Abstract: Disclosed therein is a wired and wireless power supply type portable hair iron device. The portable hair iron device uses a commercial power source of HOV or 220 or an external power source such as a vehicle battery or a power source charged in a battery embedded in the hair iron device as a driving power source, and which keeps a locked state of an upper case and a lower case and maintains an interrupted state of driving power source when the hair iron device is not used. Moreover, the portable hair iron device uses an FET which is an inexpensive power control element, uses DC power source supplied from an embedded battery or the outside as driving power source, and controls the amount of electric power supplied to heater plates of the hair iron device according to power voltage input.

Title: WIRED AND WIRELESS POWER SUPPLY TYPE PORTABLE HAIR IRON

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WIRED AND WIRELESS POWER SUPPLY TYPE PORTABLE HAIR IRON

Technical Field

The present invention relates to a wired and wireless power supply type portable hair iron device, and particularly, to a wired and wireless power supply type portable hair iron device, which uses, as a driving power source, a commercial power source of HOV or 220V, an external power source such as a vehicle battery or a power charged in a battery embedded in the hair iron device, and which keeps a locked state of an upper case and a lower case and maintains an interrupted state of the driving power source when the hair iron device is not used.

Particularly, the present invention relates to a wired and wireless power supply type portable hair iron device that uses a field effect transistor (FET) which is an inexpensive power control element, uses a battery embedded therein or a DC power supplied from the outside, as a driving power, and controls the amount of electric power supplied to a heater plates according to power voltage applied.

Background Art

In general, an electrical heating appliance refers to a device that supplies electric power to a heating means such as a heater and uses heat obtained from the heater. Examples of the electrical heating appliance include a hair iron, an electric rice cooker, an electric stove, an electric floor, an electric iron and so on, and particularly, a hot air heater, a hair drier and the hair iron are typical examples of the electrical heating appliances.
Dissimilarly to general devices, since the above-mentioned electrical heating appliances, such as the hot air heater, the hair drier and the hair iron, are devices for generating heat by applying electric power, a control circuit used in the electrical heating appliance requires the best stability. If circuits of the electrical heating appliance are not stabilized and erroneously operated or overheated, it may cause a great-scale fire.

Such an electrical heating appliance has a temperature sensor mounted near the heater generating heat. The electrical heating appliance turns off a silicon controlled rectifier (SCR), which is a power element, when the temperature sensor senses a temperature of more than a predetermined value, but turns on the SCR when the temperature sensor senses a temperature of less than a predetermined value, so that the electrical heating appliance can always keep a temperature of the predetermined value.

However, such an electrical heating appliance entails shortcomings in that the SCR or a photo-coupler used as the power element is very expensive and a large amount of electromagnetic wave noises are generated since and electric power is controlled by directly connecting an AC power source to the load of the electrical heating appliance. In addition, the prior art electrical heating appliances have a limitation in that they can use only the fixed power source such as 110V or 220V.

Most of the hair irons of the electrical heating appliances use a commercial power source of 110V or 220V supplied from the outside or a power supplied from a separate power supply, which is bulky and heavy, as a driving power. In other words, the prior art hair iron has a spatial limitation in that it must be used only in a space where the commercial power source is temporarily installed for receiving the driving power or a space where a separate power supply is equipped.
Disclosure of Invention

Technical Problem

Accordingly, it is an object of the present invention to provide a wired and wireless power supply type portable hair iron device, which keeps a locked state of an upper case and a lower case and maintains an interrupted state of a driving power when the hair iron device is not used, thereby providing convenience in safe-keeping and carrying and promoting safety in use.

Another object of the present invention is to provide a wired and wireless power supply type portable hair iron device, which can interrupt a driving power supplied to heater plates when heat generated from the heater plates exceeds a programmed temperature of a proper value, thereby preventing accidents due to overheating.

A further object of the present invention is to provide a wired and wireless power supply type portable hair iron device, which can supply a DC power of an adapter for converting an AC power of 110V or 220V or a power of a vehicle battery or others into a DC power, as a driving power directly or through a battery embedded in the hair iron device.

A still further object of the present invention is to provide a wired and wireless power supply type portable hair iron device, which can be freely used by having a battery embedded therein without obstruction of an electric wire and reduce a manufacturing cost by using an FET, which is an inexpensive power control element.

