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(54) **ATOMIZATION POWER SUPPLY DEVICE, ATOMIZATION DEVICE, AND ATOMIZATION DEVICE POWER SUPPLY CIRCUIT**

(57) The present invention provides an atomization power supply device (100), an atomization device, and an atomization device power supply circuit (10). The atomization power supply device (100) includes a plurality of contacts, a controller (110), and a memory (120). The memory (120) stores a computer program. The controller (110) first acquires a plurality of pieces of level information of the plurality of contacts, determines a connection state between the contacts and an external

atomizer (200) according to the level information, determines whether a corresponding type of atomizer (200) is normally connected, and outputs power to a normally connected atomizer (200) through a corresponding contact according to the connection state, thereby implementing compatible connection and power supply of different types of atomizers (200), and improving the compatibility of the atomization power supply device (100).

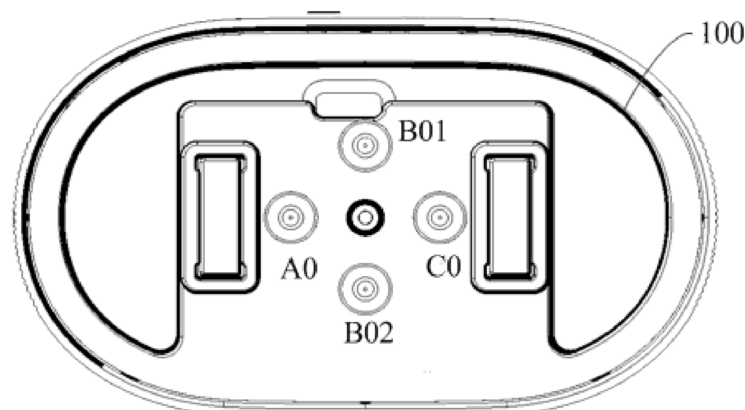


FIG. 10

Description**TECHNICAL FIELD**

5 **[0001]** The present invention belongs to the technical field of atomization, and in particular, to an atomization power supply device, an atomization device, and an atomization device power supply circuit.

BACKGROUND

10 **[0002]** An atomization device can heat an aerosol generating substrate to generate an aerosol, has the advantages of safe use, convenience, health, environmental protection and the like, and therefore is increasingly concerned and favored by people. The atomization device usually includes an atomization power supply device and an atomizer. The atomization power supply device outputs power to drive the atomizer to heat an internal aerosol generating substrate, so as to generate an aerosol for a user to inhale.

15 **[0003]** The atomizer and the atomization power supply device are respectively provided with elastic contacts, and the supply of power is implemented by means of contact connection. With the development of technologies, the atomizer gradually changes from an atomizer with a single-chamber structure to an atomizer with a multi-chamber structure. A multi-chamber atomizer is provided with a plurality of atomization components, and when being connected to the atomization power supply device for power supply, the plurality of atomization components can be separately atomized. Correspondingly, contacts on the atomization power supply device are correspondingly added, and an internal power supply logic is adjusted, so that the contacts are respectively connected to the plurality of atomization components when being connected to the multi-chamber atomizer. Due to upgrade of the atomizer and the atomization power supply device, the upgraded atomization power supply device has the problem that the upgraded atomization power supply device cannot be compatibly connected to an original single-chamber atomizer structure. When a single-chamber atomizer is inserted into the atomization power supply device, effective power supply cannot be implemented.

SUMMARY

30 **[0004]** An objective of the present invention is to provide an atomization power supply device, so as to solve the problem that a conventional upgraded atomization power supply device cannot be compatibly connected to a single-chamber atomizer.

[0005] A first aspect of embodiments of the present invention provides an atomization power supply device, including:

35 a plurality of contacts, the contacts being configured to connect to an external atomizer and supply power; and a controller and a memory, the memory storing a computer program, and the computer program, when executed by the controller, causing the controller to perform the following steps:

40 acquiring a plurality of pieces of level information of the plurality of contacts;
determining a connection state of a corresponding contact according to the plurality of pieces of level information;
and
supplying power to the corresponding atomizer through the corresponding contact according to the connection state.

45 **[0006]** Optionally, the supplying power to the corresponding atomizer through the corresponding contact according to the connection state includes:

50 skipping outputting power to the corresponding contact when it is determined that the corresponding atomizer is abnormally connected to the contact according to the connection state; and
supplying power to the atomizer through the corresponding contact when it is determined that the corresponding contact is normally connected to the atomizer according to the connection state.

[0007] Optionally, the connection state includes a type and an insertion state of the atomizer connected to the contact.

[0008] Optionally, the plurality of contacts include a first contact, a second contact, and a third contact, and the types of the atomizers include single-chamber atomizers and double-chamber atomizers;

55 the atomization power supply device further includes a first switching module and a second switching module, the first switching module being connected between a ground terminal and the first contact, and the second switching module being connected between the ground terminal and the third contact; and

the determining a connection state of a corresponding contact according to the plurality of pieces of level information includes:

acquiring level information of a target contact connected to the switching module in a switched-off state and the second contact when the first switching module or the second switching module is switched on, the target contact being the first contact or the third contact; and

determining a type and an insertion state of the atomizer according to the level information of the target contact and the second contact.

[0009] Optionally, the first contact, the second contact, and the third contact are connected to a power supply of the atomization power supply device through a pull-up resistor.

[0010] Optionally, when the target contact is at a low level and the second contact is at a high level, it is determined that the type of the atomizer is a single-chamber atomizer;

when the target contact and the second contact both are at a low level, it is determined that the type of the atomizer is a double-chamber atomizer; and

when the target contact and the second contact both are at a high level, it is determined that no atomizer is inserted.

[0011] Optionally, when the type of the atomizer is a single-chamber atomizer, power is supplied to an external atomizer through the first contact and the third contact; and

when the type of the atomizer is a double-chamber atomizer, power is supplied separately to two heating elements of the external atomizer through the first contact and the third contact as well as the second contact and the third contact.

[0012] Optionally, two second contacts are provided, and the first contact and the third contact are symmetrically disposed about a connection line between the two second contacts.

[0013] Optionally, the determining a connection state of a corresponding contact according to the plurality of pieces of level information includes:

acquiring level information of a target contact connected to the switching module in a switched-off state and the two second contacts when the first switching module or the second switching module is switched on, the target contact being the first contact or the third contact; and

determining a type of the atomizer, an insertion state of the atomizer, and an insertion direction of the atomizer according to the level information of the target contact and the two second contacts.

[0014] Optionally, when the target contact is at a low level and the two second contacts are at a high level, it is determined that the type of the atomizer is a single-chamber atomizer;

when the target contact and a first one of the second contacts are at a low level, it is determined that the type of the atomizer is a double-chamber atomizer, and the double-chamber atomizer is in a forward insertion state;

when the target contact and a second one of the second contacts are at a low level, it is determined that the type of the atomizer is a double-chamber atomizer, and the double-chamber atomizer is in an inverse insertion state;

when the target contact and the two second contacts both are at a high level, it is determined that no atomizer is inserted; and

when the two contacts both are at a low level, it is determined that an inserted atomizer is faulty.

[0015] Optionally, when the type of the atomizer is a single-chamber atomizer, power is supplied to an external atomizer through the first contact and the third contact; and

when the type of the atomizer is a double-chamber atomizer and the double-chamber atomizer is in a forward insertion state, power is supplied separately to two heating elements of the external atomizer through the first contact and the third contact as well as the third contact and a first one of the second contacts; and

when the type of the atomizer is a double-chamber atomizer and the double-chamber atomizer is in an inverse insertion state, power is supplied separately to two heating elements of the external atomizer through the first contact and the third contact as well as the first contact and a second one of the second contacts.

[0016] Optionally, the resistance value of the pull-up resistor is greater than 5 times the resistance value of the atomizer.

[0017] A second aspect of embodiments of the present invention provides an atomization device, including an atomizer

and the atomization power supply device as described above. A plurality of contacts of the atomization power supply device include a first contact, a third contact, and two second contacts, and the first contact and the third contact are symmetrically disposed about a connection line between the two second contacts.

[0018] When the type of the atomizer is a single-chamber atomizer, power is supplied to an external atomizer through the first contact and the third contact.

[0019] When the type of the atomizer is a double-chamber atomizer and the double-chamber atomizer is in a forward insertion state, power is supplied separately to two heating elements of the external atomizer through the first contact and the third contact as well as the third contact and a first one of the second contacts.

[0020] When the type of the atomizer is a double-chamber atomizer and the double-chamber atomizer is in an inverse insertion state, power is supplied separately to two heating elements of the external atomizer through the first contact and the third contact as well as the first contact and a second one of the second contacts.

[0021] A third aspect of embodiments of the present invention provides an atomization device power supply circuit, including a plurality of contacts, a controller, a first switching module, a second switching module, and a power supply. The plurality of contacts include a first contact, a third contact, and two second contacts, and the first contact and the third contact are symmetrically disposed about a connection line between the two second contacts.

[0022] The controller is configured to:

control the first contact and a ground terminal to be switched on or switched off by controlling the switching-on or switching-off of the first switching module, and/or control the third contact and the ground terminal to be switched on or switched off by controlling the switching-on or switching-off of the second switching module;

supply power to an external single-chamber atomizer through the first contact and the third contact;

or separately supply power to two heating elements of the external atomizer through the first contact and the third contact as well as the third contact and a first one of the second contacts;

or separately supply power to two heating elements of the external atomizer through the first contact and the third contact as well as the first contact and a second one of the second contacts.

[0023] Compared with the prior art, the embodiments of the present invention have the following beneficial effects: The above atomization power supply device includes a plurality of contacts, a controller, and a memory. The memory stores a computer program. The controller first acquires a plurality of pieces of level information of the plurality of contacts, determines a connection state between the contacts and an external atomizer according to the level information, determines whether a corresponding type of atomizer is normally connected, and outputs power to a normally connected atomizer through a corresponding contact according to the connection state, thereby implementing compatible connection and power supply of different types of atomizers, and improving the compatibility of the atomization power supply device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

FIG. 1 is a schematic structural diagram of an atomization device according to an embodiment of the present invention;

FIG. 2 is a first schematic structural diagram of a single-chamber atomizer according to an embodiment of the present invention;

FIG. 3 is a schematic circuit diagram of a single-chamber atomizer according to an embodiment of the present invention;

FIG. 4 is a first schematic structural diagram of a double-chamber atomizer according to an embodiment of the present invention;

FIG. 5 is a schematic circuit diagram of a double-chamber atomizer according to an embodiment of the present invention;

FIG. 6 is a first schematic circuit diagram of an atomization power supply device according to an embodiment of the present invention;

FIG. 7 is a schematic diagram of connection between an atomization power supply device and a single-chamber atomizer according to an embodiment of the present invention;

FIG. 8 is a schematic diagram of connection between an atomization power supply device and a double-chamber atomizer according to an embodiment of the present invention;

FIG. 9 is a second schematic circuit diagram of an atomization power supply device according to an embodiment of the present invention;

FIG. 10 is a schematic structural diagram of an atomization power supply device according to an embodiment of the present invention;

FIG. 11 is a third schematic circuit diagram of an atomization power supply device according to an embodiment of the present invention;

FIG. 12 is a schematic circuit diagram of a first power supply circuit and a first switching module of an atomization power supply device according to an embodiment of the present invention;

FIG. 13 is a schematic circuit diagram of a second power supply circuit and a second switching module of an atomization power supply device according to an embodiment of the present invention;

FIG. 14 is a schematic circuit diagram of a third power supply circuit of an atomization power supply device according to an embodiment of the present invention;

FIG. 15 is a schematic circuit diagram of a fourth power supply circuit of an atomization power supply device according to an embodiment of the present invention; and

FIG. 16 is a schematic structural diagram of an atomization device power supply circuit according to an embodiment of the present invention.

