A power supply device with a humidifying function includes a body, a circuit board, and a heater. An accommodation space is defined inside the body, and a water reservoir is disposed inside the accommodation space for storing water. A steam vent is formed on a surface of the body for communicating the water reservoir. The circuit board is disposed on a bottom of the accommodation space and includes an input connector and an output connector disposed thereon. The circuit board receives an external power from the input connector, transforms the external power into a first output power and outputs the first output power via the output connector, or transforms the external power into a second output power. The heater is electrically connected to the circuit board and contacts the water reservoir, for receiving the second output power for the purpose of heating water and vaporizing the water into steam.
POWER SUPPLY DEVICE WITH HUMIDIFYING FUNCTION

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] This non-provisional application claims priority under 35 U.S.C. §119(a) on Patent Application No. 20092077151.6 filed in China, P.R.C. on 2009/12/8, the entire contents of which are hereby incorporated by reference.

BACKGROUND

[0002] 1. Technical Field

[0003] The present invention relates to an external power supply device for a portable electronic device, and more particularly to a power supply device with a humidifying function.

[0004] 2. Related Art

[0005] A portable electronic device, such as a laptop computer, selectively obtains electric power from an internal power source or an external power source. The internal power source is typically a battery, such as a rechargeable battery, providing direct current (DC) power to the portable electronic device directly. The external power source is a power supply device with rectification and voltage transforming functions. The power supply device receives an alternating current (AC) power from an AC socket. Through rectification and voltage transformation, the power supply device transforms the AC power into DC power, and provides the DC power to the portable electronic device. Sometimes the DC power is also used to charge the rechargeable battery. The electrical capacity of the rechargeable battery is limited. When using the portable electronic device, if the AC power is available the user typically prefers to use the power supply device to provide the power required by the portable electronic device.

[0006] In order to ensure that the user can use the portable electronic device when away from the home or office, the user typically takes the power supply device with him/her. For example, when the user carries a laptop computer on a business trip, the user will certainly also take a power supply device for the laptop computer. Furthermore, a conventional power supply device has a certain weight and volume occupying certain luggage space. As a result, certain daily necessities cannot be accommodated in a suitcase or luggage, resulting in inconvenience when traveling.

[0007] Moreover, during a trip some people may feel uncomfortable due to variations in ambient temperature and humidity. Therefore, the present invention is intended to add a humidifying function to a power supply device, and the user can take advantage of the additional humidifying function in a single power supply device.

SUMMARY

[0008] A power supply device in the prior art occupies certain luggage space, such that the user must sacrifice carrying other daily necessities. Furthermore, a power supply device in the prior art does not equipped with functions other than power supplying; therefore it’s a necessity but a heavy object in the luggage.

[0009] In view of abovementioned problems, the present invention provides a power supply device with a humidifying function. The power supply device of the present invention not only supplies electric power to a portable electronic device, but also provides a humidifying function. A user may use a humidifying function anywhere they have access to an external power source. The power supply device of the present invention replaces humidifying devices, and satisfies the user's needs in addition to supplying power.

[0010] The present invention provides a power supply device with a humidifying function, which includes a body, a circuit board, a power input cable, a power output cable, a heater, and a steam vent. The body has an accommodation space defined therein and a water reservoir disposed inside the accommodation space, wherein the steam vent is formed on a surface of the body and communicates the water reservoir. The circuit board is disposed on a bottom of the accommodation space. An input connector and an output connector are disposed on the circuit board. The circuit board receives an external power from the input connector and selectively transforms the external power into a first output power or a second output power. The power input cable has one end connected to the input connector and another end equipped with a first power jack for receiving the external power. The power output cable has one end connected to the output connector and another end equipped with a second power jack for outputting the first output power. The heater is electrically connected to the circuit board and contacts the water reservoir, for receiving the second output power for the purpose of heating water in the water reservoir.

[0011] The external power is selectively transformed into the first output power or the second output power through the circuit board. The power supply device can be used to output the first output power to a portable electronic device directly, or output the second output power to drive the heater to heat the water in the water reservoir for vaporizing water to steam. Therefore, the power supply device according to the present invention not only provides an electric power to the portable electronic device, but also has humidifying function to replace electric humidifying appliances, such that the power supply device become an device having multi-functions.