Another object of the present invention is to provide a wired and wireless power supply type portable hair iron device, which can minimize generation of electromagnetic wave noises by using a DC power source, thereby reducing electromagnetic damages to the human body or other products.
Technical Solution

To achieve the above objects, the present invention provides a wired and wireless power supply type portable hair iron device, in which an upper case and a lower case respectively having heater plates for generating heat are integrally coupled with each other to be pivotally opened and closed about a hinge shaft at a predetermined angle, the wired and wireless power supply type portable hair iron device comprising: an inner cover for the lower case detachably coupled at an upper end portion thereof into a cover space, and a line cover mounted into a line space for receiving a power line therein, for protecting the power line, the cover space and the line space being formed at the center of a bottom side of the upper case, wherein the inner cover is mounted at a lower end portion thereof on the upper portion of the lower case having a printed circuit board (PCB) embedded therein and a mounting space formed therein for mounting a battery holder having a battery embedded therein, the inner cover having an inner space for receiving the battery holder and the PCB therein, the PCB having an operation and power controlling circuit section for controlling overall operation of the portable hair iron device and controlling power supply of the heater plates, the battery holder being detachably coupled to the mounting space of the lower case and the inside space of the inner cover; and a connection jack mounted at an end portion of the lower case so as to be electrically connected with the external power source.

In addition, it is preferable that the inner cover has a locking means to keep a state where the upper case and the lower case are integrally closed with each other, and the locking means includes: a hinge groove formed on a side of the inner cover to be coupled with a hinge shaft of a locking lever; a spring mounting groove formed on the bottom side of the inner cover in contact with the hinge groove
for receiving a spring for providing elasticity to the locking lever, a fixing protrusion formed on the upper end of the locking lever coupled to the hinge groove to be detachably coupled to a fixing groove of the upper case through a protrusion-withdrawing opening of the inner cover; and a separation-preventing piece formed on the lower end of the locking lever for preventing separation of the spring received in the spring mounting groove.

Moreover, it is preferable that the separation-preventing piece of the locking lever is formed in the shape of an arc to surround the spring mounting groove.

In addition, it is preferable that the PCB has a power switch which operates in cooperation with a power button mounted on a coupling groove of the inner cover, and the power button has a manipulation lever formed on the lower end portion thereof for releasing a locked state between the upper case and the lower case by pushing the lower end portion of the locking lever when the portable hair iron device is turned on.

Furthermore, the lower case has a fixing means for fixing the battery holder mounted in the mounting space, and the fixing means includes: a movement space formed on the inner surface of the lower case for allowing a movable member to move; a coupling groove formed on the inner walls of the movement space and the mounting space contacting with the movement space for allowing the movable member and a fixed member to be moved and coupled; a support jaw formed on the inner surface of the lower case for supporting the spring; a fixing protrusion formed at the front portion of the movable member moving inside the movement space so as to be detachably coupled to a fixing groove of a battery holder cover; a push plate formed on the bottom side of the movable member and located on the movement space; and a guide located inside the lower case and formed at the rear portion of the
fixed member integrally coupled with the movable member for elastically supporting the spring
interposed between the support jaw and the fixed member.

In addition, it is preferable that a movement-restricting step is formed at an end portion of the
movement space communicating with the mounting space for restricting the movement of the movable
member.

Moreover, it is preferable that a separation-preventing piece is formed at the upper end of the
rear portion of the fixed member on which a spring is mounted for preventing a separation of the spring
interposed between the support jaw and the fixed member.

Furthermore, it is preferable that the inner cover has a plurality of air holes formed on the upper
surface and a side surface thereof to emit heat generated from the battery received in the battery holder
by circulating the outside air into the inner cover when the upper case and the lower case are opened or
closed.

Additionally, it is preferable that the PCB has an operation and power controlling circuit section
for controlling the overall operation of the portable hair iron device and controlling power supply of the
heater plates, wherein the operation and power controlling circuit section supplies a charged electric
power from the battery or an external electric power through the connection jack of the lower case to
the heater plates as a driving power.

In addition, the operation and power controlling circuit section includes a DC/DC converter for
converting a DC power supplied from the outside into a DC power of a level necessary for operating
and charging the heater plates; the battery adapted to be charged with the DC power supplied through
the DC/DC converter; a temperature sensor for sensing the temperature of the heater plates; a central
processing unit for controlling charge and discharge of the battery according to whether or not an external power is supplied through the DC/DC converter, comparing the temperature of the heater plates sensed by the temperature sensor with a programmed temperature value or a temperature value inputted from the outside, and outputting a control signal for turning on/off DC power supplied from the DC/DC converter or the battery to the heater plates; and a power-controlling section having an FET for controlling the DC power supplied from the battery or the DC/DC converter to the heater plates by being turned on/off under the control of the central processing unit.

Moreover, it is preferable that the operation and power controlling circuit section further includes a battery level-indicating section for indicating the level of the battery under the control of the central processing unit.

Furthermore, it is preferable that the operation and power controlling circuit section farther includes a buzzer for indicating an overcharge or a shortage of the level of the battery and an overheated state of the heater plates under the control of the central processing unit.

Additionally, it is preferable that the heater plates are embedded in the portable hair iron device, a hot air heater or a hair dryer.

