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(54) ELECTRONIC CIGARETTE AND CIRCUIT THEREOF

(57) An electronic cigarette and a circuit thereof. The circuit of the electronic cigarette comprises a power supply, a microcontroller, and a heater used for heating to generate smoke, all of which are electrically connected sequentially to form a loop. The circuit of the electronic cigarette also comprises at least two gas flow sensors electrically connected to the microcontroller and used for sensing a gas flow in the electronic cigarette and outputting a sensing signal. The microcontroller connects the loop according to the sensing signal. The electronic cigarette and the circuit thereof use a technical means in which at least two gas flow sensors are electrically connected to a microcontroller and are used for sensing a gas flow in the electronic cigarette and outputting a sensing signal and the microcontroller connects a loop according to the sensing signal, the error working rate of the electronic cigarette after the gas flow sensors malfunction is exponentially reduced, hidden quality risks of the electronic cigarette are reduced, an error action is not easy to be caused, the quality is reliable and the performance is stable.

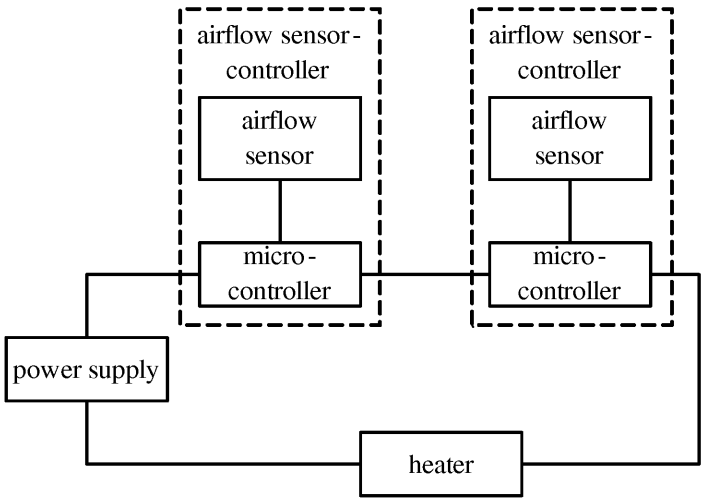

FIG. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to an electronic cigarette and circuit therein.

BACKGROUND OF THE INVENTION

[0002] Current electronic cigarette uses an airflow sensor controller to light or turn off the electronic cigarette. Because only one airflow sensor is used and the quality is not stable with a failure rate about 0.1%, it always leads to malfunction of the electronic cigarette when the airflow sensor does not work. Then the electronic cigarette can not be used and it causes energy waste.

SUMMARY OF THE INVENTION

[0003] Therefore, an object of the present invention is to provide an electronic cigarette with reliable quality, stable performance and rare malfunction.

[0004] To achieve the above-mention object, the present invention provides an electronic cigarette including a power supply, micro-controllers and a heater for heating and producing smoke, which constitute a loop by electrically connected in turn. The electronic cigarette circuit further includes at least two airflow sensors electrically connected to the micro-controller and adapted for sensing the airflow in the electronic cigarette and outputting sensed signal. The micro-controller conducts the loop according to the sensing signal.

[0005] In a further embodiment, the number of the micro-controllers is at least two, which respectively electrically connected with a airflow sensor.

[0006] In a further embodiment, one micro-controller and one airflow sensor are integrated on a printed circuit board to constitute a airflow sensor-controller. The two airflow sensor-controllers are connected in series.

[0007] In a further embodiment, the number of the micro-controllers is one, which electrically connected with two airflow sensors. The micro-controller conducts the loop according to the sensing signal sensed by the two the airflow sensors.

[0008] In a further embodiment, the airflow sensor is further used for obtaining airflow direction of the electronic cigarette to determine the type of air pressure and output the sensing signal.

[0009] In a further embodiment, the micro-controller is single-chip microcomputer.

[0010] In addition, the present invention provides an electronic cigarette including an inhalation pole and a power supply pole adapted to connect with each other. The electronic cigarette has the above-mentioned electronic cigarette circuit disposed therein.

