



(19) **United States**

(12) **Patent Application Publication**  
**XIANG**

(10) **Pub. No.: US 2017/0215484 A1**

(43) **Pub. Date: Aug. 3, 2017**

(54) **ELECTRONIC CIGARETTE AND CHARGING METHOD THEREFOR**

(52) **U.S. Cl.**  
CPC ..... *A24F 47/008* (2013.01); *H01M 10/44* (2013.01); *H02J 7/0045* (2013.01); *H02J 7/0072* (2013.01); *H02J 7/0047* (2013.01); *H01M 2220/30* (2013.01)

(71) Applicant: **Zhiyong XIANG**, DONGGUAN, GUANGDONG (CN)

(72) Inventor: **Zhiyong XIANG**, DONGGUAN, GUANGDONG (CN)

(57) **ABSTRACT**

(21) Appl. No.: **15/500,690**

(22) PCT Filed: **Jul. 31, 2014**

(86) PCT No.: **PCT/CN2014/083449**

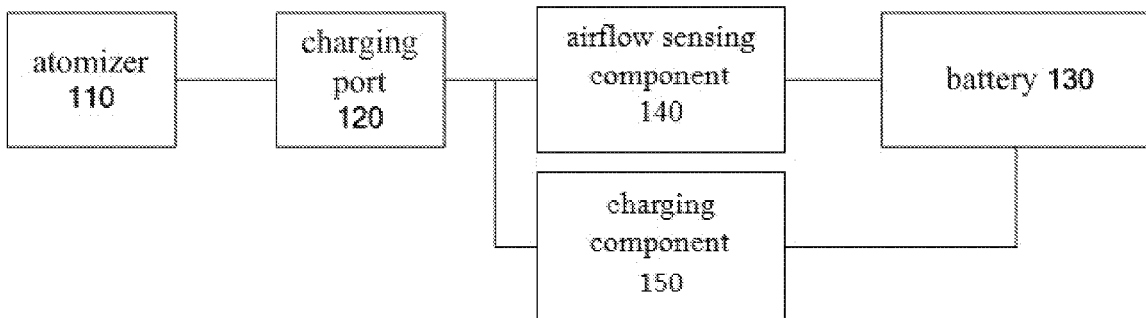
§ 371 (c)(1),  
(2) Date: **Jan. 31, 2017**

An electronic cigarette (100) and a charging method therefor, comprising an atomizer (110), a charging port (120), a battery (130), an airflow sensing component (140), and a charging component (150). The charging method comprises: when the charging port (120) is connected to an external power source, a first charging current is provided to the battery (130) via the airflow sensing component (140) and a second charging current is provided to the battery via the charging component (150). By charging the battery (130) concurrently with the first charging current and the second charging current, the charging current of the battery (130) is increased, and the charging time of the battery is reduced.

**Publication Classification**

(51) **Int. Cl.**  
*A24F 47/00* (2006.01)  
*H02J 7/00* (2006.01)  
*H01M 10/44* (2006.01)

