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Am improved steam jet electric iron.

An improved electric flatiron, controlled and commanded by an electronic apparatus (3) to which there are led: a static sensor (5) for controlling the temperature, a miniature push button (11) for selecting the temperature levels at which the iron has to work, some levels being provided for the dry working, some other for the steam jet working indicated by suitable LEDs (13) of different colors according to the type of working; an acoustic emitter (15) signaling that a selection has took place; a LED (17) warning that the plug has been inserted; a pump (19) for the water supply; a "self cleaning" miniature push button (33), causing a powerful steam jet for cleaning the plate holes.

The flat iron is further equipped with a removable tank (21) with a water inlet (25) closed by a suitable plug (27) and located under the iron handle (29) with a connecting member (31) between the tank (21) and the iron (1).

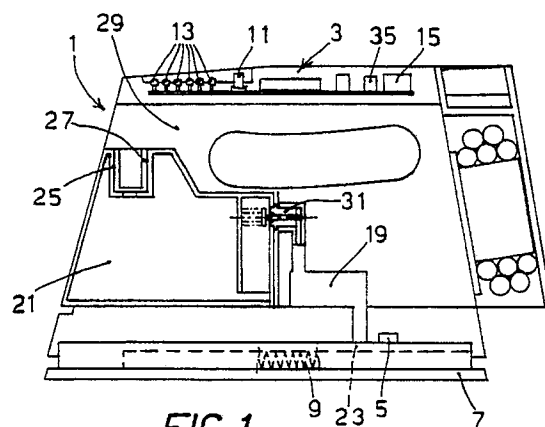


FIG. 1

The present invention relates to an improved electric flatiron capable of working either as a dry iron or a steam jet iron, equipped with an electronic apparatus for commanding and controlling the working thereof, and further controlling its alarm and safety functions.

As it is known, in conventional flatirons, either dry or steam jet irons, the control functions of the temperature are carried out by a thermostat, usually a bimetallic one, accomplishing such function through the opening or closing of an electric contact connected to the iron heating element, and the temperature selection is usually achieved by rotating the thermostat knob which is located on the iron body, usually under the handle.

Further it is known that the more recent flatirons, designed with the steam jet feature, have a chamber to this purpose fitted into the iron plate, wherein the water amount injected into the vaporisation chamber is adjusted by means of a drop supply through suitable pin cocks actuated by a knob.

It is evident that in case a correct correlation has not been achieved between the iron temperature and the amount of water to be vaporized, the iron exhibits the so called "dripping" which can damage the garments being ironed due to the limestone contained in the water.

Moreover, in spite of the instruction given to the users of a steam jet electric iron, often these latter restore the water content by placing the iron still connected to the mains directly under the water tap, which is quite a dangerous operation and can cause serious damages.

The object of the present invention is that of overcoming the above mentioned and other drawbacks by realizing an electric flatiron, capable of working either as a dry iron or steam jet iron, which through a suitable apparatus is able to control and command the working thereof, and accomplishes the safety and alarm control functions for the above mentioned situations and other that will be referred to in the following.

The subject flat iron is characterized in that the apparatus for the control and the command of the working thereof, as well as of safety and alarm, is an electronic device assembled onto a board to which the various working and control commands are led, as well as those for safety and alarm; said commands being substantially the following:

- a static sensor for controlling the temperature, located in contact with the iron plate which in turn embeds the electric resistance; said sensor electrically and continuously "informing" the above mentioned electronic apparatus about the temperature of the plate whereby said apparatus changes the feeding of the resistance to stabilize the temperature

at the value selected for ironing;

