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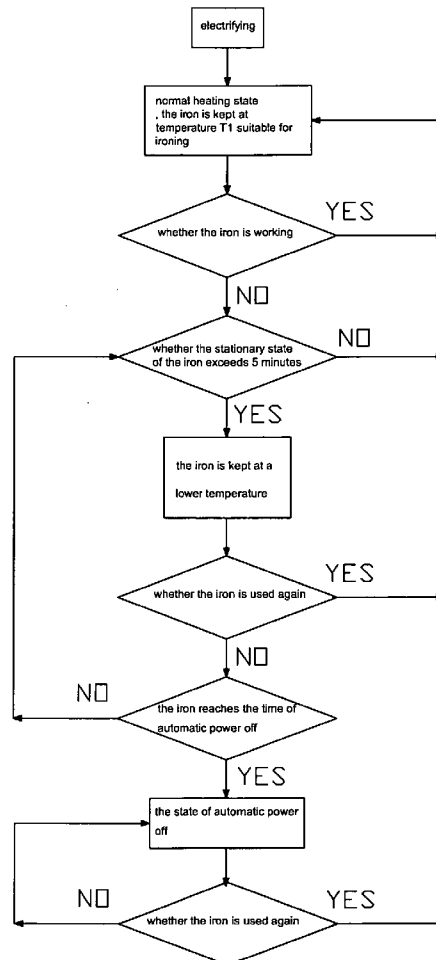
(19) **United States**(12) **Patent Application Publication**
CAI et al.(10) **Pub. No.: US 2009/0166348 A1**(43) **Pub. Date: Jul. 2, 2009**(54) **METHOD AND DEVICE FOR CONTROLLING
AN IRON****Publication Classification**(51) **Int. Cl.**
D06F 75/26 (2006.01)(52) **U.S. Cl.** **219/251**(57) **ABSTRACT**(75) Inventors: **Ruifeng CAI**, Fujian (CN); **Quanxi
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A control method of an iron and its device, wherein the method comprises the steps of: (1) keeping the output temperature of the iron a temperature T1 suitable for ironing; (2) determining whether the iron is in a working state; if yes, step (1) is carried out; if no, step (3) is carried out; (3) determining whether the time of the iron's non-working state exceeds a predetermined time S1; if yes, step (4) is carried out; if no, step (1) is carried out; (4), the output temperature of the iron is kept at a temperature T2 that is lower than T1. The invention sets a control mode of reducing electricity consumption of the iron according to users' use habit. If only the iron isn't used for a relatively long time such as 5 minutes, the output temperature of the iron will be controlled to fall from a higher constant temperature, such as 200° C., to a lower constant temperature, such as 120° C. The method of the present invention not only reduces unnecessary energy consumption, but also enables the iron to resume to its set higher temperature quickly when users want to use it again.