List of reference numerals:

[0025]

100: atomization power supply device; 200: atomizer; 210: single-chamber atomizer; 220: double-chamber atomizer; 10: atomization device power supply circuit; 110: controller; 120: memory; 130: first switching module; 140: second switching module; 150: first power supply circuit; 160: second power supply circuit; 170: third power supply circuit; 180: fourth power supply circuit; 190: power supply;

A0: first contact; B0: second contact; C0: third contact; A1: fourth contact; C1: fifth contact; A2: sixth contact; B1: seventh contact; C1: eighth contact; B01: first pin contact; B02: second pin contact;

R1: first resistor; R2: second resistor; R3: third resistor; R4: fourth resistor; R5: fifth resistor; R6: sixth resistor; R7: seventh resistor; R8: eighth resistor; R9: ninth resistor; R10: tenth resistor; R11: first pull-up resistor; R12: second pull-up resistor; R13: third pull-up resistor; R14: fourth pull-up resistor; Q1: first electronic switching tube; Q2: second electronic switching tube; Q3: third electronic switching tube; Q4: fourth electronic switching tube; Qa: fifth electronic switching tube; Qc: sixth electronic switching tube;

PWM1: first power supply control signal; PWM2: second power supply control signal; PWM3: third power supply control signal; PWM4: fourth power supply control signal; Ctrl: first switching signal; Ctr2: second switching signal.

DETAILED DESCRIPTION

[0026] In order to make the technical problems, technical solutions, and beneficial effects to be solved in the present invention clearer and more comprehensible, the present invention will be further described in detail below with reference to the accompanying drawings and embodiments. It should be understood that the specific embodiments described here are merely intended to explain the present invention but are not intended to limit the present invention.

[0027] In addition, terms "first" and "second" are used merely for the purpose of description, and shall not be construed as indicating or implying relative importance or implying a quantity of indicated technical features. Therefore, a feature defined by "first" or "second" may explicitly or implicitly include one or more of the features. In the descriptions of the present invention, unless otherwise explicitly specified, "a plurality of" means two or more than two.

[0028] A first aspect of embodiments of the present invention provides an atomization power supply device. As shown in FIG. 1, the atomization power supply device is connected with a corresponding type of atomizer in an inserted manner, and supplies power to the atomizer, so that the corresponding type of atomizer 200 atomizes an internal aerosol generating substrate, thereby generating an aerosol for a user to inhale.

[0029] As shown in FIG. 2 and FIG. 3, the atomizer 200 may have two types: a single-chamber atomizer 210 and a multi-chamber atomizer. The single-chamber atomizer 210 includes a housing and two contacts disposed on the housing. The two contacts may be a fourth contact A1 and a fifth contact C1. The single-chamber atomizer 210 further includes a first heating element R01 disposed in the housing. The first heating element R01 may be a heating wire, a heating film, or the like. The first heating element R01 is disposed in an atomization component of the single-chamber atomizer 210. An aerosol generating substrate is disposed in the atomization component. The first heating element R01 is separately connected to the fourth contact A1 and the fifth contact C1. The single-chamber atomizer 210 is inserted into a matched contact on a corresponding atomization power supply device 100 through the fourth contact A1 and the fifth contact C1, and acquires power. After receiving the power, the first heating element R01 generates heat, and heats the aerosol generating substrate of the atomization component inside the single-chamber atomizer 210, so as to generate an aerosol.

[0030] A plurality of atomization components or a plurality of heating elements are disposed inside the multi-chamber atomizer, and a plurality of contacts connected to the plurality of heating elements are disposed on a housing of the multi-chamber atomizer. For example, as shown in FIG. 4 and FIG. 5, the multi-chamber atomizer may be a double-chamber

atomizer 220. The double-chamber atomizer 220 includes the housing and three contacts disposed on the housing. The three contacts may be a sixth contact A2, a seventh contact B1, and an eighth contact C2. The multi-chamber atomizer further includes a second heating element R02 and a third heating element R03 disposed in the housing. The second heating element R02 and the third heating element R03 may be a heating wire, a heating film, or the like. The second heating element R02 and the third heating element R03 may be respectively disposed one by one in two atomization components in the double-chamber atomizer 220, or disposed in one atomization component of the double-chamber atomizer. An aerosol generating substrate is disposed in the atomization component. The second heating element R02 is separately connected to the sixth contact A2 and the eighth contact C2. The third heating element R03 is separately connected to the seventh contact B1 and the eighth contact C2. The double-chamber atomizer 220 is inserted into a matched contact on the corresponding atomization power supply device 100 through the sixth contact A2, the seventh contact B1, and the eighth contact C2, and acquires a power supply. After receiving the power, the second heating element R02 and the third heating element R03 generate heat, and respectively heat aerosol generating substrates of two atomization components inside the double-chamber atomizer 220, so as to generate an aerosol.

[0031] To be compatible for connection and compatible for charging of single-chamber atomizers and double-chamber atomizers, in this embodiment, as shown in FIG. 6, the atomization power supply device includes:

a plurality of contacts, the contacts being configured to connect to an external atomizer 200 and supply power; and a controller 110 and a memory 120, the memory 120 storing a computer program, and the computer program, when executed by the controller 110, causing the controller 110 to perform the following steps:

acquiring a plurality of pieces of level information of the plurality of contacts;
determining a connection state of a corresponding contact according to the plurality of pieces of level information;
and
supplying power to the corresponding atomizer 200 through the corresponding contact according to the connection state.

[0032] In this embodiment, the memory 120 is configured to store computer programs such as a recognition logic and a power supply logic. The controller 110 reads the computer programs stored in the memory 120 after being powered on, and performs work corresponding to recognition of the atomizer 200 and power supply output.

[0033] The plurality of contacts include at least three contacts. The at least three contacts correspond to the sixth contact A2, the seventh contact B1, and the eighth contact C2 of the double-chamber atomizer 220 in position and are correspondingly disposed on the atomization power supply device 100. The controller 110 is separately connected to the plurality of contacts.

[0034] When different types of atomizers 200 are respectively inserted into the atomization power supply device 100 or whether the atomizer 200 is normally inserted, the combined level information of the plurality of contacts is different. Correspondingly, the controller 110 may determine a connection state of a corresponding contact based on a level signal to determine whether a corresponding type of atomizer 200 is inserted, or whether an abnormal atomizer 200 is inserted, or whether an atomizer 200 is inserted, and select whether to output the power to the corresponding contact and the connected atomizer 200 according to the connection state obtained by determining.

[0035] Correspondingly, the connection state includes a type and an insertion state of the atomizer 200 connected to the contacts. For example, it is assumed that the atomization power supply device 100 includes a first contact A0, a second contact B0, and a third contact C0. As shown in FIG. 7, when the fourth contact A1 of the single-chamber atomizer 210 is inserted into the first contact A0 of the atomization power supply device 100, and the fifth contact C1 of the single-chamber atomizer 210 is inserted into the third contact C0 of the atomization power supply device 100, the first contact A0, the second contact B0, and the third contact may be at a high level. In this case, the controller 110 may determine that the connection state of a plurality of contacts is normal connection to the single-chamber atomizer 210 according to the combined level information of the corresponding contacts in the first contact A0, the second contact B0, and the third contact.

[0036] Moreover, as shown in FIG. 8, when the sixth contact A2 of the double-chamber atomizer 220 is connected to the first contact A0 of the atomization power supply device 100, the seventh contact B1 of the double-chamber atomizer 220 is connected to the second contact B0 of the atomization power supply device 100, and the eighth contact C2 of the double-chamber atomizer 220 is connected to the third contact C0 of the atomization power supply device 100, the first contact A0, the second contact B0, and the third contact may be switched to a low level. In this case, the controller 110 may determine that the connection state of a plurality of contacts is normal connection to the double-chamber atomizer 220 according to the combined level information of the corresponding contacts in the first contact A0, the second contact B0, and the third contact.

[0037] The insertion state may be a forward insertion state or an inverse insertion state of the atomizer 200, or whether the atomizer 200 is inserted or not. For example, it is assumed that the insertion state is whether the atomizer 200 is

inserted or not. When there is no atomizer 200 connected to the first contact A0 of the atomization power supply device 100, the first contact A0, the second contact B0, and the third contact C0 may partially be at a high level and partially be at a low level. In this case, the controller 110 may determine that the connection state of a plurality of contacts is not insertion of the atomizer according to the combined level information of the corresponding contacts in the first contact A0, the second contact B0, and the third contact C0.

[0038] The atomization power supply device 100 is further provided with a power supply 190. The power supply 190 is configured to provide a working voltage for the controller 110 and the memory 120, and is connected to a corresponding contact through a corresponding power supply circuit. The power supply circuit may be correspondingly switched on or switched off under the control of the controller 110, and transmit power from the power supply 190 to a plurality of contacts and a corresponding type of atomizer 200. The power supply 190 may include a battery BAT, a battery charging circuit, and the like. The power supply circuit may be a corresponding switching circuit, a voltage conversion circuit, or the like. In an optional embodiment, for example, as shown in FIG. 12 and FIG. 13, a power supply terminal of the battery BAT is separately connected to the controller 110 and the memory 120, and the power supply terminal of the battery BAT is connected to a corresponding contact through a corresponding power supply circuit.

[0039] When it is determined that a corresponding type of atomizer 200 is normally connected, the controller 110 may control the power supply circuit to be correspondingly switched on, so as to choose to transmit the power to the corresponding atomizer 200 through matched contacts or choose not to output the power.

[0040] Whether the controller 110 outputs the power may be determined according to the state of the connected atomizer 200. In an optional embodiment, the step of supplying power to the corresponding atomizer 200 through the corresponding contact according to the connection state in the controller 110 includes:

skipping outputting the power to the corresponding contact when it is determined that the corresponding atomizer 200 is abnormally connected to the contact according to the connection state; and

supplying power to the atomizer through the corresponding contact when it is determined that the corresponding contact is normally connected to the atomizer 200 according to the connection state.

[0041] In this embodiment, when it is determined that the atomizer 200 is abnormally connected according to the connection state, it indicates that the current connection state does not meet the atomization condition. The abnormal connection may indicate that a faulty atomizer 200 is connected or no atomizer 200 is connected. In this case, outputting the power has a risk of damaging the atomizer 200 or a problem of abnormal discharging of the atomization power supply device 100. Therefore, when it is determined that the atomizer 200 is abnormally connected to the contact, it is selected not to output the power, and the atomization power supply device 100 does not work.

[0042] Moreover, when it is determined that the contact is normally connected to the atomizer 200, it indicates that the current connection state meets the atomization condition. The normal connection indicates that a plurality of contacts are connected to a normal single-chamber atomizer 210 or double-chamber atomizer 220. In this case, the power may be selectively outputted to the plurality of contacts and the connected atomizer 200, so as to heat the heating element of the atomization component in the corresponding type of atomizer 200, and therefore, heat the aerosol generating substrate to generate an aerosol for a user to inhale.

[0043] In an optional embodiment, as shown in FIG. 9, a plurality of contacts include a first contact A0, a second contact B0, and a third contact C0. Types of the atomizer 200 include a single-chamber atomizer 210 and a double-chamber atomizer 220.

[0044] The atomization power supply device 100 further includes a first switching module 130 and a second switching module 140. The first switching module 130 is connected between a ground terminal and the first contact A0, and the second switching module 140 is connected between the ground terminal and the third contact C0.

[0045] The determining a connection state of a corresponding contact according to the plurality of pieces of level information includes:

acquiring level information of a target contact connected to the switching module in a switched-off state and the second contact B0 when the first switching module 130 or the second switching module 140 is switched on, the target contact being the first contact A0 or the third contact C0; and

determining a type and an insertion state of the atomizer 200 according to the level information of the target contact and the second contact B0.

[0046] In this embodiment, when the first switching module 130 is switched on, the first contact A0 is at a low level, and the levels of the second contact B0 and the third contact C0 may be in different level states based on different types of atomizers 200 that are inserted, and may be in different level states based on whether the atomizer 200 is normally inserted. Alternatively, when the second switching module 140 is switched on, the third contact C0 is at a low level, and the levels of the first contact A0 and the second contact B0 may be in different level states based on different types of atomizers

200 that are inserted, and may be in different level states based on whether the atomizer 200 is normally inserted.

[0047] Therefore, to obtain corresponding level information, the controller 110 first controls one switching module in the first switching module 130 and the second switching module 140 to be switched on and the other switching module to be switched off, and acquires level information of a target contact connected to the switching module that is switched off and the second contact B0, so as to determine the connection state of the corresponding contact to determine a type and an insertion state of the atomizer 200.

[0048] Further, for ease of distinguishing between high and low levels, in an optional embodiment, the first contact A0, the second contact B0, and the third contact C0 are connected to the power supply 190 of the atomization power supply device through a pull-up resistor. For example, as shown in FIG. 12, the first contact A0 is connected to the power supply 190 of the atomization power supply device 100 through a first pull-up resistor R11, and the power supply provides a positive voltage. Alternatively, as shown in FIG. 13, the third contact C0 is connected to the power supply 190 of the atomization power supply device 100 through a second pull-up resistor R12.