- a miniature push button for setting the temperature levels, which component at every actuation cyclically selects a different level starting from the lowest temperature one; some of said levels being provided for the dry working of the iron, some other being provided for the steam jet working; the selection of said temperature levels as a function of their nature automatically either comprising or excluding the steam production; the set temperature level being displayed through the lighting of a pilot lamp or LED which indicates whether the correct temperature of that level has been or has not been reached by the plate by means of a constant or a blinking light, respectively;
- an array of pilot lamps or LEDs, one for each temperature level, controlled by the miniature push button, in a number corresponding to the number of the temperature levels that are desired to be selected, and having different colors to show whether the iron has been set either for a "dry" or a "steam jet" ironing operation;
- a piezoelectric signaling device (or a buzzer) emitting a warning acoustic signal of the temperature selection;
- a LED, generally of a green color and signaling a condition of "plug in", which lights every time the plug of the power supply flexible cord is fitted into a current tap; said LED therefore indicating when lighted a condition of "iron ready to work", and being turned off only when the first temperature selection is carried out;
- an electromechanical pump adapted to suck water from a suitable tank and inject it into the vaporization chamber; the steam production being permitted by the electronic apparatus only when the temperature that has been selected by means of the level selection and that has been foreseen for the steam jet working has been reached and not before (LED on with continuous emission instead of a blinking light); said steam production being modified by the adjustment of the pump through the electronic apparatus by associating each flow rate, in cc/min., to each of the selected levels;
- a second miniature push button or "self cleaning" push button, causing the vaporization of a large amount of water for a short time for cleaning the plate outlet holes by means of said powerful steam outrush and for obtaining, if desired, a large amount of steam;

said flatiron being further equipped with a re-

movable tank similar to the tank of other flatirons, but having a water inlet closed by a suitable plug and located under the iron handle that is such as to prevent the water filling of said tank unless this latter has been removed from the iron (such a filling operation being allowed by other type of flatirons, although of course by no means recommended); a connecting member between the pump and the tank causing the opening of the water passage through a suitable valve.

An additional essential feature of the subject flatiron is that the electronic apparatus of said flatiron is provided with a movable sensor adapted to detect whether the iron position is:

- A - horizontal, in motion for ironing;
- B - horizontal, with the iron still;
- C - vertical, with the iron still;

and to intervene in cases B and C after a given time, to cut the electric power supply to the resistance of the plate and emit an alarm acoustic signal, thus providing for a useful safety feature; the indicative times before the intervention being of about 30 seconds in case B, and of about 10 minutes in case C; in case C the working of the pump being nevertheless always excluded so that the steam production is stopped.

The invention will now be described in details with particular reference to the attached drawings, given for exemplary and not limiting purposes, in which:

- Fig. 1 is a, schematic side elevation view, partially cross sectioned, of a flatiron according to the invention;
- Fig. 2 is a view similar to that of Fig. 1 of the flatiron body with the water tank removed;
- Fig. 3 is a schematic top view of the miniature push buttons and of the LEDs of the control and command electronic circuit;
- Fig. 4 is a block diagram of the circuit of the electronic apparatus, which is the "brain" of the subject flatiron.

As it is clearly shown in the Figures, the subject flatiron 1 is a conventional iron, quite similar to those presently on the market, but for a few features that render the appliance more effective and safer, i.e. "improved".

Such features consist of an electronic apparatus 3 for the control and the command of the working, as well as for the safety and alarm, of the type comprising a circuit board to which the various working and control commands are led, as well as those of safety and alarm.

Such electronic apparatus 3 is illustrated in the block diagram of Fig. 4.

For an easier understanding, and in order to prevent overlapping of the reference numerals, the blocks of such diagram are provided with explanations.

The commands received by such apparatus are substantially the following:

- a static sensor 5 (of the NTC resistance type) for controlling the temperature, located in contact with the iron plate 7 which in turn embeds the electric resistance 9; said static sensor 5 electrically and continuously "informing" the above mentioned electronic apparatus 3 about the temperature of the plate 7 whereby said apparatus changes the feeding of the resistance 9 to stabilize the temperature at the value selected for ironing;
- a miniature push button 11 for setting the temperature levels, which component at every actuation cyclically selects a different level starting from the lowest temperature one; some of said levels being provided for the dry working of the iron (in the illustrated example the first two), some other being provided for the steam jet working (in the illustrated example the other four); the selection of said temperature levels as a function of their nature automatically either comprising or excluding the steam production; the set temperature level being displayed through the lighting of a pilot lamp or LED 13 which indicates whether the correct temperature of that level has been or has not been reached by a constant or a blinking light, respectively;
- an array of pilot lamps or LEDs 13, one for each temperature level, controlled by the miniature push button 11, in a number corresponding to the number of the temperature levels that are desired to be selected, and having different colors to show whether the iron has been set either for a "dry" or a "steam jet" ironing operation (in the illustrated embodiment six LEDs are provided for, the first two are clear and indicate temperature levels at which the appliance works in a dry mode, whereas the other four are red and indicate the four temperature levels at which the appliance works with a steam jet);
- a piezoelectric signaling device 15 (or a buzzer) emitting a warning acoustic signal of the temperature selection;
- a LED 17, generally of a green color and signaling a condition of "plug in", which lights every time the plug of the power supply flexible cord is fitted into a current tap; said LED 17 therefore indicating when lighted a condition of "iron ready to work", and being turned off only when the first temperature selection is carried out;
- an electromechanical pump 19 adapted to suck water from a suitable tank 21 and inject it into the vaporization chamber 23; the steam production being permitted by the electronic

apparatus 3 only when the temperature that has been selected by means of the level selection and that has been foreseen for the steam jet working has been reached and not before (LED 13 on with continuous emission instead of a blinking light); said steam production being modified by the adjustment of the pump 19 through the electronic apparatus 3 by associating each flow rate, in cc/min., to each of the selected levels;

- a second miniature push button 33 or "self cleaning" push button, causing the vaporization of a large amount of water for a short time for cleaning the plate outlet holes by means of said powerful steam outrush and for obtaining, if desired, a large amount of steam.

The subject flatiron is further equipped with a removable tank 21 similar to the tank of other flatirons, but having a water inlet 25 closed by a suitable plug 27 and located under the iron handle 29 that is such as to prevent the water filling of said tank 21 unless this latter has been removed from the iron 1 (such a filling operation being allowed by other type of flat irons, although of course by no means recommended); a connecting member 31 between the pump 19 and the tank 21 causing the opening of the water passage through a suitable valve.

The electronic apparatus 3 of the subject flatiron is provided with a movable sensor 35 adapted to detect whether the iron position is:

- A - horizontal, in motion for ironing;
- B - horizontal, with the iron still;
- C - vertical, with the iron still;

and to intervene in cases B and C after a given time, to cut the electric power supply to the resistance 9 of the plate 7 and emit an alarm acoustic signal, thus providing for a useful safety feature; the indicative times before the intervention being of about 30 seconds in case B, and of about 10 minutes in case C; in case C the working of the pump being nevertheless always excluded so that the steam production is stopped.

In the above illustrated embodiment said movable sensor 35 is an optoelectronic device having a movable reflecting surface with a timer, but of course it could be a mercury switch or another suitable movable sensor.