100



100

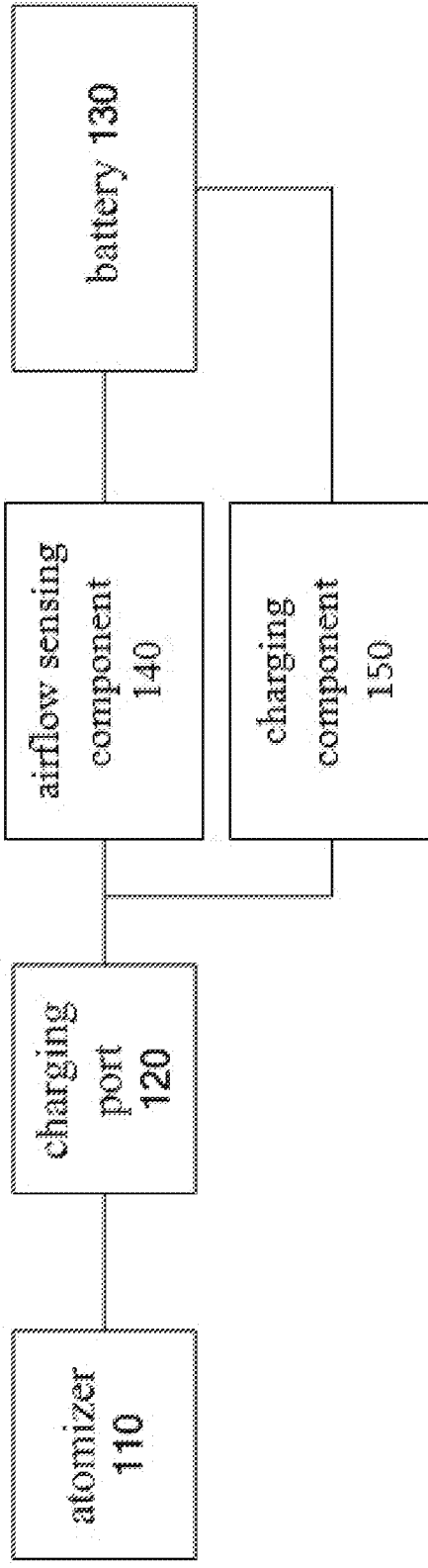


FIG. 1

100

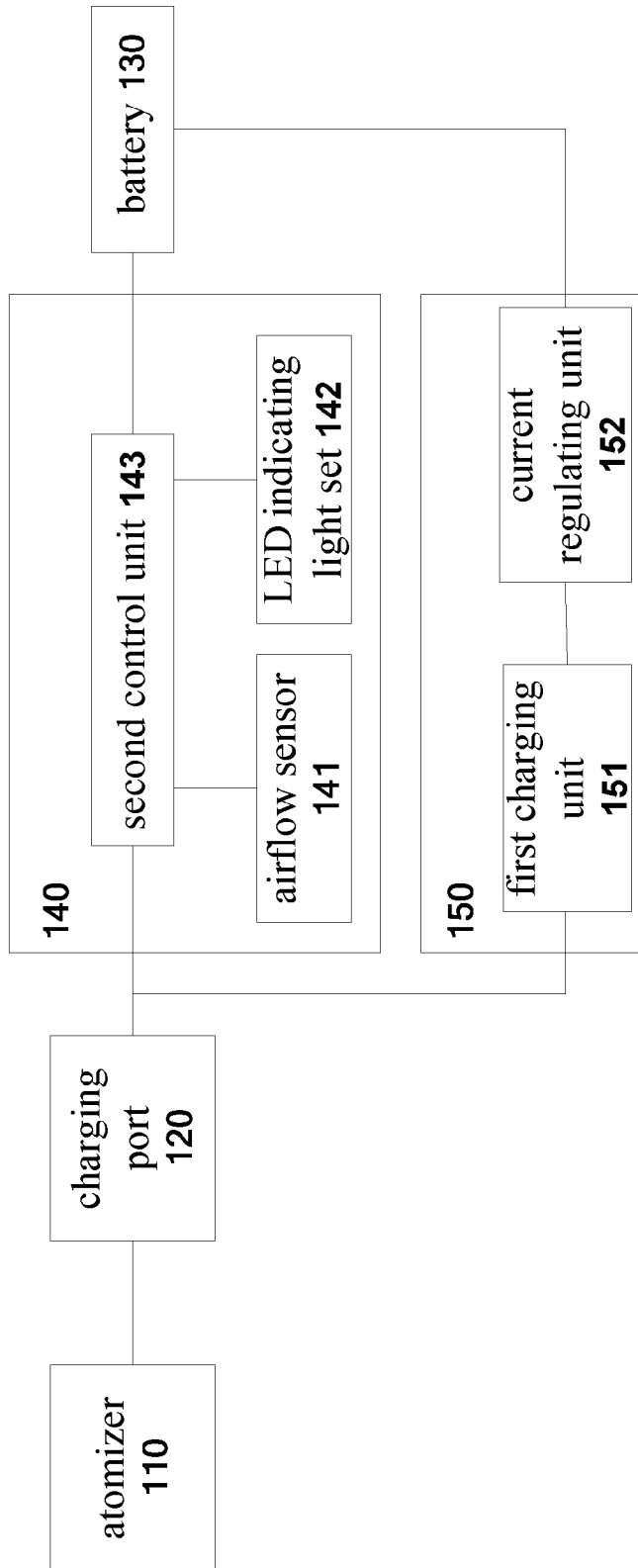


FIG. 2

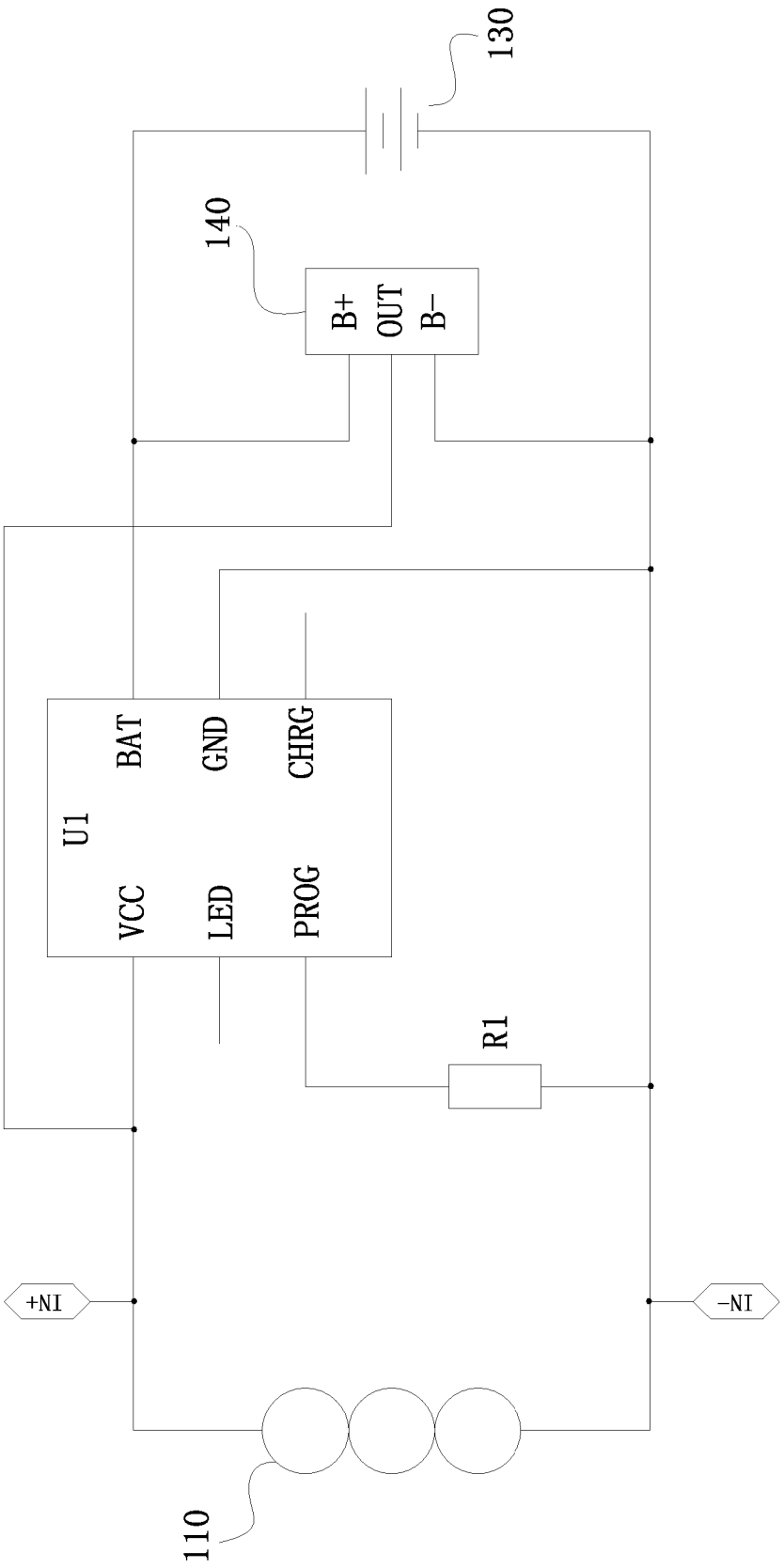


FIG. 3

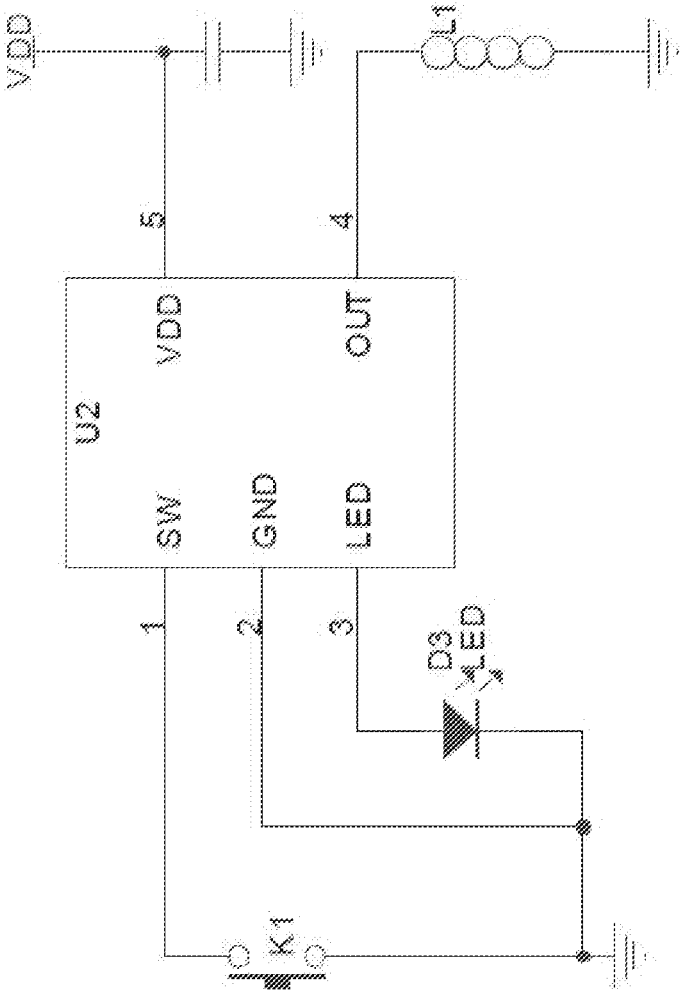


FIG. 4

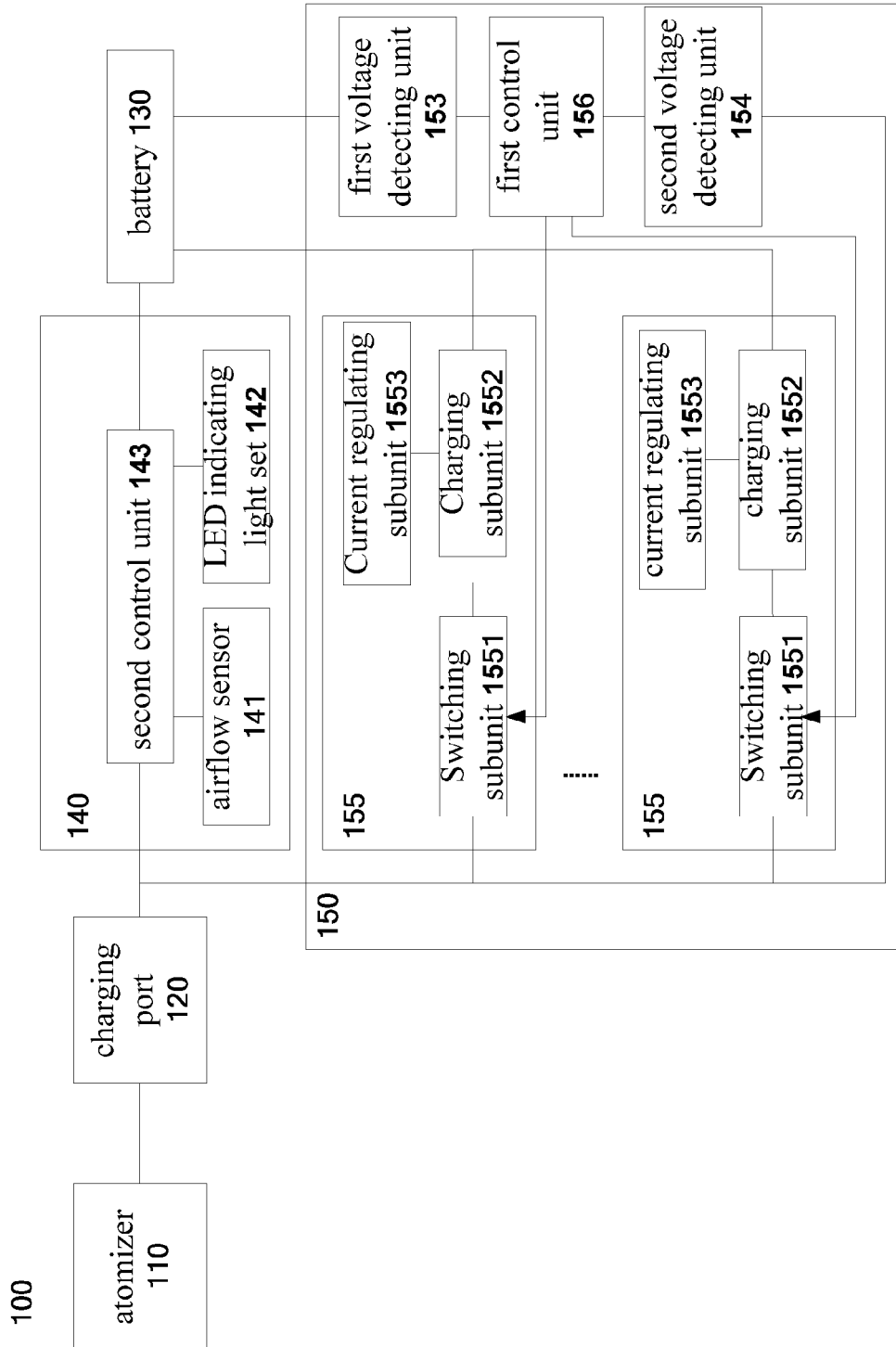


FIG. 5

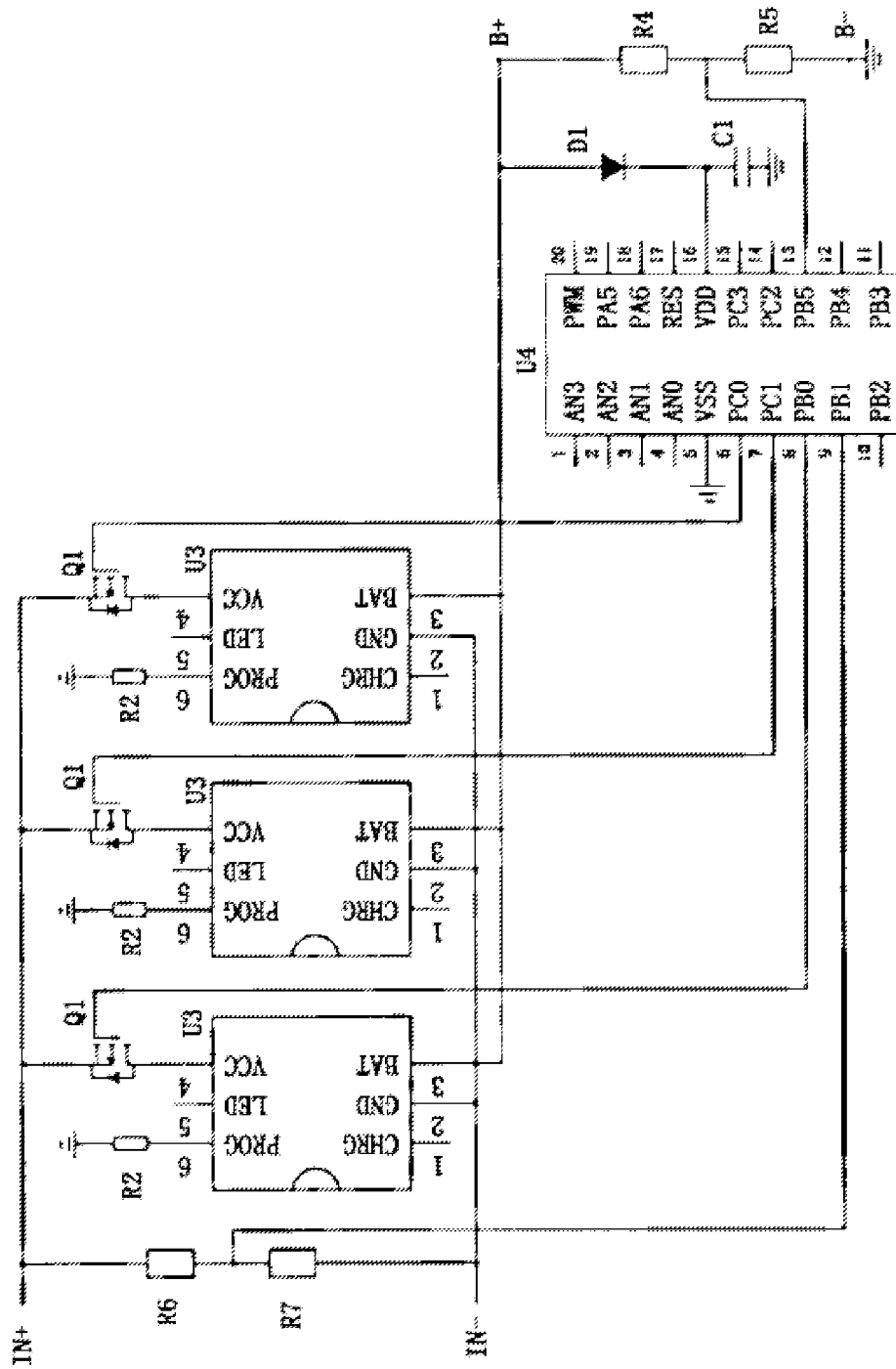