**Advantageous Effects**

The present invention can provide convenience in safe-keeping and carrying and promote safety in use since it keeps a locked state of an upper case and a lower case and maintains an interrupted state of a driving power source when the hair iron device is not used.
In addition, the present invention can interrupt a driving power supplied to heater plates when heat generated from the heater plates exceeds a programmed temperature of a proper value, thereby preventing accidents such as a bum or a fire.

Moreover, the present invention can safely supply a DC power of an adapter that converts an AC power of 110V or 220V or a power of a vehicle battery or a separate power supply into a DC power, as a driving power, directly or through a battery embedded in the hair iron device.

Furthermore, the present invention can be freely used by having a battery embedded therein without obstruction of an electric wire and reduce a manufacturing cost of various electric heating appliances including the hair iron by using an FET, which is an inexpensive power control element.

Additionally, the present invention can minimize generation of electromagnetic wave noises by using a DC power source, thereby reducing electromagnetic damages to the human body or other products.

**Description of Drawings**

FIG. 1 is a perspective view of a portable hair iron device according to the present invention.

FIG. 2 is a partially exploded bottom perspective view of the portable hair iron device.

FIG. 3 is an exploded perspective view of the portable hair iron device.

FIG. 4 is a sectional view of essential parts of the portable hair iron device including heater plates.

FIG. 5 is a partially enlarge and exploded perspective view of a line cover coupled to the bottom of an upper case.
FIG. 6 is a sectional view showing a structure for emitting heat generated from a battery by circulating the outdoor air into an inner cover according to opening and closing of the upper case and a lowercase.

FIG. 7 is a perspective view of essential parts of the portable hair iron device including the inner cover for turning on/off a power source and locking the upper case and the lower case.

FIGS. 8 and 9 are sectional views showing a state where the upper case and the lower case are locked or unlocked according to on/off operation of a power switch.

FIG. 10 is a perspective view showing a configuration for locking a cover of a battery holder to the lower case.

FIG. 11 is a sectional view showing a locked state and an unlocked state between the lower case and the cover.

FIG. 12 is a configurational view of an operation and power controlling circuit section mounted in the portable hair iron device.

FIG. 13 is a flow chart showing a process for controlling operation of the portable hair iron device through control of the operation and power controlling circuit section.

**Best Mode**

A portable hair iron device of a wire or wireless power supply type according to the present invention, as shown in FIG. 1, has an upper case 11 and a lower case 12 coupled with each other in such a way as to be pivotally opened and closed about a hinge shaft (not shown) at a predetermined angle, and the lower case 12 has a connection jack 13 formed at an end portion thereof for an electrical
connection with a commercial power source of HOV or 220V, an external power supply such as a vehicle power supply or a separate power supply. Of course, the connection jack 13 must be connected to a PCB (Printed Circuit Board) mounted in the lower case 12 and a battery electrically connected with the PCB.

Here, the connection jack 13 may be mounted also on the upper case 11. In this instance, it is preferable that mounting positions of electromagnetic circuit-related parts and power-related parts, which will be described later, are changed according to the position of the connection jack 13. Hereinafter, a preferred embodiment of the present invention will be described referring to the drawings, but the present invention can be modified in various ways without being restricted to the above.

Heater plates 14 and 15 respectively having heaters therein for generating heat for hair-styling are coupled to the front end portions of the upper case 11 and the lower case 12, where a hinge shaft is not formed, and faced with each other. The lower case 12 has a battery holder 16 mounted at the rear end portion thereof for receiving a battery or a disposable dry cell, which supplies a driving power to the heater of the heater plates 14 and 15 and the PCB having an electromagnetic circuit. Of course, as shown in FIG. 2, since an openable cover 17 is coupled to the battery holder 16, the battery or dry cell received in the battery holder 16 can be replaced with a new one at any time if necessary.

Moreover, the lower case 12 has the PCB mounted therein, which has an operation and power controlling circuit section for controlling an overall operation of the hair iron device including the heater of the heater plates. Additionally, a power button 20, which interlocks with the power switch controlling a power of the heater electrically connected with the operation and power controlling circuit section of the PCB, and a transparent window 18, which allows a user to check an operational state of the above parts from the outside by transmitting lamp light to the outside, are mounted on the outer
surface of the lower case 12 to be exposed to the outside. The power button 20 or the transparent window 18 mounted on the lower case 12 may be also mounted on the upper case 11 in various forms if necessary.

Here, the power button 20 mounted on an inner cover 39 of the lower case 12 interlocks with the power switch while sliding in a longitudinal direction of the portable hair iron device, and serves to keep a closed state between the upper case 11 and the lower case 12 when the portable hair iron device is not used, namely, when the upper case 11 and the lower case 12 are integrally closed with each other.

