(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 417 070 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
21.08.2024 Bulletin 2024/34

(21) Application number: **22882537.8**

(22) Date of filing: **20.09.2022**

(51) International Patent Classification (IPC):
A24F 40/40 *(2020.01)* ***A24F 40/50*** *(2020.01)*
A24F 40/20 *(2020.01)*

(52) Cooperative Patent Classification (CPC):
A24F 40/20; A24F 40/40; A24F 40/50

(86) International application number:
PCT/CN2022/119935

(87) International publication number:
WO 2023/065926 (27.04.2023 Gazette 2023/17)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **20.10.2021 CN 202111220248**
20.10.2021 CN 202122523317 U

(71) Applicants:
- **Shenzhen Smoore Technology Limited**
Shenzhen Guangdong 518102 (CN)
- **Shenzhen Merit Technology Co., Ltd.**
Shenzhen, Guangdong 518105 (CN)

(72) Inventors:
- **DU, Jing**
Shenzhen, Guangdong 518102 (CN)
- **LIANG, Feng**
Shenzhen, Guangdong 518102 (CN)

(74) Representative: **Manitz Finsterwald**
Patent- und Rechtsanwaltspartnerschaft mbB
Martin-Greif-Strasse 1
80336 München (DE)

(54) AEROSOL GENERATING DEVICE AND CONTROL METHOD AND CONTROL DEVICE THEREFOR, AND READABLE STORAGE MEDIUM

(57) An aerosol generating device and a control method and control device therefor, and a readable storage medium. The aerosol generating device includes a housing (102) having a resonant cavity (104); a first resonant column (106) arranged in the resonant cavity (104) and disposed at the top of the resonant cavity (104), the first resonant column (106) being hollow to allow an aerosol generating substrate (200) to be arranged therein; a second resonant column (108) arranged in the resonant cavity (104) and disposed at the bottom of the resonant cavity (104); and a microwave assembly (110) arranged on the housing (102). The microwave assembly (110) includes a first microwave-feeding portion (112) and a second microwave-feeding portion (114). The first microwave-feeding portion (112) is configured to feed microwave to the top of the resonant cavity (104), and the second microwave-feeding portion (114) is configured to feed microwave to the bottom of the resonant cavity (104). The aerosol generating device can heat at least two portions of the aerosol generating substrate (200), thereby increasing heating efficiency of the aerosol generating substrate (200), accelerating generation of aerosol, increasing heating uniformity of the aerosol generating substrate (200), and increasing working efficiency of the aerosol generating device.

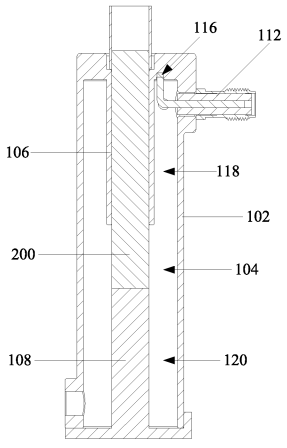

FIG. 2

EP 4 417 070 A1

Description

[0001] This application claims the priorities of Chinese patent application No. 202111220248.5, filed on October 20, 2021 and entitled "AEROSOL GENERATING DEVICE AND CONTROL METHOD AND CONTROL DEVICE THEREFOR, AND READABLE STORAGE MEDIUM", Chinese patent application No. 202122523317.1, filed on October 20, 2021 and entitled "AEROSOL GENERATING DEVICE", the entire contents of which are incorporated herein by reference in their entireties.

TECHNICAL FIELD

[0002] The present application relates to the field of aerosol technology, specifically, to an aerosol generating device, a control method and a control device therefor, and a readable storage medium.

BACKGROUND

[0003] In the related art, a microwave is fed from a resonant cavity by the aerosol generating device, but the microwave generally acts on only one position of the object to be atomized (such as the aerosol-forming substrate), thus causing technical problems that the atomized object is heated unevenly, and that the atomization effect is poor.

SUMMARY

[0004] The present application aims to solve at least one of the technical problems existing in the prior art.

[0005] In view of this, in a first aspect, the application provides an aerosol generating device.

[0006] In a second aspect, the application provides a control method for aerosol generating device.

[0007] In a third aspect, the application provides a control device for aerosol generating device.

[0008] In a fourth aspect, the application provides a readable storage medium.

[0009] In the first aspect, the present application provides an aerosol generating device, including: a housing, the housing having a resonant cavity; a first resonant column arranged in the resonant cavity and disposed at the top of the resonant cavity, the first resonant column being hollow to allow an aerosol-forming substrate to be arranged therein; a second resonant column arranged in the resonant cavity and disposed at the bottom of the resonant cavity; and a microwave assembly arranged on the housing, wherein: the microwave assembly includes a first microwave-feeding portion and a second microwave-feeding portion; the first microwave-feeding portion is configured to feed microwave to the top of the resonant cavity; and the second microwave-feeding portion is configured to feed microwave to the bottom of the resonant cavity.