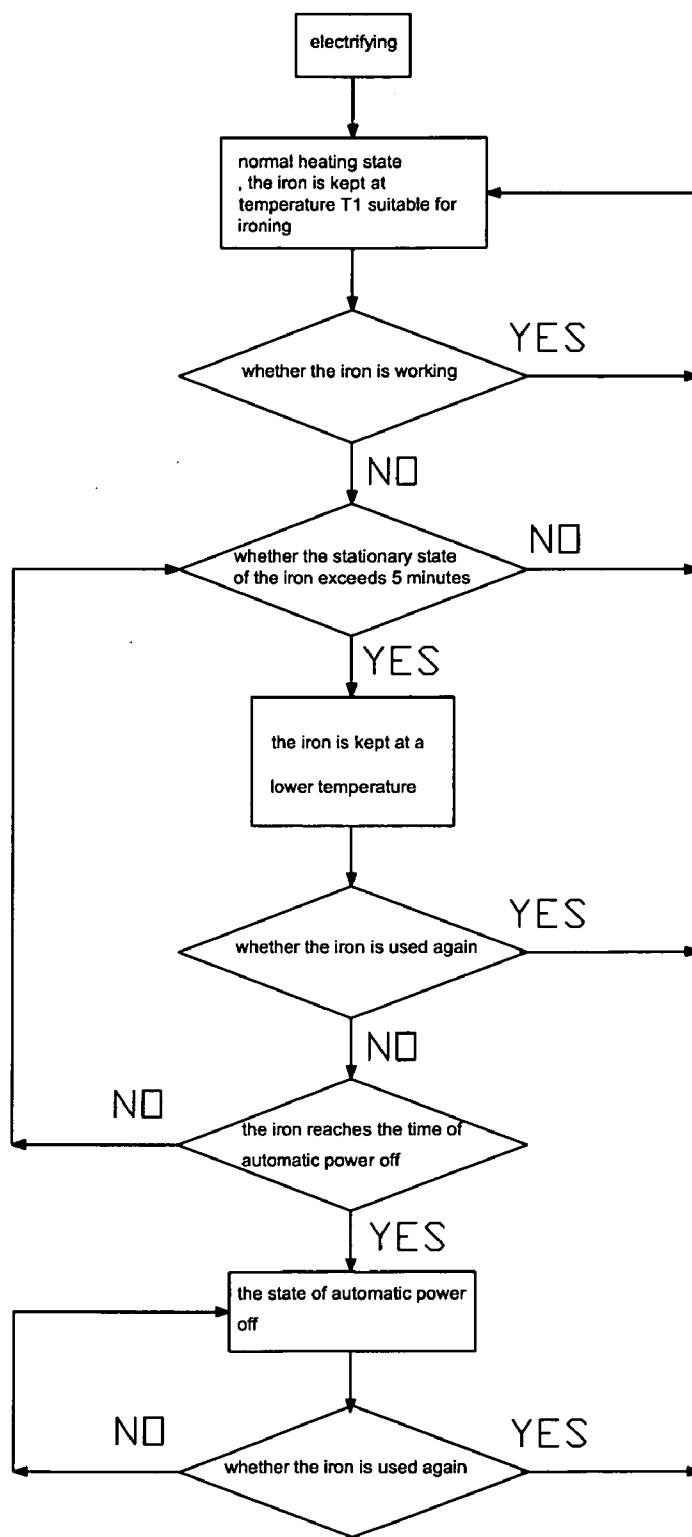


FIG. 1

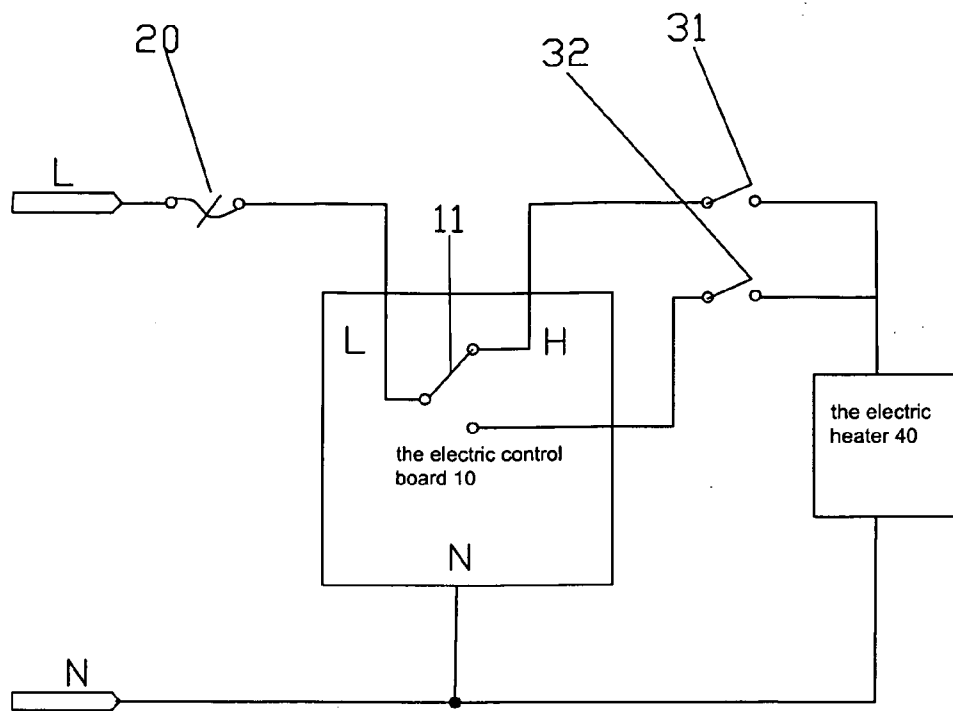


FIG. 2

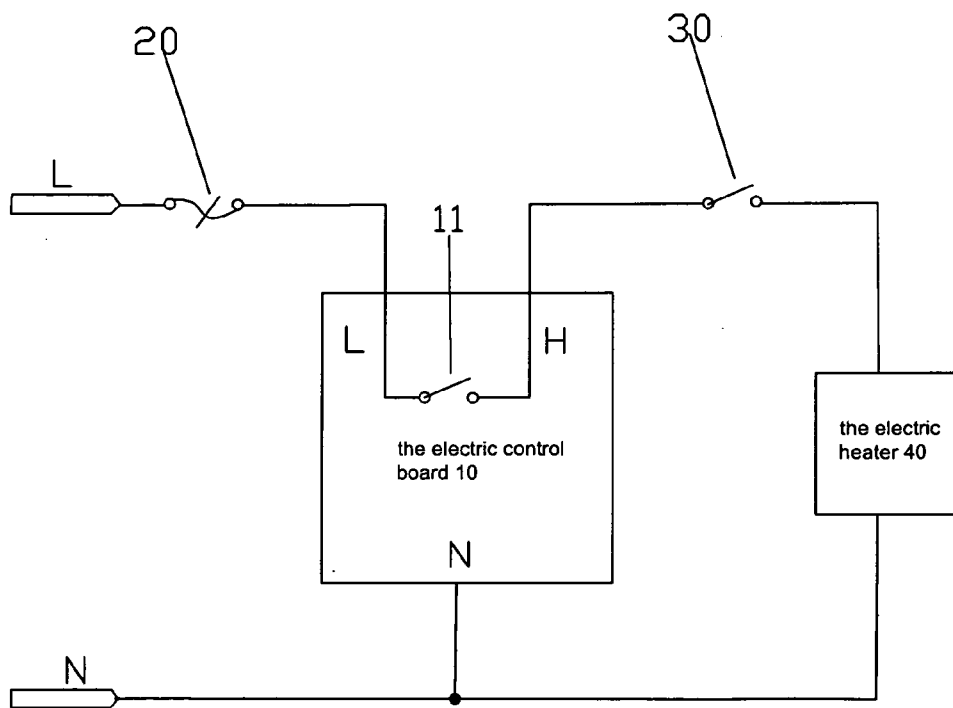


FIG. 3

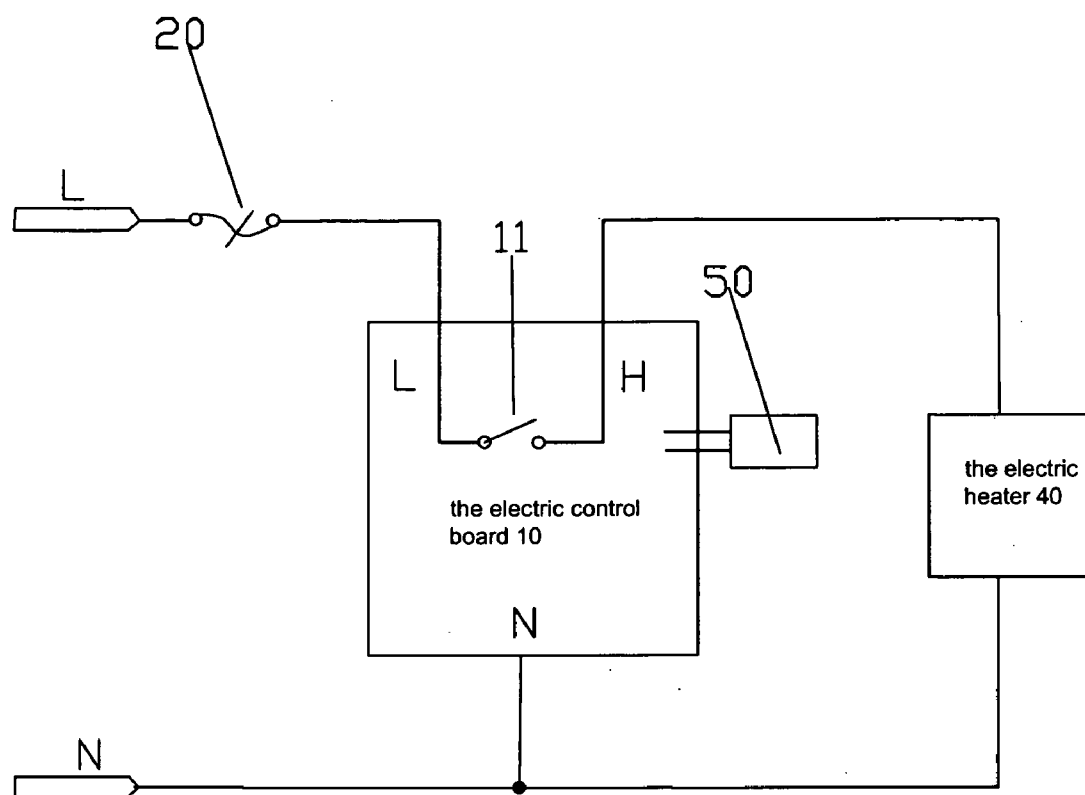


FIG. 4

METHOD AND DEVICE FOR CONTROLLING AN IRON

FIELD OF THE INVENTION

[0001] The invention relates to a control method of the iron and its device, more particularly to a control method of saving electricity and safety of the iron and the device thereof.

RELATED ART

[0002] Early mechanical electric iron has work principle as follows: after the output temperature of the electric iron is set at some temperature such as 200° C., whether the iron is used, if only the power isn't shut off, the electric heating tray of the iron will always keep at set point such as 200° C., which will waste electric energy, reduce useful life, and bring potential safety hazard when the electric iron is not used.

[0003] Aiming at above disadvantages, people advance an electronic-controlled electric iron, which has work principle as follows. The iron can sense whether itself is being used by a moving sense switch, if no, the electric heating tray of the iron will not keep at set using temperature such as 200° C. until the power of the iron goes off automatically (generally keeping flat 30 seconds later or keeping upright 15 seconds later). Experiment proves: the bigger difference in