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(54) **ELECTRONIC CIGARETTE AND METHOD FOR DETECTING QUALITY GUARANTEE PERIOD OF ELECTRONIC CIGARETTE**

(57) An electronic cigarette and a method for detecting a quality guarantee period of the electronic cigarette. The electronic cigarette comprises a power supply battery (20), and a microcontroller (10) and an atomizer (30) separately connected to the power supply battery (20). The microcontroller (10) is provided with a first timing module (11), a comparison module (12), and a control module (13). The first timing module (11) is used for timing. The comparison module (12) is used for comparing a timed time of the first timing module (11) with a preset timed time. The control module (13) is used for controlling the power supply battery (20) of the electronic cigarette

to stop supplying power to the atomizer (30) when the comparison result of the comparison module (12) is that the timed time is longer or equal to the preset timed time. The preset timed time is equal to duration of a quality guarantee period of the electronic cigarette, and the microcontroller (10) sets and stores the preset timed time. The electronic cigarette and the detection method of the embodiments have the beneficial effects: when the quality guarantee period of the electronic cigarette expires, the electronic cigarette does not work and prompts a user, so as to ensure he taste and the safety of the user when the user uses the electronic cigarette.

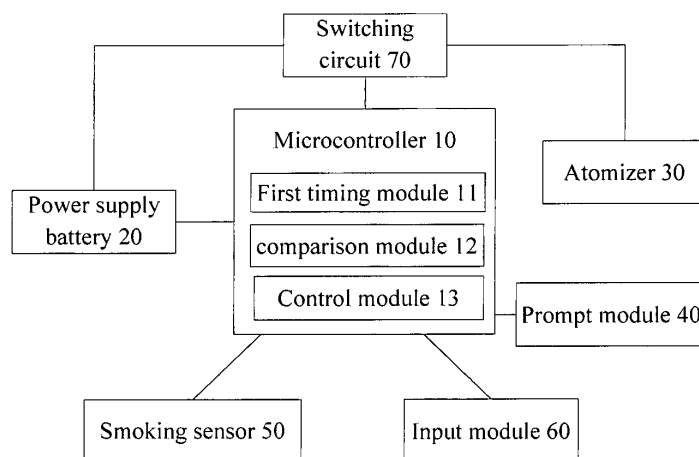


Fig. 2

Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of electronic products, and more particularly, relates to an electronic cigarette and a method for detecting quality guarantee period of the electronic cigarette.

BACKGROUND OF THE INVENTION

[0002] An electronic cigarette, through heating and further atomizing the liquid tobacco, is provided to smokers as a succedaneum of the cigarette; and the electronic cigarette becomes more and more popular for smokers. At present, when users use electronic cigarettes, many users find that the taste of electronic cigarettes is changed. The cause is that the electronic cigarettes are stored over their quality guarantee period and the taste is becoming worse. Currently, the production date and quality guarantee period of the electronic cigarettes are only marked on their product packages or products, which makes it hard to be perceived by users. When the electronic cigarettes passed their quality guarantee period are inhaled, users will feel bad taste and even the users' healthy may be affected.

SUMMARY OF THE INVENTION

[0003] To solve the drawbacks that electronic cigarette can't positively remind users according to the quality guarantee period, the present invention provides an electronic cigarette and a method for detecting quality guarantee period of the electronic cigarette.

[0004] The technical solutions of the present invention for solving the technical problems are as follows:

An electronic cigarette, comprises a power supply battery, a microcontroller connected with the power supply battery and an atomizer connected with the power supply battery; the microcontroller includes a first timing module, a comparison module and a control module;
the first timing module is configured to time;
the comparison module is configured to compare a timing period timed by the first timing module with a preset period;
the control module is configured to control the power supply battery to be disconnected with the atomizer when a comparison result obtained by the comparison module is that the timing period is equal to or greater than the preset period;
the preset period is equal to a quality guarantee period of the electronic cigarette; the preset period is set and stored by the microcontroller.

[0005] Advantageously, the first timing module is a calculagraph and the timing period of the calculagraph is

equal to the quality guarantee period of the electronic cigarette.

[0006] Advantageously, the first timing module is a timer and the timing period of the timer is equal to the quality guarantee period of the electronic cigarette.

[0007] Advantageously, the electronic cigarette further comprises a prompt module connected with the microcontroller; the prompt module is configured to output and display whether the timing period timed by the first timing module reaches the preset period or not, and to output reminding information to users when the comparison result obtained by the comparison module is that the timing period is equal to or greater than the preset period.

[0008] Advantageously, the reminding information is outputted from the prompt module by way of voice and/or display.

[0009] Advantageously, the electronic cigarette further comprises a smoking sensor connected with the microcontroller and/or an input module connected with the microcontroller; the smoking sensor is configured to detect a smoking signal and transmit the smoking signal to the microcontroller; the input module is configured to receive an external input signal then transmit the external input signal to the microcontroller;

if the comparison result of the comparison module is that the timing period timed by the first timing module is less than the preset period, the microcontroller controls the power supply battery to provide power to the atomizer according to the smoking signal detected from the smoking sensor or the input signal received from the input module;

if the comparison result of the comparison module is that the timing period timed by the first timing module is equal to or greater than the preset period, the microcontroller controls the power supply battery to be disconnected with the atomizer.

[0010] Advantageously, the input module is a key input module or a touch screen input module.

[0011] Advantageously, the electronic cigarette further comprises a switch circuit configured to control the power supply battery to be connected or disconnected with the atomizer; the switch circuit is a semiconductor switch.

[0012] Advantageously, wherein the microcontroller can be an MCU, a CPU, a GPU or an ASIC chip.

[0013] An electronic cigarette comprises a power supply battery, a microcontroller and an atomizer connected with the power supply battery respectively; the electronic cigarette further comprises a second timing module which is respectively connected with the microcontroller and the power supply battery; the second timing module is configured to time and transmit a timing signal to the microcontroller;
the microcontroller includes a comparison module and a control module;

the comparison module is configured to compare the a timing period timed by the second timing module with the preset period;

the control module is configured to control the power supply

ply battery to be disconnected with the atomizer when a comparison result obtained by the comparison module is that the timing period is equal to or greater than the preset period;

the preset period is equal to a quality guarantee period of the electronic cigarette; the preset period is set and stored by the microcontroller.