FIG. 6

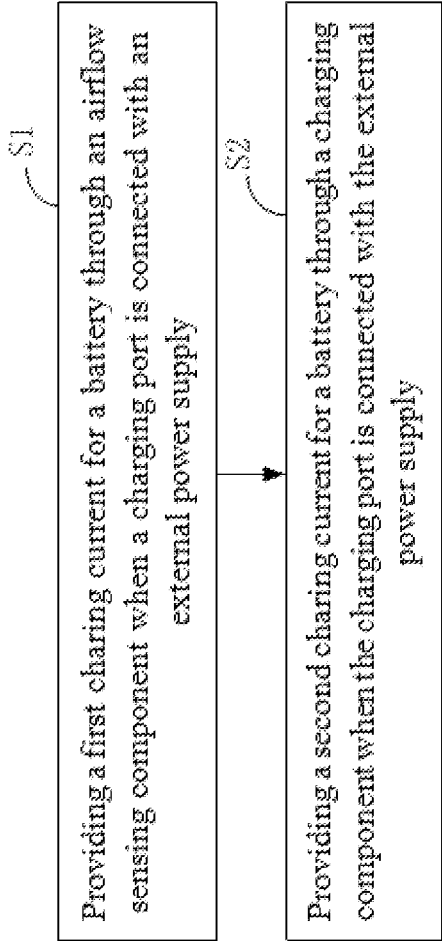


FIG. 7



## ELECTRONIC CIGARETTE AND CHARGING METHOD THEREFOR

### FIELD OF THE INVENTION

[0001] The present invention relates to the field of electronic cigarettes, and more particularly to an electronic cigarette and a charging method of the electronic cigarette.

