temperature is not hot enough for ironing polyester. Until the heating element heats the soleplate 10 up to a temperature of 120°C, then the temperature setting indicator 26 stops blinking and remains lit. This tells the user that the soleplate temperature is hot enough for ironing polyester and ironing can be commenced.

[0040] FIG. 4 shows that the temperature range is set at 200-230°C for ironing linen, and the actual current temperature at the soleplate 10 is 208°C which is within the set temperature range hot enough for ironing.

[0041] The benefit of using an electric iron with a synchronizing temperature display disclosed in the present application is that it can show the actual temperature of the soleplate at any time during an ironing process. This ensures that a user can iron clothing of different materials at the right temperature. For example, after setting a high temperature at a range of 150-200°C for ironing cotton, a user may want to lower the temperature of the soleplate to a range of 90-120°C for ironing silk. With the electric iron having a synchronizing temperature display, the user can set the temperature to a range of 90-120°C suitable for ironing silk and start ironing only after the actual soleplate temperature appearing on the synchronizing temperature LED display drops to 90-120°C. This can avoid the possibility of ironing silk when the actual temperature at the soleplate is still too high. On the contrary, a conventional electric iron with only a rotatable temperature-setting dial does not have a synchronizing temperature display for displaying the actual temperature at the soleplate. After turning the dial at a high temperature for ironing cotton, a user can only turn the dial at a lower temperature suitable for ironing silk. However, the user would not be able to tell whether the temperature at the soleplate has actually dropped to the desired low temperature suitable for ironing silk or not. Hence, there exists the chance that the user will iron clothing made of silk at too high a temperature that causes damage to the clothing being ironed.

[0042] As illustrated in FIGS. 5-7, the soleplate 10 may be provided with an integrally formed collar 50 extending upwardly from the inner surface 52 of the soleplate 10 and encompassing the temperature sensor 16. The collar 50 may be generally oval in shape.

[0043] The heating element 40 can be mounted on the soleplate 10. At least a portion of the heating element 40 is bent inwardly and disposed proximate to the collar 50. According to the illustrated embodiment, the heating element 40 includes a first section 40a extending between a first edge 10a of the soleplate 10 and one side 50a of the collar 50, and a second section 40b extending between a second edge 10b of the soleplate 10 and an

opposite side 50b of the collar 50. Middle portions 40c, 40d of the first and second sections 40a, 40b of the heating element 40 respectively may bend towards the collar 50 into a generally neck-shaped portion.

[0044] The heating element 40 and the collar 50 can prevent the temperature at the center of the soleplate 10 from dropping too fast causing a difference between the temperature at the soleplate 10 and the temperature displayed on the temperature LED display 18. The inwardly bending portions of the heating element 40 can heat up the center of the soleplate 10 where the NTC temperature sensor 16 is located so that the temperature at the center of the soleplate can be substantially equal to the temperature at the rest of the soleplate. Furthermore, the collar 50 can absorb more heat from the heating element 40 thereby preventing the temperature at the center of the soleplate 10 from dropping too fast causing a difference between the temperature at the soleplate 10 and the temperature displayed on the temperature LED display 18.

[0045] Although it has been shown and described that the collar 50 is generally oval in shape, it is understood by one skilled in the art that the collar 50 can be in any other appropriate shape such as circle.

[0046] While the electric iron with a synchronizing temperature display disclosed in the present patent application has been shown and described with particular references to a number of preferred embodiments thereof, it should be noted that various other changes or modifications may be made without departing from the scope of the appended claims.

Claims

1. An electric iron comprising:

a soleplate;
a heating element mounted on the soleplate;
a temperature sensor for measuring temperature of the soleplate; and
a temperature display coupled to the temperature sensor for synchronously displaying the temperature at the soleplate;

wherein the soleplate has a collar extending upwardly from an inner surface of the soleplate and encompassing the temperature sensor, and the heating element is extending on the soleplate between an edge of the soleplate and the collar wherein at least a portion of the heating element is disposed proximate to the collar.