FIGS. 3 to 11 illustrates the portable hair iron device according to the present invention. The portable hair iron device according to the present invention includes a heating means, a power supply controlling means for controlling a power supplied to the heating means, and a locking means for keeping a locked state of the hair iron device when the portable hair iron device is not used. That is, the portable hair iron device includes the upper case 11, the lower case 12, and a plurality of components contained in the upper case 11 and the lower case 12.

First, as shown in FIGS. 3 and 4, the heater plates 14 and 15 where the heater are printed or attached, holders 25 and 26 made of an insulating material of low thermal conductivity, and plastic holders 23 and 24 including a ceramic material are integrally coupled with each other on the inner surfaces of the front parts of the upper case 11 and the lower case 12. The heater plates 14 and 15 respectively have coupling pieces 27 and 28 formed thereon in a direction that the holders 25 and 26 made of the insulating material and the plastic holders 23 and 24 are coupled with each other, and the holders 25 and 26 and the plastic holders 23 and 24 respectively have coupling holes 31 and 32 and coupling holes 29 and 30 for inserting the coupling pieces 27 and 28 thereto. The plastic holders 23 and 24 respectively have fixing protrusions 35 and 36 formed at both ends thereof to be coupled to fixing grooves 33 and 34 formed on the inner surfaces of the upper case 11 and the lower case 12. So, the
user can easily fix the heater plates 14 and 15, the holders 25 and 26 made of the insulating material and the plastic holders 23 and 24 on the inner surfaces of the upper case and the lower case 12 without using an additional fixing means such as screws.

Here, sides of the fixing protrusions 35 and 36 fixed in the fixing groove 34 are fixed by a line cover 21 and the inner cover 39 coupled to the inner surfaces of the upper case 11 and the lower case 12.

As shown in FIGS. 3 and 5, the central part of the bottom side of the upper case 11 is divided into a line space 37 for receiving a power line connected to the heater plate 14 and a cover space 38 to be detachably coupled with the inner cover 39 for the lower case 12. The line cover 21 is mounted on the line space 37 for protecting the power line received in the line space 37. Particularly, as mentioned above, since a portion of the line cover 21 presses and fixes the fixing protrusion 35 of the plastic holder 23 when the line cover 21 is coupled to the upper case 11, also the plastic holder 23 can be fixed when the line cover 21 is coupled.

The cover space 38 of the upper case 11 is a space to minimize an increase in volume of the portable hair iron device even though the battery for charging an external power source is mounted to allow the user to use the portable hair iron device by radio, since a space for the battery holder 16 in which the battery 40 is accommodated is extended to the upper case 11.

Additionally, on the middle part of the lower case 12, formed are a receiving space 42 for receiving the PCB 41 on which the power switch 19 interlocking with the power button 20, various lamps 20a for indicating the operational state of the portable hair iron device, and the operation and power controlling circuit section for controlling the overall operation of the portable hair iron device and controlling power supply of the heater plates 14 and 15 are mounted, and a mounting space 43 for mounting the battery holder 16 in which the battery 40 is embedded. Here, the receiving space 42 is opened at the upper side, but the mounting space 43 is opened at the upper side and the lower side.
The inner cover 39 is coupled to the middle part of the upper side of the lower case 12 in which the receiving space 42 and the mounting space 43 are formed, and inner cover 39 surrounds the PCB 41 received in the receiving space 42 and has an inner space for mounting the battery holder 16 therein.

The inner cover 39 has a plurality of air holes 44 and 45 formed on the upper surface and a side thereof. As shown in FIG. 6, the air holes 44 and 45 are formed to emit heat generated from the battery 40 by introducing the outside air filling the cover space 38 of the upper case 11 to the inner cover 39, namely, the battery holder 16, and discharging the air to the outside.

Moreover, the line cover 21 and the lower case 12 have a structure to manipulate the power switch 19 of the PCB 41 and lock the upper case 11 and the lower case 12 when the portable hair iron device is not used, and it will be described referring to FIGS. 3 and 7 to 9.

First, a coupling hole 46 is formed on a vertical side of the line cover 21, which is coupled to the inner surface of the upper case 11, to be detachably coupled with a retaining protrusion 48 of a locking lever 47.