### BACKGROUND OF THE INVENTION

[0002] A traditional electronic cigarette comprises an atomizer, an airflow sensing component, a heating wire and a battery, the battery supplies power to the airflow sensing component. When a user smokes, the airflow sensing component detects a change of an airflow and outputs a voltage to the heating wire, after the heating wire is heated, smoke oil in the atomizer is atomized, thereby producing smoke for the user to inhale.

[0003] For a chargeable electronic cigarette, when it needs to be charged, disassembling the atomizer at a load end, connecting the electronic cigarette with a charger, then charging the battery with a relatively small charging current. Since the charging current is relatively small, a charging time of the battery will be long.

### SUMMARY OF THE INVENTION

[0004] Aiming at the technical problem of increasing a charging time of a battery of the existing chargeable electronic cigarette results from that the battery only can be charged with a relatively small charging current, the present invention provides an electronic cigarette and a charging method of the electronic cigarette to achieve a technical effect of reducing a charging time of a battery through multi-channel charging current charging for the battery.

[0005] The technical solutions adopted by the present invention to solve the technical problem is to provide an electronic cigarette, comprising an atomizer, a charging port and a battery, the electronic cigarette further comprises:

[0006] an airflow sensing component configured for receiving an electric energy provided by the battery to detect a change of an airflow when the atomizer is connected to the charging port, and outputting a high level to the atomizer through the charging port to make the atomizer work when detecting the change of the airflow; the airflow sensing component is further configured for providing a first charging current for the battery when the charging port is connected to an external power supply; and

[0007] a charging component configured for providing a second charging current for the battery when the charging port is connected to the external power supply.

[0008] Preferably, the charging component comprises:

[0009] a first charging unit configured for providing the second charging current for the battery when the charging port is connected to the external power supply; and

[0010] a current regulating unit configured for regulating the second charging current.

[0011] Preferably, the current regulating unit comprises a first resistor configured for determining a magnitude of the second charging current.

[0012] Preferably, the current regulating unit comprises a first variable resistor configured for regulating a magnitude of the second charging current.

[0013] Preferably, the first charging unit comprises a first charging integrated circuit, a positive power port of the first

charging integrated circuit is connected with a positive electrode of the charging port, and a negative power port of the first charging integrated circuit is connected with a negative electrode of the charging port; a power supply port of the first charging integrated circuit is connected with a positive electrode of the battery, a charging current regulating port of the first charging integrated circuit is connected to the negative electrode of the charging port via the current regulating unit; a negative electrode of the battery is connected with the negative electrode of the charging port.

[0014] Preferably, the charging component comprises:

[0015] a first voltage detecting unit configured for detecting a voltage of the battery;

[0016] a second voltage detecting unit configured for detecting a voltage of the charging port;

[0017] multiple second changing units in parallel, each second changing unit is configured for providing a third changing current for the battery when the charging port is connected with the external power supply and receives an actuating instruction, and a total of the third changing current outputted by the each second changing unit is the second charging current; and

[0018] a first control unit configured for sending the actuating instruction to a corresponding quantity of the second changing units according to a detected voltage of the battery when the second voltage detecting unit detects that the charging port is connected to the external power supply.

[0019] Preferably, the second changing unit comprises:

[0020] a switching subunit configured for being conducted when receiving the actuating instruction;

[0021] a charging subunit configured for providing the third changing current for the battery when the switching subunit is conducted; and

[0022] a current regulating subunit configured for regulating the third charging current.

[0023] Preferably, the charging subunit comprises a second charging integrated circuit, a positive power port of the second charging integrated circuit is connected to a positive electrode of the charging port via the switching subunit, a negative power port of the second charging integrated circuit is connected with a negative electrode of the charging port, a charging current regulating port of the second charging integrated circuit is connected to ground via the current regulating subunit, a power supply port of the second charging integrated circuit is connected with a positive electrode of the battery; a negative electrode of the battery is connected to ground.

[0024] Preferably, the switching subunit comprises a MOSFET, a grid of the MOSFET is connected with the first control unit to receive the actuating instruction, a source of the MOSFET is connected with the positive electrode of the charging port, a drain of the MOSFET is connected with the positive power port of the second charging integrated circuit.

[0025] Preferably, the current regulating subunit comprises a second resistor configured for determining a magnitude of the third charging current.

[0026] Preferably, the current regulating subunit comprises a second variable resistor configured for regulating a magnitude of the third charging current.

[0027] Preferably, the first voltage detecting unit comprises a first divider resistor and a second divider resistor connected in series between a positive electrode and a negative electrode of the battery.

**[0028]** Preferably, the second voltage detecting unit comprises a third divider resistor and a fourth divider resistor connected in series between a positive electrode and a negative electrode of the charging port.

**[0029]** Preferably, the first control unit comprises a single chip Micropyco, the single chip Micropyco comprises a first detecting pin, a second detecting pin and multiple output control pins; the first detecting pin is connected between the first divider resistor and the second divider resistor, and the first detecting pin is configured for receiving a detection value of the voltage of the battery; the second detecting pin is connected between the third divider resistor and the fourth divider resistor, and the second detecting pin is configured for receiving a detection value of the voltage of the charging port; the output control pins are connected to the second changing units correspondingly, and the output control pins are configured for outputting the actuating instruction to the second changing units.

**[0030]** Preferably, the airflow sensing component comprises an airflow sensor, a LED indicating light set and a second control unit; the airflow sensor is configured for detecting the change of the airflow; the second control unit is configured for lighting the LED indicating light set and outputting the high level to the atomizer through the charging port to make the atomizer work when the airflow sensor detects the change of the airflow; the second control unit is further configured for detecting whether the charging port is connected to the external power supply or not, providing the first charging current for the battery and lighting the LED indicating light set when the charging port is connected to the external power supply.

**[0031]** Preferably, the LED indicating light set is provided on one end of the electronic cigarette; the LED indicating light set is configured for imitating a traditional cigarette burning when being lighted and further configured for indicating a charging state.

**[0032]** The present application further provides a charging method of an electronic cigarette, configured for charging the battery of the electronic cigarette above, the charging method comprises steps as follows:

**[0033]** S1. providing the first charging current for the battery through the airflow sensing component when the charging port is connected to the external power supply;

**[0034]** S2. providing the second charging current for the battery through the charging component when the charging port is connected to the external power supply.

**[0035]** Preferably, the charging component comprises a first charging unit and a current regulating unit, the step S2 comprises substeps as follows:

**[0036]** S21. the first charging unit detects whether the charging port is connected to the external power supply or not, and provides the first charging current for the battery when the charging port is connected to the external power supply;

**[0037]** S22. regulating the second charging current through the current regulating unit.

**[0038]** Preferably, the charging component comprises a first voltage detecting unit, a second voltage detecting unit, multiple second changing units in parallel and a first control unit, the step S2 comprises substeps as follows:

**[0039]** S23. the first voltage detecting unit detects a voltage of the battery and outputs a detection result to the first control unit;

**[0040]** S24. the second voltage detecting unit detects a voltage of the charging port and outputs a detection result to the first control unit;

**[0041]** S25. the first control unit sends an actuating instruction to a corresponding quantity of the second changing units according to the voltage of the battery when the voltage detected by the second voltage detecting unit is greater than a second preset threshold, so as to make the corresponding quantity of the second changing units provide a third changing current for the battery; and the voltage of the battery is detected by the first voltage detecting unit.