[0014] Advantageously, when the timing period is equal to or greater than the preset period, the microcontroller controls the second timing module to stop timing.

[0015] Advantageously, the second timing module is a calcuagraph chip with a type of RX8025.

[0016] Advantageously, the microcontroller can be an MCU, a CPU, a GPU or an ASIC chip.

[0017] A method for detecting a quality guarantee period of an electronic cigarette, the electronic cigarette comprises a microcontroller, a power supply battery connected with the microcontroller and an atomizer connected with the power supply battery; the microcontroller includes a first timing module, a comparison module and a control module; the method comprising the steps of:

setting a preset period which is equal to the quality guarantee period of the electronic cigarette;

beginning timing by the first timing module;

the comparison module comparing the preset period with the timing period timed by the first timing module;

when the timing period is equal to or greater than the preset period, the control module of the microcontroller controls the power supply battery to be disconnected with the atomizer.

[0018] Advantageously, the method further comprises:

when the timing period timed by the first timing module is equal to or greater than the preset period, the microcontroller controls the prompt module to output reminding information to users; the reminding information is outputted by way of voice and/or display.

[0019] Advantageously, the prompt module comprises a LED displayer and/or a speaker.

[0020] Advantageously, the prompt module comprises a light-emitting diodes and/or a speaker.

[0021] A method for detecting a quality guarantee period of an electronic cigarette, the electronic cigarette comprises a microcontroller, a power supply battery connected with the microcontroller, an atomizer connected with the power supply battery, a second timing module which is respectively connected with the microcontroller and the power supply battery; the microcontroller includes a comparison module and a control module; the method comprising the steps of:

setting a preset period which is equal to the quality guarantee period of the electronic cigarette;

beginning timing by the second timing module;

obtaining the timing period from the second timing module by the microcontroller and comparing the preset period with the timing period by the comparison module;

when the timing period timed by the second timing module is equal to or greater than the preset period, the control module of the microcontroller controls the power supply battery to be disconnected with the atomizer.

[0022] Advantageously, the method further comprises: when the timing period timed by the second timing module is equal to or greater than the preset period, the microcontroller controls the prompt module to output reminding information to users; the reminding information is outputted by way of voice and / or display.

[0023] Implementing the electronic cigarette and the method for detecting the quality guarantee period of the electronic cigarette according to the present invention, and applying to electronic cigarettes, especially disposable electronic cigarettes, the following advantageous effects can be achieved: when an electronic cigarette passes its quality guarantee period, the electronic cigarette stops working and reminds users, which ensures good taste of the electronic cigarette and keeps users' health when they are using the electronic cigarette.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The present invention will be further described with reference to the accompanying drawings and embodiments in the following, in the accompanying drawings:

Fig. 1 is a structure diagram of an electronic cigarette in accordance with an embodiment of the present invention;

Fig. 2 is a structure diagram of an electronic cigarette in accordance with a first preferred embodiment of the present invention;

Fig. 3 is a circuit diagram of the electronic cigarette shown in Fig. 2 in accordance with the first preferred embodiment of the present invention;

Fig. 4 is a structure diagram of an electronic cigarette in accordance with a second preferred embodiment of the present invention;

Fig. 5 is a flow chart of a method for detecting a quality guarantee period of the electronic cigarette in accordance with the first preferred embodiment of the present invention;

Fig. 6 is a flow chart a method for detecting a quality guarantee period of the electronic cigarette in accordance with the second preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0025] In order to make the technical features, objects and effects of the present invention to be understood more clearly, the various embodiments of the present invention will now be described with reference to the figures.

[0026] As shown in Fig. 1, which is a structure diagram of an electronic cigarette in accordance with an embodiment of the present invention.

[0027] In the embodiment of the present invention, the electronic cigarette comprises a microcontroller 10, a power supply battery 20 and an atomizer 30. The microcontroller 10 can be an MCU, a CPU, a GPU or an ASIC chip. The microcontroller 10 is connected with the power supply battery 20. The atomizer 30 is connected with the power supply battery 20. The atomizer 30 includes oil storage cotton 31 and an electrically heated wire assembly 32. Liquid tobacco is stored in the oil storage cotton 31. The working principle of the electronic cigarette is that the liquid tobacco stored in the oil storage cotton 31 enters the atomizer 30, and the microcontroller 10 controls the power supply battery 20 to provide power to the atomizer 30, then the electrically heated wire assembly 32 begins to heat and further atomize the liquid tobacco to form smoke.

[0028] The liquid tobacco in the electronic cigarette needs to be stored in the dark and cool dry place in order to avoid the liquid tobacco going bad. However, the quality guarantee period of the liquid tobacco is limited. It must be before the quality guarantee period when using the electronic cigarette to ensure the taste of the liquid tobacco. Regarding to disposable electronic cigarettes, liquid tobacco can't be changed. So, if the liquid tobacco is beyond the quality guarantee period, the taste will be worse and users' health will be influenced.

[0029] As shown in Fig. 2, which is a structure diagram of an electronic cigarette in accordance with a first preferred embodiment of the present invention. In the first preferred embodiment of the present invention, a first timing module 11 is set in the microcontroller 10 to make sure that the electronic cigarette has a reminding function for the quality guarantee period. In the first preferred embodiment of the present invention, the electronic cigarette comprises the microcontroller 10, the power supply battery 20, the atomizer 30, a prompt module 40, a smoking sensor 50, an input module 60 and a switching circuit 70. The prompt module 40 is connected with the microcontroller 10 and is configured to output and display a reminding signal. The prompt module 40 includes a LED displayer and/or a speaker. The prompt module 40 may also include a Light-emitting diodes and/or a speaker. The smoking sensor 50 is connected with the microcontroller 10 and is configured to detect a smoking signal and then transmit the smoking signal to the microcontroller 10. The input module 60 is connected with the microcontroller 10 and is configured to receive an input signal,

and then transmit the input signal to the microcontroller 10. The input module 60 is a key input module or a touch screen input module. The switch circuit 70 is respectively connected with the microcontroller 10, the power supply battery 20 and the atomizer 30. The microcontroller 10 controls the switch circuit 70 to be turned on or off in order to control the power supply battery 20 to be connected or disconnected with the atomizer 30. The switch circuit 70 is a semiconductor switch. The semiconductor switch can be a triode, MOSFET, transistor or thyristor etc.