temperature between the temperature of the object in open environment and the environmental temperature, the more quickly the object dissipates heat. Correspondingly the higher temperature that an object keeps at in open environment, the more energy will be consumed in unit time. By the experiment, the temperature that the electric iron keeps at for some time after the iron isn't used is set using temperature such as 200° C., which is high and will cost a large quantity of electric energy.

[0004] Both the iron of electric heating tray and the iron of steam generator have above-mentioned disadvantages.

SUMMARY OF THE INVENTION

[0005] The invention provides a work control method of the iron, which overcomes the shortcoming of wasting much electric energy of known irons in related art.

[0006] The present invention adopts technical solution one to overcome the shortcoming as follows.

[0007] A work control method of the iron, comprising steps as follows:

[0008] step (1), normal working step, for making the output temperature of the iron keep at a higher temperature T1 fit for working;

[0009] step (2), a first judging step, for judging whether the iron is working; if yes, step (1) is carried out; if no, step (3) is carried out;

[0010] step (3), a second judging step, for judging whether the time that the iron keeps at nonuse state exceeds scheduled time S1; if yes, step (4) is carried out; if no, step (1) is carried out;

[0011] step (4), constant temperature step, for making the output temperature of the iron keep at a lower temperature T2 that is lower than T1.

[0012] According to a preferred embodiment of the invention, the method also comprises following steps:

[0013] step five, a third judging step, for judging whether the nonuse state of the iron is changed; if the state is changed to working state, carrying out state one; if no, carrying out step six;

[0014] step six, a fourth judging step, for judging whether the time that the iron keeps at nonuse state reaches the time S2 of automatic power off; if yes, carrying out step seven; if no, step (4) is carried out;

[0015] step seven, step of automatic power off, for shutting off the power automatically.

[0016] According to a preferred embodiment of the invention, the method also comprises following step:

[0017] step eight, a fifth judging step, for judging whether the nonuse state of the iron is changed; if the state is changed to working state, carrying out state one; if no, carrying out step seven;

[0018] According to a preferred embodiment of the invention, the scheduled time S1 in the second judging step of step (3) is 2-8 minutes.

[0019] According to a preferred embodiment of the invention, T2 in the step of constant temperature of step (4) is 80-120° C.