2. The electric iron as claimed in claim 1, wherein the heating element comprises a first section extending between a first edge of the soleplate and one side of the collar, and a second section extending between a second edge of the soleplate and an opposite side of the collar, and wherein a middle portion

of each of the first and second sections of the heating element bends towards the collar.

3. The electric iron as claimed in claim 1, wherein the collar is generally oval in shape.

4. The electric iron as claimed in claim 1, further comprising a control panel which includes a temperature setting button for setting a plurality of temperature ranges, and a plurality of temperature setting indicators for indicating the modes of the temperature setting.

5. The electric iron as claimed in claim 4, wherein the plurality of temperature ranges includes a temperature range of about 90-120°C suitable for ironing silk, a temperature range of 120-150°C suitable for ironing polyester, a temperature range of about 150-200°C suitable for ironing cotton, and a temperature range of about 200-230°C suitable for ironing linen.

6. The electric iron as claimed in claim 1, wherein the temperature sensor is disposed in a bore formed on an inner surface of the soleplate at a center thereof.

7. The electric iron as claimed in claim 1, wherein the temperature sensor is a negative temperature coefficient temperature sensor.

8. An electric iron comprising:

a soleplate;
a temperature sensor for measuring temperature of the soleplate; and
a temperature display coupled to the temperature sensor for synchronously displaying the temperature at the soleplate.

9. The electric iron as claimed in claim 8, wherein the soleplate has collar extending upwardly from an inner surface of the soleplate and encompassing the temperature sensor.

10. The electric iron as claimed in claim 9, further comprising a heating element extending on the soleplate between an edge of the soleplate and the collar, wherein at least a portion of the heating element is disposed proximate to the collar.

11. The electric iron as claimed in claim 10, wherein the heating element comprises a first section extending between a first edge of the soleplate and one side of the collar, and a second section extending between a second edge of the soleplate and an opposite side of the collar, and wherein a middle portion of each of the first and second sections of the heating element bends towards the collar.

12. The electric iron as claimed in claim 9, wherein the collar is generally oval in shape.
13. The electric iron as claimed in claim 8, further comprising a control panel which includes a temperature setting button for setting a plurality of temperature ranges, and a plurality of temperature setting indicators for indicating the modes of the temperature setting.
14. The electric iron as claimed in claim 8, wherein the temperature sensor is disposed in a bore formed on an inner surface of the soleplate at a center thereof.
15. The electric iron as claimed in claim 8, wherein the temperature sensor is a negative temperature coefficient temperature sensor.

