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(54) **ELECTRIC IRON WITH A SYNCHRONIZING TEMPERATURE DISPLAY**

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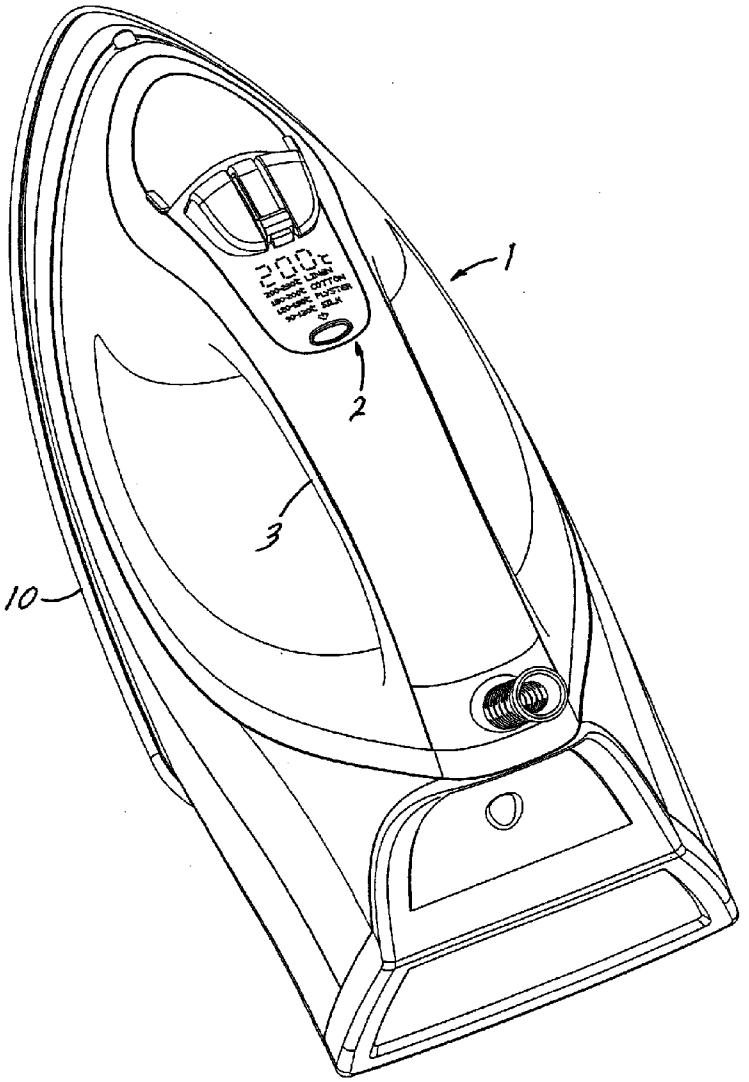
(57) **ABSTRACT**

An electric iron includes a control panel, a circuit board, and a temperature sensor provided on a soleplate. The temperature sensor is connected to the circuit board which is in turn connected to the control panel. The control panel includes a synchronizing temperature display, a temperature setting button, and a plurality of temperature setting indicators. The temperature setting button is employed to set a desired temperature, and the synchronizing temperature display is employed to indicate the actual temperature at the soleplate during ironing.