[0049] The high level and the low level may respectively correspond to a voltage, and the voltage of the high level is greater than the voltage of the low level. To distinguish between high and low levels, in an optional embodiment, the resistance value of the pull-up resistor is greater than 5 times the resistance value of the atomizer 200, that is, the resistance value of the pull-up resistor is greater than 5 times the resistance value of each heating element. When the single-chamber atomizer 210 is inserted into the atomization power supply device 100 and the second switching module 140 is switched on, the first pull-up resistor R11 and the first heating element R01 form a voltage dividing circuit, and the first contact A0 may be at a low level. When the double-chamber atomizer 220 is inserted into the atomization power supply device 100, because the second heating element R02 and the third heating element R03 are grounded through the eighth contact C2 and the third contact C0, the first contact A0 and the second contact B0 both are at a low level.

[0050] Correspondingly, in an optional embodiment, when the target contact is at a low level and the second contact B0 is at a high level, it is determined that the type of the atomizer 200 is a single-chamber atomizer 210;

when the target contact and the second contact B0 both are at a low level, it is determined that the type of the atomizer 200 is a double-chamber atomizer 220; and

when the target contact and the second contact B0 both are at a high level, it is determined that no atomizer 200 is inserted.

[0051] Referring to the following Table 1, it is assumed that the second switching module 140 is controlled to be switched on, the first switching module 130 is controlled to be switched off, and correspondingly, the target contact is the first contact A0 connected to the first switching module 130. When the single-chamber atomizer 210 is inserted into the atomization power supply device 100, as shown in FIG. 7 and FIG. 9, in this case, the first contact A0 is connected to the fourth contact A1 of the single-chamber atomizer 210, the third contact C0 is connected to the fifth contact C1 of the single-chamber atomizer 210, and the second contact B0 is not connected. In this case, the low level of the third contact C0 may be transmitted to the first contact A0 through the first heating element R01, the first contact A0 may be at a low level, and the second contact B0 may be at a high level due to the existence of a pull-up resistor. Therefore, it may be determined that the connection state of the first contact A0 and the third contact C0 is connection to the single-chamber atomizer 210, and the type of the inserted atomizer 200 is the single-chamber atomizer 210.

[0052] Moreover, when the double-chamber atomizer 220 is inserted into the atomization power supply device 100, as shown in FIG. 8, the first contact A0 is connected to the sixth contact A2 of the double-chamber atomizer 220, the second contact B0 is connected to the sixth contact B1 of the double-chamber atomizer 220, and the third contact C0 is connected to the eighth contact C2 of the double-chamber atomizer 220. In this case, the low level of the third contact C0 may be transmitted to the first contact A0 through the second heating element R02 and transmitted to the second contact B0 through the third heating element R03, and the first contact A0 and the second contact B0 may both be at a low level. It may be determined that the connection state of the first contact A0, the second contact B0, and the third contact C0 is connection to the double-chamber atomizer 220, and the type of the inserted atomizer 200 is the double-chamber atomizer 220.

[0053] Moreover, when no atomizer 200 is inserted, there is no level transmission path between the first contact A0 and the third contact C0, and there is no level transmission path between the second contact B0 and the third contact C0. In this case, the first contact A0 and the second contact B0 may both be at a high level due to the existence of a pull-up resistor. It may be determined that the connection state of the first contact A0, the second contact B0, and the third contact C0 is no connection to the atomizer 200.

[0054] Moreover, when a faulty atomizer 200 is inserted, the first contact A0 may be in a high-resistance state or another state, and the second contact B0 may be at a low level. In this case, it may be determined that the connection state of the first contact A0, the second contact B0, and the third contact C0 is connection to the faulty atomizer 200.

Table 1

Step	State of first switching module	State of second switching module	Level of contact B0	Level of contact A0	Detection result
1	Switched off	Switched on	H	L	Single-chamber atomizer
2	Switched off	Switched on	L	L	Double-chamber atomizer
3	Switched off	Switched on	H	H	No atomizer
4	Switched off	Switched on	L	X	Atomizer fault

[0055] Alternatively, referring to the following Table 2, it is assumed that the first switching module 130 is controlled to be switched on, the second switching module 140 is controlled to be switched off, and correspondingly, the target contact is the third contact C0 connected to the second switching module 140. When the single-chamber atomizer 210 is inserted into the atomization power supply device 100, as shown in FIG. 7, in this case, the first contact A0 is connected to the fourth contact A1 of the single-chamber atomizer 210, the third contact C0 is connected to the fifth contact C1 of the single-chamber atomizer 210, and the second contact B0 is not connected. In this case, the low level of the first contact A0 may be transmitted to the third contact C0 through the first heating element R01, the third contact C0 may be at a low level, and the second contact B0 may be at a high level due to the existence of a pull-up resistor. Therefore, it may be determined that the connection state of the first contact A0 and the third contact C0 is connection to the single-chamber atomizer 210, and the type of the inserted atomizer 200 is the single-chamber atomizer 210.

[0056] Moreover, when the double-chamber atomizer 220 is inserted into the atomization power supply device 100, as shown in FIG. 8, the first contact A0 is connected to the sixth contact A2 of the double-chamber atomizer 220, the second contact B0 is connected to the seventh contact B1 of the double-chamber atomizer 220, and the third contact C0 is connected to the eighth contact C2 of the double-chamber atomizer 220. In this case, the low level of the first contact A0 may be transmitted to the third contact C0 through the second heating element R02 and transmitted to the second contact B0 through the third heating element R03, and the third contact C0 and the second contact B0 may both be at a low level. It may be determined that the connection state of the first contact A0, the second contact B0, and the third contact C0 is connection to the double-chamber atomizer 220, and the type of the inserted atomizer 200 is the double-chamber atomizer 220.

[0057] Moreover, when no atomizer 200 is inserted, there is no level transmission path between the first contact A0 and the third contact C0, and there is no level transmission path between the second contact B0 and the third contact C0. In this case, the third contact C0 and the second contact B0 may both be at a high level due to the existence of a pull-up resistor. It may be determined that the connection state of the first contact A0, the second contact B0, and the third contact C0 is no connection to the atomizer 200.

[0058] Moreover, when a faulty atomizer 200 is inserted, the third contact C0 may be in a high-resistance state or another state, and the second contact B0 may be at a low level. In this case, it may be determined that the connection state of the first contact A0, the second contact B0, and the third contact C0 is connection to the faulty atomizer 200.

Table 2

Step	State of first switching module	State of second switching module	Level of contact B0	Level of contact C0	Detection result
1	Switched on	Switched off	H	L	Single-chamber atomizer
2	Switched on	Switched off	L	L	Double-chamber atomizer
3	Switched on	Switched off	H	H	No atomizer
4	Switched on	Switched off	L	X	Atomizer fault

[0059] In an optional embodiment, when it is determined that the type of the atomizer 200 is the single-chamber atomizer 210, the controller 110 may control the atomization power supply device 100 to output the power to the single-chamber atomizer 210 through the first contact A0 and the third contact C0. One of the first contact A0 and the third contact C0 outputs the power, and the other contact is grounded, so as to form a current loop through the first heating element R01. After receiving the power, the first heating element R01 generates heat, and heats the aerosol generating substrate of the atomization component inside the single-chamber atomizer 210, thereby generating an aerosol.

[0060] When it is determined that the type of the atomizer 200 is the double-chamber atomizer 220, the controller 110 may control the atomization power supply device 100 to output the power to the double-chamber atomizer 220 through the first contact A0, the second contact B0, and the third contact C0. The first contact A0, the sixth contact A2, the second

heating element R02, the eighth contact C2, and the third contact C0 are sequentially connected and form a current loop, and the second contact B0, the seventh contact B1, the third heating element R03, the eighth contact C2, and the third contact C0 are sequentially connected and form another current loop. After receiving the power, the second heating element R02 and the third heating element R03 generate heat, and respectively heat the aerosol generating substrates of the atomization components inside the double-chamber atomizer 220, thereby generating an aerosol.

[0061] The sixth contact A2, the seventh contact B1, and the eighth contact C2 may be sequentially disposed at an interval along a straight line, or may be disposed at a corresponding included angle. As shown in FIG. 4, in an optional embodiment, the sixth contact A2 and the eighth contact C2 are symmetrically disposed on two sides of the seventh contact B1, and the sixth contact A2, the seventh contact B1, and the eighth contact C2 are not located on a straight line. Corresponding to the structure of the double-chamber atomizer 220, the first contact A0 and the third contact C0 are symmetrically disposed on two sides of the second contact B0, and the first contact A0, the second contact B0, and the third contact C0 are not located on a straight line.

[0062] The fourth contact A1 and the fifth contact C1 of the single-chamber atomizer 210 are arranged side by side. During forward insertion with the single-chamber atomizer 210, the first contact A0 is connected to the fourth contact A1 of the single-chamber atomizer 210, and the third contact C0 is connected to the fifth contact C1 of the single-chamber atomizer 210. During inverse insertion with the single-chamber atomizer 210, the first contact A0 is connected to the fifth contact C1 of the single-chamber atomizer 210, and the second contact B0 is connected to the fourth contact A1 of the single-chamber atomizer 210.

[0063] During forward insertion with the double-chamber atomizer 220, the first contact A0 is connected to the sixth contact A2 of the double-chamber atomizer 220, the second contact B0 is connected to the seventh contact B1 of the single-chamber atomizer 210, and the third contact C0 is connected to the eighth contact C2.

[0064] However, when the double-chamber atomizer 220 is inversely inserted into the atomization power supply device 100, the first contact A0 is connected to the eighth contact C2 of the double-chamber atomizer 220, the second contact B0 is not connected to the seventh contact B1 of the double-chamber atomizer 220, and the third contact C0 is connected to the sixth contact A2. In this case, normal power supply to the double-chamber atomizer 220 cannot be implemented.

[0065] Therefore, in an optional embodiment, as shown in FIG. 10 and FIG. 11, two second contacts B0 are disposed, and the first contact A0 and the third contact C0 are symmetrically disposed about a connection line between the two second contacts B0. It is assumed that the second contacts B0 include a first pin contact B01 and a second pin contact B02.

[0066] When the double-chamber atomizer 220 is forward inserted into the atomization power supply device 100, the first contact A0 is connected to the sixth contact A2 of the double-chamber atomizer 220, the first pin contact B01 is connected to the seventh contact B1 of the double-chamber atomizer 220, and the third contact C0 is connected to the eighth contact C2.

[0067] When the double-chamber atomizer 220 is inversely inserted into the atomization power supply device 100, the first contact A0 is connected to the eighth contact C2 of the double-chamber atomizer 220, the second pin contact B02 is connected to the seventh contact B1 of the double-chamber atomizer 220, and the third contact C0 is connected to the sixth contact A2, thereby implementing forward and inverse insertion of the double-chamber atomizer 220, and implementing normal power supply to the double-chamber atomizer 220 in different inserted states.

[0068] Corresponding to the four contact structures of the first contact A0, the second contacts B0, and the third contact C0, in an optional embodiment, the determining a connection state of a corresponding contact according to the plurality of pieces of level information includes:

acquiring level information of a target contact connected to the switching module in a switched-off state and the two second contacts B0 when the first switching module 130 or the second switching module 140 is switched on, the target contact being the first contact A0 or the third contact C0; and

determining a type of the atomizer 200, an insertion state of the atomizer 200, and an insertion direction of the atomizer 200 according to the level information of the target contact and the two second contacts B0.

[0069] In this embodiment, when the first switching module 130 is switched on, the first contact A0 is at a low level, and the levels of the two second contacts B0 and the third contact C0 may be in different level states based on different types of atomizers 200 that are inserted, may be in different level states based on whether the atomizer 200 is normally inserted, and may be in different level states when the double-chamber atomizer 220 is inserted in different insertion directions. Alternatively, when the second switching module 140 is switched on, the third contact C0 is at a low level, and the levels of the first contact A0 and the two second contacts B0 may be in different level states based on different types of atomizers 200 that are inserted, may be in different level states based on whether the atomizer 200 is normally inserted, and may be in different level states when the double-chamber atomizer 220 is inserted in different insertion directions.

[0070] Therefore, to obtain corresponding level information, the controller first controls one switching module in the first switching module 130 and the second switching module 140 to be switched on and the other switching module to be switched off, and acquires level information of a target contact connected to the switching module that is switched off and

the two second contacts B0, so as to determine the connection state of the corresponding contact to determine a type, an insertion state, and an insertion direction of the atomizer 200.