[0030] In the first preferred embodiment of the present invention, the microcontroller 10 includes a first timing module 11, a comparison module 12 and a control module 13. The first timing module 11 is configured to time. A start timing time of the first timing module 11 is the production date of the electronic cigarette production date or a time set by the user. In the first preferred embodiment of the present invention, the first timing module 11 begins timing from the start timing time and continually counts a timing period, and finally stops timing until the timing period passing a quality guarantee period of the electronic cigarette or a preset period by user for the electronic cigarette. For example, production date of an electronic cigarette is January 1st, 2013, 17:00, then the start timing time of the first timing module 11 can be set as January 1st, 2013, 17:00. Users can use the input module 60 to set the start timing time or stop timing time. The microcontroller 10 can receive the input from the input module 60 and correspondingly sets the start timing time and stop timing time for the first timing module 11.

[0031] The comparison module 12 is configured to compare the timing period of the first timing module 11 with the preset period.

[0032] The control module 13 is configured to control the power supply battery 20 to be disconnected with the atomizer 30 when the timing period of the first timing module 11 is equal to or greater than the preset period. If the timing period of the first timing module 11 is equal to or greater than the preset period, the prompt module 40 outputs reminding information to users. The reminding information is outputted by way of voice and/or display.

[0033] During working, when the timing period of the first timing module 11 ends, the control module 13 of the microcontroller 11 controls the switch circuit 70 to be turned off so that the power supply battery 20 can't provide power to the atomizer 30.

[0034] The first timing module 11 can be a calculagraph or a timer. The microcontroller 10 sets the preset period to be equal to the quality guarantee period and stores the preset period.

[0035] If the first timing module 11 is the calculagraph, the first timing module 11 adopts clockwise timing mode. The start timing time is the production date of the electronic cigarette or a time set by the user. A timing period begins from zero and continually counts the timing period, and finally stops timing when the timing period is equal to or greater than the quality guarantee period of the electronic cigarette.

[0036] If the first timing module 11 is the timer, it adopts countdown mode. The timer begins countdown from a period corresponding with the quality guarantee period of the electronic cigarette or a period set by the user. When the timing period is zero, timing is stopped.

[0037] In the first preferred embodiment of the present invention, users can set a start timing time through the input module 60. The microcontroller 10 sets the start timing time for the first timing module 11 according to the signal received from the input module 60.

[0038] In the first preferred embodiment of the present invention, if the timing period of the first timing module 11 is less than the preset period, the microcontroller 10 controls the switch circuit 70 to be turned on, and the power supply battery 20 can provide power to the atomizer 30 according to the detecting signal received from the smoking sensor 50 or the input signal received from the input module 60. If the timing period of the first timing module 11 is equal to or greater than the preset period, the microcontroller 10 controls the switch circuit 70 to be turned off, even if the microcontroller receives the detecting signal from the smoking sensor 50 or the input signal from the input module 60, thus the power supply battery 20 can't provide power to the atomizer 30.

[0039] As shown in Fig. 3, which is a circuit diagram of the electronic cigarette shown in Fig. 2 in accordance with the first preferred embodiment of the present invention. In the first preferred embodiment of the present invention, the microcontroller 10 is a single-chip microcomputer with a type of Sn8P2711B, and other types of single-chip microcomputers or CPUs with similar function can also be selected. The switch circuit 70 includes a MOSFET Q1. A first pin of the single-chip microcomputer with the type of Sn8P2711B is VDD; a tenth pin is VSS; a second pin is P0.2/Xout; a third pin is P0.4/RST/Vpp; a fourth pin is P5.3/BZ1/PWM1; a fifth pin is P5.4/BZ0/PWM0; a sixth pin is P4.0/AIN0/AVrefH; a seventh pin is P4.1/AIN1; a eighth pin is P4.2/AIN2; and a ninth pin is P4.4/AIN4.

[0040] The first pin of the microcontroller 10 is connected with the anode of the power supply battery 20 and grounded via a filter capacitor C1; the second pin is connected with the smoking sensor 50; the fourth pin is connected with the gate of the MOSFET Q1; the fifth pin is connected with the prompt module 40; the ninth pin is connected with the input module 60; the tenth pin is grounded.

[0041] The source of the MOSFET Q1 is connected with ground and the cathode of the power supply battery 20 respectively; the drain of the MOSFET Q1 is connected with one end of the atomizer 30; the other end of the atomizer 30 is connected with the anode of the power supply battery 20.

[0042] During working, the timing period of the first timing module 11 of the microcontroller 10 is controlled by software. If the timing period of the first timing module 11 is less than the preset period, it means that the timing period has not passed the quality guarantee period of

the electronic cigarette. At this time, if the second pin of the microcontroller 10 detects high voltage, which means that the smoking sensor 50 detects a smoke signal, or if the ninth pin detects high voltage, which means the input module 60 detects an input signal, the microcontroller 10 outputs a high voltage from the fourth pin. The MOSFET Q1 is hence turned on and the power supply battery 20 provides power to the atomizer 30. The atomizer 30 begins working.

[0043] If the timing period of the first timing module 11 is equal to or greater than the preset period, the microcontroller 10 outputs a low voltage from the fourth pin. The MOSFET Q1 is hence turned off and the power supply battery 20 can't provide power to the atomizer 30. At this moment, even if the second pin of the microcontroller 10 detects a high voltage or the ninth pin detects a high voltage, the microcontroller 10 still outputs a low voltage from the fourth pin. The power supply battery 20 still can't provide power to the atomizer 30. Moreover, the microcontroller 10 outputs a signal from its fifth pin to make the prompt module 40 output a reminding signal, therefore users know the quality guarantee period of the electronic cigarette is passed. Reminding information is outputted by way of voice and/or display. When the quality guarantee period of the electronic cigarette is passed, the atomizer 30 stops working, i.e. the electronic cigarette stops working after passing its quality guarantee period. Therefore it prevents users from using overdue electronic cigarettes.