[0011] In a further embodiment, the inhalation pole has an atomizer disposed therein. The atomizer has the heater disposed therein.

[0012] In a further embodiment, the power pole has lithium batteries or Farad capacitor inside for power supplying.

[0013] In a further embodiment, the inhalation pole and the power supply pole are connected by screwthreads.

[0014] The electronic cigarette and the electronic cigarette circuit of the present invention utilize at least two airflow sensors electrically connected to the micro-controller and sensing the airflow in the electronic cigarette and outputting sensed signal such that the micro-controller conducts the loop according to the sensing signal to achieve exponentially reducing malfunction rate of electronic cigarettes as a result of the airflow sensor failure, The electronic cigarette reduces the quality risks of electronic cigarette. The electronic cigarette and the circuit are not easily to cause malfunction, and has reliable quality and stable performance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is a schematic diagram of the circuit of an electronic cigarette according to an embodiment of the present invention.

FIG. 2 is a schematic diagram of the circuit of an electronic cigarette according to another embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0016] It is needed to state that embodiments and all element limitations in all embodiments may be combined in the case of no conflicts. The present invention will be described in detail in the following combining figures and embodiments.

[0017] Referring to FIG.1 and FIG. 2, the present invention provides an electronic cigarette and circuit to resolve the problem of the current electronic cigarette as that when the airflow sensor does not work, it leads to malfunction of the electronic cigarette and the electronic cigarette can not be used and causing energy waste.

[0018] The electronic cigarette circuit includes a power supply, a micro-controller and a heater for heating and producing smoke, which constitute a loop by electrically connected in turn. Furthermore, the electronic cigarette circuit includes at least two airflow sensors electrically connected to the micro-controller and adapted for sensing airflow in the electronic cigarette and outputting the sensing signal. The micro-controller conducts the loop according to the sensing signal. In the embodiment, the micro-controller is a single-chip microcomputer (SCM).

[0019] As an embodiment, the airflow sensor is also used to obtain the airflow direction of the electronic cigarette to determine the type of air pressure and output the sensing signal such that the micro-controller processes the sensing signal to detect the air pressure en-

tering the electronic cigarette. Then, the micro-controller controls the electronic cigarette turn-on or turn-off based on the detected air pressure. The control principle is the same as the airflow sensor controls airflow by sensing, which will not be repeated.

[0020] As an embodiment, there are at least two micro-controllers, both of which are electrically connected with an airflow sensor respectively. Preferably, referring to FIG. 1, there are two micro-controllers, both of which are electrically connected with an airflow sensor respectively. One micro-controller and one airflow sensor are integrated on a printed circuit board to be an airflow sensor-controller. The two airflow sensor-controllers are series connected. The airflow sensors, or called as two airflow sensor-controllers, shall work simultaneously to conduct the loop effectively.

[0021] As another embodiment, there is only one micro-controller, which is electrically connected with at least two airflow sensors. The micro-controller conducts the loop according to the sensing signal detected by all the airflow sensors. Preferably, referring to FIG. 2, there are two airflow sensors, both of which work simultaneously to make the micro-controller to conduct the loop effectively.

[0022] The present invention also provides an electronic cigarette which includes an inhalation pole and a power supply pole adapted to connect with each other. Specifically, the inhalation pole and the power supply pole are connected by screwthreads. Furthermore, the electronic cigarette includes above-mentioned electronic cigarette circuit disposed therein.

[0023] The inhalation pole has an atomizer disposed therein. The atomizer has the heater disposed therein.

[0024] The power supply pole has lithium batteries or Farad capacitor inside for power supplying.

[0025] Assuming that the failure rate of using only one airflow sensor as X, and the failure rate of the electronic cigarette of the present invention which adapts "n" airflow sensors electrically connected with micro-controller is Y, then the following formula is established: $Y = X^n$. For example, the failure rate of an airflow sensor is 0.1%, but the failure rate of the electronic cigarette will be reduced to 10^{-6} when the electronic cigarette uses two connected airflow sensors. Obviously, the technology solution of the present invention can exponentially reduce the failure rate of the electronic cigarette caused by the airflow sensors' malfunction.