[0071] Further, for ease of distinguishing between high and low levels, in an optional embodiment, the two second contacts B0 are both connected to the power supply 190 of the atomization power supply device 100 through a pull-up resistor. For example, as shown in FIG. 14, the first pin contact B01 is connected to the power supply 190 of the atomization power supply device 100 through a third pull-up resistor R13, and the power supply 190 provides a positive voltage. Alternatively, as shown in FIG. 15, the second pin contact B02 is connected to the power supply 190 of the atomization power supply device 100 through a fourth pull-up resistor R14.

[0072] Correspondingly, based on the four-contact structure, the controller may determine a type, an insertion direction, and an insertion state of the atomizer 200 based on the level information of the target contact and the two second contacts B0. In an optional embodiment, when the target contact is at a low level and the two second contacts B0 are at a high level, it is determined that the type of the atomizer 200 is the single-chamber atomizer 210.

[0073] When the target contact and a first one of the second contacts B0 are at a low level, it is determined that the type of the atomizer 200 is the double-chamber atomizer 220, and the double-chamber atomizer 220 is in a forward insertion state.

[0074] When the target contact and a second one of the second contacts B0 are at a low level, it is determined that the type of the atomizer 200 is the double-chamber atomizer 220, and the double-chamber atomizer 220 is in an inverse insertion state.

[0075] When the target contact and the two second contacts B0 both are at a high level, it is determined that no atomizer 200 is inserted; and when the two contacts both are at a low level, it is determined that the inserted atomizer 200 is faulty.

[0076] Referring to the following Table 3, the first one of the second contacts B0 is used as the first pin contact B01, and the second one of the second contacts B0 is used as the second pin contact B02. It is assumed that the second switching module 140 is controlled to be switched on, the first switching module 130 is controlled to be switched off, and correspondingly, the target contact is the first contact A0 connected to the first switching module 130. When the single-chamber atomizer 210 is inserted into the atomization power supply device 100, as shown in FIG. 11, in this case, the first contact A0 is connected to the fourth contact A1 of the single-chamber atomizer 210, the third contact C0 is connected to the fifth contact C1 of the single-chamber atomizer 210, and the two second contacts B0 are not connected. In this case, the low level of the third contact C0 may be transmitted to the first contact A0 through the first heating element R01, the first contact A0 may be at a low level, and the two second contacts B0 may be at a high level due to the existence of a pull-up resistor. Therefore, it may be determined that the connection state of the first contact A0 and the third contact C0 is connection to the single-chamber atomizer 210, and the type of the inserted atomizer 200 is the single-chamber atomizer 210.

[0077] Moreover, when the double-chamber atomizer 220 is inserted into the atomization power supply device 100 and is in a forward insertion state, the first contact A0 is connected to the sixth contact A2 of the double-chamber atomizer 220, the first pin contact B01 is connected to the seventh contact B1 of the double-chamber atomizer 220, the second pin contact B02 is not connected, and the third contact C0 is connected to the eighth contact C2 of the double-chamber atomizer 220. In this case, the low level of the third contact C0 may be transmitted to the first contact A0 through the second heating element R02 and transmitted to the first pin contact B01 through the third heating element R03, the first contact A0 and the first pin contact B01 may both be at a low level, and the second pin contact B02 is at a high level. It may be determined that the connection state of the first contact A0, the first pin contact B01, and the third contact C0 is connection to the double-chamber atomizer 220, and the insertion direction is a forward insertion direction.

[0078] When the double-chamber atomizer 220 is inserted into the atomization power supply device 100 and is in an inverse insertion state, the first contact A0 is connected to the sixth contact A2 of the double-chamber atomizer 220, the second pin contact B02 is connected to the seventh contact B1 of the double-chamber atomizer 220, the first pin contact B01 is not connected, and the third contact C0 is connected to the eighth contact C2 of the double-chamber atomizer 220. In this case, the low level of the third contact C0 may be transmitted to the first contact A0 through the second heating element R02 and transmitted to the second pin contact B02 through the third heating element R03, the first contact A0 and the second pin contact B02 may both be at a low level, and the first pin contact B01 is at a high level. It may be determined that the connection state of the first contact A0, the first pin contact B01, and the third contact C0 is connection to the double-chamber atomizer 220, and the insertion direction is an inverse insertion direction.

[0079] Moreover, when no atomizer 200 is inserted, there is no level transmission path between the first contact A0 and the third contact C0, and there is no level transmission path between the two second contacts B0 and the third contact C0. In this case, the first contact A0 and the second contacts B0 may both be at a high level due to the existence of a pull-up resistor. It may be determined that the connection state of the first contact A0, the two second contacts B0, and the third contact C0 is no connection to the atomizer 200.

[0080] Moreover, when a faulty atomizer 200 is inserted, the first contact A0 may be in a high-resistance state or another state, and the two second contacts B0 may be at a low level. In this case, it may be determined that the connection state of the first contact A0, the second contacts B0, and the third contact C0 is connection to the faulty atomizer 200.

Table 3

Step	State of first switching module	State of second switching module	Level of contact B01	Level of contact B02	Level of contact A0	Detection result
1	Switched off	Switched on	H	H	L	Single-chamber atomizer
2	Switched off	Switched on	L	H	L	Forward insertion of double-chamber atomizer
3	Switched off	Switched on	H	L	L	Inverse insertion of double-chamber atomizer
4	Switched off	Switched on	H	H	H	No atomizer
5	Switched off	Switched on	L	L	X	Atomizer fault

[0081] Alternatively, referring to the following Table 4, it is assumed that the first switching module 130 is controlled to be switched on, the second switching module 140 is controlled to be switched off, and correspondingly, the target contact is the third contact C0 connected to the second switching module 140. When the single-chamber atomizer 210 is inserted into the atomization power supply device 100, as shown in FIG. 11, in this case, the first contact A0 is connected to the fourth contact A1 of the single-chamber atomizer 210, the third contact C0 is connected to the fifth contact C1 of the single-chamber atomizer 210, the two second contacts B0 are not connected, the low level of the first contact A0 may be transmitted to the third contact C0 through the first heating element R01, the third contact C0 may be at a low level, and the two second contacts B0 may be at a high level due to the existence of a pull-up resistor. Therefore, it may be determined that the connection state of the first contact A0 and the third contact C0 is connection to the single-chamber atomizer 210, and the type of the inserted atomizer 200 is the single-chamber atomizer 210.

[0082] Moreover, when the double-chamber atomizer 220 is inserted into the atomization power supply device 100 and is in a forward insertion state, the first contact A0 is connected to the sixth contact A2 of the double-chamber atomizer 220, the first pin contact B01 is connected to the seventh contact B1 of the double-chamber atomizer 220, the second pin contact B02 is not connected, and the third contact C0 is connected to the eighth contact C2 of the double-chamber atomizer 220. In this case, the low level of the first contact A0 may be transmitted to the third contact C0 through the second heating element R02 and transmitted to the first pin contact B01 through the third heating element R03, the third contact C0 and the first pin contact B01 may both be at a low level, and the second pin contact B02 is at a high level. It may be determined that the connection state of the first contact A0, the first pin contact B01, and the third contact C0 is connection to the double-chamber atomizer 220, and the insertion direction is a forward insertion direction.

[0083] When the double-chamber atomizer 220 is inserted into the atomization power supply device 100 and is in an inverse insertion state, the first contact A0 is connected to the sixth contact A2 of the double-chamber atomizer 220, the second pin contact B02 is connected to the seventh contact B1 of the double-chamber atomizer 220, the first pin contact B01 is not connected, and the third contact C0 is connected to the eighth contact C2 of the double-chamber atomizer 220. In this case, the low level of the first contact A0 may be transmitted to the third contact C0 through the second heating element R02 and transmitted to the second pin contact B02 through the third heating element R03, the first contact A0 and the second pin contact B02 may both be at a low level, and the first pin contact B01 is at a high level. It may be determined that the connection state of the first contact A0, the first pin contact B01, and the third contact C0 is connection to the double-chamber atomizer 220, and the insertion direction is an inverse insertion direction.

[0084] Moreover, when no atomizer 200 is inserted, there is no level transmission path between the first contact A0 and the third contact C0, and there is no level transmission path between the second contact B0 and the third contact C0. In this case, the third contact C0 and the second contact B0 may both be at a high level due to the existence of a pull-up resistor. It may be determined that the connection state of the first contact A0, the second contact B0, and the third contact C0 is no connection to the atomizer 200.

[0085] Moreover, when a faulty atomizer 200 is inserted, the third contact C0 may be in a high-resistance state or another state, and the second contact B0 may be at a low level. In this case, it may be determined that the connection state of the first contact A0, the second contact B0, and the third contact C0 is connection to the faulty atomizer 200.

Table 4

Step	State of first switching module	State of second switching module	Level of contact B01	Level of contact B02	Level of contact C0	Detection result
1	Switched on	Switched off	H	H	L	Single-chamber atomizer

(continued)

Step	State of first switching module	State of second switching module	Level of contact B01	Level of contact B02	Level of contact C0	Detection result
2	Switched on	Switched off	L	H	L	Forward insertion of double-chamber atomizer
3	Switched on	Switched off	H	L	L	Inverse insertion of double-chamber atomizer
4	Switched on	Switched off	H	H	H	No atomizer
5	Switched on	Switched off	L	L	X	Atomizer fault

[0086] In an optional embodiment, when it is determined that the type of the atomizer 200 is the single-chamber atomizer 210, the controller 110 may control the atomization power supply device 100 to output the power to the single-chamber atomizer 210 through the first contact A0 and the third contact C0. One of the first contact A0 and the third contact C0 outputs the power, and the other contact is grounded, so as to form a current loop through the first heating element R01. After receiving the power, the first heating element R01 generates heat, and heats the aerosol generating substrate of the atomization component inside the single-chamber atomizer 210, thereby generating an aerosol.

[0087] When it is determined that the type of the atomizer 200 is the double-chamber atomizer 220 and the double-chamber atomizer 220 is in a forward insertion state, the controller 110 may control the atomization power supply device 100 to separately supply power to two heating elements of the external atomizer 200 through the first contact A0 and the third contact C0 as well as the third contact C0 and the first one of the second contacts B0. The first contact A0, the sixth contact A2, the second heating element R02, the eighth contact C2, and the third contact C0 are sequentially connected and form a current loop, and the first pin contact B01, the seventh contact B1, the third heating element R03, the eighth contact C2, and the third contact C0 are sequentially connected and form another current loop. After receiving the power, the second heating element R02 and the third heating element R03 generate heat, and respectively heat the aerosol generating substrates of the atomization components inside the double-chamber atomizer 220, thereby generating an aerosol. Meanwhile, when the double-chamber atomizer 220 is forward inserted, the controller further controls the first switching module 130 to be switched off, and controls the second switching module 140 to be switched on, and the third contact C0 is grounded.

[0088] When it is determined that the type of the atomizer 200 is the double-chamber atomizer 220 and the double-chamber atomizer 220 is in an inverse insertion state, the controller 110 may control the atomization power supply device 100 to respectively supply power to two heating elements of the external atomizer 200 through the first contact A0 and the third contact C0 as well as the first contact A0 and the second one of the second contacts B0. The first contact A0, the sixth contact A2, the second heating element R02, the eighth contact C2, and the third contact C0 are sequentially connected and form a current loop, and the second pin contact B02, the seventh contact B1, the third heating element R03, the eighth contact C2, and the first contact A0 are sequentially connected and form another current loop. After receiving the power, the second heating element R02 and the third heating element R03 generate heat, and respectively heat the aerosol generating substrates of the atomization components inside the double-chamber atomizer 220, thereby generating an aerosol. Meanwhile, when the double-chamber atomizer 220 is inversely inserted, the controller further controls the second switching module 140 to be switched off, and controls the first switching module 130 to be switched on, and the first contact A0 is grounded.

[0089] The atomization power supply device 100 further includes a first power supply circuit 150, a second power supply circuit 160, a third power supply circuit 170, and a fourth power supply circuit 180. The first power supply circuit 150 is connected between the power supply 190 and the first contact A0. The second power supply circuit 160 is connected between the third contact C0 and the power supply 190. The third power supply circuit 170 is connected between the power supply 190 and the first pin contact B01. The fourth power supply circuit 180 is connected between the power supply 190 and the second pin contact B02.