**[0042]** Preferably, the second changing unit comprises a switching subunit, a charging subunit and a current regulating subunit, the substep S25 comprises substeps as follows:

**[0043]** S251. the switching subunit is conducted when receiving the actuating instruction to make the charging subunit provide the third charging current for the battery;

**[0044]** S252. regulating the third charging current through the current regulating subunit.

**[0045]** The present invention provides an electronic cigarette and a charging method of the electronic cigarette, which can be achieved the following advantageous effects: a first charging current provided by an airflow sensing component and a second charging current provided by a charging component charge a battery together when the electronic cigarette is connected to an external power supply and charged from the external power supply, thus to achieve a technical effect of increasing a charging current of the battery and reducing a charging time of the battery.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0046]** FIG. 1 illustrates a functional block diagram of an electronic cigarette of the present invention;

**[0047]** FIG. 2 illustrates a functional block diagram of the electronic cigarette in accordance with a first preferred embodiment of the present invention;

**[0048]** FIG. 3 illustrates a schematic circuit diagram of the electronic cigarette in accordance with the first preferred embodiment of the present invention;

**[0049]** FIG. 4 illustrates a schematic circuit diagram of an airflow sensing component in accordance with the first preferred embodiment of the present invention;

**[0050]** FIG. 5 illustrates a functional block diagram of the electronic cigarette in accordance with a second preferred embodiment of the present invention;

**[0051]** FIG. 6 illustrates a schematic circuit diagram of a charging component in accordance with a preferred embodiment of the present invention;

**[0052]** FIG. 7 illustrates a flowchart of a charging method of the electronic cigarette in accordance with a first preferred embodiment of the present invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

**[0053]** To make the technical features, objective and effects of the invention more clearly understood, the invention is to be further described with reference to the accompanying drawings and embodiments.

**[0054]** As shown in the FIG. 1, the present invention provides an electronic cigarette 100, the electronic cigarette 100 comprises an atomizer 110 (a structure of the atomizer is commonly known), a charging port 120, a battery 130, an airflow sensing component 140 and a charging component

**150.** The atomizer **110** is detachably connected to the charging port **120**, the charging port **120** is connected to the battery **130** via the airflow sensing component **140** and the charging component **150** respectively.

**[0055]** when the atomizer **110** is connected to the charging port **120**, the electronic cigarette **100** is in an using mode and can be smoked by users. At the moment, the airflow sensing component **140** is powered by the battery **130**, and the airflow sensing component **140** is configured for detecting a change of an airflow. When the users smoke through a cigarette holder (not marked in the figure) of the electronic cigarette **100**, the airflow sensing component **140** detects the change of the airflow, and outputs a high level to the atomizer **110** through the charging port **120**, then a heating wire (shown as L1 in FIG. 4) in the atomizer **110** generates heat, then smoke oil stored in the atomizer **110** is atomized, thereby producing smoke for the users to inhale.

**[0056]** When the atomizer **110** is demounted and the charging port **120** is connected to an external power supply, the electronic cigarette **100** is in a charging state. The airflow sensing component **140** detects a high level at the charging port **120** and provides a first charging current for the battery **130**. The charging component **150** detects a high level at the charging port **120** and provides a second charging current for the battery **130**. In other words, the airflow sensing component **140** and the charging component **150** charge the battery **130** together, and a charging current of the battery **130** is a sum of the first charging current and the second charging current.

**[0057]** It should be pointed out here that, the electronic cigarette **100** is in the using mode, the airflow sensing component **140** outputs a high level to the atomizer **110** through the charging port **120** when detecting the change of the airflow, the charging component **150** also detects a high level at the charging port **120** at the moment. If it needs to prevent the charging component **150** charging the battery **130** when the electronic cigarette **100** is in the using mode, the charging component **150** needs to compare a value of a detected level with a first preset threshold when detecting the high level at the charging port **120**. If the value of the detected level is greater than or equal to the first preset threshold, the charging component **150** will charge the battery **130**. The first preset threshold is greater than the high level outputted by the airflow sensing component **140** to the atomizer **110**. For example, the high level outputted by the airflow sensing component **140** to the atomizer **110** is 3.5V, and the first preset threshold is 5.0V.

**[0058]** The electronic cigarette **100** provided by the present invention, when being connected to the external power supply, the first charging current provided by the airflow sensing component **140** and the second charging current provided by the charging component **150** charge the battery **130** together, so as to achieve a technical effect of increasing the charging current of the battery **130** and reducing a charging time of the battery **130**.

**[0059]** FIG. 2 illustrates a functional block diagram of the electronic cigarette **100** in accordance with a first preferred embodiment of the present invention. As shown in the FIG. 2, in the embodiment, the electronic cigarette **100** comprises an atomizer **110**, a charging port **120**, a battery **130**, an airflow sensing component **140** and a charging component **150**. The atomizer **110** is detachably connected to the charging port **120**, the charging port **120** is connected with

the battery **130** via the airflow sensing component **140** and the charging component **150** respectively.

**[0060]** In the embodiment, the airflow sensing component **140** comprises an airflow sensor **141**, a LED indicating light set **142** and a second control unit **143**. The second control unit **143** is connected with the charging port **120**, the battery **130**, the airflow sensor **141** and the LED indicating light set **142** respectively, and the second control unit **143** is provided on one end of the electronic cigarette **100**. When the electronic cigarette **100** is in an using mode, the second control unit **143** is powered by the battery **130** and detects a change of an airflow through the airflow sensor **141**, and the second control unit **143** further outputs a high level to the atomizer **110** through the charging port **120** to make the atomizer **110** work when the airflow sensor **141** detects the change of the airflow. In the meantime, the second control unit **143** powers the LED indicating light set **142** to light the LED indicating light set **142**, so as to achieve a technical effect of indicating smoking and imitating a traditional cigarette burning. Furthermore, the second control unit **143** is further configured for detecting a voltage at the charging port **120**, and outputting a first charging current to the battery **130** to charge the battery **130** when detecting a high level (the charging port **120** is connected to an external power supply). At the moment, the second control unit **143** powers the LED indicating light set **142** to light the LED indicating light set **142**, so as to achieve a technical effect of indicating being charged. The above configurations make a whole construction of the electronic cigarette be simpler, achieves lower costs, avoids defects of complicated circuits and high costs caused by providing an additional indicating device in the prior arts, and overcomes the above technology biases of those skilled in the art.

**[0061]** In the embodiment, the charging component **150** comprises a first charging unit **151** and a current regulating unit **152**. The first charging unit **151** is connected to the charging port **120** and the current regulating unit **152** respectively. The first charging unit **151** is configured for detecting the voltage at the charging port **120**, and outputting a second charging current when a detected voltage is greater than a first preset threshold. The current regulating unit **152** is also connected to the battery **130**, and the current regulating unit **152** is configured for regulating a magnitude of the second charging current.

**[0062]** FIG. 3 illustrates a schematic circuit diagram of the electronic cigarette **100** in accordance with the first preferred embodiment of the present invention. Combined with FIG. 2 and FIG. 3, in the embodiment, the airflow sensing component **140** comprises a positive power port B+, a negative power port B- and an output control port OUT. A model of the airflow sensing component **140** is S085 or CT811ZM. The first charging unit **151** comprises a first charging integrated circuit U1. A model of the first charging integrated circuit U1 is JW1057 or VA7204. The current regulating unit **152** comprises a first resistor R1. The atomizer **110** is connected between a positive electrode IN+ and a negative electrode IN- of the charging port **120**. A positive power port VCC of the first charging integrated circuit U1 is connected to the positive electrode IN+ of the charging port **120**, a negative power port GND of the first charging integrated circuit U1 is connected to the negative electrode IN- of the charging port **120**, a charging current regulating port PROG of the first charging integrated circuit U1 is connected to the negative electrode IN- of the charging port

**120** via a first resistor **R1**, a power supply port **BAT** of the first charging integrated circuit **U1** is connected to a positive electrode of the battery **130**. The positive power port **B+** of the airflow sensing component **140** is connected with the positive electrode of the battery **130**, the negative power supply port **B-** of the airflow sensing component **140** is connected to a negative electrode of the battery **130**, and the output control port **OUT** of the airflow sensing component **140** is connected to the positive electrode **IN+** of the charging port **120**.