[0012] The technical solutions and embodiments of the present invention are described in detail below, and the content of the detailed description is sufficient for persons skilled in the art to understand the technical content of the present invention and to carry out the present invention there accordingly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The present invention will become fully understood from the detailed description given herein below for illustration only, and thus are not limitative of the present invention, and wherein:

[0014] FIG. 1 is a cross-sectional view according to an embodiment of the present invention;

[0015] FIG. 2 is a cross-sectional view according to the embodiment of the present invention, in which a power output cable and a power input cable are connected to an output connector and an input connector respectively;

[0016] FIG. 3 is a top view according to the embodiment of the present invention;

[0017] FIG. 4A is a side view according to the embodiment of the present invention, in which a switch cover is utilized to cover a switch; and
FIG. 4B is a side view according to the embodiment of the present invention, in which the switch cover is opened to expose the switch.

DETAILED DESCRIPTION

[0019] Please refer to FIGS. 1 and 2, a power supply device with a humidifying function according to an embodiment of the present invention is provided, which stores water therein for the purpose of vaporizing water to steam. The power supply device with a humidifying function includes a body 10, a circuit board 20, and a heater 30.

[0020] Please refer to FIGS. 1 and 2, in which the body 10 includes an accommodation space 11 defined therein, and the accommodation space 11 is used to accommodate other components of the power supply device. In general, the body 10 is made of electrical insulation material such as plastics. One side of the body 10 is preferably in a shape of curve surface, but the implement of the present invention is not limited thereto. Moreover, the body 10 further has a water reservoir 12, disposed inside the accommodation space 11 for storing water.

[0021] Please refer to FIGS. 1 and 2, in which the circuit board 20 is disposed on the bottom of accommodation space 11 of the body 10, and is wrapped and protected by the body 10 without being exposed to external environment. An input connector 21 and an output connector 22 are disposed on the circuit board 20. The input connector 21 and the output connector 22 are disposed at two opposite edge of the circuit board 20 respectively. Moreover, the circuit board 20 includes a voltage converter 23 disposed thereon, for selectively transforming the external power into a first output power or a second output power.

[0022] Please refer to FIG. 2, in which the power supply device with a humidifying function according to the embodiment of the present invention further includes a power input cable 50 and a power output cable 51.

[0023] The power input cable 50 has one end detachably connected to the input connector 21, and the other end equipped with a first power jack 52. Here, the first power jack 52 is preferably a household power plug for insertion into a household power socket, so as to receive AC power as an external power. However, the first power jack 52 according to the present invention is not limited to the household power plug. Through the first power jack 52 and the power input cable 50, the circuit board 20 receives the external power from the input connector 21.

[0024] The power output cable 51 has one end detachably connected to the output connector 22, and the other end equipped with a second power jack 53. Here, the second power jack 53 is preferably a direct current (DC) power jack, which is used for being connected to a power connector of a portable electronic device, such that the voltage converter 23 of the circuit board 20 transforms the external power received from input connector 21 and outputs the first output power such as DC power through output connector 22. Finally, the first output power is provided to the portable electronic device through the second power jack 53.

[0025] Please refer to FIGS. 1 and 2, in which the heater 30 is electrically connected to the circuit board 20, which is used for receiving the second output power to increase the temperature of the heater 30 itself. The heater 30 contacts to the water reservoir 12 and extends into the water reservoir 12 to contact the water stored in the water reservoir 12. The heater 30 receives the second output power to increase its temperature for heating the water 13 in the water reservoir 12. In general, the heater 30 is made of a material with desirable heat conductivity, for example, a metal plate or metal bar, such that the heat can increases the temperature of the water 13 in the water reservoir 12 in short time.

[0026] Please refer to FIGS. 1, 2, and 3, the body 10 has a steam vent 14 formed on a surface of the body 10 for communicating the water reservoir 12. Preferably, the steam vent 14 is located at the central of the upper surface of the body 10, but the present invention is not limited thereto. Furthermore, the power supply device with a humidifying function further includes a sealing cover 15, detachably combined with the body 10 for sealing the steam vent 14.

[0027] Please refer to FIGS. 4A and 4B, in which the power supply device with a humidifying function further includes a switch 16, disposed on the surface of the body 10 and electrically connected to the circuit board 20. The switch 16 is used to control the circuit board 20 to provide the first output power or the second output power. As the voltage converter 23 stops outputting the second output power to the heater 30, the voltage converter 23 is switched to the output connector 22. The switch 16 is provided for selectively controlling the circuit board 20 to output the first output power via the output connector 22 or output the second output power to the heater 30.