[0044] Referring to Fig. 4, which is a structure diagram of an electronic cigarette in accordance with a second preferred embodiment of the present invention. In the second preferred embodiment of the present invention, the electronic cigarette comprises a microcontroller 10, a power supply battery 20, an atomizer 30, a prompt module 40, a smoking sensor 50, an input module 60, a switching circuit 70 and a second timing module 80. The connections and functions of the microcontroller 10, the power supply battery 20, the atomizer 30, the prompt module 40, the smoking sensor 50, the input module 60 and the switching circuit 70 are the same as those of the first preferred embodiment. There is no need to repeat here. The second timing module 80 is respectively connected with the microcontroller 10 and the power supply battery 20. The second timing module 80 is configured to time and transmit a timing signal to the microcontroller 10. A start timing time of the second timing module 80 is production date of the electronic cigarette or a time set by the user. In the second preferred embodiment of the present invention, the second timing module 80 begins timing from the start timing time, continuously counts a timing period, and finally stop timing until the timing period passes a quality guarantee period of the electronic cigarette or a preset period by user. Users can use the input module 60 to set the start timing time or a stop timing time. The microcontroller 10 can receive the input signal from the input module 60 and control the second timing module 80 to time according to the start timing time and

stop timing time for.

[0045] The microcontroller 10 includes a comparison module 12 and a control module 13. The comparison module 12 is configured to compare the timing period of the second timing module 80 with the preset period. The control module 13 is configured to control the power supply battery 20 to be disconnected with the atomizer 30 when the timing period of the second timing module 80 is equal to or greater than the preset period. At the same time the control module 13 controls the second timing module 80 to stop timing. The preset period is equal to the quality guarantee period of the electronic cigarette. The preset period is set and stored by the microcontroller 10.

[0046] In the second preferred embodiment of the present invention, the second timing module 80 is a cal-cuagraph chip with a type of RX8025. It is powered by the power supply battery 20.

[0047] During working, the second timing module 80 begins timing after receiving a control signal from the microcontroller 10. When the timing period timed by the second timing module is less than the preset period, it means that the quality guarantee period of the electronic cigarette has not yet ended. At this moment, if the microcontroller 10 receives a detecting signal from the smoking sensor 50 or an input signal from the input module 60, the microcontroller 10 controls the power supply battery 20 to provide power to the atomizer 30. The atomizer 30 starts working.

[0048] If the timing period of the second timing module 80 is equal to or greater than the preset period, the microcontroller 10 controls to open the power supply circuit through which the power supply battery 20 provide power to the atomizer 30. At this moment, even if the microcontroller 10 receives a detecting signal from the smoking sensor 50 or an input signal from the input module 60, the microcontroller 10 still control the power supply battery 20 not to provide power to the atomizer 30. At same time, the microcontroller 10 controls the prompt module 40 to output a reminding signal; therefore, users know that the quality guarantee period of the electronic cigarette is ended. The reminding information is outputted by way of voice and/or display. For example, when the quality guarantee period is ended, a light-emitting diode of the prompt module 40 emits a flicker light or a speaker of the prompt module 40 sounds to prompt the user.

[0049] As shown in Fig. 5, which is a flow chart of a method for detecting a quality guarantee period of an electronic cigarette in accordance with a first preferred embodiment of the present invention. In this embodiment, the electronic cigarette comprises a microcontroller, a power supply battery connected with the microcontroller, a prompt module connected with the microcontroller and a prompt module connected with the microcontroller, an input module connected with the microcontroller, and an atomizer connected with the power supply battery. The microcontroller includes a first timing module, a comparison module, and a control module. The

method comprises:

- S01. Setting a preset period which is equal to the quality guarantee period of the electronic cigarette;
- S02. The first timing module begins timing;
- S03. The comparison module compares the preset period with a timing period timed by the first timing module;
- S04. The microcontroller judges whether the timing period is equal to or greater than the preset period or not, and if yes going to S05, otherwise going to S06;
- S05. The control module of the microcontroller controls the power supply battery to be disconnected with the atomizer; and
- S06. The control module of the microcontroller controls the power supply battery to be connected with the atomizer, and going to S03.

[0050] At step S02, the microcontroller defines the time beginning timing as the production date of the electronic cigarette or a time set by the user. Users set the time through the input module.

[0051] The method for detecting the quality guarantee period of the electronic cigarette according to the first preferred embodiment of the present invention further comprises: the microcontroller controls the timing period to be outputted and displayed through the prompt module. And when timing period of the first timing module is equal to or greater than the preset period, the microcontroller controls the prompt module to output reminding information to users. The prompting information is outputted by way of voice and/or display.

[0052] As shown in Fig. 6, which is a flow chart a method for detecting a quality guarantee period of an electronic cigarette in accordance with a second preferred embodiment of the present invention. In this embodiment, the electronic cigarette comprises a microcontroller, a second timing module connected with the microcontroller, a power supply battery connected with the microcontroller, a prompt module connected with the microcontroller, an input module connected with the microcontroller, and an atomizer connected with the power supply battery. The second timing module is also connected with the power supply battery. The microcontroller includes a comparison module, and a control module. The method comprises:

- S 11. Setting a preset period which is equal to the quality guarantee period of the electronic cigarette;
- S 12. The second timing module begins timing;
- S 13. The microcontroller obtains a timing period from the second timing module, and the comparison module compares the preset period with the timing period obtained from the second timing module;
- S 14. The microcontroller judges whether timing period is equal to or greater than preset period or not, and if yes going to S 15, otherwise going to S16;

S 15. The control module of the microcontroller controls the power supply battery to be disconnected with the atomizer; and

S16. The control module of the microcontroller controls the power supply battery to be connected with the atomizer, and going to S03.

[0053] At step S12, the microcontroller controls the second timing module to begin timing; the start timing time is the production date of the electronic cigarette or a time set by the user. Users set the time through the input module.