[0090] As shown in FIG. 12, the first power supply circuit 150 includes a first resistor R1, a second resistor R2, and a first electronic switching tube Q1. The first end of the second resistor R2 is configured to input a first power supply control signal PWM1. The second end of the second resistor R2 and the first end of the first resistor R1 are connected to the control end of the first electronic switching tube Q1. The second end of the first resistor R1 and the first end of the first electronic switching tube Q1 are connected to the power supply 190. The second end of the first electronic switching tube Q1 is connected to the first contact A0.

[0091] The first switching module 130 includes a ninth resistor R9 and a fifth electronic switching tube Qa. The first end of the ninth resistor R9 is connected to the control end of the fifth electronic switching tube Qa and is configured to input a first

switching signal Ctrl. The second end of the ninth resistor R9 and the second end of the fifth electronic switching tube Qa are grounded. The first end of the fifth electronic switching tube Qa is connected to the first contact A0.

[0092] As shown in FIG. 13, the second power supply circuit 160 includes a third resistor R3, a fourth resistor R4, and a second electronic switching tube Q2. The first end of the fourth resistor R4 is configured to input a second power supply control signal PWM2. The second end of the fourth resistor R4 and the first end of the third resistor R3 are connected to the control end of the second electronic switching tube Q2. The second end of the third resistor R3 and the first end of the second electronic switching tube Q2 are connected to the power supply 190. The second end of the second electronic switching tube Q2 is connected to the third contact C0.

[0093] The second switching module 140 includes a tenth resistor R10 and a sixth electronic switching tube Qc. The first end of the tenth resistor R10 is connected to the control end of the sixth electronic switching tube Qc and is configured to input a second switching signal Ctr2. The second end of the tenth resistor R10 and the second end of the sixth electronic switching tube Qc are grounded. The first end of the sixth electronic switching tube Qc is connected to the third contact C0.

[0094] As shown in FIG. 14, the third power supply circuit 170 includes a fifth resistor R5, a sixth resistor R6, and a third electronic switching tube Q3. The first end of the sixth resistor R6 is configured to input a third power supply control signal PWM3. The second end of the sixth resistor R6 and the first end of the fifth resistor R5 are connected to the control end of the third electronic switching tube Q3. The second end of the fifth resistor R5 and the first end of the third electronic switching tube Q3 are connected to the power supply 190. The second end of the third electronic switching tube Q3 is connected to the first pin contact B01.

[0095] As shown in FIG. 15, the fourth power supply circuit 180 includes a fifth resistor R7, an eighth resistor R8, and a fourth electronic switching tube Q4. The first end of the eighth resistor R8 is configured to input a second power supply control signal PWM4. The second end of the eighth resistor R8 and the first end of the fifth resistor R7 are connected to the control end of the fourth electronic switching tube Q4. The second end of the fifth resistor R7 and the first end of the fourth electronic switching tube Q4 are connected to the power supply 190. The second end of the fourth electronic switching tube Q4 is connected to the second pin contact B02.

[0096] The first switching module 130, the second switching module 140, the first power supply circuit 150, the second power supply circuit 160, the third power supply circuit 170, and the fourth power supply circuit 180 are separately connected to the controller 110. The controller 110 separately outputs corresponding switching signals and power supply control signals to implement level information detection and power supply output of contacts.

[0097] Referring to the following Table 5, it is assumed that the controller 110 controls the second switching module 140 to be switched on and the first switching module 130 to be switched off. In this case, the fifth electronic switching tube Qa is switched off, and the sixth electronic switching tube Qc is switched on. In addition, the controller 110 controls the four power supply circuits to be switched off, that is, controls the first electronic switching tube Q1, the second electronic switching tube Q2, the third electronic switching tube Q3, and the fourth electronic switching tube Q4 to be switched off. Correspondingly, the target contact is the first contact A0 connected to the first switching module 130. When the single-chamber atomizer 210 is inserted into the atomization power supply device 100, as shown in FIG. 11, in this case, the first contact A0 is connected to the fourth contact A1 of the single-chamber atomizer 210, the third contact C0 is connected to the fifth contact C1 of the single-chamber atomizer 210, and the two second contacts B0 are not connected. In this case, the low level of the third contact C0 may be transmitted to the first contact A0 through the first heating element R01, the first contact A0 may be at a low level, and the two second contacts B0 may be at a high level due to the existence of a pull-up resistor. Therefore, it may be determined that the connection state of the first contact A0 and the third contact C0 is connection to the single-chamber atomizer 210, and the type of the inserted atomizer 200 is the single-chamber atomizer 210.

[0098] Moreover, when the double-chamber atomizer 220 is inserted into the atomization power supply device 100 and is in a forward insertion state, the first contact A0 is connected to the sixth contact A2 of the double-chamber atomizer 220, the first pin contact B01 is connected to the seventh contact B1 of the double-chamber atomizer 220, the second pin contact B02 is not connected, and the third contact C0 is connected to the eighth contact C2 of the double-chamber atomizer 220. In this case, the low level of the third contact C0 may be transmitted to the first contact A0 through the second heating element R02 and transmitted to the first pin contact B01 through the third heating element R03, the first contact A0 and the first pin contact B01 may both be at a low level, and the second pin contact B02 is at a high level. It may be determined that the connection state of the first contact A0, the first pin contact B01, and the third contact C0 is connection to the double-chamber atomizer 220, and the insertion direction is a forward insertion direction.

[0099] When the double-chamber atomizer 220 is inserted into the atomization power supply device 100 and is in an inverse insertion state, the first contact A0 is connected to the sixth contact A2 of the double-chamber atomizer 220, the second pin contact B02 is connected to the seventh contact B1 of the double-chamber atomizer 220, the first pin contact B01 is not connected, and the third contact C0 is connected to the eighth contact C2 of the double-chamber atomizer 220. In this case, the low level of the third contact C0 may be transmitted to the first contact A0 through the second heating element R02 and transmitted to the second pin contact B02 through the third heating element R03, the first contact A0 and the second pin contact B02 may both be at a low level, and the first pin contact B01 is at a high level. It may be determined that the connection state of the first contact A0, the first pin contact B01, and the third contact C0 is connection to the

double-chamber atomizer 220, and the insertion direction is an inverse insertion direction.

[0100] Moreover, when no atomizer 200 is inserted, there is no level transmission path between the first contact A0 and the third contact C0, and there is no level transmission path between the two second contacts B0 and the third contact C0. In this case, the first contact A0 and the second contacts B0 may both be at a high level due to the existence of a pull-up resistor. It may be determined that the connection state of the first contact A0, the two second contacts B0, and the third contact C0 is no connection to the atomizer 200.

[0101] Moreover, when a faulty atomizer 200 is inserted, the first contact A0 may be in a high-resistance state or another state, and the two second contacts B0 may be at a low level. In this case, it may be determined that the connection state of the first contact A0, the second contacts B0, and the third contact C0 is connection to the faulty atomizer 200.

Table 5

Step	State of Qa	State of Qc	Level of contact B01	Level of contact B02	Level of contact A0	Detection result
1	Switched off	Switched on	H	H	L	Single-chamber atomizer
2	Switched off	Switched on	L	H	L	Forward insertion of double-chamber atomizer
3	Switched off	Switched on	H	L	L	Inverse insertion of double-chamber atomizer
4	Switched off	Switched on	H	H	H	No atomizer
5	Switched off	Switched on	L	L	X	Atomizer fault

[0102] When it is determined that the type of the atomizer 200 is the single-chamber atomizer 210, the controller 110 may control one of the fifth electronic switching tube Qa and the sixth electronic switching tube Qc to be switched off and the other to be switched on, and control the corresponding power supply circuit to be switched on. For example, the controller 110 may control the fifth electronic switching tube Qa to be switched off, the sixth electronic switching tube Qc to be switched on, and the third contact C0 to be grounded, and output the first power supply control signal PWM1 to the first electronic switching tube Q1. The first power supply circuit 150 outputs the power to the first contact A0, and a current loop is formed through the single-chamber atomizer 210. After receiving the power, the first heating element R01 generates heat, and heats the aerosol generating substrate of the atomization component inside the single-chamber atomizer 210, so as to generate an aerosol.

[0103] When it is determined that the type of the atomizer 200 is the double-chamber atomizer 220 and the double-chamber atomizer 220 is in a forward insertion state, the controller 110 may control the fifth electronic switching tube Qa to be switched off, the sixth electronic switching tube Qc to be switched on, and the third contact C0 to be grounded, output the second power supply control signal PWM2 to the second electronic switching tube Q2, and output the third power supply control signal PWM3 to the third electronic switching tube Q3. The third power supply circuit 170 and the fourth power supply circuit 180 respectively supply power to two heating elements of the external atomizer 200 through the first contact A0 and the third contact C0 as well as the third contact C0 and the first one of the second contacts B0. The first contact A0, the sixth contact A2, the second heating element R02, the eighth contact C2, and the third contact C0 are sequentially connected and form a current loop, and the first pin contact B01, the seventh contact B1, the third heating element R03, the eighth contact C2, and the third contact C0 are sequentially connected and form another current loop. After receiving the power, the second heating element R02 and the third heating element R03 generate heat, and respectively heat the aerosol generating substrates of the atomization components inside the double-chamber atomizer 220, thereby generating an aerosol.

[0104] When it is determined that the type of the atomizer 200 is the double-chamber atomizer 220 and the double-chamber atomizer 220 is in an inverse insertion state, the controller 110 may control the fifth electronic switching tube Qa to be switched on, the sixth electronic switching tube Qc to be switched off, and the first contact A0 to be grounded, output the second power supply control signal PWM2 to the second electronic switching tube Q2, and output the third power supply control signal PWM3 to the third electronic switching tube Q3. The third power supply circuit 170 and the fourth power supply circuit 180 respectively supply power to two heating elements of the external atomizer 200 through the first contact A0 and the third contact C0 as well as the first contact A0 and the second one of the second contacts B0. The first contact A0, the sixth contact A2, the second heating element R02, the eighth contact C2, and the third contact C0 are sequentially connected and form a current loop, and the second pin contact B02, the seventh contact B1, the third heating element R03,

the eighth contact C2, and the first contact A0 are sequentially connected and form another current loop. After receiving the power, the second heating element R02 and the third heating element R03 generate heat, and respectively heat the aerosol generating substrates of the atomization components inside the double-chamber atomizer 220, thereby generating an aerosol.

[0105] A second aspect of embodiments of the present invention provides an atomization device. As shown in FIG. 1, the atomization device includes an atomizer 200 and the above atomization power supply device 100. For a specific structure of the atomization power supply device 100, reference is made to the above embodiments. Because the atomization device uses all technical solutions of all the above embodiments, the atomization device has at least all beneficial effects brought by the technical solutions of the above embodiments, and details are not described herein again. As shown in FIG. 10 and FIG. 11, a plurality of contacts of the atomization power supply device 100 include a first contact A0, a third contact C0, and two second contacts B0, and the first contact A0 and the third contact C0 are symmetrically disposed about a connection line between the two second contacts B0.

[0106] When the type of the atomizer 200 is the single-chamber atomizer 210, power is supplied to the external atomizer 200 through the first contact A0 and the third contact C0.

[0107] When the type of the atomizer 200 is the double-chamber atomizer 220 and the double-chamber atomizer 220 is in a forward insertion state, power is supplied separately to two heating elements of the external atomizer 200 through the first contact A0 and the third contact C0 as well as the third contact C0 and the first one of the second contacts B0.

[0108] When the type of the atomizer 200 is the double-chamber atomizer 220 and the double-chamber atomizer 220 is in an inverse insertion state, power is supplied separately to two heating elements of the external atomizer 200 through the first contact A0 and the third contact C0 as well as the first contact A0 and the second one of the second contacts B0.

[0109] In this embodiment, the atomization power supply device 100 further includes a first switching module 130 and a second switching module 140. The first switching module 130 is connected between the ground terminal and the first contact A0. The second switching module 140 is connected between the ground terminal and the third contact C0. When the first switching module 130 or the second switching module 140 is switched on, the controller 110 acquires level information of a target contact connected to the switching module in a switched-off state and two second contacts B0, and determines a type, an insertion state, and an insertion direction of the atomizer 200 according to the level information of the target contact and the second contacts B0.

[0110] When it is determined that the type of the atomizer 200 is the single-chamber atomizer 210, the controller 110 may control the atomization power supply device 100 to output the power to the single-chamber atomizer 210 through the first contact A0 and the third contact C0. One of the first contact A0 and the third contact C0 outputs the power, and the other contact is grounded, so as to form a current loop through the first heating element R01. After receiving the power, the first heating element R01 generates heat, and heats the aerosol generating substrate of the atomization component inside the single-chamber atomizer 210, thereby generating an aerosol.