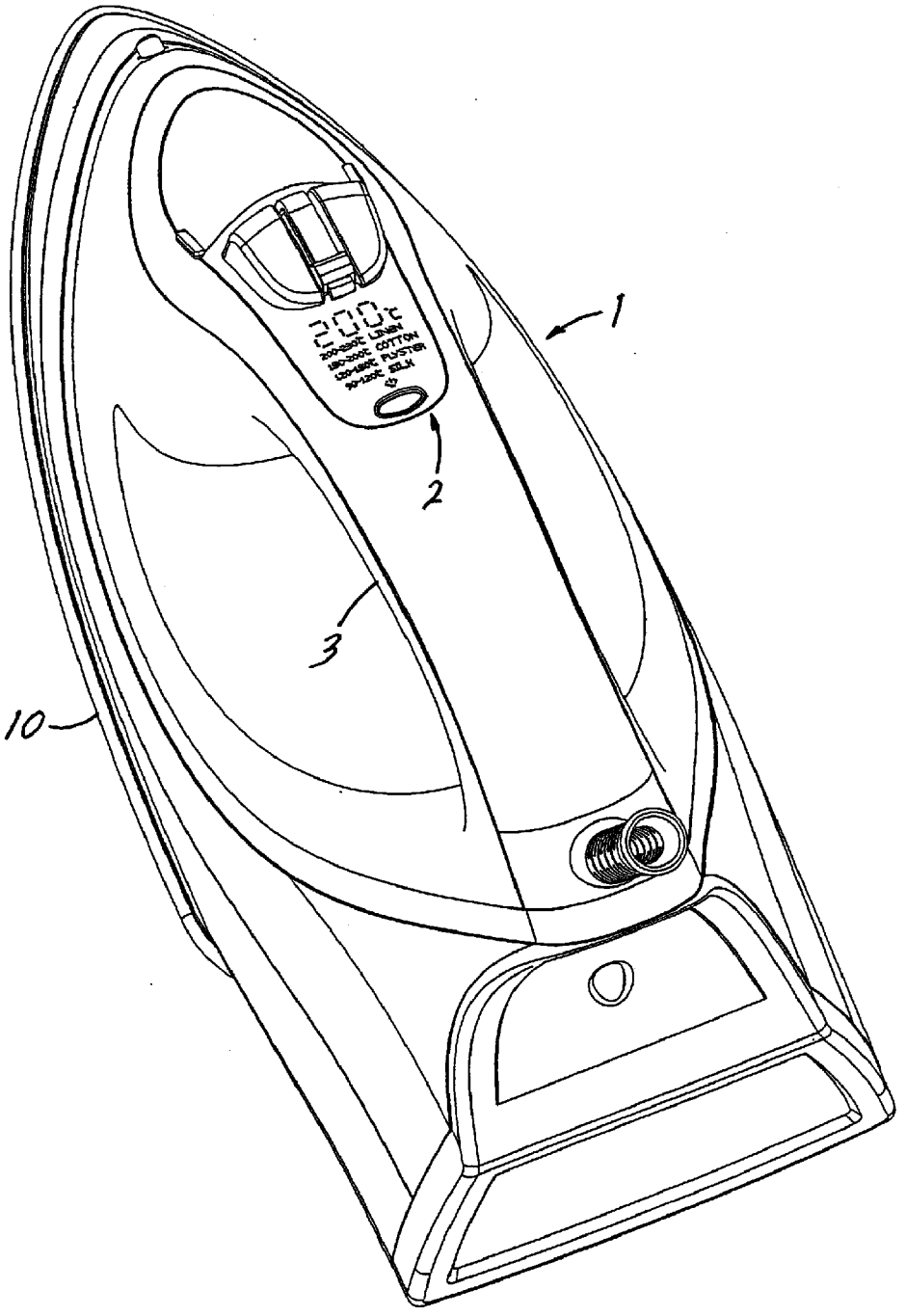


FIG. 1

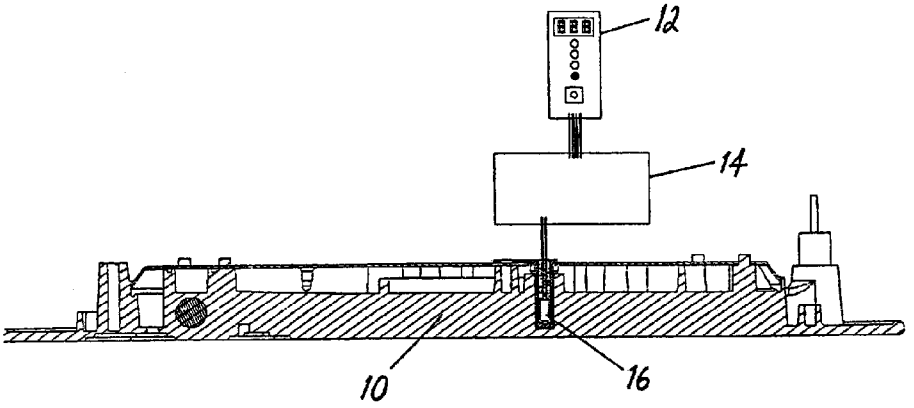


FIG. 2

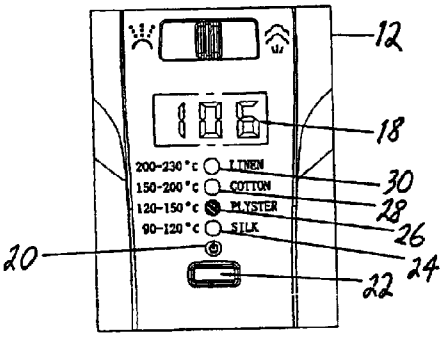


FIG. 3

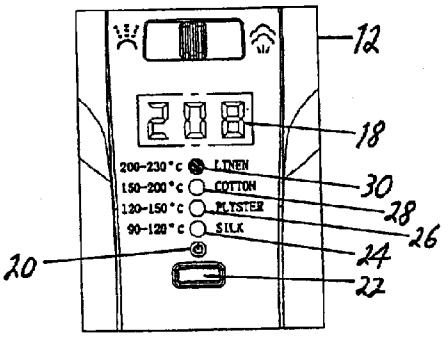


FIG. 4

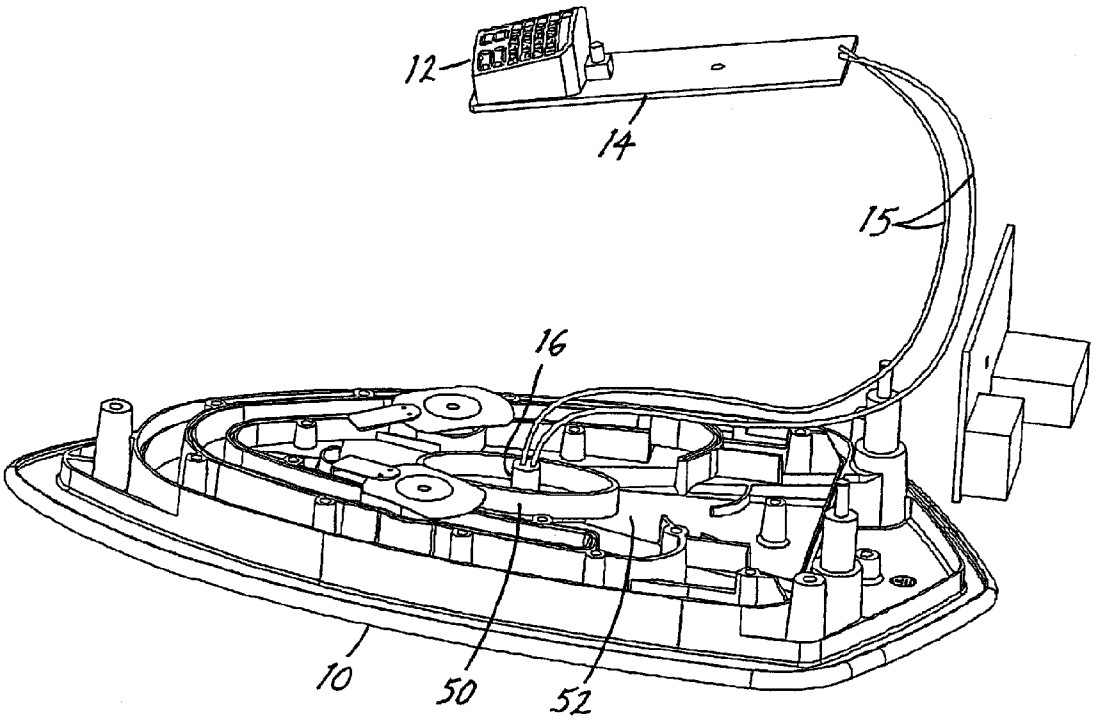


FIG. 5

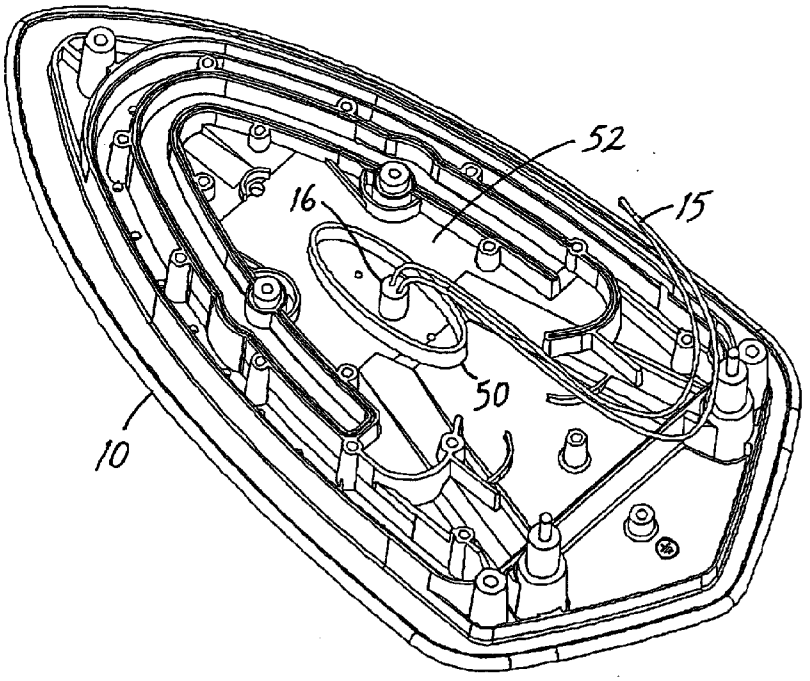


FIG. 6

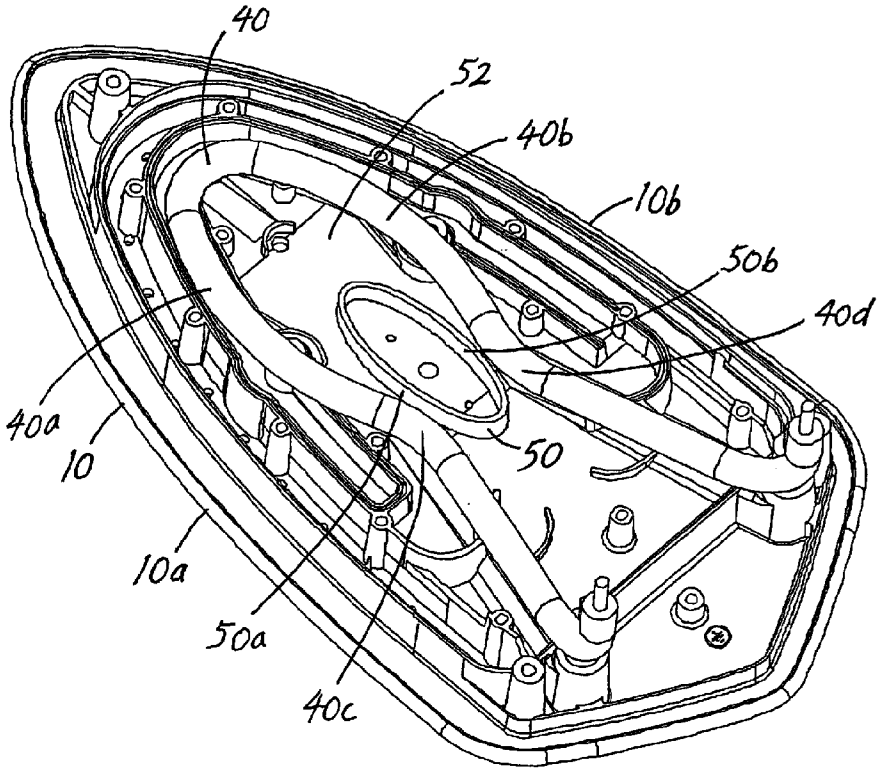


FIG. 7

ELECTRIC IRON WITH A SYNCHRONIZING TEMPERATURE DISPLAY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims benefit of U.S. Provisional Application No. 61/167,865 filed on Apr. 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.

SUMMARY

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

[0007] a soleplate;

[0008] a heating element mounted on the soleplate;

[0009] a temperature sensor for measuring temperature of the soleplate; and

[0010] a temperature display coupled to the temperature sensor for synchronously displaying the temperature at the soleplate;

[0011] 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.

