

HAIR DRYER

Field of the Invention

The present invention relates to an electric appliance. In particular, the present invention relates to a hair dryer.

5 Background

Electric hair dryers are available in various forms offering attractive features. Regardless of the variations, the electric hair dryers available in the market are configured with two or more of distinct buttons/switches, or combination of both for normal operations.

10 Typically, at least one button/switch is adapted to control the motor driving electric fan components, whereas the heating components are controlled by the distinct button/switch. Each of these buttons/switches further provides control of fan and heat in various levels. For user friendliness, these buttons/switches are usually placed at the handle where they are reachable easily through the fingers of
15 the hand holding the hair dryer. Due to the size restrain on the handle, the various levels are limited. For example, a full-featured hair dryer comprises both buttons/switches employing three-level adjustments, wherein, level 0 represents no airflow for the electric component, level 1 represents regular airflow and level 2 represents high airflow for the electric component. Similarly, level 0-2 for
20 button/switch associated to the heating component represents no heat, regular heat and high heat respectively. Some hair dryers can even feature with more distinct buttons/switches as the features and controls increase.

There are of course some mini- or portable or travel hair dryers available on the market. These hair dryers adopt one single switch that switching between regular heated air, regular air, and no air blow for simplicity. In addition, such travel hair dryers or those ordinary or professional hair dryers, also feature with a
5 mechanical switch for switching between different voltages.

In high power (generally above 1500W) hair dryers, or professional grade hair dryers, it is generally not practical to adapt dual voltages switching. The hair dryers are generally made to suit the voltage level of intended region/market.

It can be seen and understood to users that controlling the hair dryer via two
10 or more distinct buttons/switches can be complicated. It can also be wasteful in energy usage due to the limited level controls, and thus decrease users' satisfactions in many regards.

It can thus be seen that there exists a need for a simple and robust way for a hair dryer.

15 Summary

In accordance with one aspect of the present invention, there is provided a hair dryer having a fan and a heater. The hair dryer comprises a PCB board having programmable integrated circuit (IC) components mounted thereon, wherein the fan and the heater are also connected to the PCB board; a plurality of presets defining
20 operating levels of the fan and the heater, alone or in any combinations; and a multi-mode switch connected to the PCB board for controlling the plurality of presets, the multi-mode switch is positioned at an one-hand operable location on the hair dryer, wherein user is able to operate the hair dryer with only a hand holding

hair dryer and controlling the plurality of presets through the multi-mode switch.

In one embodiment, the multi-mode switch is a rotary dial. It is also possible that the multi-mode switch is a toggle switch. The toggle switch may be toggleable in an up-down direction or a left-right direction. It is also possible that the toggle switch is an omni-directional toggle switch that is able to toggle in at least up-down and left-right directions.

Alternatively, the multi-mode switch is a push button. Further, the button may comprise a first button and a second button, or the button may be a single button. It is also possible that the multi-mode switch comprises a combination of any one of the above multi-mode switches. The multi-mode switch may be located on an upper side of the handle of the hair dryer.

In another embodiment, the hair dryer may further include a far infrared emitter and an ionic generator connected to the PCB board, wherein their operating status is defined in one of the presets. The PCB may further comprises a switch mode power supply unit and a auto-cut-off circuit.

Brief Description of Drawings

This invention will be described by way of non-limiting embodiments of the present invention, with reference to the accompanying drawings, in which:

Fig. 1 is a schematic block diagram of a hair dryer in accordance with one embodiment of the present invention;

Fig. 2 is a schematic view of a hair dryer according to one embodiment of

the present invention;

Fig. 3 is a schematic view of a hair dryer according to an alternative embodiment of the present invention;

Fig. 4 is a schematic view of a hair dryer according to a further embodiment
5 of the present invention;

Fig. 5 is a schematic view of a hair dryer according to another embodiment of the present invention;

Fig. 6 is a schematic view of a hair dryer according to yet another embodiment of the present invention;

10 Fig. 7 is a schematic view of a hair dryer according to yet a further embodiment of the present invention;

Fig. 8 is a schematic view of a hair dryer according to yet an alternative embodiment of the present invention;

Fig. 9 is a schematic view of a hair dryer according to yet further
15 embodiment of the present invention;

Fig. 10 is a cross sectional view of a hair dryer according to yet another embodiment of the present invention; and

Fig. 11 is a cross sectional view of a hair dryer according to a further embodiment of the present invention.