[0020] According to a preferred embodiment of the invention, in the constant temperature step of step (4), the thermostat of higher temperature for controlling the electric heater is changed to the thermostat of lower temperature by controlling the switch.

[0021] According to a preferred embodiment of the invention, in the constant temperature step of step (4), the lower temperature T2 is kept by controlling circular on-off of the switch of the electric heater.

[0022] According to a preferred embodiment of the invention, in the constant temperature step of step (4), the thermostat of higher temperature for controlling the steam generator is changed to the thermostat of lower temperature by controlling the switch.

[0023] According to a preferred embodiment of the invention, in the constant temperature step of step (4), the lower temperature T2 is kept by controlling circular on-off of the switch of the steam generator.

[0024] According to a preferred embodiment of the invention, in the first judging step of step (2), whether the iron is working is judged by a moving sense switch of the iron.

[0025] According to a preferred embodiment of the invention, in constant temperature step of step (4), firstly a temperature sensor senses the temperature of the electric heating tray and transmits the temperature signal to a control board, then the control board compares the set temperature with the sensed temperature and controls on/off of the electric heater according to the contrastive result.

[0026] According to a preferred embodiment of the invention, in constant temperature step of step (4), firstly a temperature sensor senses the temperature of the steam generator and transmits the temperature signal to a control board, then the control board compares the set temperature with the sensed temperature and controls on/off of the electric heater according to the contrastive result.

[0027] According to a preferred embodiment of the invention, the nonuse state of the iron comprises immobile state of the iron.

[0028] According to a preferred embodiment of the invention, the nonuse state of the iron comprises the state that the steam generator of the iron doesn't eject steam.

[0029] According to a preferred embodiment of the invention, the iron is boiler iron; the output temperatures of the iron comprise the temperature of the electric heating tray of the iron, the temperature of the steam generator of the iron or both of them.

[0030] According to a preferred embodiment of the invention, the iron is the iron of electric heating tray; the output temperatures of the iron comprise the temperature of the electric heating tray of the iron, the temperature of the steam generating room of the iron or both of them.

[0031] The present invention adopts technical solution two to overcome the shortcoming as follows.

[0032] A control device of the iron at least comprises a first judging module and a second judging module;

[0033] The first judging module, for judging whether the iron is working; if yes, making the output temperature of the iron keep at a higher temperature T1 fit for working; if no, carrying out the second judging module;

[0034] The second judging module, for judging whether the time that the iron keeps at nonuse state exceeds scheduled time S1; if yes, making the output temperature of the iron keep at a lower temperature T2 that is lower than T1; if no, making the output temperature of the iron keep at the higher temperature T1 fit for working.

[0035] According to a preferred embodiment of the invention, the device also comprises a third judging module and a fourth judging module;

[0036] the third judging module, for judging whether the nonuse state of the iron is changed; if the state is changed to working state, making the output temperature of the iron keep at the higher temperature T1 fit for working; if no, carrying out the fourth judging module;

[0037] the fourth judging module, for judging whether the time that the iron keeps at nonuse state reaches the time S2 of automatic power off; if yes, shutting off the power automatically; if no, making the output temperature of the iron keep at the lower temperature T2.

[0038] According to a preferred embodiment of the invention, the device also comprises a five judging module;

[0039] the five judging module, for judging whether the nonuse state of the iron is changed; if the state is changed to working state, making the output temperature of the iron keep at the lower temperature T2; if no, keeping the state of power off.

[0040] According to a preferred embodiment of the invention, the nonuse state of the iron comprises immobile state of the iron.

[0041] According to a preferred embodiment of the invention, the nonuse state of the iron comprises the state that the steam generator of the iron doesn't eject steam.

[0042] The invention has advantages as follows. The invention advances a control method of saving electricity of the iron according to using customs of users. If only the iron isn't used for a longer time such as 5 minutes, the output temperature of the iron will be controlled to fall to a lower constant temperature such as 120° C. from a higher constant temperature such as 200° C., which reduces unnecessary consumed energy and can make the iron resume to its set higher temperature quickly when users want to use it again.

BRIEF DESCRIPTION OF THE DRAWINGS

[0043] The present invention will be further described according to the drawings and embodiments.

[0044] FIG. 1 is a flow diagram of the control method of a preferred embodiment.

[0045] FIG. 2 is a controlling circuit diagram of a preferred embodiment.