[0054] The method for detecting the quality guarantee period of the electronic cigarette according to the second preferred embodiment of the present invention further comprises: the microcontroller controls the timing period to be outputted and displayed through the prompt module. When the timing period timed by the second timing module is equal to or greater than the preset period, the microcontroller controls the prompt module to output reminding information to users. The reminding information is outputted by way of voice and/or display.

[0055] If, the method for detecting the quality guarantee period of the electronic cigarette according to the first and second preferred embodiments of the present invention, is applied to electronic cigarettes, the taste of electronic cigarettes can be ensured and the health of users can be ensured.

[0056] In the present invention, by utilizing the timing function of the microcontroller or adding a timing module in an electronic cigarette, the microcontroller sets a quality guarantee period of the electronic cigarette as a preset period. When the electronic cigarette is ex-factory, the microcontroller can begin timing and continually count a timing period. If the timing period from the microcontroller or the timing module is passing the preset period, the electronic cigarette will stop working and stop responding to user's smoking action. Through a light emitting diode or a display screen of the prompt module, users can get reminding information that shows the electronic cigarette is passed its quality guarantee period. Therefore, users can avoid smoking overdue electronic cigarettes and feeling uncomfortable when the electronic cigarettes is stored too long, and leads to the taste of liquid tobacco changes.

[0057] In the embodiment of the present invention, the electronic cigarette can be a disposable electronic cigarette or an electronic cigarette that can be renewed for many times and its liquid tobacco can be changed. If the electronic cigarette is a disposable electronic cigarette, the preset period can be set according to the quality guarantee period of the electronic cigarette. The start timing time of the first timing module of the microcontroller or the second timing module that is connected with the microcontroller is the production date of the electronic cigarette. If the electronic cigarette is an electronic cigarette can be renewed for many times and its liquid tobacco can be changed, the start timing time of the microcon-

troller or the second timing module can be set by users through the input module according to the changing date of the liquid tobacco. And the preset period is also can be set by users through the input module. After users change liquid tobacco, the timing begins and the preset period has been set. And when the timing period is equal to or greater than the preset period, the power supply battery is disconnected with the atomizer and the prompt module outputs reminding information to users. When users changes liquid tobacco again, the timing of the microcontroller or the second timing module is reset and the microcontroller or the second timing module begins timing again.

[0058] In the embodiment of the present invention, the microcontroller and the second timing module can be both powered by the power supply battery. And in order to ensure timing is continuity and accuracy, the power supply can't be cutoff.

[0059] Therefore, the present invention is not limited to the public specific embodiment, should be comprise all embodiments that fall with the range of claims. Under the teaching of the present invention, skilled in the art can make various changes and equivalents without departing from the scope of the present invention.

Claims

1. An electronic cigarette, comprising:

a power supply battery;
a microcontroller connected with the power supply battery; and
an atomizer connected with the power supply battery;
wherein, the microcontroller includes a first timing module, a comparison module and a control module;
the first timing module is configured to time;
the comparison module is configured to compare a timing period timed by the first timing module timed by the first timing module with a preset period;
the control module is configured to control the power supply battery to be disconnected with the atomizer when a comparison result obtained by the comparison module is that the timing period is equal to or greater than the preset period;
the preset period is equal to a quality guarantee period of the electronic cigarette; the preset period is set and stored by the microcontroller.

2. The electronic cigarette according to claim 1, wherein the first timing module is a calculagraph and the timing period of the calculagraph is equal to the quality guarantee period of the electronic cigarette.

3. The electronic cigarette according to claim 1, where-

in the first timing module is a timer and the timing period of the timer is equal to the quality guarantee period of the electronic cigarette.

4. The electronic cigarette according to claim 1, wherein the electronic cigarette further comprises a prompt module connected with the microcontroller; the prompt module is configured to output and display whether the first timing module reaches the preset period or not, and to output reminding information when the comparison result obtained by the comparison module is that the timing period is equal to or greater than the preset period. 5
5. The electronic cigarette according to claim 4, wherein the reminding information is outputted from the prompt module by way of voice and/or display. 10
6. The electronic cigarette according to claim 1, wherein the electronic cigarette further comprises: 15
 - a smoking sensor and/or an input module connected with the microcontroller respectively; the smoking sensor is configured to detect a smoking signal and transmit the smoking signal to the microcontroller; the input module is configured to receive an external input signal then transmit the external input signal to the microcontroller; 20
 - if the comparison result of the comparison module is that the timing period timed by the first timing module is less than the preset period, the control module of the microcontroller controls the power supply battery to provide power to the atomizer according to the smoking signal detected from the smoking sensor or the external input signal received from the input module; 25
 - if the comparison result of the comparison module is that the timing period timed by the first timing module is equal to or greater than the preset period, the control module of the microcontroller controls the power supply battery to be disconnected with the atomizer. 30
7. The electronic cigarette according to claim 6, wherein the input module is a key input module or a touch screen input module. 35
8. The electronic cigarette according to claim 1, wherein the electronic cigarette further comprises a switch circuit configured to control the power supply battery to be connected or disconnected with the atomizer; the switch circuit is a semiconductor switch. 40
9. The electronic cigarette according to any one of claims 1-8, wherein the microcontroller can be an MCU, a CPU, a GPU or an ASIC chip. 45

10. An electronic cigarette, comprising:

- a power supply battery;
- a microcontroller connected with the power supply battery; and
- an atomizer connected with the power supply battery;
- wherein, the electronic cigarette further comprises a second timing module which is respectively connected with the microcontroller and the power supply battery; the second timing module is configured to time and transmit a timing signal to the microcontroller;
- the microcontroller includes a comparison module and a control module;
- the comparison module is configured to compare a timing period timed by the second timing module with a preset period;
- the control module is configured to control the power supply battery to be disconnected with the atomizer when a comparison result obtained by the comparison module is that the timing period is equal to or greater than the preset period; the preset period is equal to a quality guarantee period of the electronic cigarette; the preset period is set and stored by the microcontroller.