Detailed Description

In line with the above summary, the following description of a number of specific and alternative embodiments are provided to understand the inventive features of the present invention. It shall be apparent to one skilled in the art, however that this invention may be practiced without such specific details. Some of the details may not be described at length so as not to obscure the invention. For ease of reference, common reference numerals will be used throughout the figures when referring to the same or similar features common to the figures.

In accordance with one embodiment of the present invention, there is provided an electric hair dryer comprises a heater, a fan, a multi-mode button/switch and a printed circuit board (PCB) connecting the heater, the fan and the multi-mode button/switch. The PCB provides a simultaneous control over the heater and the fan via the multi-mode button/switch. With simple operations for the electric hair dryer in accordance with the embodiment of the present invention, a user can simultaneously control the working temperature and airflow easily with one hand. Because the power of a hair dryer is controlled and adjusted by built-in programs, it saves energy consumption. The advantages offer more users' satisfactions. For avoidance of doubt, the fan referred herein includes a motor and fan blades, wherein the motor is operationally driving the fan blades to generate airflow. A skilled person would appreciate that any means of generating airflow can be desired. Further, it is also understood that controlling fan or the like has the same meaning as controlling the airflow.

Further, the present invention is adaptable in high power hair dryer, which includes professional grade hair dryer.

Fig. 1 is a schematic block diagram of a hair dryer in accordance with an embodiment of the present invention. The hair dryer 100 comprises a multi-mode trigger 102, a Controller 104, a heater 106 and a fan 108. Specifically, The Controller 104 generally comprises one or more IC components. The heater 106 operationally generates heat for the hair dryer 100. The heater 106 can be any heating wire transforming electrical energy into heat. The fan 108 operationally generates airflow for the hair dryer 100. The fan 108 comprises a fan and an electric motor to generate airflow. Both heater 106 and fan 108 are respectively connected to the Controller 104. The Controller 104 provides controls on power level to the fan 108 and heat level to the heater 106 in many levels or combination of levels. The Controller 104 is further connected to the multi-mode trigger 102 that allow users to fully control the hair dryer 100 through the single multi-mode trigger 102.

Still referring to Fig. 1, when operating the hair dryer 100 with the multi-mode trigger 102, the multi-mode trigger 102 generates signals to trigger the Controller 104 and simultaneously provides appropriate controls over the heater 106 and the fan 108. For example, once the Controller 104 receives a signal from the multi-mode trigger 102, and based on built-in programs resides in the Controller 104, it controls the heater 106 and the fan 108 by employing a corresponding adjustment process in response to the signal.

Fig. 2 illustrates a schematic diagram of a hair dryer 200 in accordance with one embodiment of the present invention. The hair dryer 200 also includes the Controller 104, the heater 106, and the fan 108. The hair dryer 200 further comprises a multi-mode trigger 202 exposed on an inner side of a handle 201 of the hair dryer 200. The multi-mode trigger 202 includes a rotary dial that is rotatable clockwise and anticlockwise in all angles. The rotary dial further comprises a

potentiometer reside thereto; the potentiometer operationally generates signals through turning the rotary dial from a first angle to a second angle. Certainly, controls and adjustments of the heat level and the airflow power are controlled in accordance with the controlled according to the built-in program resides in the
5 Controller 104 in response to the signals from the multi-mode trigger 102.

For the hair dryer 200 adapting the Controller 104 for controlling the major operations, the built-in program resided in the IC component is configured to read the signals from the multi-mode trigger 102, and provide a relevant response to control the heater and fan. For example, the Controller 104 of the hair dryer 200
10 are configured to control the heater 104 and the fan 108 thereof such that the heat generated by the heater 106 is adjusted to a required level A and the airflow supplied by the fan 108 is adjusted to a required level B, upon the signal is received by the Controller 104, the heat generated by the heater 106 is adjusted to the required level A, and the airflow supplied by the fan 108 is adjusted to the required
15 level B.