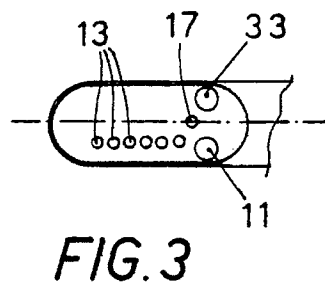
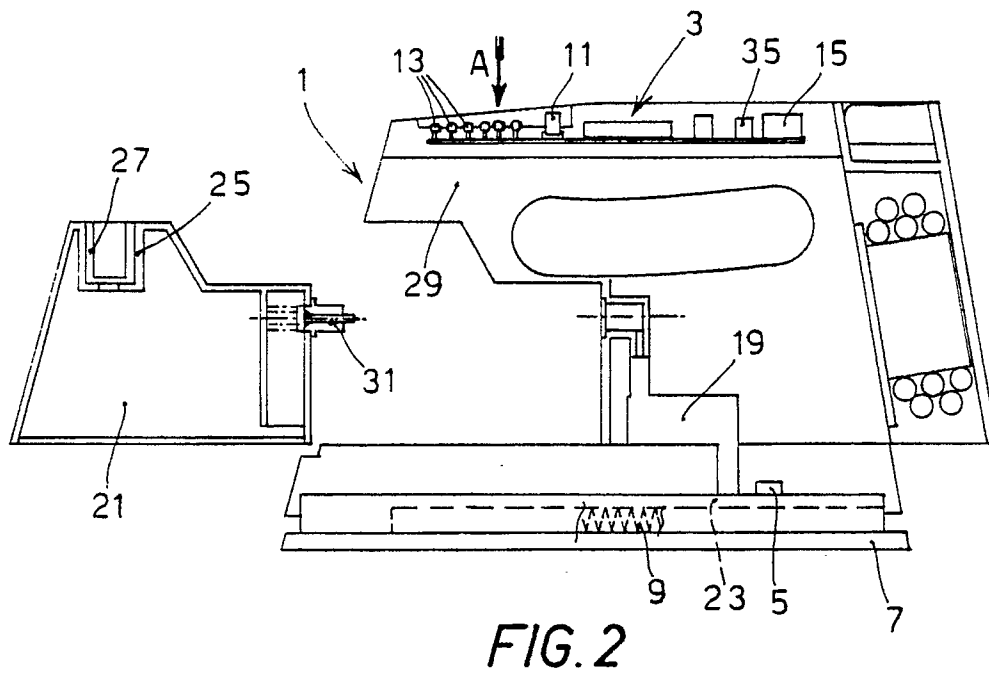
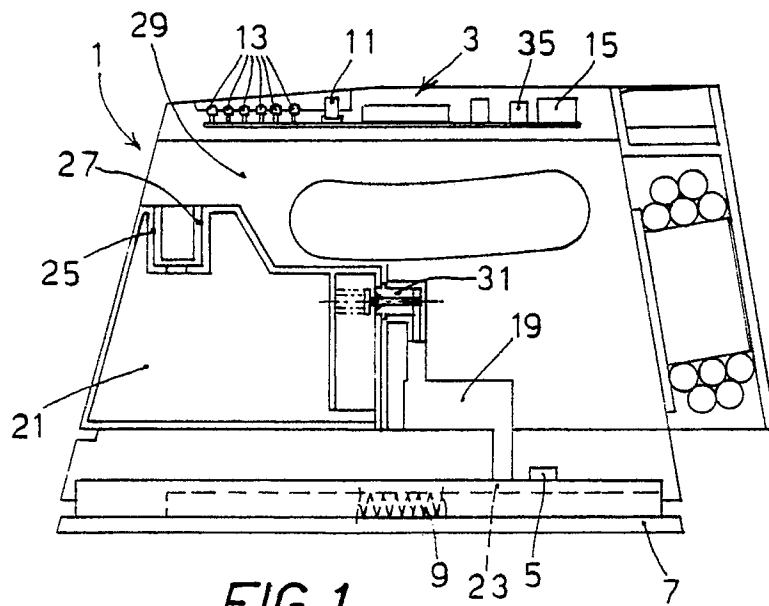
Claims