[0028] Please refer to FIGS. 4A and 4B, in which the power supply device with a humidifying function further includes a switch cover 17, which is movably jointed to the body 10 for selectively covering the switch 16; the switch 16 is therefore hidden and protected under the switch cover 17, to prevent the switch 16 being switch on by mistake.

[0029] Please refer to FIG. 2, in which when the user uses the power supply device with a humidifying function, one end of the power input cable 50 is connected to the input connector 21 and the first power jack 52 at the other end is plugged to an external power source, such as a household AC socket, for receiving the external power. The external power is transferred through the power input cable 50, and meanwhile the circuit board 20 receives the external power through the input connector.

[0030] Please refer to FIGS. 4A and 4B, in which the switch 16 is provided for the user to switch the circuit board 20 to output power to the first output power or the second output power. When the first output power is required, the user opens the switch cover 17 and switches the switch 16 to the first output power position, so as to control the voltage converter 23 to transform the external power into the first output power. Subsequently, the user then closes the switch cover 17, to prevent the switch 16 from being switched by mistake. At this time, the circuit board 20 outputs the first output power through the output connector 22, and then the first output power is output to the portable electronic device through the output power cable 51 and the second power jack 53.

[0031] Please refer to FIG. 1, 3, 4A, and 4B, in which when the humidifying function is required, the user remove the sealing cover 15 which seals the steam vent 14, and then open the switch cover 17. Next, the user switches the switch 16 to the second output power position to control the voltage converter 23 to transform the external power into the second output power. At this time, the second output power is transferred to the heater 30 from the circuit board 20. Through the second output power, the heater 30 generates heat to increase the temperature itself. Since the heater 30 contacts with the water 13 in the water reservoir 12, the water temperature is...
increased and the water 13 is vaporized and turned into steam. Meanwhile, the steam evaporates from the water reservoir 12 through the steam vent 14. As shown in FIG. 2, when using the humidifying function, the power output cable 51 may also be detached from the output connector 22, so as to prevent the power output cable 51 from interfering with the operation of the user.

[0032] After use of the humidifying function has stopped, the sealing cover 15 then covers the steam vent 14, so as to stop the steam from escaping from the water reservoir 12 and maintain the environment humidity.

[0033] In the present invention, the water reservoir 12 and the heater 30 is combined with the circuit board 20, and the external power is transformed into the first output power or the second output power selectively. The first output power is output to achieve the basic function (power supplying) of the power supply device. The second output power is output to the heater 30 to heat the water in the water reservoir 12 for vaporizing water to steam, so as to achieve the humidifying function and control indoor air relative humidity.

[0034] While the present invention has been described by the way of example and in terms of the preferred embodiments, it is to be understood that the invention need not to be limited to the disclosed embodiments. On the contrary, it is intended to cover various modifications and similar arrangements included within the spirit and scope of the appended claims, the scope of which should be accorded the broadest interpretation so as to encompass all such modifications and similar structures.

What is claimed is:

1. A power supply device with a humidifying function, storing water for the purpose of vaporizing water to steam, comprising:
   a body, comprising an accommodation space defined therein, a water reservoir disposed inside the accommodation space for storing water, and a steam vent formed on a surface of the body for communicating the water reservoir;
   a circuit board, disposed on a bottom of the accommodation space, and an input connector and an output connector being disposed on the circuit board; the circuit board receiving an external power from the input connector, selectively transforming the external power into a first output power or a second output power, and outputting the first output power via the output connector; a power input cable, having one end connected to the input connector and another end equipped with a first power jack for receiving the external power;
   a power output cable, having one end connected to the output connector and another end equipped with a second power jack for outputting the first output power; and a heater, electrically connected to the circuit board and contacting to the water reservoir, for receiving the second output power to heat the water in the water reservoir.

2. The power supply device with a humidifying function as claimed in claim 1, further comprising a sealing cover detachably combined with the body for sealing the steam vent.

3. The power supply device with a humidifying function as claimed in claim 1, wherein the first power jack is a household power plug.

4. The power supply device with a humidifying function as claimed in claim 1, wherein the circuit board further comprises a voltage converter for selectively transforming the external power into the first output power or the second output power.

5. The power supply device with a humidifying function as claimed in claim 1, wherein the second power jack is a direct current power jack.

6. The power supply device with a humidifying function as claimed in claim 1, further comprising a switch disposed on the body and electrically connected to the circuit board, for controlling the circuit board to output the first output power or the second output power.

7. The power supply device with a humidifying function as claimed in claim 6, further comprising a switch cover movably jointed to the body, for selectively covering the switch.