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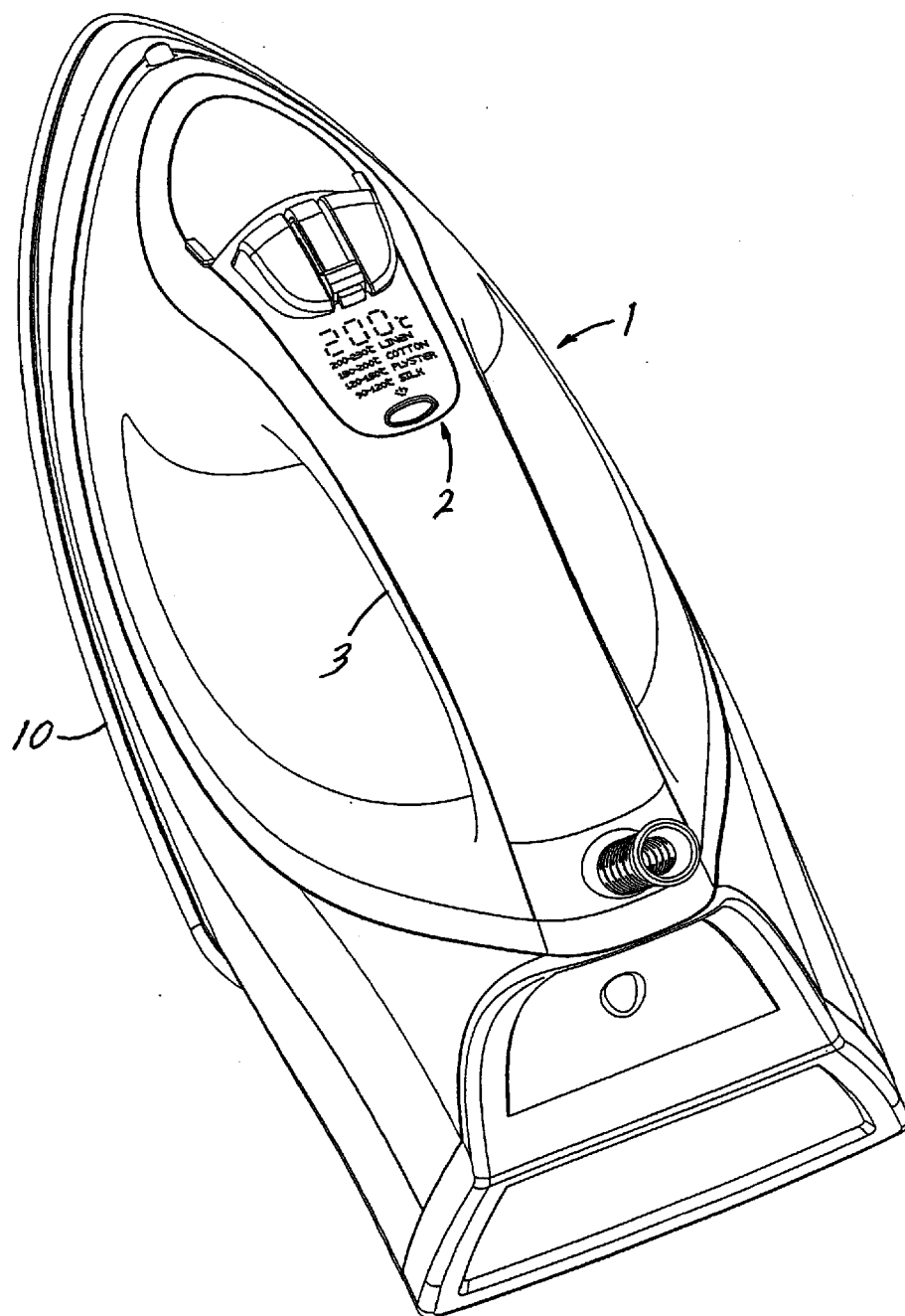