11. The electronic cigarette according to claim 10, wherein when the timing period is equal to or greater than the preset period, the microcontroller controls the second timing module to stop timing. 50
12. The electronic cigarette according to claim 11, wherein the second timing module is a calcuagraph chip with a type of RX8025. 55
13. The electronic cigarette according to any one of claims 10-12, wherein the microcontroller can be an MCU, a CPU, a GPU or an ASIC chip.
14. A method for detecting an quality guarantee period of an electronic cigarette, the electronic cigarette comprising a microcontroller, a power supply battery connected with the microcontroller and an atomizer connected with the power supply battery; the microcontroller including a first timing module, a comparison module and a control module; wherein the method comprises the steps of:

- setting a preset period which is equal to the quality guarantee period of the electronic cigarette;
- beginning timing by the first timing module;
- the comparison module comparing the preset period with a timing period timed by the first timing module ; and
- when the timing period is equal to or greater than the preset period, the control module of the microcontroller controls the power supply battery

to be disconnected with the atomizer.

15. The method for detecting the quality guarantee period of the electronic cigarette according to claim 14, wherein the method further comprises:

a prompt module of the electronic cigarette outputs and displays the timing period; and when the timing period timed by the first timing module is equal to or greater than the preset period, the control module of the microcontroller controls the prompt module to output reminding information; the reminding information is outputted by way of voice and/or display.

16. The method for detecting the quality guarantee period of the electronic cigarette according to claim 15, wherein the prompt module comprises a LED display and/or a speaker.

17. The method for detecting the quality guarantee period of the electronic cigarette according to claim 15, wherein the prompt module comprises a light-emitting diode and/or a speaker.

18. A method for detecting an quality guarantee period of an electronic cigarette, the electronic cigarette comprising a microcontroller, a power supply battery connected with the microcontroller, an atomizer connected with the power supply battery, a second timing module which is respectively connected with the microcontroller and the power supply battery; the microcontroller including a comparison module and a control module; wherein the method comprises the steps of:

setting a preset period which is equal to the quality guarantee period of the electronic cigarette; beginning timing by the second timing module; obtaining the timing period from the second timing module by the microcontroller and comparing the preset period with the timing period by the comparison module; and when the timing period timed by the second timing module is equal to or greater than the preset period, the control module of the microcontroller controls the power supply battery to be disconnected with the atomizer.

19. The method for detecting the quality guarantee period of the electronic cigarette according to claim 18, wherein the method further comprises:

a prompt module of the electronic cigarette outputs and displays the timing period received by the microcontroller; and when the a timing period timed by the second timing module is equal to or greater than the

preset period, said the control module of the microcontroller controls the prompt module to output reminding information; the reminding information is outputted by way of voice and/or display.