**[0063]** When the atomizer **110** is connected to the charging port **120**, the airflow sensing component **140** is powered by the battery **130**. The airflow sensing component **140** outputs a high level to the atomizer **110** from the output control port **OUT** to make the atomizer **110** work when detecting the change of the airflow. At the moment, a voltage of the positive power port **VCC** of the first charging integrated circuit **U1** is not greater than the first preset threshold, thus the first charging integrated circuit **U1** does not work. When the atomizer **110** is demounted and the charging port **120** is connected to the external power supply, the voltage of the positive power port **VCC** of the first charging integrated circuit **U1** is greater than the first preset threshold. The first charging integrated circuit **U1** outputs the second charging current to the battery **130** through the power supply port **BAT**, and a magnitude of the second charging current is related to a value of the first resistor **R1**. Meanwhile, the airflow sensing component **140** detects a high level at the output control port **OUT**, and outputs the first charging current to the battery **130** through the positive power port **B+** and the negative power port **B-**. A charging current of the battery **130** is a sum of the first charging current and the second charging current.

**[0064]** In other embodiments, the current regulating unit **152** also can be implemented through a variable resistor. At the moment, an adjustable hardware switch can be provided on a shell of the electronic cigarette **100**. A value of the variable resistor can be changed by toggling the hardware switch, thus the magnitude of the second charging current is changed. Furthermore, the hardware switch can be provided with multiple tap positions, and different tap positions correspond to different resistances. Users can choose among the multiple tap positions by toggling the hardware switch, so as to guarantee security of the electronic cigarette **100** effectively and regulate effectiveness of the second charging current.

**[0065]** FIG. 4 illustrates a schematic circuit diagram of an airflow sensing component **140** in accordance with the first preferred embodiment of the present invention. As shown in the FIG. 4, in the embodiment, the airflow sensor **141** equivalents to a switch **K1** in the circuit. When the airflow sensor **141** detects the change of the airflow, the switch **K1** is closed. The LED indicating light set **142** comprises a LED light **D3**. The second control unit **143** is implemented through a chip **U2**, and a model of the chip **U2** is CT811Z. A switching signal input port **SW** of the chip **U2** is connected to ground via the switch **K1**, an indicator light control port **LED** of the chip **U2** is connected to a positive electrode of the LED light **D3**, and a negative electrode of the LED light **D3** is connected to the ground. A positive power port **VDD** of the chip **U2** (that is the positive power port **B+** of the airflow sensing component **140**) is connected to the positive electrode of the battery **130**, a negative power port **GND** of the chip **U2** (that is the negative power supply port

**B-** of the airflow sensing component **140**) is connected to the ground. An output control port **OUT** of the chip **U2** is connected to a heating wire **L1** in the atomizer **110** through the positive electrode **IN+** of the charging port **120**.

**[0066]** In the first preferred embodiment of the electronic cigarette **100** of the present invention, the voltage at the charging port **120** is detected through the second control unit **143**, and the first charging current for the battery **130** is provided when the high level (the charging port **120** is connected to the external power supply) is detected. The voltage at the charging port **120** is detected through the first charging unit **151**, and the second charging current for the battery **130** is provided when the detected voltage is greater than the first preset threshold. The embodiment can achieve a technical effect of increasing the charging current of the battery **130** and reducing a charging time of the battery **130**.

**[0067]** FIG. 5 illustrates a functional block diagram of the electronic cigarette **100** in accordance with a second preferred embodiment of the present invention. As shown in the FIG. 5, in the embodiment, the electronic cigarette **100** comprises an atomizer **110**, a charging port **120**, a battery **130**, an airflow sensing component **140** and a charging component **150**. The atomizer **110** is detachably connected with the charging port **120**, the charging port **120** is connected to the battery **130** via the airflow sensing component **140** and the charging component **150** respectively.

**[0068]** Differences between the second preferred embodiment and the first preferred embodiment are that, in the second preferred embodiment, the charging component **150** comprises a first voltage detecting unit **153**, a second voltage detecting unit **154**, multiple second changing units **155** in parallel and a first control unit **156**. The first voltage detecting unit **153** is configured for detecting a voltage of the battery **130**. The second voltage detecting unit **154** is configured for detecting a voltage at the charging port **120**. Each second changing unit **155** is configured for providing a third changing current for the battery **130** when the charging port **120** is connected to an external power supply and receives an actuating instruction. A total of the third changing current outputted by the each second changing unit **155** is a second changing current. The first control unit **156** is configured for sending the actuating instruction to corresponding quantity of the second changing units **155** according to the voltage of the battery **130** detected by the first voltage detecting unit **153**, when the second voltage detecting unit **154** detects that the voltage of the the charging port **120** is greater than or equal to a second preset threshold, and the detected.

**[0069]** In the embodiment, the second changing unit **155** comprises a switching subunit **1551**, a charging subunit **1552** and a current regulating subunit **1553**. The switching subunit **1551** is configured for being conducted when receiving the actuating instruction sent by the first control unit **156**. The charging subunit **1552** is configured for providing the third charging current for the battery **130** when the switching subunit **1551** is conducted. The current regulating subunit **1553** is configured for regulating the third charging current.

**[0070]** As shown in FIG. 6, in the embodiment, take three second changing units **155** in parallel (a quantity of the second changing units **155** in parallel in the present invention is not limited) for example. The first voltage detecting unit **153** comprises a first divider resistor **R4** and a second divider resistor **R5** connected in series between a positive electrode and a negative electrode of the battery **130**. The second voltage detecting unit **154** comprises a third divider

resistor R6 and a forth divider resistor R7 connected in series between a positive electrode and a negative electrode of the charging port 120. The switching subunit 1551 comprises a MOSFET Q1. The charging subunit 1552 comprises a second charging integrated circuit U3. The current regulating subunit 1553 comprises a second resistor R2. In other embodiments, a resistance value in the current regulating subunit 1553 of each subcircuit can be unequal, and the current regulating subunit 1553 can comprise a second variable resistor. In the embodiment, the first control unit 156 comprises a single chip Micyoco U4, and a model of the single chip Micyoco U4 is HT46R064 or SN8P2712. A positive power port VCC of the second charging integrated circuit U3 is connected to a drain of the MOSFET Q1. A negative power port VCC of the second charging integrated circuit U3 is connected to a negative electrode IN- of the charging port 120, a charging current regulating port PROG of the second charging integrated circuit U3 is connected to ground via the second resistor R2, and a power supply port BAT of the second charging integrated circuit U3 is connected to a positive electrode of the battery 130. A source of the MOSFET Q1 is connected to a positive electrode IN+ of the charging port 120, a grid of the MOSFET Q1 is connected to an output control pin PB0 (PC0 and PC1 are also output control pins) of the single chip Micyoco U4. Connectivity of other subcircuits in parallel is in a similar fashion. A first detecting pin PBS of the single chip Micyoco U4 is connected between the first divider resistor R4 and the second divider resistor R5, and a second detecting pin PB1 is connected between the third divider resistor R6 and the forth divider resistor R7.