[0111] When it is determined that the type of the atomizer 200 is the double-chamber atomizer 220 and the double-chamber atomizer 220 is in a forward insertion state, the controller 110 may control the atomization power supply device 100 to separately supply power to two heating elements of the external atomizer 200 through the first contact A0 and the third contact C0 as well as the third contact C0 and the first one of the second contacts B0. The first contact A0, the sixth contact A2, the second heating element R02, the eighth contact C2, and the third contact C0 are sequentially connected and form a current loop, and the first pin contact B01, the seventh contact B1, the third heating element R03, the eighth contact C2, and the third contact C0 are sequentially connected and form another current loop. After receiving the power, the second heating element R02 and the third heating element R03 generate heat, and respectively heat the aerosol generating substrates of the atomization components inside the double-chamber atomizer 220, thereby generating an aerosol. Meanwhile, when the double-chamber atomizer 220 is forward inserted, the controller further controls the first switching module 130 to be switched off, and controls the second switching module 140 to be switched on, and the third contact C0 is grounded.

[0112] When it is determined that the type of the atomizer 200 is the double-chamber atomizer 220 and the double-chamber atomizer 220 is in an inverse insertion state, the controller 110 may control the atomization power supply device 100 to respectively supply power to two heating elements of the external atomizer 200 through the first contact A0 and the third contact C0 as well as the first contact A0 and the second one of the second contacts B0. The first contact A0, the sixth contact A2, the second heating element R02, the eighth contact C2, and the third contact C0 are sequentially connected and form a current loop, and the second pin contact B02, the seventh contact B1, the third heating element R03, the eighth contact C2, and the first contact A0 are sequentially connected and form another current loop. After receiving the power, the second heating element R02 and the third heating element R03 generate heat, and respectively heat the aerosol generating substrates of the atomization components inside the double-chamber atomizer 220, thereby generating an aerosol. Meanwhile, when the double-chamber atomizer 220 is inversely inserted, the controller further controls the second switching module 140 to be switched off, and controls the first switching module 130 to be switched on, and the first contact A0 is grounded.

[0113] As shown in FIG. 16, a third aspect of embodiments of the present invention provides an atomization device

power supply circuit 10, including a plurality of contacts, a controller 110, a first switching module 130, a second switching module 140, and a power supply 190. The plurality of contacts include a first contact A0, a third contact C0, and two second contacts B0, and the first contact A0 and the third contact C0 are symmetrically disposed about a connection line between the two second contacts B0.

[0114] The controller 110 is configured to:

control the first contact A0 and the ground terminal to be switched on or switched off by controlling the switching-on or switching-off of the first switching module 130, and/or control the third contact C0 and the ground terminal to be switched on or switched off by controlling the switching-on or switching-off of the second switching module 140; supply power to the external single-chamber atomizer 210 through the first contact A0 and the third contact C0; or separately supply power to two heating elements of the external atomizer 200 through the first contact A0 and the third contact C0 as well as the third contact C0 and the first one of the second contacts B0; or separately supply power to two heating elements of the external atomizer 200 through the first contact A0 and the third contact C0 as well as the first contact A0 and the second one of the second contacts B0.

[0115] In this embodiment, the atomization device power supply circuit 10 is disposed in the atomization device, and recognizes and supplies power to the inserted atomizer 200.

[0116] The controller 110 first recognizes the atomizer 200, controls one of the first switching module 130 and the second switching module 140 to be switched on and the other to be switched off, acquires level information of a target contact connected to the switching module in a switched-off state and two second contacts B0, and determines a type, an insertion state, and an insertion direction of the atomizer 200 according to the level information of the target contact and the second contacts B0.

[0117] When it is determined that the type of the atomizer 200 is the single-chamber atomizer 210, the controller 110 may control the power supply 190 to output the power to the single-chamber atomizer 210 through the first contact A0 and the third contact C0. One of the first contact A0 and the third contact C0 outputs the power, and the other contact is grounded, so as to form a current loop through the first heating element R01. After receiving the power, the first heating element R01 generates heat, and heats the aerosol generating substrate of the atomization component inside the single-chamber atomizer 210, thereby generating an aerosol.

[0118] When it is determined that the type of the atomizer 200 is the double-chamber atomizer 220 and the double-chamber atomizer 220 is in a forward insertion state, the controller 110 may control the power supply 190 to separately supply power to two heating elements of the external atomizer 200 through the first contact A0 and the third contact C0 as well as the third contact C0 and the first one of the second contacts B0. The first contact A0, the sixth contact A2, the second heating element R02, the eighth contact C2, and the third contact C0 are sequentially connected and form a current loop, and the first pin contact B01, the seventh contact B1, the third heating element R03, the eighth contact C2, and the third contact C0 are sequentially connected and form another current loop. After receiving the power, the second heating element R02 and the third heating element R03 generate heat, and respectively heat the aerosol generating substrates of the atomization components inside the double-chamber atomizer 220, thereby generating an aerosol. Meanwhile, when the double-chamber atomizer 220 is forward inserted, the controller further controls the first switching module 130 to be switched off, and controls the second switching module 140 to be switched on, and the third contact C0 is grounded.

[0119] When it is determined that the type of the atomizer 200 is the double-chamber atomizer 220 and the double-chamber atomizer 220 is in an inverse insertion state, the controller 110 may control the power supply 190 to respectively supply power to two heating elements of the external atomizer 200 through the first contact A0 and the third contact C0 as well as the first contact A0 and the second one of the second contacts B0. The first contact A0, the sixth contact A2, the second heating element R02, the eighth contact C2, and the third contact C0 are sequentially connected and form a current loop, and the second pin contact B02, the seventh contact B1, the third heating element R03, the eighth contact C2, and the first contact A0 are sequentially connected and form another current loop. After receiving the power, the second heating element R02 and the third heating element R03 generate heat, and respectively heat the aerosol generating substrates of the atomization components inside the double-chamber atomizer 220, thereby generating an aerosol. Meanwhile, when the double-chamber atomizer 220 is inversely inserted, the controller further controls the second switching module 140 to be switched off, and controls the first switching module 130 to be switched on, and the first contact A0 is grounded.

[0120] The above embodiments are merely intended for describing the technical solutions of the present invention, but not for limiting the present invention. Although the present invention is described in detail with reference to the above embodiments, those of ordinary skill in the art should understand that they may still make modifications to the technical solutions described in the above embodiments or make equivalent replacements to some technical features thereof.

Claims

1. An atomization power supply device (100), comprising:

a plurality of contacts, the contacts being configured to connect to an external atomizer (200) and supply power; and
a controller (110) and a memory (120), the memory (120) storing a computer program, and the computer program, when executed by the controller (110), causing the controller (110) to perform the following steps:

acquiring a plurality of pieces of level information of the plurality of contacts;
determining a connection state of a corresponding contact according to the plurality of pieces of level information; and
supplying power to the corresponding atomizer (200) through the corresponding contact according to the connection state.

2. The atomization power supply device (100) of claim 1, wherein the supplying power to the corresponding atomizer (200) through the corresponding contact according to the connection state comprises:

skipping outputting power to the corresponding contact when it is determined that the corresponding atomizer (200) is abnormally connected to the contact according to the connection state; and
supplying power to the atomizer (200) through the corresponding contact when it is determined that the corresponding contact is normally connected to the atomizer (200) according to the connection state.

3. The atomization power supply device (100) of claim 1, wherein the connection state comprises a type and an insertion state of the atomizer (200) connected to the contact.

4. The atomization power supply device (100) of claim 3, wherein the plurality of contacts comprise a first contact (A0), a second contact (B0), and a third contact (C0), and the types of the atomizers (200) comprise single-chamber atomizers (210) and double-chamber atomizers (220);

the atomization power supply device (100) further comprises a first switching module (130) and a second switching module (140), the first switching module (130) being connected between a ground terminal and the first contact (A0), and the second switching module (140) being connected between the ground terminal and the third contact (C0); and

the determining a connection state of a corresponding contact according to the plurality of pieces of level information comprises:

acquiring level information of a target contact connected to the switching module in a switched-off state and the second contact (B0) when the first switching module (130) or the second switching module (140) is switched on, the target contact being the first contact (A0) or the third contact (C0); and
determining a type and an insertion state of the atomizer (200) according to the level information of the target contact and the second contact (B0).

5. The atomization power supply device (100) of claim 4, wherein the first contact (A0), the second contact (B0), and the third contact (C0) are connected to a power supply (190) of the atomization power supply device (100) through a pull-up resistor.

6. The atomization power supply device (100) of claim 5, wherein when the target contact is at a low level and the second contact (B0) is at a high level, it is determined that the type of the atomizer (200) is a single-chamber atomizer (210);

when the target contact and the second contact (B0) both are at a low level, it is determined that the type of the atomizer (200) is a double-chamber atomizer (220); and
when the target contact and the second contact (B0) both are at a high level, it is determined that no atomizer (200) is inserted.

7. The atomization power supply device (100) of claim 6, wherein when the type of the atomizer (200) is a single-chamber atomizer (210), power is supplied to an external atomizer (200) through the first contact (A0) and the third contact (C0); and

when the type of the atomizer (200) is a double-chamber atomizer (220), power is supplied separately to two heating elements of the external atomizer (200) through the first contact (A0) and the third contact (C0) as well as the second contact (B0) and the third contact (C0).

8. The atomization power supply device (100) of claim 6, wherein two second contacts (B0) are provided, and the first contact (A0) and the third contact (C0) are symmetrically disposed about a connection line between the two second contacts (B0).

9. The atomization power supply device (100) of claim 8, wherein the determining a connection state of a corresponding contact according to the plurality of pieces of level information comprises:

acquiring level information of a target contact connected to the switching module in a switched-off state and the two second contacts (B0) when the first switching module (130) or the second switching module (140) is switched on, the target contact being the first contact (A0) or the third contact (C0); and

determining a type of the atomizer (200), an insertion state of the atomizer (200), and an insertion direction of the atomizer (200) according to the level information of the target contact and the two second contacts (B0).

10. The atomization power supply device (100) of claim 9, wherein when the target contact is at a low level and the two second contacts (B0) are at a high level, it is determined that the type of the atomizer (200) is a single-chamber atomizer (210);

when the target contact and a first one of the second contacts (B0) are at a low level, it is determined that the type of the atomizer (200) is a double-chamber atomizer (220), and the double-chamber atomizer (220) is in a forward insertion state;

when the target contact and a second one of the second contacts (B0) are at a low level, it is determined that the type of the atomizer (200) is a double-chamber atomizer (220), and the double-chamber atomizer (220) is in an inverse insertion state;

when the target contact and the two second contacts (B0) both are at a high level, it is determined that no atomizer (200) is inserted; and

when the two contacts both are at a low level, it is determined that an inserted atomizer (200) is faulty.

11. The atomization power supply device (100) of claim 10, wherein when the type of the atomizer (200) is a single-chamber atomizer (210), power is supplied to an external atomizer (200) through the first contact (A0) and the third contact (C0); and

when the type of the atomizer (200) is a double-chamber atomizer (220) and the double-chamber atomizer (220) is in a forward insertion state, power is supplied separately to two heating elements of the external atomizer (200) through the first contact (A0) and the third contact (C0) as well as the third contact (C0) and a first one of the second contacts (B0); and

when the type of the atomizer (200) is a double-chamber atomizer (220) and the double-chamber atomizer (220) is in an inverse insertion state, power is supplied separately to two heating elements of the external atomizer (200) through the first contact (A0) and the third contact (C0) as well as the first contact (A0) and a second one of the second contacts (B0).

12. The atomization power supply device (100) of claim 5, wherein the resistance value of the pull-up resistor is greater than 5 times the resistance value of the atomizer (200).

13. An atomization device, comprising an atomizer (200) and the atomization power supply device (100) according to any one of claims 1 to 12, wherein a plurality of contacts of the atomization power supply device (100) comprise a first contact (A0), a third contact (C0), and two second contacts (B0), and the first contact (A0) and the third contact (C0) are symmetrically disposed about a connection line between the two second contacts (B0);

when the type of the atomizer (200) is a single-chamber atomizer (210), power is supplied to an external atomizer (200) through the first contact (A0) and the third contact (C0);

when the type of the atomizer (200) is a double-chamber atomizer (220) and the double-chamber atomizer (220) is in a forward insertion state, power is supplied separately to two heating elements of the external atomizer (200) through the first contact (A0) and the third contact (C0) as well as the third contact (C0) and a first one of the second contacts (B0); and

when the type of the atomizer (200) is a double-chamber atomizer (220) and the double-chamber atomizer (220) is in an inverse insertion state, power is supplied separately to two heating elements of the external atomizer (200) through the first contact (A0) and the third contact (C0) as well as the first contact (A0) and a second one of the second contacts (B0).