In addition, the inner cover 39 includes a hinge groove 52 formed on the front lower portion thereof to be coupled with a hinge shaft 49 of the locking lever 47, and a spring mounting groove 51 is formed in front of the hinge groove 52 for inserting a spring 56 thereto. Furthermore, a protrusion-withdrawing opening 53 is formed on the front plate of the inner cover 39 for protruding the retaining protrusion 48 of the locking lever 47 to the outside therethrough. The inner cover 39 further includes a coupling groove 57 formed on a side plate thereof to be coupled with the power button 20. A manipulation lever 54 is formed below the power button 20 mounted in the coupling groove 57 for pushing a lower end portion 55 of the locking lever 47 so that the locking lever 47 interlocks with the power switch 19 of the PCB 41 according to the power on/off operation of the power switch 19.
In other words, as shown in FIGS. 8 and 9, since the locking lever keeps an unlocked state when the power switch 19 is in an ON-state but keeps a locked state when the power switch 19 is in an OFF-state, the portable hair iron device can reduce its bulk and prevent accidents due to power supply when the portable hair iron device is not used.

The locking lever 47 interlocking with the power button 20 includes: the hinge shaft 49 formed at the central portion thereof for rotation; the retaining protrusion 48 formed at the upper portion thereof and directed forward to be detachably coupled with the coupling hole 46 of the line cover 21; and a separation-preventing piece 50 formed at the lower portion thereof for holding the spring 56 mounted in the spring mounting groove 51 of the inner cover 39. In this instance, the separation-preventing piece 50 is formed in the shape of an arc in consideration that the locking lever 47 is pivotally rotated about the hinge shaft 49 at a predetermined angle.

The chargeable and dischargeable battery 40 is embedded in the battery holder 16 mounted inside the inner cover 39 through the mounting space 43 of the lower case 12. Of course, the battery 40 is electrically connected with the PCB 41 having the operation and power controlling circuit section for controlling the overall operation of the portable hair iron device and controlling power supply of the heater plates 14 and 15 and with the connection jack 13 to which the external power is supplied.

The battery holder 16 coupled with the cover 17 can be fixed inside the mounting space 43 of the lower case 12 by a fixing means. That is, as shown in FIG. 10, the lower case 12 has the fixing means for fixing the battery holder 16. Of course, the cover 17 has a fixing groove 67 or a structure to be detachably coupled with other fixing means.

The lower case 12 has a movement space 61 formed on the central part of the bottom face thereof for moving a movable member 63, and a coupling groove 60 for combining the movable member 63 with a fixed member 68 is formed at the central portion of the movement space 61 contacting with the
mounting space 43 and at a portion of the lower case 12 contacting with the mounting space 43. Particularly, a movement-restricting step 62 is formed at a portion of the movement space 61, which communicates with the mounting space 43, to restrict a movement of the movable member 63. In addition, the lower case 12 has a support jaw 59 formed on the inner surface thereof at a predetermined interval from the coupling groove 60 for supporting a spring 72.

A portion of the movable member 63 actuated when the battery holder 16 is separated from or coupled to the mounting space 43 of the lower case 12 is located on the outer surface of the lower case 12. The movable member 63 includes a fixing protrusion 64 formed at the front portion thereof to be detachably coupled with the fixing groove 67 of the cover 17, a push plate 66 formed on the bottom side thereof moving along the longitudinal direction of the portable hair iron device inside the movement space 61 in a state where it is exposed to the outside of the lower case 12 and manipulated by the user, and a coupling hole 65 formed on the upper portion thereof for allowing screw-coupling when the movable member 63 is integrally coupled with the fixed member 68.

The fixed member 68 integrally coupled with the movable member 63 in a state where the fixed member 68 is located inside the lower case 12 is to hold the movable member 63 in such a way that the movable member 63 moves inside the movement space 61. The fixed member 68 includes a coupling hole 69 vertically formed for allowing the screw-coupling between the fixed member 68 and the movable member 63, a guide 70 formed at the rear thereof for elastically supporting the spring 72 between the fixed member 68 and the support jaw 59 of the lower case 12, and a spring separation-preventing bar 71 formed on the upper portion of the guide 70 for holding the spring 72 located between the support jaw 59 and the fixed member 68 in a state where the spring separation-preventing bar 71 is fit on the guide 70.
Therefore, when the user does not manipulate the push plate 66, as shown in FIG. 11, the movable member 63 and the fixed member 68 are moved in a direction that the battery holder 16 is located by elasticity of the spring 72 to keep a state where the fixing protrusion 64 of the movable member 63 is coupled to the fixing groove 67 of the cover 17, whereby the battery holder 16 is not separated from the mounting space 43 of the lower case 12.

On the other hand, when the battery 40 is replaced with a new one or the user pushes the push plate 66 in the opposite direction to a direction that the battery holder 16 is located as occasion demands, as shown in FIG. 11, the movable member 63 and the fixed member 68 are moved in the opposite direction to the battery holder 16 while overcoming elasticity of the spring 72, and the fixing protrusion 64 of the movable member 63 is separated from the fixing groove 67 of the cover 17, whereby the battery holder 16 is separated from the mounting space 43 of the lower case 12.