Fig. 3 illustrates a schematic diagram of a hair dryer 300 in accordance with one embodiment of the present invention. The hair dryer 300 has substantially a same design as the hair dryer 200 of Fig. 2, except that the multi-mode trigger 302 has a rotary dial that is rotatable within a limited angle and less than one full
20 revolution, in the present example, 270 degree. Such configuration allows the multi-mode trigger 302 be used as an ON/OFF switch when it is dialed to one extreme position.

Figs. 4 and 5 illustrate two hair dryers 400, 500 having a multi-mode trigger in accordance with the alternative embodiments of the present invention. In Fig. 4,
25 the multi-mode trigger comprises a toggle switch 402 to toggle in an up-down

direction, whereby Fig. 5 has its toggle switch 502 to toggle in a left-right direction.

Fig. 6 illustrates a hair dryer 600 having a multi-mode trigger 602 in accordance with a further embodiment of the present invention. The multi-mode trigger 602 comprises an omni-directional toggle rod that is able to toggle at least in
5 up-down and left-right directions (i.e. four directions). The omni-directional toggle rod is a single rod that protrude on the handle. By default, the single rod is orientated upright to the handle (i.e. not tilting anywhere). As the rod is being pushed/toggled, the potentiometer connected thereto generates a corresponding signal and sends to the Controller 104 for the relevant controls.

10 Fig. 7 illustrates a hair dryer 700 in accordance with yet a further embodiment of the present invention. The hair dryer 700 includes an up-down directional pad 702. The up-down directional pad 702 may be a soft touch button or the like that makes the operations more user friendly. The up-down directional pad may have a similar operational setting as the toggles mentioned above.

15 Fig. 8 illustrates a multi-mode trigger 802 in accordance with an alternative embodiment of the present invention. The multi-mode trigger 802 comprises a push button.

In yet a further embodiment, the multi-mode trigger can be one single trigger integrating one or more of the aforementioned triggers.

20 The triggers provide in the aforesaid embodiments, may or may not provide intermediate values. Certainly, those that provide intermediate values are capable of providing more operational controls on the hair dryer.

In another embodiment, the multi-mode trigger is stepless multi-mode trigger, i.e. continuous signal measurements. The controller 104 may have a sampling rate for acquiring the signal measurements during the operation.

In further embodiment, the Controller 104 controls the heat and airflow levels in a fixed-step manner i.e. each step associated to a prescribed heat/airflow level. In yet a further embodiment, the Controller 104 includes a plurality of operational modes that pre-store level of heat or airflow or combination of both.

In a further embodiment, the multi-mode trigger may be located on the handle of the hair dryer. Certainly, the multi-mode trigger may also be located on other positions of the hair dryer, such as airflow cylinder or external remote control apparatus.

In yet a further embodiment, the multi-mode trigger may integrate switch function with respect to the different embodiments as described above, e.g. to turn on or turn off the power supply by turning the rotary component to a certain angle or the like.

The hair dryer according to the other embodiments of the present invention comprises a heater, an electric component, an multi-mode trigger and an integrated circuit component connecting with the heater, the electric component and the multi-mode trigger, the integrated circuit component being used for simultaneously controlling the heater and the multi-mode trigger in response to the signal from the multi-mode trigger, such that the working temperature and airflow of the hair dryer are controlled simultaneously through simple operations. Because the power of the hair dryer is controlled and adjusted by built-in programs, it can save energy, and thus the user's satisfaction is increased. In addition, various multi-mode triggers can

be provided for user's various operation needs.

Fig. 9 illustrates a hair dryer 900 according yet another embodiment of the present invention. The hair dryer 900 further comprises a LCD display 905 for displaying operating information. For example, the LCD display 905 may show
5 the current heat and airflow level or the current operating mode.