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14. An atomization device power supply circuit (10), comprising a plurality of contacts, a controller (110), a first switching module (130), a second switching module (140), and a power supply (190), wherein the plurality of contacts comprise a first contact (A0), a third contact (C0), and two second contacts (B0), and the first contact (A0) and the third contact (C0) are symmetrically disposed about a connection line between the two second contacts (B0); and
- 10 the controller (110) is configured to:

control the first contact (A0) and a ground terminal to be switched on or switched off by controlling the switching-on or switching-off of the first switching module (130), and/or control the third contact (C0) and the ground terminal to be switched on or switched off by controlling the switching-on or switching-off of the second switching module

15 (140);

supply power to an external single-chamber atomizer (210) through the first contact (A0) and the third contact (C0);

or separately supply power to two heating elements of the external atomizer (200) through the first contact (A0) and the third contact (C0) as well as the third contact (C0) and a first one of the second contacts (B0);

20 or separately supply power to two heating elements of the external atomizer (200) through the first contact (A0) and the third contact (C0) as well as the first contact (A0) and a second one of the second contacts (B0).

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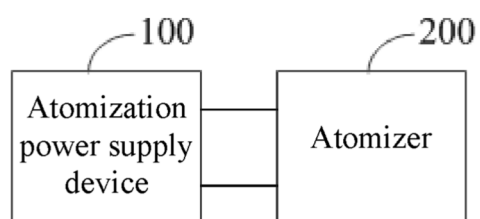