FIG. 1

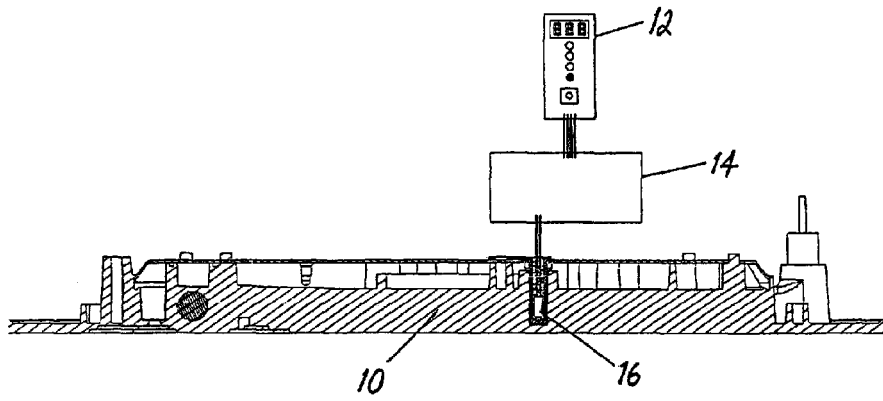


FIG. 2

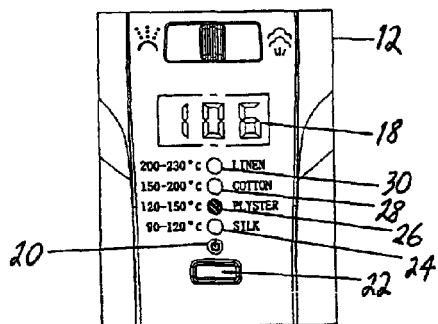


FIG. 3

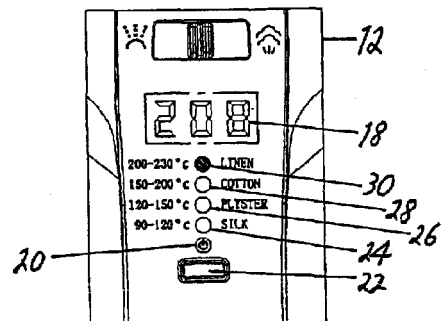


FIG. 4

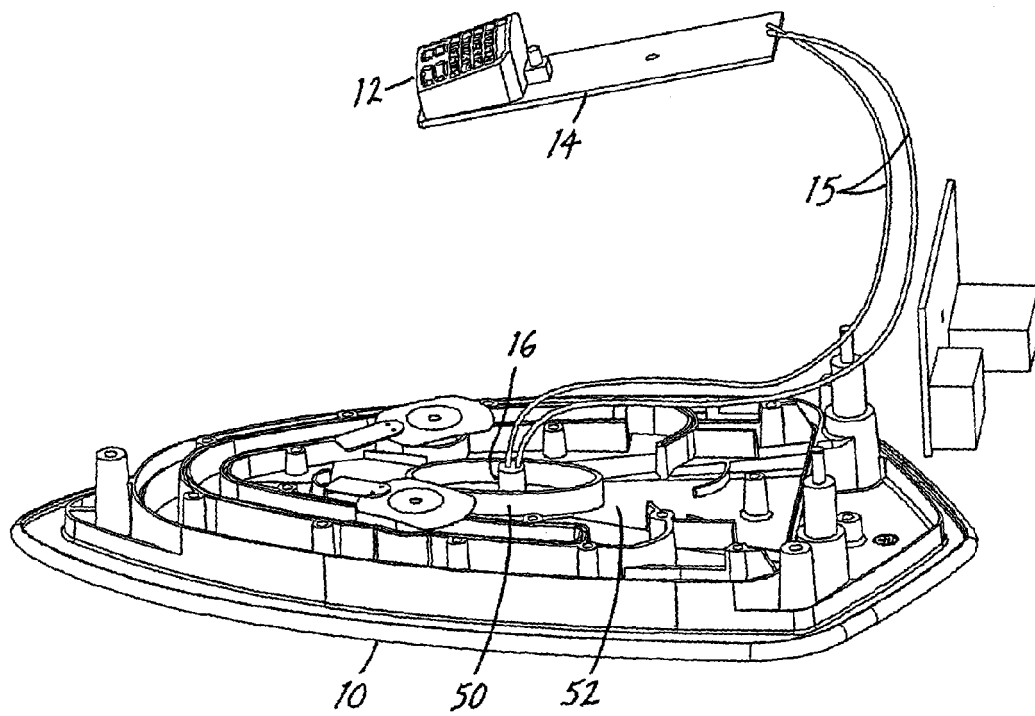


FIG. 5

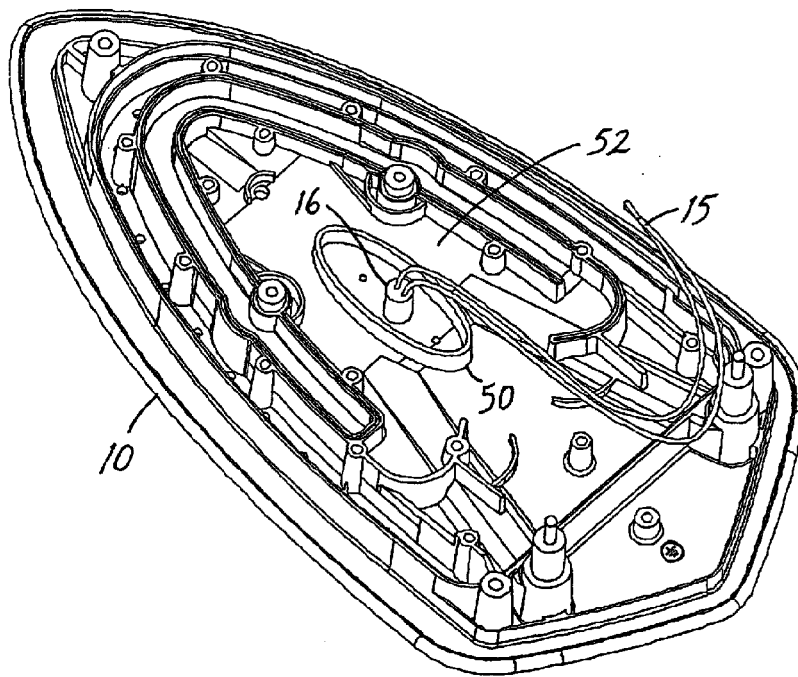


FIG. 6