[0046] FIG. 3 is a controlling circuit diagram of another preferred embodiment.

[0047] FIG. 4 is a controlling circuit diagram of another preferred embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0048] Referring to FIG. 1, it is a flow diagram of the control method of a preferred embodiment.

[0049] A control method of the iron comprises steps as follows.

[0050] Step zero, electrifying state, for electrifying the iron and making the iron start its working state.

[0051] Step (1), normal working step, for making the output temperature of the iron keep at a higher temperature T1 fit for working; for example, T1 can be 200° C. In the embodiment, if the iron is the iron of electric heating tray, the output temperatures of the iron can be the temperature of the electric heating tray of the iron, the temperature of the steam generating room of the iron or both of them; if the iron is boiler iron, the output temperatures of the iron can be the temperature of the electric heating tray of the iron, the temperature of the steam generator of the iron or both of them.

[0052] Step (2), a first judging step, for judging whether the iron is working; if yes, step (1) is carried out; if no, step (3) is carried out; in the embodiment, whether the iron is working is judged by a moving sense switch of the iron, and the iron comprises a parallel immobile state, an upright immobile state and an using state; the judging method is existing art and will not be described here.

[0053] Step (3), a second judging step, for judging whether the time that the iron keeps at nonuse state exceeds scheduled time S1; if yes, step (4) is carried out; if no, step (1) is carried out; in the embodiment, the nonuse state of the iron comprises the immobile state of the iron and the state that the steam generator of the iron doesn't eject steam; the scheduled time S1 can be 2-8 minutes according to using customs of users, had better 5 minutes.

[0054] Step (4), constant temperature step, for making the output temperature of the iron keep at a lower temperature T2 such as 100° C. according to the function of saving energy and the function of reverting to T1 quickly.

[0055] Step five, a third judging step, for judging whether the nonuse state of the iron is changed; if the state is changed to working state, carrying out state one; if no, carrying out step six; step five can refer to step (2).

[0056] Step six, a fourth judging step, for judging whether the time that the iron keeps at nonuse state reaches the time S2 of automatic power off; if yes, carrying out step seven; if no, step (4) is carried out.

[0057] Step seven, step of automatic power off, for shutting off the power automatically.

[0058] Step eight, a fifth judging step, for judging whether the nonuse state of the iron is changed; if the state is changed to working state, carrying out state one; if no, carrying out step seven.

[0059] Above control method has a precondition that the iron has been electrified and has not been shut off by the power or the switch, actually the acting time of the control method is between the iron is electrified and the iron is shut off by the power or the switch.

[0060] A control device of the iron comprises a first judging module, a second judging module, a third judging module, a fourth judging module and a fifth judging module; the first judging module, for judging whether the iron is working; if yes, making the output temperature of the iron keep at a

higher temperature T1 fit for working; if no, carrying out the second judging module; the second judging module, for judging whether the time that the iron keeps at nonuse state exceeds scheduled time S1; if yes, making the output temperature of the iron keep at a lower temperature T2 that is lower than T1; if no, making the output temperature of the iron keep at the higher temperature T1 fit for working; the third judging module, for judging whether the nonuse state of the iron is changed; if the state is changed to working state, making the output temperature of the iron keep at the higher temperature T1 fit for working; if no, carrying out the fourth judging module; the fourth judging module, for judging whether the time that the iron keeps at nonuse state reaches the time S2 of automatic power off; if yes, shutting off the power automatically; if no, making the output temperature of the iron keep at the lower temperature T2; the five judging module, for judging whether the nonuse state of the iron is changed; if the state is changed to working state, making the output temperature of the iron keep at the lower temperature T2; if no, keeping the state of power off. In the embodiment, the nonuse state of the iron comprises immobile state of the iron and the state that the steam generator of the iron doesn't eject steam.

[0061] In the embodiment the control device is a control board, which comprises a singlechip and a moving sense switch. The first judging module, the second judging module, the third judging module, the fourth judging module and the fifth judging module are wrote into the singlechip.