For hinge-coupling between the upper case 11 and the lower case 12, two flat-plate type support panels 73 and 76 extend downwardly from the rear end portion of the upper case 11 in integration with the upper case 11, and the support panels 73 and 76 respectively have through-holes 75 and 77 for combining the support panels 73 and 76 with a spring 58, a hinge shaft 22 and an oilless bearing 74.

In this instance, the two through-holes 75 have the same height, and the outer peripheral surface of the support panel 73 is located more inwardly than the outer surface of the upper case 11. So, the support panel 76 of the lower case 12 does not excessively protrude to the outside even though the support panel 76 of the lower case 12 is overlapped doubly on the support panel 73 of the upper case 11.

As described above, the through-hole 77 is formed on the central portion of the support panel 76 formed integrally with the lower case 12 for inserting the hinge shaft 22 and the oilless bearing 74 thereto, and other through-holes 80 are formed at a portion spaced from the through-hole 77 at a predetermined interval for coupling hooks 79 of a cover 78 to the support panel 76. Here, it is natural
that the through-holes 80 are located in a straight line with the through-hole 75 of the support panel 73 to which the hooks 79 of the cover 78 are coupled.

FIG. 12 illustrates the operation and power controlling circuit section mounted on the PCB 41. The operation and power controlling circuit section includes a DC/DC converter 81, the power switch 19, a voltage-controlling section 82, a central processing unit 83, the battery 40, a power-controlling section 85, the heater plates 14 and 15, a buzzer 86, a battery level-indicating section 87, and a temperature sensor 84.

The DC/DC converter 81 serves to convert a DC power, which is converted from an AC power of 110V or 220V or a power of a vehicle battery by an adapter (not shown), into a DC power of a level necessary for operating and charging the heater plates 14 and 15 of the portable hair iron device, which is one of various electrical heating appliances. The power switch 19 is a switch to turn on/off DC the power supplied to the electrical heating appliance, such as the portable hair iron device, a hot air heater and a hair drier, namely, the voltage-controlling section 82 through the DC/DC converter 81. The voltage-controlling section 82 converts a DC power supplied from the DC/DC converter 81 into a DC power of a proper level necessary to the central processing unit 83 or other various controllers.

Here, the DC/DC converter 81 does not generate a DC power of more than 48V which is harmful to the human body, since it converts all input power into a DC power of 8.4V to 16V without regard to DC power source inputted from the outside.

In addition, the central processing unit 83 controls charge and discharge of the battery 40 according to whether or not an external power is supplied through the DC/DC converter 81, compares temperature of the heater plates 14 and 15 sensed by the temperature sensor 84 with a programmed temperature value or a temperature value inputted from the outside, and then outputs a control signal for turning on/off the DC power supplied from the DC/DC converter 81 or the battery 40 to the heater plates 14.
and 15. The battery 40 charges the DC power source converted by the DC/DC converter 81, and supplies it to the voltage-controlling section 82 and the heater plates 14 and 15 by control of the central processing unit 83. The power-controlling section 85 includes an inexpensive FET (Field Effect Transistor), and controls a DC power supplied from the battery 40 or the DC/DC converter 81 to the heater plates 14 and 15 by being turned on/off under the control of the central processing unit 83.

Moreover, a load including the heater plates 14 and 15 means the heater embedded in the electrical heating appliance, such as the hot air heater, the hair drier or the portable hair iron device. The buzzer 86 indicates overcharge or a shortage of level of the battery 40 and an overheated state of the heater plates 14 and 15 under the control of the central processing unit 83. The battery level-indicating section 87 indicates the level of the battery 40 under the control of the central processing unit 83. The temperature sensor 84 is a sensor to sense temperature of the load including the heater plates 14 and 15, such as the heater of the electrical heating appliance, such as the hot air heater, the hair drier or the portable hair iron device.

Referring to FIG. 13, a process for controlling a power supplied from the outside or the battery 40 embedded in the electrical heating appliance to the heater plates 14 and 15 of the portable hair iron device, which is one of the electrical heating appliances will be described.

First, the central processing unit 83 mounted in the electrical heating appliance, such as the hot air heater, the hair drier or the portable hair iron device, checks whether or not a DC power is supplied from the outside through the DC/DC converter 81 (S12) when the power switch 19 is manipulated into the ON-state (SII).

When a DC power is inputted from the outside through the DC/DC converter 81, the central processing unit 83 controls operation of the power-controlling section 85 to supply the inputted a DC power voltage to the heater plates 14 and 15 through the power-controlling section 85, and controls the
power-controlling section 85 to charge the battery 40, such as lithium ion, with the inputted DC power (S13).

Of course, it is natural that the central processing unit 83 prevents overcharge of the battery 40 by checking the level of the battery 40 before or during charging of the battery 40 with a DC power.