[0026] The above -mentioned is embodiments of the present invention. It is pointed out that various improvement and modifications can be made to the embodiments by those skilled in the art without departing from the true spirit and scope of the disclosure as defined by the appended claims.

Claims

1. An electronic cigarette circuit comprising a power supply, micro-controller and a heater for heating and producing smoke, which constitute a loop by electrically connected in turn, wherein the electronic cigarette circuit further comprising at least two airflow sensors electrically connected to the micro-controller and adapted for sensing airflow in the electronic cigarette and outputting sensing signal, the micro-controller conducts the loop according to the sensing signal.

2. According to the electronic cigarette circuit in claim 1, wherein the number of the micro-controllers is at least two, which respectively electrically connected with an airflow sensor.

3. According to the electronic cigarette circuit in claim 2, wherein one micro-controller and one airflow sensor are integrated on a circuit board to constitute an airflow sensor-controller, the two airflow sensor-controllers are connected in series.

4. According to the electronic cigarette circuit in claim 1, wherein the number of the micro-controllers is one, which electrically connected with two airflow sensors, the micro-controller conducts the loop according to the sensing signal detected by the two the airflow sensors.

5. According to the electronic cigarette circuit in claim 1, wherein the airflow sensor is further used for obtaining airflow direction of the electronic cigarette to determine the type of air pressure and output the sensing signal.

6. According to the electronic cigarette circuit in claim 1, wherein the micro-controller is single-chip microcomputer.

7. An electronic cigarette comprising an inhalation pole and a power supply pole adapted to connect with each other, wherein the electronic cigarette further comprising an electronic cigarette circuit claimed in any one of claims 1 to 6 disposed therein

8. According to the electronic cigarette in claim 7, wherein the inhalation pole has an atomizer disposed therein, the atomizer has the heater disposed therein.

9. According to the electronic cigarette in claim 7, wherein the power pole has lithium batteries or Farad capacitor inside for power supplying.

10. According to the electronic cigarette in claim 7, wherein the inhalation pole and the power supply pole are connected by screwthreads.

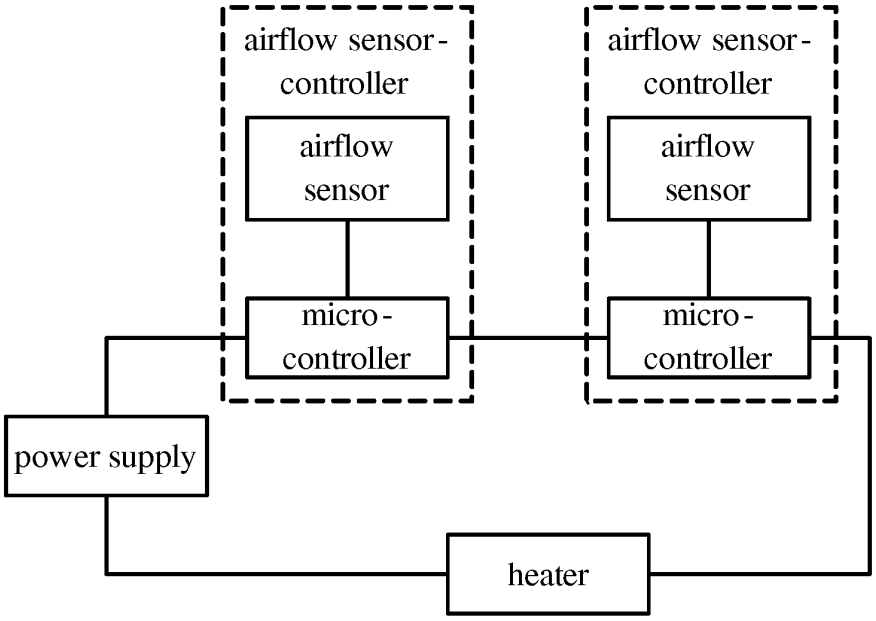
airflow sensor-controller
airflow sensor
micro-controller
airflow sensor-controller
airflow sensor
micro-controller
power supply
heater