[0071] When the charging port 120 is connected to the external power supply, the single chip Micyoco U4 detects a high level that is greater than or equal to the second preset threshold through the second detecting pin PB1, the single chip Micyoco U4 receives a battery voltage through the first detecting pin PBS, and controls a corresponding quantity of MOSFETs Q1 to be conducted. At the moment, the second charging integrated circuits U3 of multiple conducted subcircuits output third charging currents to the battery 130 through their own power supply ports BAT respectively. The single chip Micyoco U4 can finish corresponding judgment and control work through programs recorded, for example, the single chip Micyoco U4 prestores a corresponding relation table, and corresponding relationships between voltage ranges of a battery and quantities of necessary conducted subcircuits are recorded in the corresponding relation table. The single chip Micyoco U4 searches the corresponding relation table to obtain a quantity of necessary conducted subcircuits, then outputs the actuating instruction (a voltage signal) to control the MOSFETs Q1 to be conducted through corresponding output control pins.

[0072] The single chip Micyoco U4 can control a corresponding quantity of the MOSFETs Q1 to be conducted and maintain the quantity of the conducted MOSFETs Q1 unchanged in a process of charging only when a voltage detected by the second detecting pin PB1 changes from being lower than the second preset threshold to be greater than or equal to the second preset threshold. The process continues until the charging is completed. After the charging is completed, while the quantity of the corresponding conducted subcircuits corresponding to a voltage detected at the first detecting pin PB3 of the single chip Micyoco U4 in the corresponding relation table is 0, the single chip Micyoco

U4 stops outputting the actuating instruction and turns off all the MOSFETs Q1. Alternatively, the single chip Micyoco U4 changes the quantity of the conducted MOSFETs Q1 correspondingly according to the voltage detected at a first detecting pin PB3 in the process of the charging.

[0073] Configurations and connection ships of the airflow sensing component 140 in this embodiment are same as those in the first preferred embodiment.

[0074] In the second preferred embodiment of the electronic cigarette 100 of the present invention, the voltage at the charging port 120 is detected through the second voltage detecting unit 154, the actuating instruction is sent to the corresponding quantity of the second changing units 155 according to the voltage of the battery 130 detected by the first voltage detecting unit 153 when the detected voltage is greater than or equal to the second preset threshold, so as to make the corresponding quantity of the second changing units 155 provide a third changing current for the battery 130. The embodiment can make the corresponding quantity of the second changing units 155 work to charge the battery 130 according to a remaining capacity of the battery 130, thus to guarantee security of the battery 130 and reduce the charging time of the battery 130.

[0075] FIG. 7 illustrates a flowchart of a charging method of the electronic cigarette in accordance with a first preferred embodiment of the present invention. As shown in the FIG. 7, in the embodiment, the charging method includes steps as follows:

[0076] S1. providing a first charging current for a battery 130 through an airflow sensing component 140 when a charging port 120 is connected with an external power supply;

[0077] S2. providing a second charging current for the battery 130 through a charging component 150 when the charging port 120 is connected with the external power supply.

[0078] As shown in the FIG. 2, the airflow sensing component 140 comprises an airflow sensor 141, a LED indicating light set 142 and a second control unit 143. The second control unit 143 is connected with the charging port 120, the battery 130, the airflow sensor 141 and the LED indicating light set 142 respectively. The LED indicating light set 142 is provided on one end of the electronic cigarette 100.

[0079] In the step S1 of the embodiment, the second control unit 143 detects a voltage at the charging port 120, and concludes that the charging port 120 is connected to the external power supply when detecting a high level. At the moment, the second control unit 143 outputs the first charging current to the battery 130 and charges the battery 130. Meanwhile, the second control unit 143 powers the LED indicating light set 142 to light the LED indicating light set 142, so as to achieve a technical effect of indicating being charged. The above configurations make a whole construction of the electronic cigarette be simpler, achieves lower costs, avoids defects of complicated circuit and high cost caused by providing an additional indicating device in the prior arts, and overcomes the above technology biases of those skilled in the art.

[0080] As shown in the FIG. 2, the charging component 150 comprises a first charging unit 151 and a current regulating unit 152. The first charging unit 151 is connected

to the charging port 120 and the current regulating unit 152 respectively. The current regulating unit 152 is also connected to the battery 130.

[0081] The step S2 of the embodiment comprises substeps as follows: S21. the first charging unit 151 detects whether the charging port 120 is connected to the external power supply or not, and provides the first charging current for the battery 130 when the charging port 120 is connected to the external power supply; S22. regulating the second charging current through the current regulating unit 152.

[0082] In the sub step S21, the first charging unit 151 detects a voltage at the charging port 120, and concludes that the charging port 120 is connected to the external power supply to provide a second changing current for the battery 130 when detecting the voltage is greater than or equal to a first preset threshold.

[0083] In the substep S22, the current regulating unit 152 can be a regulatable resistor, which can regulate the second charging current by changing a resistance value of the regulatable resistor.

[0084] In the first preferred embodiment of the electronic cigarette 100 of the present invention, the voltage at the charging port 120 is detected through the second control unit 143, and the first charging current is provided for the battery 130 when the high level is detected. The voltage at the charging port 120 is detected through the first charging unit 151, and the second charging current is provided for the battery 130 when a detected voltage is greater than the first preset threshold. The embodiment can achieve a technical effect of increasing a charging current of the battery 130 and reducing a charging time of the battery 130.

[0085] In the second preferred embodiment of the electronic cigarette 100 of the present invention, as shown in FIG. 5, the charging component 150 comprises a first voltage detecting unit 153, a second voltage detecting unit 154, multiple second changing units 155 in parallel and a first control unit 156. The second changing unit 155 comprises a switching subunit 1551, a charging subunit 1552 and a current regulating subunit 1553.

[0086] In the embodiment, the step S2 comprises substeps as follows: S23. the first voltage detecting unit 153 detects a voltage of the battery 130 and outputs a detection result to the control unit 156; S24. the second voltage detecting unit 154 detects a voltage at the charging port 120 and outputs a detection result to the first control unit 156; S25. the first control unit 156 sends an actuating instruction to a corresponding quantity of the second changing units 155 according to the voltage of the battery 130 when the voltage detected by the second voltage detecting unit 154 is greater than a second preset threshold, so as to make the corresponding quantity of the second changing units 155 provide a third changing current for the battery 130.

[0087] In the substep S25, the first control unit 156 compares the voltage detected by the second voltage detecting unit 154 with the second preset threshold, and concludes that the charging port 120 is connected to the external power supply if the voltage is greater than or equal to the second preset threshold, at the moment, the first control unit 156 sends the actuating instruction to the corresponding quantity of the second changing units 155 according to the voltage of the battery 130, the voltage of the battery 130 is detected by the first voltage detecting unit 153; the switching subunit 1551 is conducted when receiving the actuating instruction to make the charging subunit 1552 provide the third charging

current for the battery 130; the third charging current is regulated through the current regulating subunit 1553.

[0088] In the second preferred embodiment of the charging method of the electronic cigarette of the present invention, the voltage at the charging port 120 is detected through the second voltage detecting unit 154, and the actuating instruction is sent to the corresponding quantity of the second changing units 155 according to the detected voltage of the battery 130 when the detected voltage is greater than or equal to the second preset threshold, so as to make the corresponding quantity of the second changing units 155 provide the third changing current for the battery 130. The embodiment can make the corresponding quantity of the second changing units 155 work to charge the battery 130 according to a remaining capacity of the battery 130, thus to guarantee security of the battery 130 and reduce a charging time of the battery 130.

[0089] Obviously, those with ordinary skill in the art can make various changes and modification for these embodiments without breaking away from the spirit and protection scope of the present invention. In this case, if these changes and modification for the present invention are within the scope of the claims of the present invention and its equivalent technology, the present invention is also intent to include these changes and modification.