Furthermore, when a DC power is not supplied from the outside through the DC/DC converter 81, the central processing unit 83 controls operation of the power-controlling section 85 to supply the power of the battery 45 embedded in the electrical heating appliance such as the portable hair iron device to the heater plates 14 and 15 through the power-controlling section 85 (S14), checks the level of the battery 40, and displays it through the battery level-indicating section 87 (S15).

Moreover, after the central processing unit 83 checks whether or not the level of the battery 40 is more than a predetermined level (S16), if the level of the battery 40 is as small as it cannot operate the load of the electrical heating appliance, namely, the heater plates 14 and 15, the central processing unit 83 indicates it through the battery level-indicating section 87 and notifies it to the user to charge a power source of the battery 40 or replace the battery 40 with a new one by operating the buzzer 86.

Additionally, the central processing unit 83 checks the temperature value of the heater plates 14 and 15 sensed by the temperature sensor 84 while a DC power of the DC/DC converter 81 or a DC power of the battery 40 is supplied as a driving power of the heater plates 14 and 15, and then, checks whether or not the temperature value is a value set by the internal program or by the external input (S19).

As a checked result, when the sensed temperature value is lower than the set value, the central processing unit 83 judges it that the electrical heating appliance such as the portable hair iron device is operated normally, and then, returns to the step S12 to check input of the DC power through the DC/DC converter 81. However, when the sensed temperature value is higher than the set value, the central processing unit 83 judges it that the heater plates 14 and 15 of the electrical heating appliance
are operated abnormally, and controls the operation of the power-controlling section 85 to interrupt the power supplied to the heater plates 14 and 15 (S21).

Of course, also in this instance, in the same way as the case where there is an error in the level of the battery 40, the central processing unit 83 actuates the battery level-indicating section 87 and the buzzer 86 to notify the user that the heater plates 14 and 15 are operated abnormally (S20).

**Industrial Applicability**

As described above, the present invention can provide convenience in safe-keeping and carrying and promote safety in use since it keeps a locked state of an upper case and a lower case and maintains an interrupted state of a driving power when the hair iron device is not used.

In addition, the present invention can interrupt a driving power supplied to heater plates when heat generated from the heater plates exceeds a programmed temperature of a proper value, thereby preventing accidents such as a bum or a fire.

Moreover, the present invention can safely supply a DC power of an adapter that converts an AC power of 110V or 220V or a power of a vehicle battery or a separate power supply into a DC power, as a driving power, directly or through a battery embedded in the hair iron device.

Furthermore, the present invention can be freely used by having a battery embedded therein without obstruction of an electric wire and reduce a manufacturing cost of various electric heating appliances including the hair iron by using an FET, which is an inexpensive power control element.

Additionally, the present invention can minimize generation of electromagnetic wave noises by using a DC power source, thereby reducing electromagnetic damages to the human body or other products.
CLAIMS

1. A wired and wireless power supply type portable hair iron device, wherein an upper case and a lower case respectively having heater plates for generating heat are integrally coupled with each other to be pivotally opened and closed about a hinge shaft at a predetermined angle, characterized in that a cover space with which a inner cover of the lower case is detachably coupled and a line space for receiving a power line therein are formed at the center of a bottom side of the upper case and a line cover for protecting a power line is coupled with the line space; and a printed circuit board (PCB) having a operation and power controlling circuit section for controlling overall operation of the portable hair iron device and controlling power supply of the heater plates is embedded in the lower case and a mounting space for mounting a battery holder therein is formed in the lower case and the inner cover having an inner space for receiving a battery holder and the PCB therein is coupled with the lower case, the battery holder being detachably coupled to the mounting space of the lower case and the inside space of the inner cover, and a connection jack is mounted at an end portion of the lower case so as to be electrically connected with the external power source.

2. A wired and wireless power supply type portable hair iron device as claimed in claim 1, wherein the inner cover has a locking means to keep a state where the upper case and the lower case are integrally closed with each other, and the locking means includes: a hinge groove formed on a side of the inner cover to be coupled with a hinge shaft of a locking lever; a spring mounting groove formed on the bottom side of the inner cover in contact with the hinge groove for receiving a spring for providing elasticity to the locking lever; a fixing protrusion formed on the upper end of the locking
lever coupled to the hinge groove to be detachably coupled to a fixing groove of the upper case through
a protrusion-withdrawing opening of the inner cover; and a separation-preventing piece formed on the
lower end of the locking lever for preventing separation of the spring received in the spring mounting
groove.

3. A wired and wireless power supply type portable hair iron device as claimed in claim 2,
wherein the separation-preventing piece of the locking lever is formed in the shape of an arc to
surround the spring mounting groove.