[0062] In above constant temperature step, the thermostat of higher temperature for controlling the electric heater is changed to the thermostat of lower temperature by controlling the switch, for making the output temperature of the iron keep at the lower temperature T2. FIG. 2 is the controlling circuit diagram. The control device comprises an electric control board 10, a fuse 20, a thermostat 31 of higher temperature, a thermostat 32 of lower temperature and an electric heater 40, and there is single-pole double-throw switch 11 on the electric control board 10. In normal using, the control board 10 controls the switch 11 to start the adjustable thermostat 31 of higher temperature to act for controlling the heating of the electric heater 40; when the set time controlled by the control method arrives, the control board 10 controls the switch 11 to make the thermostat 32 of lower temperature act for making the electric heater 40 keep at a lower temperature.

[0063] In another embodiment, in above constant temperature step, the lower temperature T2 is kept by controlling circular on-off of the switch of the electric heater. FIG. 3 is the controlling circuit diagram. The control device comprises an electric controlling board 10, a fuse 20, a thermostat 30 and an electric heater 40. There is a unipath uprated switch 11 that can drive and shut off the electric heater, which can be relay, Triac or SCR. When the iron is in normal heating state, the control board 10 controls the switch 11 to make it be closed all along; the on/off of the electric heater 40 is absolutely controlled by the thermostat 30 abutting against the surface of the heater 40. When the time that the iron is kept in nonuse state or immobile state exceeds set time, the iron will come into the state of saving energy, and the control board 10 will make the switch 11 be off. According to the proportion of the constant temperature and the output time of the power in the below table, the relay can carry through switch controlling, Triac and SCR can carry through tangential angle controlling (Triac and SCR can conduct tangential angle controlling), for making the iron keep at a lower constant temperature. The table

takes the iron doing the experiment of dry heating as an example, which has an electric heating tray of 1200 W, the temperature difference of 30° C. between the higher temperature and the lower temperature, an environment temperature of 20° C.

	100° C.	150° C.	200° C.
average constant temperature			
the time of power output in a period	10 seconds	10 seconds	11 seconds
the time of no power output in a period	4 minutes and 10 seconds	2 minutes and 10 seconds	1 minutes and 30 seconds
the time percentage of power output in a period	4%	7%	11%

[0064] According to the normal constant temperature 200° C. and the constant temperature 100° C. of saving energy from above table, taking a long view and on the regular service conditions, about 60% electric energy can be saved.

[0065] In another embodiment, in above constant temperature step, the lower temperature T2 is kept by controlling power on-off of the switch of the electric heater. FIG. 4 is the controlling circuit diagram. The device comprises a control board 10, a fuse 20, a temperature sensor 50 and an electric heater 40. The control device comprises an electric controlling board 10, a fuse 20, a thermostat 30 and an electric heater 40. There is a unipath uprated switch 11 that can drive and shut off the electric heater, which can be relay, Triac or SCR. The temperature sensor 50 such as NTC abuts against the electric heating tray of the iron; the NTC senses the temperature of the electric heating tray and transmits the temperature signal to the singlechip of the control board. In normal working, set temperature in the singlechip is 200° C., and in constant temperature step set temperature in the singlechip is changed to 120° C. The singlechip of the control board compares the set temperature with the sensed temperature and controls the power on/off of the electric heater according to the compared result to make the temperature of the electric heating tray keep at the set value. If the temperature is lower than some set value, the electric heater will heat; if the temperature is higher than some set value, the electric heater will stop heating, which can control the temperature of the electric heating tray to make it keep at set temperature interval.

[0066] The control method of the invention and its device is not only fit for common handheld iron, but also fit for saving energy of the steam generator of the boiler iron. The condition that judges whether the mode of saving energy is started can be that the iron doesn't move in a longer time or that users don't use the function of ejecting steam in a longer time. Wherein, the same is with the steam generator of the boiler iron, namely once the iron is electrified, the steam generator will be controlled to keep at a higher temperature fit for working such as 150° C. controlled by the thermostat and the pressure switch.