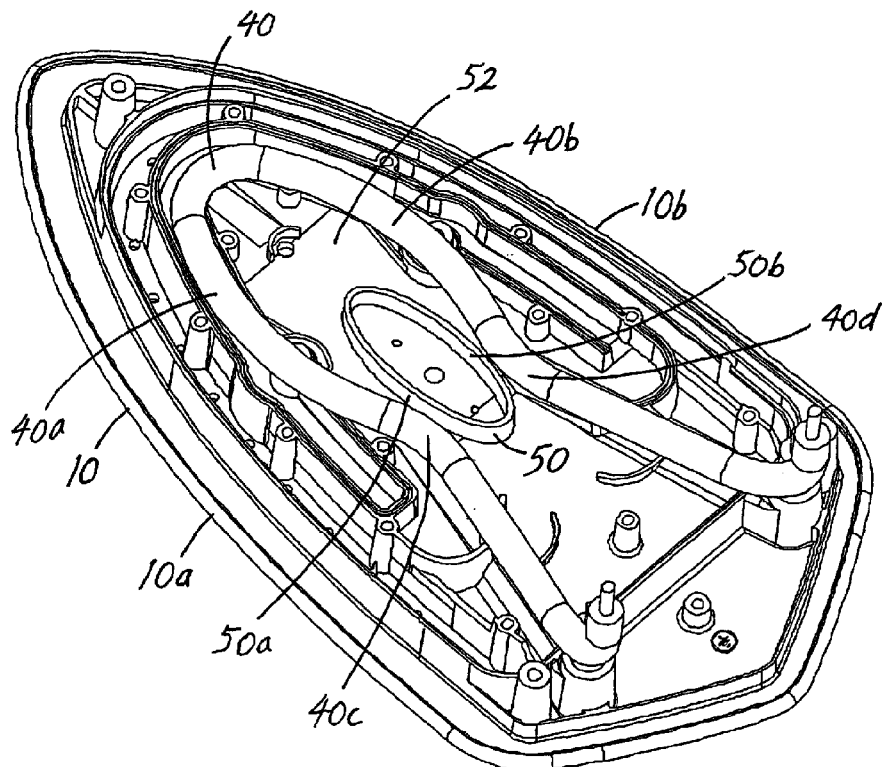


FIG. 7



EUROPEAN SEARCH REPORT

Application Number
EP 10 15 7182

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<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 10 15 7182

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