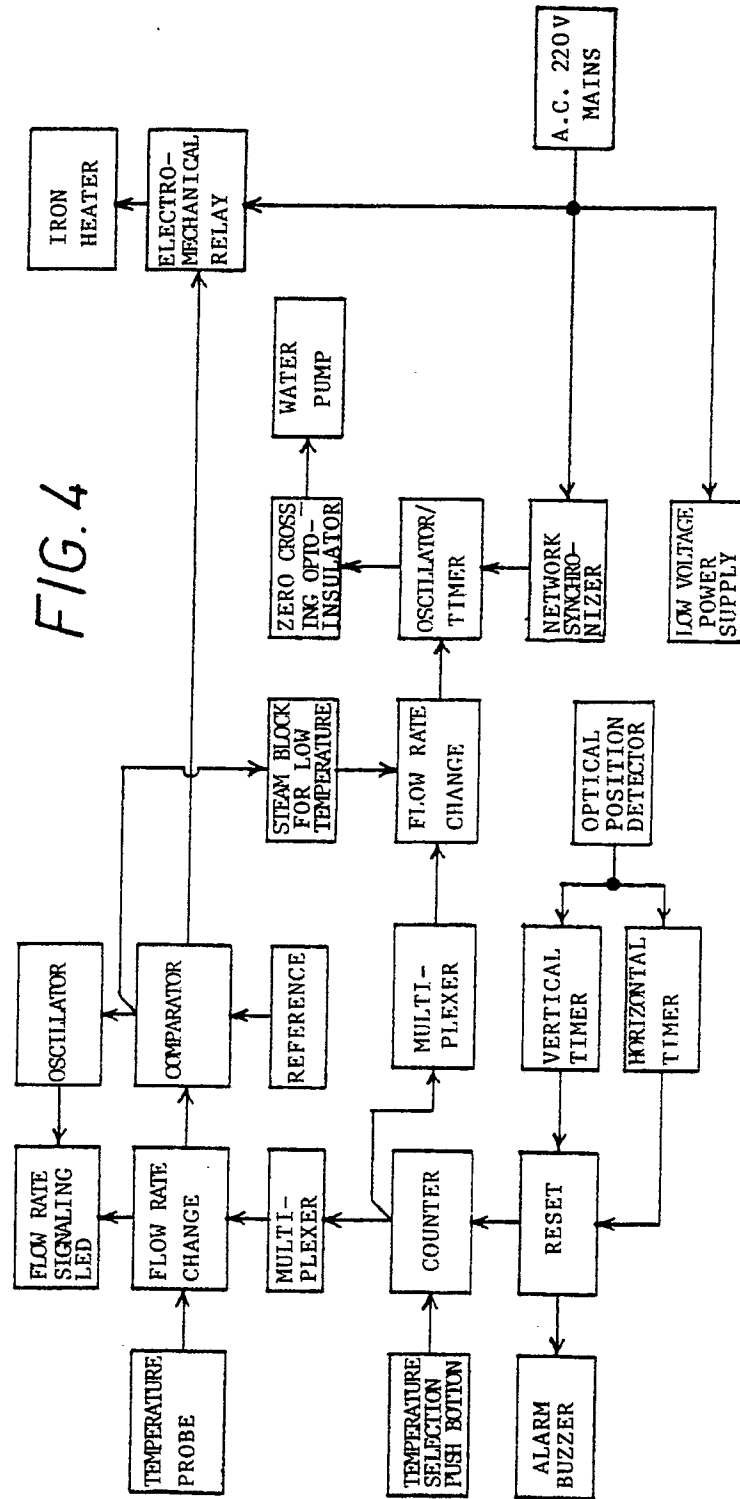
1. An improved electric flatiron, capable of working either as a dry iron or steam jet iron, characterized in that the apparatus for the control and the command of the working thereof, as well as of safety and alarm, is an electronic device (3) assembled onto a board to which

the various working and control commands are led, as well as those for safety and alarm; said commands being substantially the following:

- a static sensor (5) for controlling the temperature, located in contact with the iron plate (7) which in turn embeds the electric resistance (9); said sensor (5) electrically and continuously "informing" the above mentioned electronic apparatus (3) about the temperature of the plate (7) whereby said apparatus changes the feeding of the resistance (9) to stabilize the temperature at the value selected for ironing;
- a miniature push button (11) for setting the temperature levels, which component at every actuation cyclically selects a different level starting from the lowest temperature one; some of said levels being provided for the dry working of the iron, some other being provided for the steam jet working; the selection of said temperature levels as a function of their nature automatically either comprising or excluding the steam production; the set temperature level being displayed through the lighting of a pilot lamp or LED (13) which indicates whether the correct temperature of that level has been or has not been reached by the plate (7) by means of a constant or a blinking light, respectively;
- an array of pilot lamps or LEDs (13), one for each temperature level, controlled by the miniature push button (11), in a number corresponding to the number of the temperature levels that are desired to be selected, and having different colors to show whether the iron has been set either for a "dry" or a "steam jet" ironing operation;
- a piezoelectric signaling device (15) (or a buzzer) emitting a warning acoustic signal of the temperature selection;
- a LED (17), generally of a green color and signaling a condition of "plug in", which lights every time the plug of the power supply flexible cord is fitted into a current tap; said LED (17) therefore indicating when lighted a condition of "iron ready to work", and being turned off only when the first temperature selection is carried out;
- an electromechanical pump (19) adapted to suck water from a suitable tank (21) and inject it into the vaporization chamber (23); the steam production being permitted by the electronic apparatus (3)