[0067] The foregoing description of the exemplary embodiment of the invention has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Many modifications and variations are possible in light of the above teaching. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. A method for controlling an iron comprising:
 - (1) keeping the output temperature of the iron at temperature T1 suitable for ironing;
 - (2) determining whether the iron is in a working state or in a non-working state; if the iron is in a working state, carrying out step (1); if the iron is in a non-working state, carrying out step (3);
 - (3) determining whether the time of the iron's non-working state exceeds a predetermined time S1; if yes, carrying out step (4); if no, carrying out step (1); and
 - (4) maintaining the output temperature of the iron at a predetermined temperature T2 that is lower than T1.
2. The method according to claim 1, further comprising:
 - (5) determining whether the non-working use of the iron is changed; if the state is changed to working state, carrying out state (1); if no, carrying out step (6);
 - (6) determining whether the time of the iron's non-working state reaches a second predetermined time S2 for automatic power off; if yes, carrying out step (7); if no, carrying out step (4) out; and
 - (7) shutting off the power automatically.
3. The method according to claim 2, further comprising:
 - (8) determining whether the non-working state of the iron is changed to the working state; if yes, carrying out step (1); if no, carrying out step (7).
4. The method according to claim 1, wherein the predetermined time S1 in step (3) is about 2-8 minutes.
5. The method according to claim 1, wherein the predetermined temperature T2 in step (4) is about 80-120° C.
6. The method according to claim 1, wherein the iron is heated with an electric heater under the control of a first thermostat for a higher temperature and second thermostat for a lower temperature, and wherein in step (4), the control of the electric heater is changed to the second thermostat from the first thermostat by controlling a switch.
7. The method according to claim 6, wherein the temperature T2 is maintained by controlling a circular on-off of the switch on the electric heater.
8. The method according to claim 1, wherein the iron comprises a steam generator heater under the control of a first thermostat for a higher temperature and second thermostat for a lower temperature, and wherein in step (4), the control of the steam generator is changed to the second thermostat from the first thermostat by controlling a switch.
9. The method according to claim 8, wherein in step (4), the lower temperature T2 is maintained by controlling a circular on-off of the switch of the steam generator.
10. The method according to claim 1, wherein in step (2), whether the iron is working is determined by a movement sensing switch of the iron.
11. The method according to claim 6, wherein in step (4), firstly a temperature sensor senses the temperature of a electric heating tray and transmits the temperature signal to a control circuit, then the control circuit compares the set tem-

perature with the sensed temperature, and then controls on/off of the electric heater according to the comparison result.

12. The method according to claim 8, wherein in step (4), firstly a temperature sensor senses the temperature of the steam generator and transmits the temperature signal to a control circuit, then the control circuit compares the set temperature with the sensed temperature and then controls on/off of the electric heater according to the comparison result.

13. The method according to claim 1, wherein the non-working state of the iron comprises a stationary state, or a state where a steam generator thereof is not being used for ejecting steam.

14. The method according to claim 1, wherein the iron is boiler iron; and the output temperature of the iron is the temperature of an electric heating tray of the iron, or the temperature of the steam generator of the iron or both of them.

15. The method according to claim 1, wherein the iron is of an electric heating tray type; and the output temperature of the iron is the temperature of the iron's electric heating tray, or the temperature of the iron's steam generating room, or both.

16. A control device of an iron, which comprises a first determining module and a second determining module; wherein the first determining module determines whether the iron is in a working-working state, and the second determining module determines whether the iron is in a non-working state; and wherein if the iron is in a working state, an output temperature of the iron is kept at a temperature T1 fit for working; and if the iron is in a non-working state, whether the time of the non-working state is determined and if the non-working state exceeds a predetermined time S1; output temperature of the iron is kept at a temperature T2 that is lower than T1, and if the non-working state does not exceed S1, the output temperature of the iron is kept at temperature T1.

17. The device according to claim 16, which further comprises a third determining module and a fourth determining module; wherein the third determining module determines whether the non-working state of the iron is changed to the working state, and if yes, the output temperature of the iron is kept at the temperature T1; if no, the fourth determining module determines whether the time of the iron is in a non-working state reaches a predetermined time S2 for automatic power off, and if the time of the iron is in a non-working state reaches a predetermined time S2, the power is shut off automatically; if the time of the iron is in a non-working state has not reached S2, the output temperature of the iron is kept at temperature T2.

18. The control device according to claim 17, which comprises a fifth determining module which determines whether the non-working state of the iron is changed to the working state, and if yes, the output temperature of the iron is kept at the lower temperature T2, if no, the power-off state is kept.

19. The control device according to claim 16, wherein the nonuse state of the iron is a stationary state, or a state where the steam generator thereof is not used for ejecting steam.

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