FIG. 1

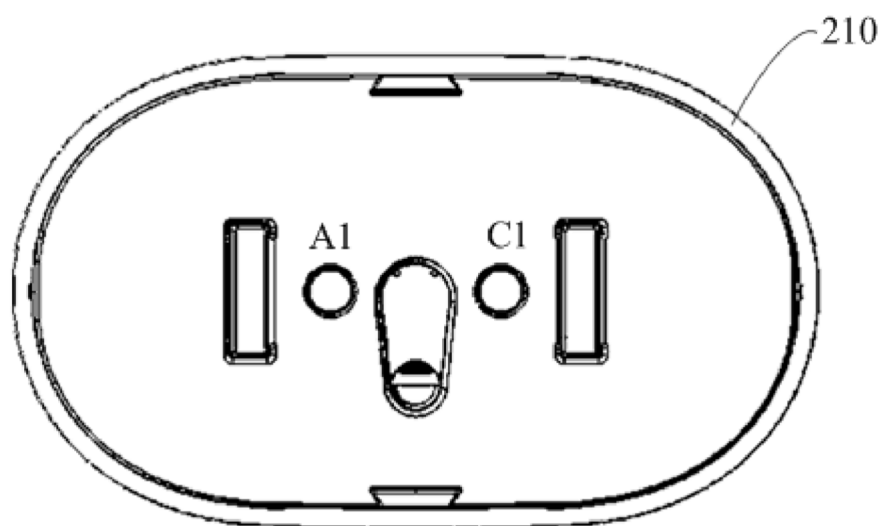


FIG. 2

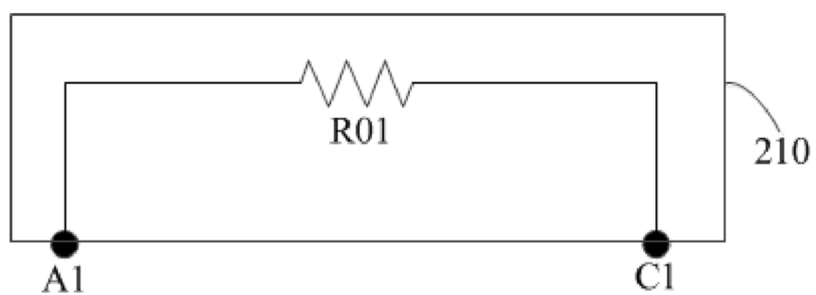


FIG. 3

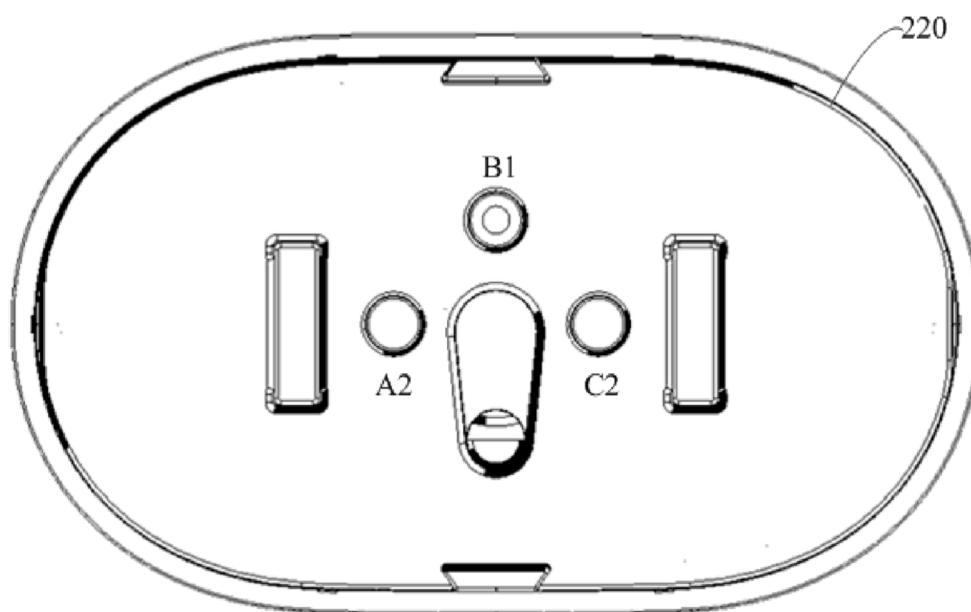


FIG. 4

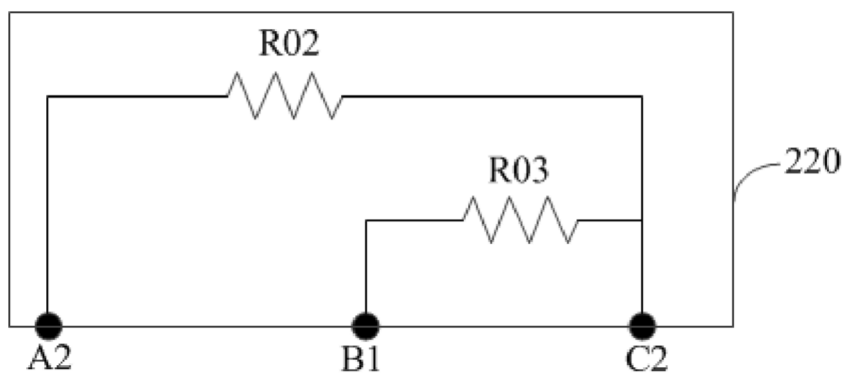


FIG. 5

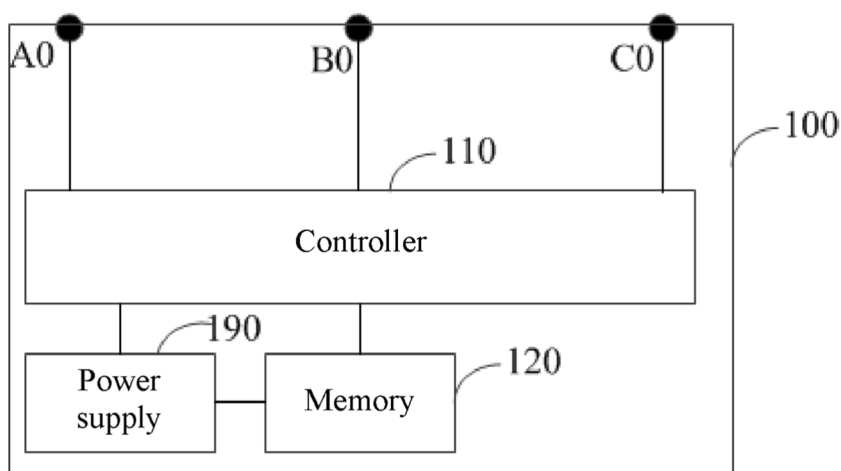


FIG. 6

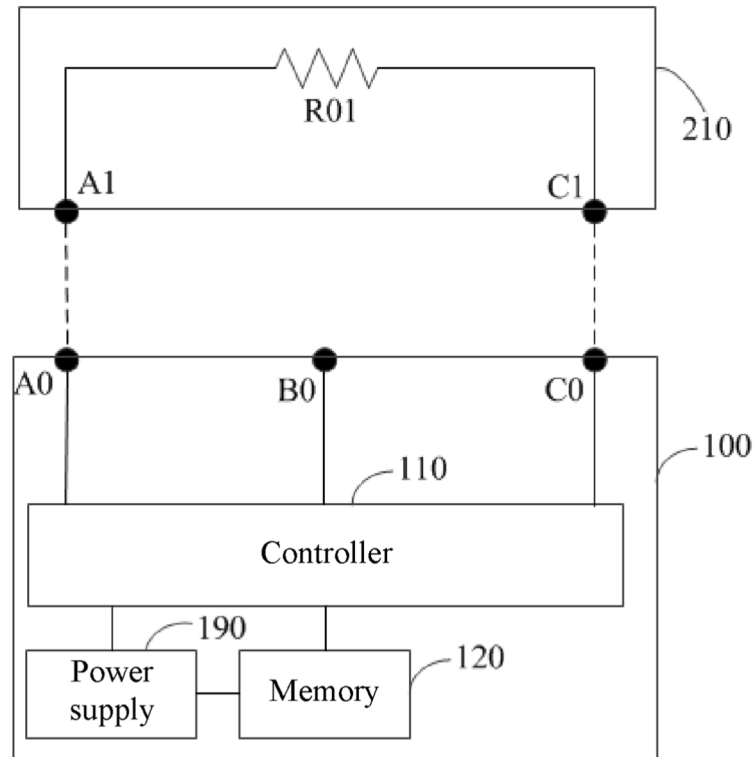


FIG. 7

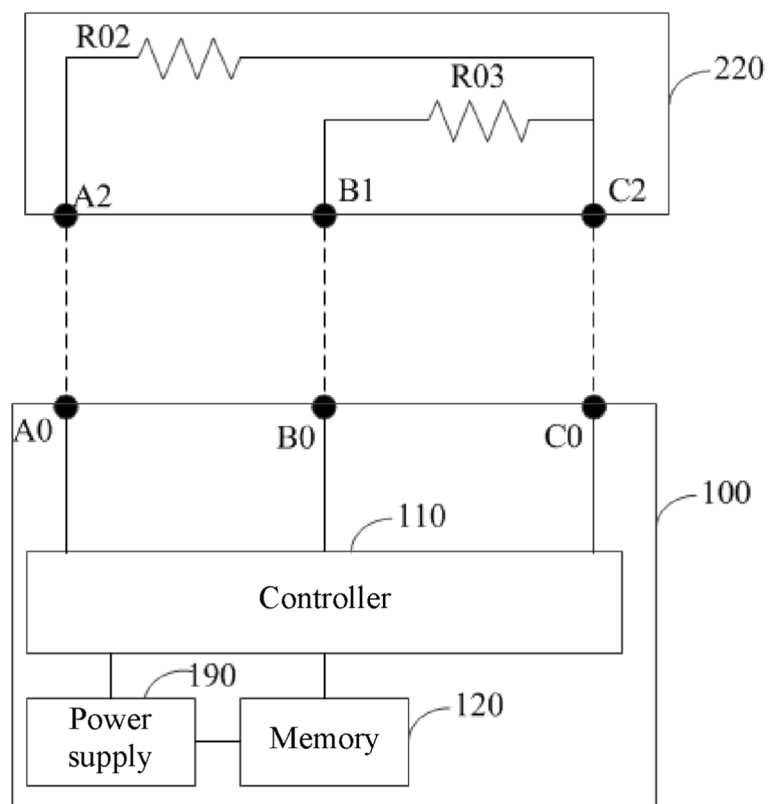


FIG. 8

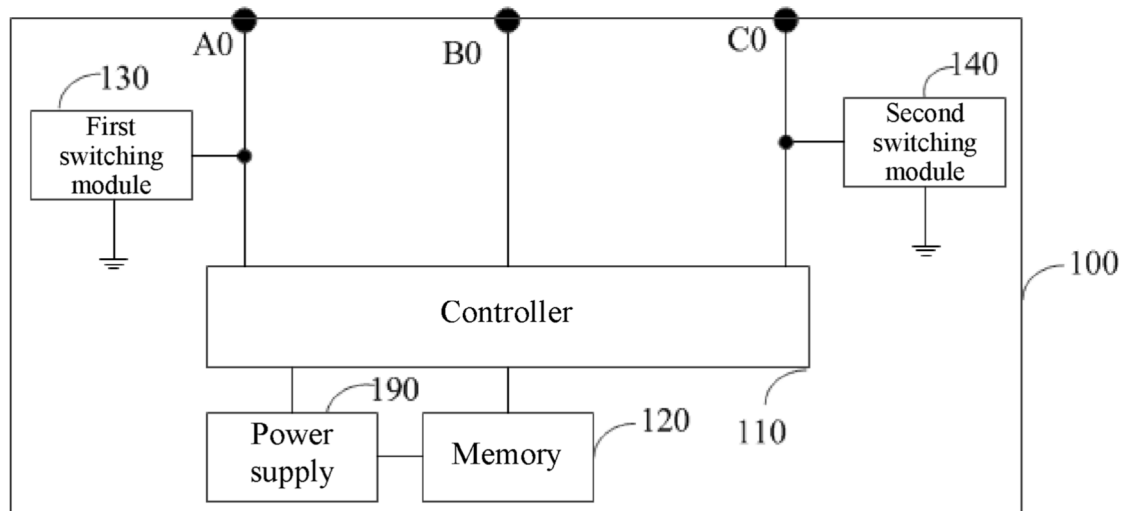


FIG. 9

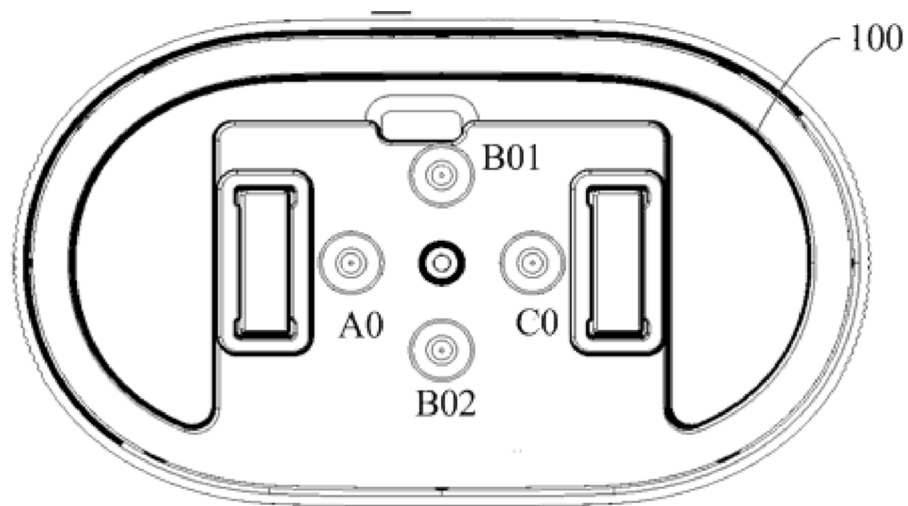


FIG. 10

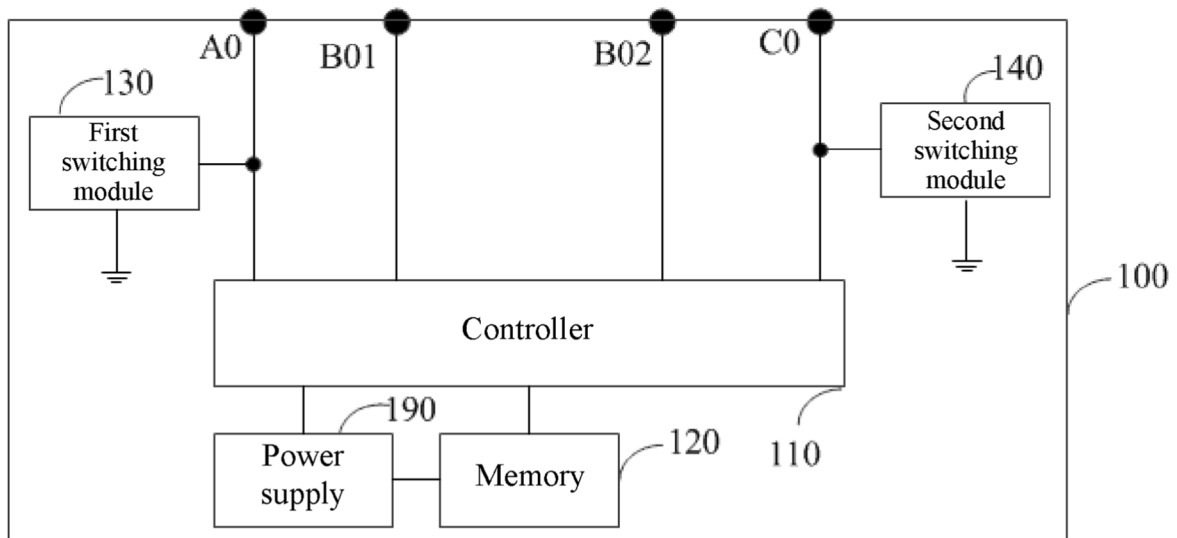


FIG. 11

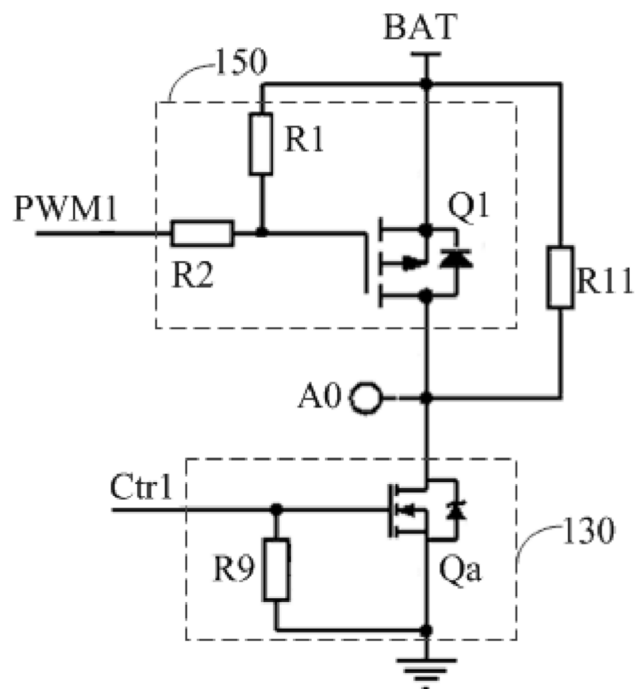


FIG. 12

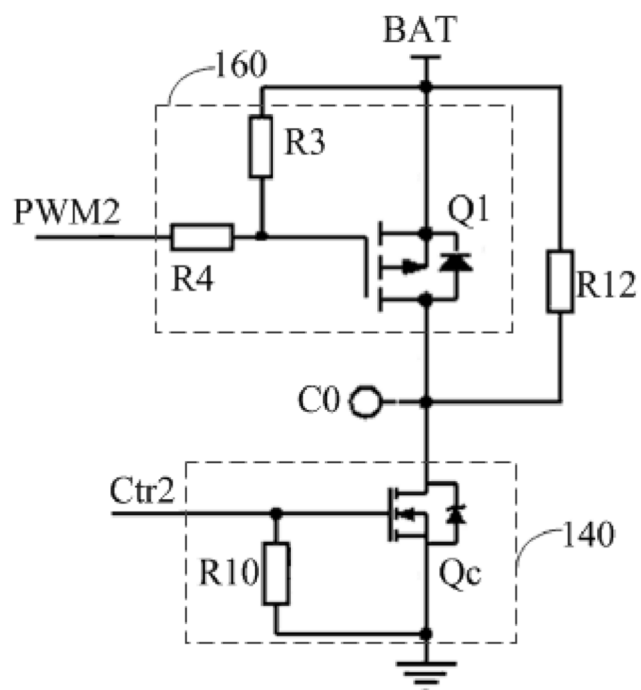


FIG. 13

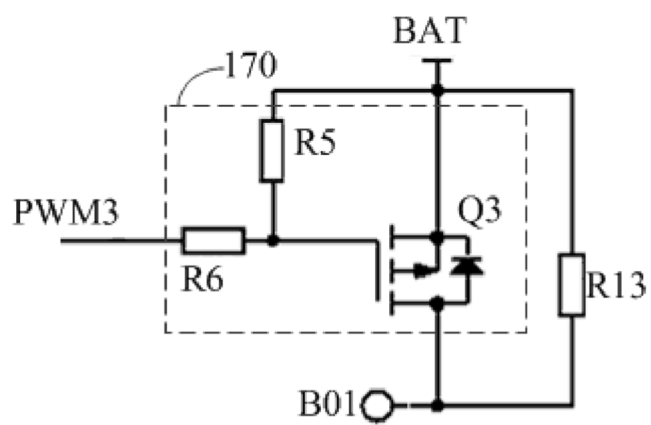


FIG. 14

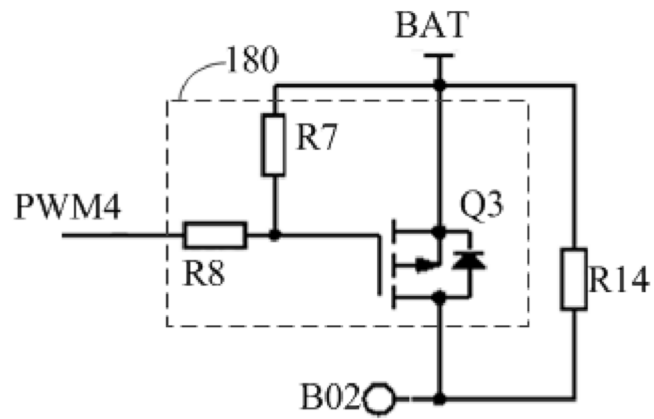


FIG. 15

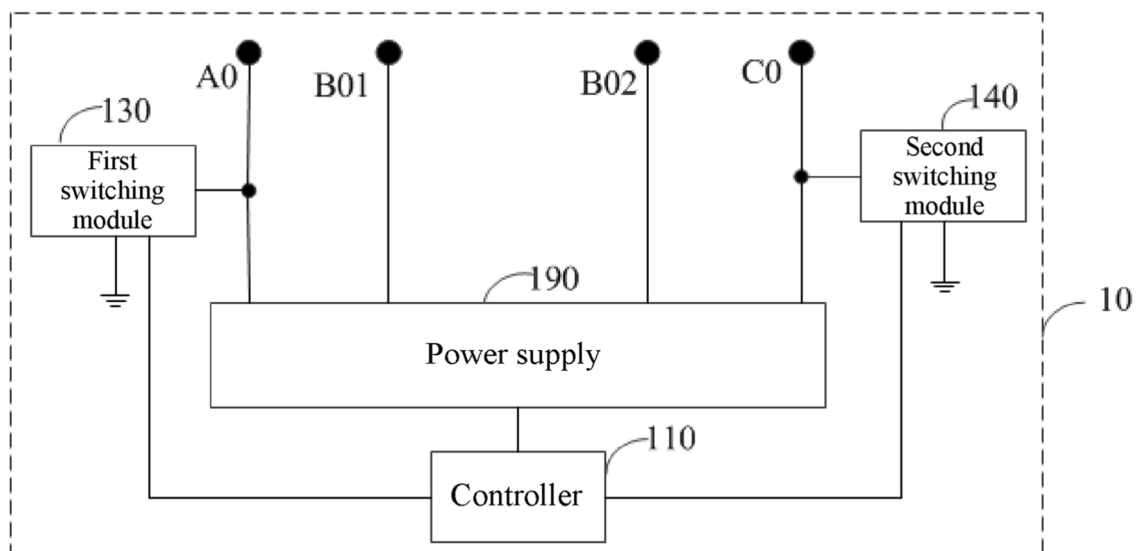


FIG. 16



EUROPEAN SEARCH REPORT

Application Number

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