Fig. 10 illustrates a cross sectional view of a hair dryer 950 in accordance with yet another embodiment of the present invention. The IC component of the Controller 104 is mounted on a printed circuit board (PCB). Besides the IC components, it is possible that the PCB may further comprise a voltage converter,
10 which allow the hair dryer 950 to be used in multiple regions adapting different voltage levels and frequencies. The PCB may further provide a switch mode power supply (converter) unit. The PCB includes means for auto-switching operating voltage/frequency as the case may be which allows the hair dryer be used in any regions without additional adapted or converter. As the PCB is adapted,
15 which is not suggested or taught in any of the prior hair dryer, more features and controls can be achieved with the hair dryer 950. For example, the PCB may include safety features such as auto cut off, in case of any undue impact on the hair dryer, such as dropping of the hair dryer.

The PCB is further mounted within the cavity of the handle. The PCB is
20 positioned within the handle, as it is furthest away from the heating elements of the hair dryer 950.

Fig. 11 illustrates a cross sectional view of a spout of a hair dryer 980 in accordance with another embodiment of the present invention. The hair dryer 980 further comprises a far-infra red emitter 985 mounted at the spout cylinder of the

hair dryer. The far-infra red emitter 985 is used to improve the blood circulations.

The above are the detailed embodiments of the present invention. It should be noted that some modifications and variations could be made within the spirit of the present invention for those skilled in the art, and these modifications and
5 variations should be regarded within the protection scope of the present invention.

CLAIMS

1. A hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) having a fan (108), a heater (106), a Printed Circuit Board (PCB) and a controller (104), characterized in that:
 - 5 the PCB board having programmable integrated circuit (IC) components mounted thereon, wherein the fan and the heater are also connected to the PCB board;
 - the controller (104) including a plurality of operation modes that pre-store a combined fan and heater operating level on each operation mode, to provide a simultaneous control of both fan and heater operating level through each operating mode;
 - 10 wherein the hair dryer further comprises a multi-mode switch (102, 202, 302, 402, 502, 602, 702, 802) connected to the PCB board for selecting the plurality of operation modes, the multi-mode switch (102, 202, 302, 402, 502, 602, 702, 802) is positioned at an one-hand operable location on the hair dryer, wherein user is able to operate the hair dryer with only a hand holding hair dryer and controlling the plurality of operation modes through the multi-
 - 15 mode switch (102, 202, 302, 402, 502, 602, 702, 802).
2. The hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) according to claim 1, wherein the multi-mode switch is a rotary dial (202, 302).
- 20 3. The hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) according to claim 1, wherein the multi-mode switch is a toggle switch (402, 502).
4. The hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) according to claim 3, wherein the toggle switch (402) is toggleable in an up-down direction.
 - 25 5. The hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) according to claim 3, wherein the toggle switch (502) is toggleable in a left-right direction.
 6. The hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) according to claim 3,
 - 30 wherein the toggle switch (602) is an omni-directional toggle switch (602) that is able to toggle in at least up-down and left-right directions.
 7. The hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) according to claim 1, wherein the multi-mode switch is a push button (802).

8. The hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) according to claim 7, wherein the button comprises a first button and a second button, or the button component is a single button.

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9. The hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) according to any one of claims 1 to 7, wherein the multi-mode switch (102, 202, 302, 402, 502, 602, 702, 802) is located on an upper side of a handle (201) of the hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) .

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10. The hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) according to claim 1, further comprising a far infrared emitter connected to the PCB board, wherein its operating status is defined in one of the operation modes.

15 11. The hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) according to claim 1, further comprising an ionic generator connected to the PCB board, wherein its operating status is defined in one of the operation modes.

12. The hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) according to claim 1,
20 wherein the PCB further comprises a voltage/frequency converter.

13. The hair dryer(100, 200, 300, 400, 500, 600, 700, 900, 950, 980) according to claim 12, wherein the PCB further comprises a switch mode power supply unit.

25 14. The hair dryer (100, 200, 300, 400, 500, 600, 700, 900, 950, 980) according to claim 1, wherein the PCB includes an auto-cut-off circuit.