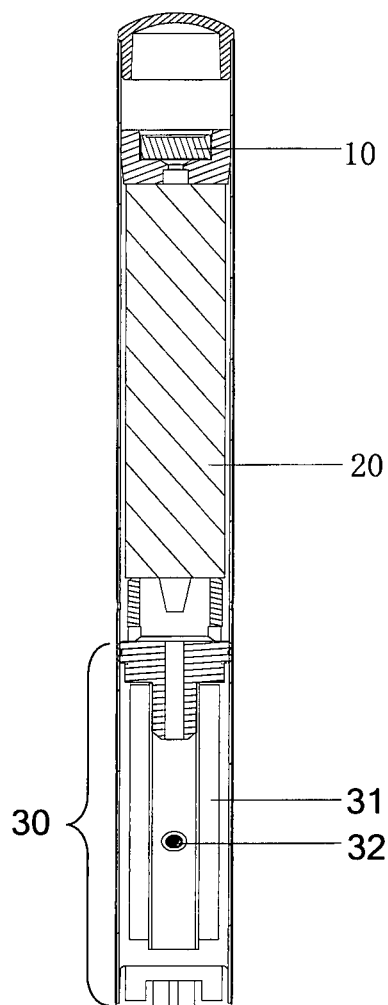


Fig. 1

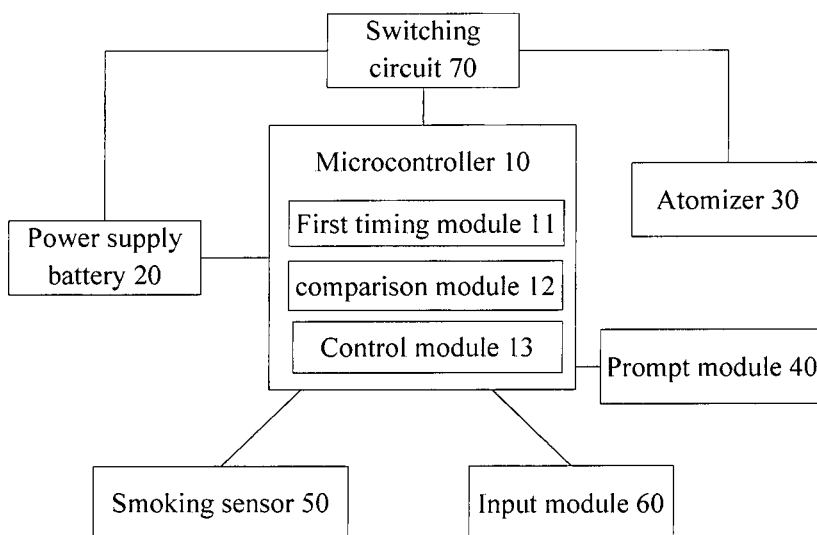


Fig. 2

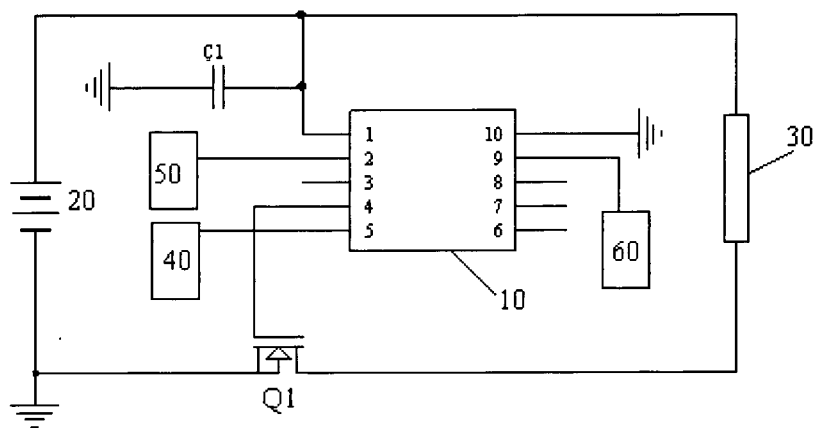


Fig. 3

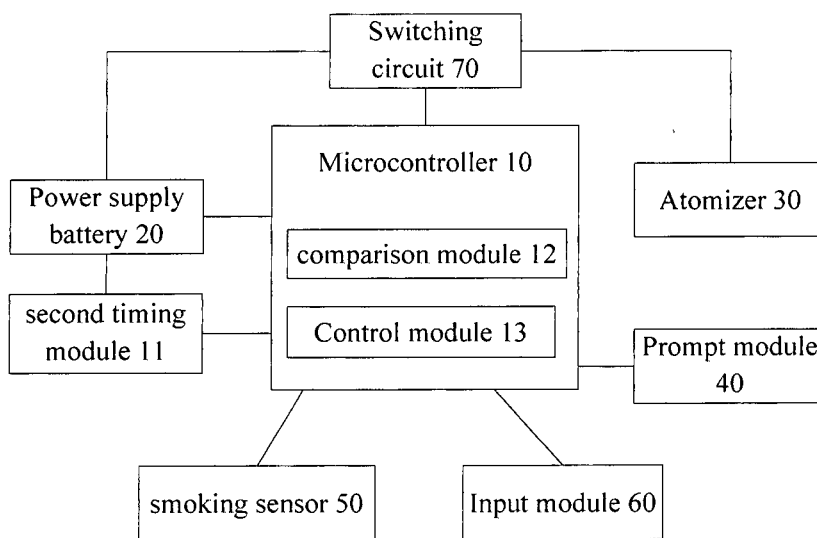


Fig. 4

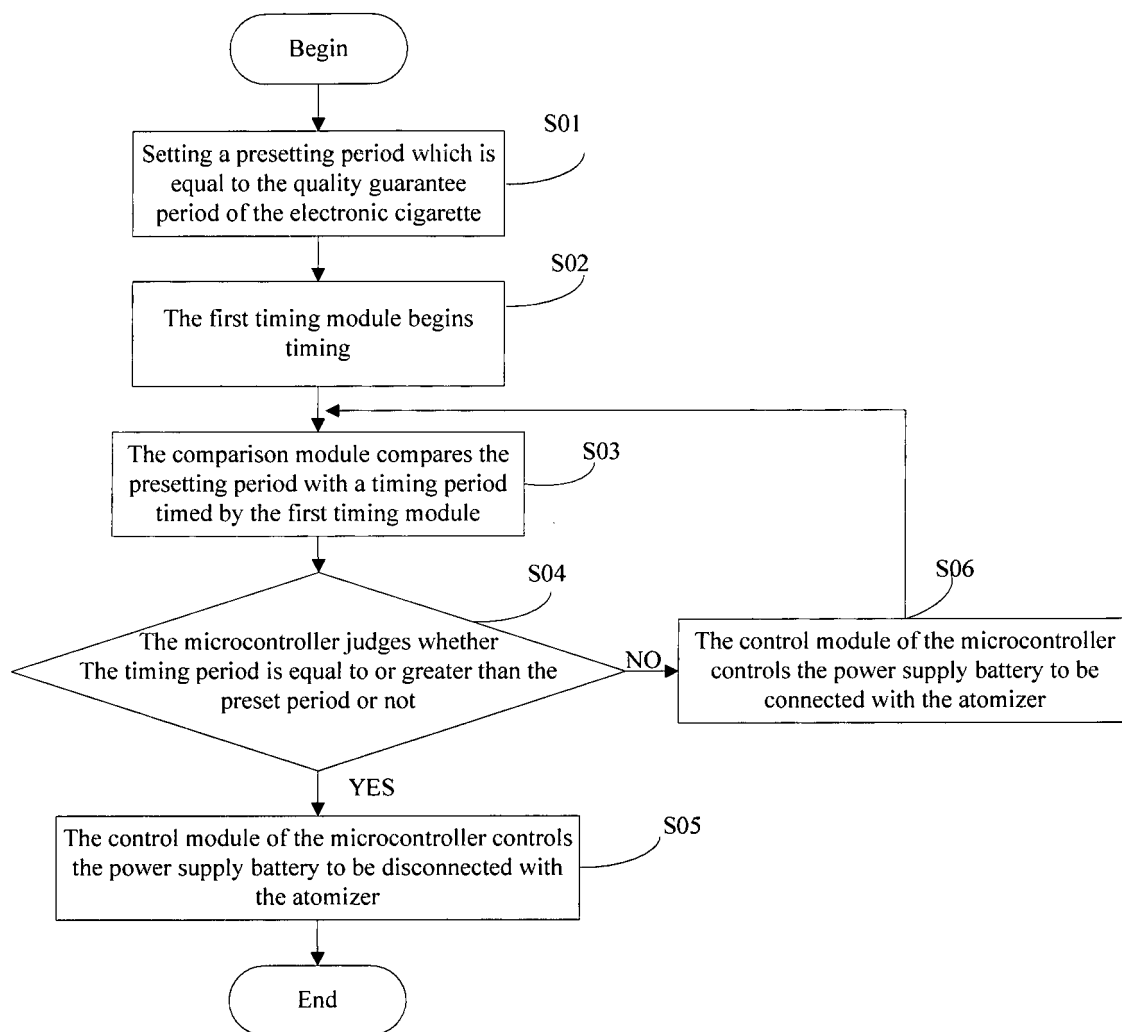


Fig. 5

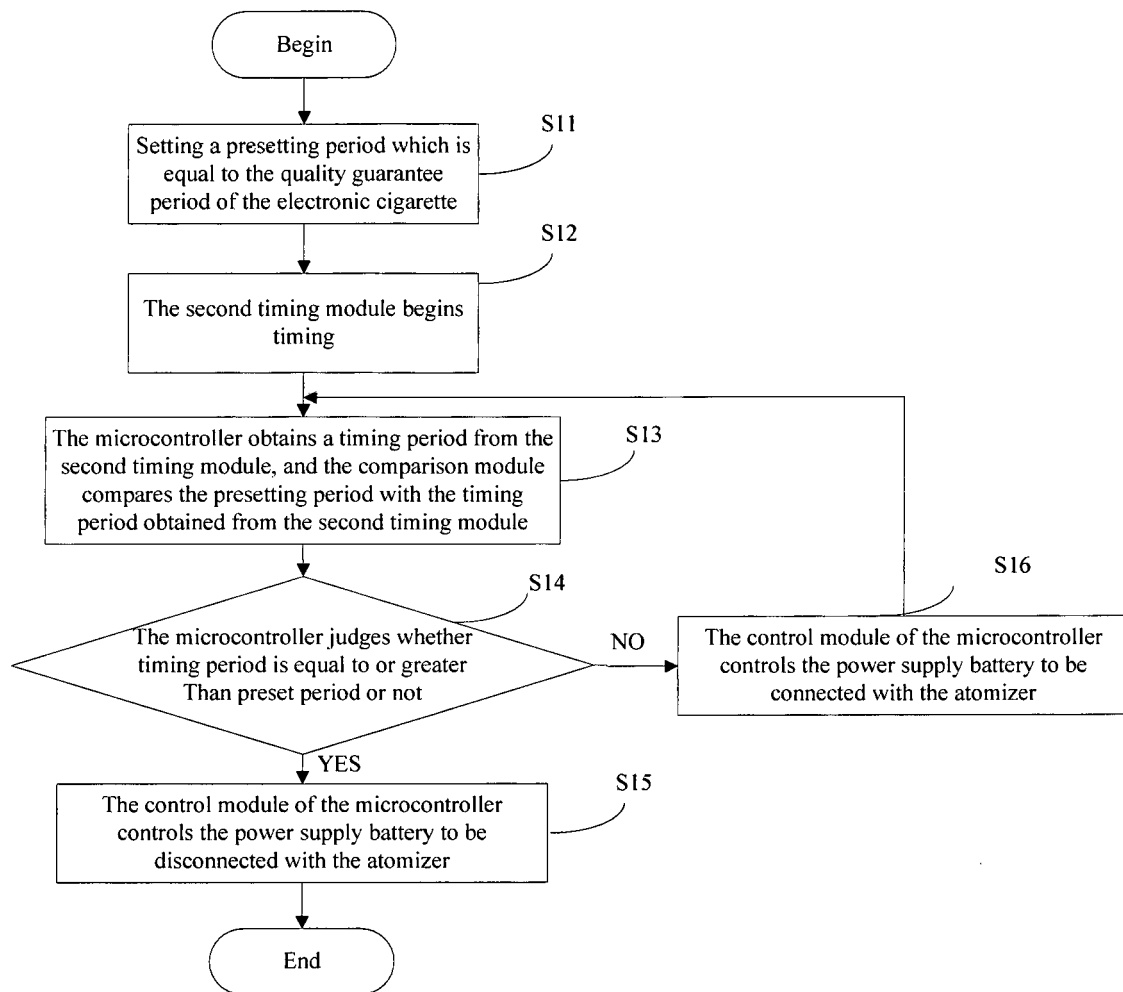


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2013/073837

A. CLASSIFICATION OF SUBJECT MATTER

See the extra sheet

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/-; A24F 13/-; A61M 11/-; A61M 15/-; G07C 1/-; G04F 10/-

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, CNKI, EPODOC, WPI, EI, ISI, GOOGLE: XIANG Zhiyong, caution, date used, electronic 1W cigarette?, timer, life, shelef W life, (calculate+ OR record+) S tim???, quality S period?, remain+ 3W time, residual 3W time, expiration, expired S indicat+, time 3D elaps+, control+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 202172847 U (BILDANNY, Marangos) 28 March 2012 (28.03.2012) description, paragraphs [0025] and [0037] to [0082] and figures 1 to 9	1-19
Y	CN 201429864 Y (ZHOU, Weizhong) 24 March 2010 (24.03.2010) description, page 1, the last paragraph, page 2, paragraphs [0006] and [0007] and figures 1 and 2	1-19
Y	CN 2594841 Y (CHEN, Zhenfu) 24 December 2003 (24.12.2003) description, page 1, the last paragraph, to page 3, paragraph [0002] and figure 1	15-17, 19
A	CN 202331579 U (SUN, Lei) 11 July 2012 (11.07.2012) the whole document	1-19

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

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"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