4. A wired and wireless power supply type portable hair iron device as claimed in claim 1,
wherein the PCB has a power switch which operates in cooperation with a power button mounted on a
coupling groove of the inner cover, and the power button has a manipulation lever formed on the lower
dend portion thereof for releasing a locked state between the upper case and the lower case by pushing
the lower end portion of the locking lever when the portable hair iron device is turned on.

5. A wired and wireless power supply type portable hair iron device as claimed in claim 1,
wherein the lower case has a fixing means for fixing the battery holder mounted in the mounting space,
and the fixing means includes: a movement space formed on the inner surface of the lower case for
allowing a movable member to move; a coupling groove formed on the inner walls of the movement
space and the mounting space contacting with the movement space for allowing the movable member
and a fixed member to be moved and coupled; a support jaw formed on the inner surface of the lower
case for supporting the spring; a fixing protrusion formed at the front portion of the movable member moving inside the movement space so as to be detachably coupled to a fixing groove of a battery holder cover; a push plate formed on the bottom side of the movable member and located on the movement space; and a guide located inside the lower case and formed at the rear portion of the fixed member integrally coupled with the movable member for elastically supporting the spring interposed between the support jaw and the fixed member.

6. A wired and wireless power supply type portable hair iron device as claimed in claim 5, wherein a movement-restricting step is formed at an end portion of the movement space communicating with the mounting space for restricting the movement of the movable member.

7. A wired and wireless power supply type portable hair iron device as claimed in claim 5, wherein a separation-preventing piece is formed at the upper end of the rear portion of the fixed member on which a spring is mounted for preventing a separation of the spring interposed between the support jaw and the fixed member.

8. A wired and wireless power supply type portable hair iron device as claimed in claim 1, wherein the inner cover has a plurality of air holes formed on the upper surface and a side surface thereof to emit heat generated from the battery received in the battery holder by circulating the outside air into the inner cover when the upper case and the lower case are opened or closed.
9. A wired and wireless power supply type portable hair iron device as claimed in claim 1,
wherein the PCB has an operation and power controlling circuit section for controlling the overall
operation of the portable hair iron device and controlling power supply of the heater plates, the
operation and power controlling circuit section supplying a charged electric power from the battery or
an external electric power through the connection jack of the lower case to the heater plates as a driving
power.

10. A wired and wireless power supply type portable hair iron device as claimed in claim 1
or 9, wherein the operation and power controlling circuit section includes a DC/DC converter for
converting a DC power supplied from the outside into a DC power of a level necessary for operating
and charging the heater plates; the battery adapted to be charged with the DC power supplied through
the DC/DC converter, a temperature sensor for sensing the temperature of the heater plates; a central
processing unit for controlling charge and discharge of the battery according to whether or not an
external power is supplied through the DC/DC converter, comparing the temperature of the heater
plates sensed by the temperature sensor with a programmed temperature value or a temperature value
inputted from the outside, and outputting a control signal for turning on/off a DC power supplied from
the DC/DC converter or the battery to the heater plates; and a power-controlling section having an FET
for controlling the DC power supplied from the battery or the DC/DC converter to the heater plates by
being turned on/off under the control of the central processing unit.
11. A wired and wireless power supply type portable hair iron device as claimed in claim 10, wherein the operation and power controlling circuit section further includes a battery level-indicating section for indicating the level of the battery under the control of the central processing unit.

12. A wired and wireless power supply type portable hair iron device as claimed in claim 1, wherein the operation and power controlling circuit section further includes a buzzer for indicating an overcharge or a shortage of the level of the battery and an overheated state of the heater plates under the control of the central processing unit.

13. A wired and wireless power supply type portable hair iron device as claimed in claim 1, wherein the heater plates are embedded in the portable hair iron device, a hot air heater or a hair drier.
FIG. 13

Start

Turn on power switch

S11

Is external DC power supplied through DC/DC converter?

Yes

S13

Supply the DC power of DC/DC converter to heater plates and charge battery

No

S14

Supply power of battery to heater plates

S15

Check and indicate the level of battery

More than a predetermined value?

Yes

Supply the DC power of DC/DC converter to heater plates and charge battery

No

Indicate the battery level on buzzer and indicating section

S16

S17

Sense the temperature of heater plates

More than a predetermined temperature?

Yes

Indicate the temperature on buzzer and indicating section

No

End

Interrupt power of heater plates
A. CLASSIFICATION OF SUBJECT MATTER

A45D 1/04(2006.01)1

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC8 A45D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

KR  IPC as above
JP (utility models)  IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKIPASS(KIPO internal)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Date of the actual completion of the international search
06 FEBRUARY 2007 (06 02 2007)

Date of mailing of the international search report
07 FEBRUARY 2007 (07.02.2007)

Authorized officer
LEE, Kang Young
Telephone No 82-42-481-5583
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