FIG. 1

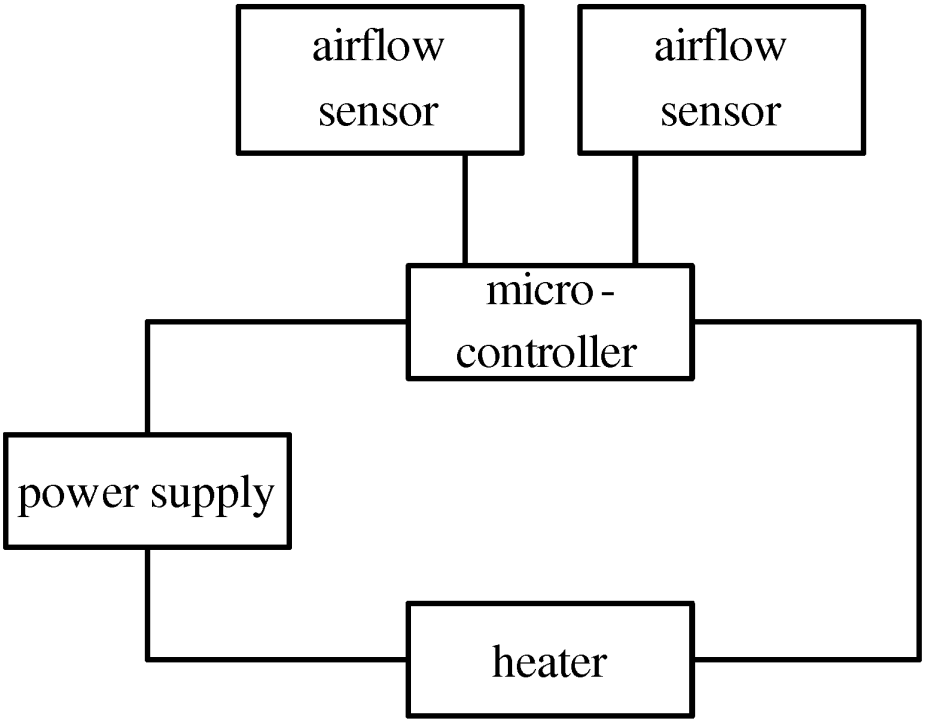
airflow sensor
airflow sensor
micro-controller
power supply
heater

FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2013/073868

A. CLASSIFICATION OF SUBJECT MATTER

A24F 47/00 (2006.01) i

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)

IPC: A24F 47/-, A24D

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

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

CNPAT, WPI, EPODOC: electric cigarette, simulated cigarette, air flow, electronic, emulat+, simulat+, cigarette?, smoke+/al, air+, current, measure+, sense+, sensor?, switch, series

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 202774133 U (LIU, Qiuming), 13 March 2013 (13.03.2013), description, paragraphs [0026] and [0036]-[0039], and figures 2 and 6	1-10
Y	CN 2276718 Y (XU, Daohua), 25 March 1998 (25.03.1998), description, page 1, paragraphs 4-6, and figure 1	1-10
Y	CN 201199922 Y (LI, Dehong), 04 March 2009 (04.03.2009), description, page 4, line 9 to page 5, line 1, and figures 1-2	1-10
Y	CN 202774134 U (LIU, Qiuming), 13 March 2013 (13.03.2013), claim 1	10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 December 2013 (25.12.2013)	**16 January 2014 (16.01.2014)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **MA, Dongna** Telephone No.: (86-10) **62411615**

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2013/073868

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 202774133 U	13.03.2013	None	
CN 2276718 Y	25.03.1998	None	
CN 201199922 Y	04.03.2009	None	
CN 202774134 U	13.03.2013	None	

Form PCT/ISA/210 (patent family annex) (July 2009)