[0012] 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.

[0013] In one embodiment, the collar is generally oval in shape.

[0014] In one embodiment, the electric iron further includes a circuit board connecting between the temperature display and the temperature sensor.

[0015] 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.

[0016] 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.

[0017] 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.

[0018] In one embodiment, the temperature sensor is disposed in a bore formed on an inner surface of the soleplate at a center thereof.

[0019] In one embodiment, the temperature sensor is a negative temperature coefficient temperature sensor.

[0020] In one embodiment, the temperature display is a LED display.

[0021] According to another aspect, there is provided an electric iron including:

[0022] a soleplate;

[0023] a temperature sensor for measuring temperature of the soleplate; and

[0024] a temperature display coupled to the temperature sensor for synchronously displaying the temperature at the soleplate.

[0025] In one embodiment, the soleplate has a collar extending upwardly from an inner surface of the soleplate and encompassing the temperature sensor.

[0026] 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.

[0027] 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.

[0028] In one embodiment, the collar is generally oval in shape.

[0029] In one embodiment, the electric iron further includes a circuit board connecting between the temperature display and the temperature sensor.

[0030] 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.

[0031] 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.

[0032] 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.

[0033] In one embodiment, the temperature sensor is disposed in a bore formed on an inner surface of the soleplate at a center thereof.

[0034] In one embodiment, the temperature sensor is a negative temperature coefficient temperature sensor.

[0035] In one embodiment, the temperature display is a LED display.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] 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:

[0037] FIG. **1** is a perspective view of an electric iron with a synchronizing temperature display;

[0038] 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;

[0039] FIG. **3** is a top plan view of the synchronizing temperature display of the electric iron;

[0040] 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;

[0041] FIG. **5** is a perspective view of a soleplate with a temperature sensor and the synchronizing temperature display;

[0042] FIG. **6** is a perspective view of a soleplate with the temperature sensor; and

[0043] FIG. **7** is a perspective view of a soleplate with a heating element.

DETAILED DESCRIPTION

[0044] 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.

[0045] 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.

[0046] 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**.

[0047] 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.

[0048] 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**.

[0049] 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.

[0050] 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.

[0051] 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**.

[0052] 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**.

[0053] 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.

[0054] 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.

[0055] 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.

[0056] 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.

[0057] 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.

[0058] 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 **40***a* extending between a first edge **10***a* of the soleplate **10** and one side **50***a* of the collar **50**, and a second section **40***b* extending between a second edge **10***b* of the soleplate **10** and an opposite side **50***b* of the collar **50**. Middle portions **40***c*, **40***d* of the first and second sections **40***a*, **40***b* of the heating element **40** respectively may bend towards the collar **50** into a generally neck-shaped portion.

[0059] 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**.

[0060] 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.

[0061] 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.

What is claimed is:

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 circuit board connecting between the temperature display and the temperature sensor.

5. The electric iron as claimed in claim **4**, wherein 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.

6. The electric iron as claimed in claim **1**, further comprising a control panel which includes a temperature setting but-

ton for setting a plurality of temperature ranges, and a plurality of temperature setting indicators for indicating the modes of the temperature setting.

7. The electric iron as claimed in claim **6**, 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.

8. 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.

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

10. 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.

11. The electric iron as claimed in claim **10**, wherein the soleplate has collar extending upwardly from an inner surface of the soleplate and encompassing the temperature sensor.

12. The electric iron as claimed in claim **11**, 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.

13. The electric iron as claimed in claim **12**, 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.

14. The electric iron as claimed in claim **11**, wherein the collar is generally oval in shape.

15. The electric iron as claimed in claim **10**, further comprising a circuit board connecting between the temperature display and the temperature sensor.

16. The electric iron as claimed in claim **15**, wherein 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.

17. The electric iron as claimed in claim **10**, 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.

18. The electric iron as claimed in claim **17**, 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.

19. The electric iron as claimed in claim **10**, wherein the temperature sensor is disposed in a bore formed on an inner surface of the soleplate at a center thereof.

20. The electric iron as claimed in claim **10**, wherein the temperature sensor is a negative temperature coefficient temperature sensor.

* * * * *