- only when the temperature that has been selected by means of the level selection and that has been foreseen for the steam jet working has been reached and not before (LED (13) on with continuous emission instead of a blinking light); said steam production being modified by the adjustment of the pump (19) through the electronic apparatus (3) by associating each flow rate, in cc/min., to each of the selected levels;
- a second miniature push button (33) or "self cleaning" push button, causing the vaporization of a large amount of water for a short time for cleaning the plate outlet holes by means of said powerful steam outrush and for obtaining, if desired, a large amount of steam;
- said flatiron being further equipped with a removable tank (21) similar to the tank of other flatirons, but having a water inlet (25) closed by a suitable plug (27) and located under the iron handle (29) that is such as to prevent the water filling of said tank (21) unless this latter has been removed from the iron (such a filling operation being allowed by other type of flatirons, although of course by no means recommended); a connecting member (31) between the pump (19) and the tank (21) causing the opening of the water passage through a suitable valve.
2. An improved flatiron as claimed in claim 1, characterized in that the electronic apparatus (3) of said flatiron is provided with a movable sensor (35) adapted to detect whether the iron position is:
- A - horizontal, in motion for ironing;
 - B - horizontal, with the iron still;
 - C - vertical, with the iron still;
- and to intervene in cases B and c after a given time, to cut the electric power supply to the resistance (9) of the plate (7) and emit an alarm acoustic signal, thus providing for a useful safety feature; the indicative times before the intervention being of about 30 seconds in case B, and of about 10 minutes in case C; in case C the working of the pump being nevertheless always excluded so that the steam production is stopped.







EUROPEAN SEARCH REPORT

EP 91 20 1177

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	IEEE TRANSACTIONS ON CONSUMER ELECTRONICS. vol. 35, no. 4, November 1989, NEW YORK US pages 820 - 825; T. H. OOI, K. T. LAU: 'Electronic Iron Controller ' - - -	1	D 06 F 75/26 D 06 F 75/14 D 06 F 75/18
A	US-A-4 692 589 (A.S. BORSARI E.A.) * column 2, line 7 - line 11 ** column 5, line 10 - column 6, line 57 * - - -	1,2	
A	GB-A-2 158 105 (JOHN ZINK COMPANY) * page 1, line 118 - page 2, line 69; figure 1 * - - -	1,2	
A	EP-A-0 024 613 (ROWENTA-WERKE GMBH) - - -	1	
A,P,A	JP-A-2 136 194 (MATSUSHITA ELECTRIC IND CO LTD) * figures & PATENT ABSTRACTS OF JAPAN vol. 14, no. 377 (C-748) August 15, 1990 (MATSUSHITA ELECTRIC IND CO LTD) ** the whole document * - - -	1,1	
P,A	JP-A-2 295 598 (MATSUSHITA ELECTRIC IND CO LTD) * figures & PATENT ABSTRACTS OF JAPAN vol. 15, no. 68 (C-807) February 18, 1991 ** the whole document * - - -	1	
A	FR-A-2 368 862 (ROWENTA-WERKE GMBH) * the whole document * - - -	1	
A	US-A-4 646 451 (SANYO ELECTRIC CO., LTD.) * figure 7 * - - - - -	1	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of search 19 September 91	Examiner KELLNER F.M.
CATEGORY OF CITED DOCUMENTS 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 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			