"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	"&" document member of the same patent family

Date of the actual completion of the international search
18 December 2013 (18.12.2013)

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Telephone No. (86-10) 62413467

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2013/073837

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 2602620 Y (LIN, Zhixie) 11 February 2001 (11.02.2001) the whole document	1-19
A	CN 202574987 U (SHANGHAI FENGXIAN HIGH SCHOOL) 05 December 2012 (05.12.2012) the whole document	1-19
A	US 2003/0142590 A1 (ESCHENBRENNER, Michael P.) 31 July 2003 (31.07.2003) the whole document	1-19
A	DE 20007666 U1 (SCHROEDER, Armin et al.) 03 August 2000 (03.08.2000) the whole document	1-19
A	JP 2006322728 A (CASIO HITACHI MOBILE COMMUNICATION CO.) 30 November 2006 (30.11.2006) the whole document	1-19

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INTERNATIONAL SEARCH REPORT
 Information on patent family members

 International application No.
 PCT/CN2013/073837

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 202172847 U	28.03.2012	US 2012/0199146 A1	09.08.2012
CN 201429864 Y	24.03.2010	None	
CN 2594841 Y	24.12.2003	None	
CN 202331579 U	11.07.2012	None	
CN 2602620 Y	11.02.2004	None	
CN 202574987 U	05.12.2012	None	
US 2003/0142590 A1	31.07.2003	None	
DE 20007666 U1	03.08.2000	None	
JP 2006322728 A	30.11.2006	JP 4860180 B2	25.01.2012

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2013/073837

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A. CLASSIFICATION OF SUBJECT MATTER

A24F 47/00 (2006.01) i
G07C 1/00 (2006.01) i
G04F 10/00 (2006.01) i