1. An electronic cigarette, comprising an atomizer (110), a charging port (120) and a battery (130), wherein the electronic cigarette further comprises:

an airflow sensing component (140) configured for receiving an electric energy provided by the battery (130) to detect a change of airflow when the atomizer (110) is connected with the charging port (120), and outputting a high level to the atomizer (110) through the charging port (120) to make the atomizer (110) work when the change of the airflow is detected; the airflow sensing component (140) is further configured for providing a first charging current for the battery (130) when the charging port (120) is connected to an external power supply; and

a charging component (150) configured for providing a second charging current for the battery (130) when the charging port (120) is connected to the external power supply.

2. The electronic cigarette according to claim 1, wherein the charging component (150) comprises:

a first charging unit (151) configured for providing the second charging current for the battery (130) when the charging port (120) is connected to the external power supply; and

a current regulating unit (152) configured for regulating the second charging current.

3. The electronic cigarette according to claim 2, wherein the current regulating unit (152) comprises a first resistor configured for determining a magnitude of the second charging current.

4. The electronic cigarette according to claim 2, wherein the current regulating unit (152) comprises a first variable resistor configured for regulating a magnitude of the second charging current.

5. The electronic cigarette according to claim 2, wherein the first charging unit (151) comprises a first charging integrated circuit (U1), a positive power port of the first charging integrated circuit (U1) is connected with a positive electrode of the charging port (120), and a negative power

port of the first charging integrated circuit (U1) is connected with a negative electrode of the charging port (120); a power supply port of the first charging integrated circuit (U1) is connected with a positive electrode of the battery (130), a charging current regulating port of the first charging integrated circuit (U1) is connected to the negative electrode of the charging port (120) via the current regulating unit (152); a negative electrode of the battery (130) is connected with the negative electrode of the charging port (120).

6. The electronic cigarette according to claim 1, wherein the charging component (150) comprises:

a first voltage detecting unit (153) configured for detecting a voltage of the battery (130);

a second voltage detecting unit (154) configured for detecting a voltage of the charging port (120);

multiple second changing units (155) in parallel, each second changing unit (155) is configured for providing a third changing current for the battery (130) when the charging port (120) is connected with the external power supply and receives an actuating instruction, and a total of the third changing current outputted by the each second changing unit (155) is the second charging current; and

a first control unit (156) configured for sending the actuating instruction to a corresponding quantity of the second changing units (155) according to a detected voltage of the battery (130) when the second voltage detecting unit (154) detects that the charging port (120) is connected to the external power supply.

7. The electronic cigarette according to claim 6, wherein the second changing unit (155) comprises:

a switching subunit (1551) configured for being conducted when receiving the actuating instruction;

a charging subunit (1552) configured for providing the third charging current for the battery (130) when the switching subunit (1551) is conducted; and

a current regulating subunit (1553) configured for regulating the third charging current.

8. The electronic cigarette according to claim 7, wherein the charging subunit (1552) comprises a second charging integrated circuit (U3), a positive power port of the second charging integrated circuit (U3) is connected to a positive electrode of the charging port (120) via the switching subunit (1551), a negative power port of the second charging integrated circuit (U3) is connected with a negative electrode of the charging port (120), a charging current regulating port of the second charging integrated circuit (U3) is connected to ground via the current regulating subunit (1553), a power supply port of the second charging integrated circuit (U3) is connected with a positive electrode of the battery (130); a negative electrode of the battery (130) is connected to ground.

9. The electronic cigarette according to claim 8, wherein the switching subunit (1551) comprises a MOSFET (Q1), a grid of the MOSFET (Q1) is connected with the first control unit (156) to receive the actuating instruction, a source of the MOSFET (Q1) is connected with the positive electrode of the charging port (120), a drain of the MOSFET (Q1) is connected with the positive power port of the second charging integrated circuit (U3).

10. The electronic cigarette according to claims 8, wherein the current regulating subunit (1553) comprises a second resistor.

11. The electronic cigarette according to claims 8, wherein the current regulating subunit (1553) comprises a second variable resistor.

12. The electronic cigarette according to claim 6, wherein the first voltage detecting unit (153) comprises a first divider resistor (R4) and a second divider resistor (R5) connected in series between a positive electrode and a negative electrode of the battery (130).

13. The electronic cigarette according to claim 12, wherein the second voltage detecting unit (154) comprises a third divider resistor (R6) and a fourth divider resistor (R7) connected in series between a positive electrode and a negative electrode of the charging port (120).

14. The electronic cigarette according to claim 13, wherein the first control unit (156) comprises a single chip Micoyo (U4), the single chip Micoyo (U4) comprises a first detecting pin, a second detecting pin and multiple output control pins; the first detecting pin is connected between the first divider resistor (R4) and the second divider resistor (R5), and the first detecting pin is configured for receiving a detection value of the voltage of the battery (130); the second detecting pin is connected between the third divider resistor (R6) and the fourth divider resistor (R7), and the second detecting pin is configured for receiving a detection value of the voltage of the charging port (120); the output control pins are connected with the second changing units (155) correspondingly, and the output control pins are configured for outputting the actuating instruction to the second changing units (155).

15. The electronic cigarette according to claim 1, wherein the airflow sensing component (140) comprises an airflow sensor (141), a LED indicating light set (142) and a second control unit (143); the airflow sensor (141) is configured for detecting the change of the airflow; the second control unit (143) is configured for lighting the LED indicating light set (142) and outputting the high level to the atomizer (110) through the charging port (120) to make the atomizer (110) work when the airflow sensor (141) detects the change of the airflow; the second control unit (143) is further configured for detecting whether the charging port (120) is connected to the external power supply or not, providing the first charging current for the battery (130) and lighting the LED indicating light set (142) when the charging port (120) is connected to the external power supply.

16. The electronic cigarette according to claim 15, wherein the LED indicating light set (142) is provided on one end of the electronic cigarette; the LED indicating light set (142) is configured for imitating a traditional cigarette burning when being lightened and further configured for indicating a charging state.

17. A charging method of an electronic cigarette, configured for charging the battery (130) of the electronic cigarette of claim 1, wherein the charging method comprises steps as follows:

S1. providing the first charging current for the battery (130) through the airflow sensing component (140) when the charging port (120) is connected to the external power supply;

S2. providing the second charging current for the battery (130) through the charging component (150) when the charging port (120) is connected to the external power supply.

18. The charging method of the electronic cigarette according to claim 17, wherein the charging component

(150) comprises a first charging unit (151) and a current regulating unit (152), the step S2 comprises substeps as follows:

S21. the first charging unit (151) detects whether the charging port (120) is connected to the external power supply or not, and provides the first charging current for the battery (130) when the charging port (120) is connected to the external power supply;

S22. regulating the second charging current through the current regulating unit (152).

19. The charging method of the electronic cigarette according to claim 17, wherein the charging component (150) comprises a first voltage detecting unit (153), a second voltage detecting unit (154), multiple second changing units (155) in parallel and a first control unit (156), the step S2 comprises substeps as follows:

S23. the first voltage detecting unit (153) detects a voltage of the battery (130) and outputs a detection result to the first control unit (156);

S24. the second voltage detecting unit (154) detects a voltage of the charging port (120) and outputs a detection result to the first control unit (156);

S25. the first control unit (156) sends an actuating instruction to a corresponding quantity of the second changing units (155) according to the voltage of the battery (130) detected by the first voltage detecting unit (153) when the voltage detected by the second voltage detecting unit (154) is greater than a second preset threshold, so as to make the corresponding quantity of the second changing units (155) provide a third changing current for the battery (130).

20. The charging method of the electronic cigarette according to claim 19, wherein the second changing unit (155) comprises a switching subunit (1551), a charging subunit (1552) and a current regulating subunit (1553), the substep S25 comprises substeps as follows:

S251. the switching subunit (1551) is conducted when receiving the actuating instruction to make the charging subunit (1552) provide the third charging current for the battery (130);

S252. regulating the third charging current through the current regulating subunit (1553).

\* \* \* \* \*