[0010] The aerosol generating device proposed in the present application includes the housing, the first resonant column, the second resonant column, and the microwave assembly. The resonant cavity is formed inside the housing, and an inside of the resonant cavity is conductive. The first resonant column and the second resonant column are both arranged in the resonant cavity, and the first resonant column and the second resonant column are configured to transmit microwave and adjust a resonant frequency, and the first resonant column and the second resonant column each are in conductive contact with an inner wall of the resonant cavity. Outer walls of the first resonant column and second resonant column are conductive. The first resonant column is disposed at the top of the resonant cavity, and the second resonant column is disposed at the bottom of the resonant cavity. In addition, the first resonant column is hollow, such that the aerosol-forming substrate may be installed inside the first resonant column, and it is ensured that at least part of the aerosol-forming substrate is located inside the resonant cavity 104. In addition, the second resonant column may be solid or hollow.

[0011] Further, the microwave assembly includes the first microwave-feeding portion and the second microwave-feeding portion. The first microwave-feeding portion is arranged at the top of the housing and engages with the first resonant column, and the second microwave-feeding portion is arranged at the top of the housing and engages with the second resonant column. During usage of the aerosol generating device, the first microwave-feeding portion feeds the microwave generated by the microwave assembly to the top of the resonant cavity, and the second microwave-feeding portion feeds the microwave generated by the microwave assembly to the bottom of the resonant cavity.

[0012] In this way, the microwave fed into the resonant cavity by the first microwave-feeding portion may heat the first portion of the aerosol-forming substrate, and the microwave fed into the resonant cavity by the second microwave-feeding portion may heat the second portion of the aerosol-forming substrate. Furthermore, the first portion is higher than the second portion. That is, during usage, the aerosol generating device proposed in the present application may heat at least two positions of the aerosol-forming substrate, and may heat the top and bottom of the aerosol-forming substrate at the same time, thus greatly improving the heating efficiency for the aerosol-forming substrate, accelerating the generation of the aerosol, and improving the working efficiency of the aerosol generating device.

[0013] In addition, the first resonant column and the second resonant column may serve as conductors, and the first resonant column and the second resonant column may be made of metallic materials. For example, the first resonant column and the second resonant column are made of copper, aluminum, iron, etc., or an alloy thereof. The first resonant column and the second resonant column are configured to transmit microwave and improve the microwave transmission rate. The micro-

wave is not prone to attenuation when it is transmitted inside the resonant cavity.

[0014] Moreover, the first resonant column and the second resonant column may guide transmission of the microwave to the aerosol-forming substrate, so that the microwave may act on the aerosol-forming substrate. The aerosol-forming substrate absorbs the microwave, and polar molecules in the aerosol-forming substrate vibrate rapidly to generate thermal energy, thereby heating the aerosol-forming substrate. What's more, part of the aerosol-forming substrate may also extend into the resonant cavity, thus preventing the microwave from being transmitted to the outside of the housing to cause a leakage, and avoiding harm to a user.

[0015] In some possible examples, the first resonant column comprises a first opening and a second opening, the second opening is connected with the resonant cavity, and there is a first space between the second opening and the top of the second resonant column; at least part of the aerosol-forming substrate is capable of extending into the first resonant column through the first opening and extending into the resonant cavity through the second opening.

[0016] In this example, the first resonant column comprises the first opening and the second opening. The first opening at the top of the first resonant column allows the user to insert the aerosol-forming substrate into the first resonant column. The second opening at the bottom of the first resonant column is connected with the resonant cavity. There is the first space between the second opening and the top of the second resonant column at the bottom of resonant cavity. In this way, at least part of the aerosol-forming substrate located inside the first resonant column extends into the resonant cavity through the first opening, such that, during the usage of the aerosol generating device, the microwave provided by the microwave assembly may be ensured to act on the aerosol-forming substrate, thus causing the polar molecules in the aerosol-forming substrate to vibrate rapidly to generate heat energy to heat the aerosol-forming substrate.

[0017] In some possible examples, the microwave assembly further includes a microwave emission source, and the microwave emission source is connected to the first microwave-feeding portion and connected to the second microwave-feeding portion.

[0018] In this example, the microwave assembly further includes the microwave emission source. The microwave emission source is connected to the first microwave-feeding portion and the second microwave-feeding portion, respectively, such that the microwave generated by the microwave emission source is fed into the resonant cavity through the first microwave-feeding portion and second microwave-feeding portion, respectively.

[0019] In some possible examples, the microwave emission source includes: a first microwave emission source connected to the first microwave-feeding portion; and a second microwave emission source connected to the second microwave-feeding portion.

[0020] In this example, the microwave emission source includes the first microwave emission source and the second microwave emission source. The first microwave emission source is connected to the first microwave-feeding portion, and the microwave generated by the first microwave emission source may be fed to the top of the resonant cavity through the first microwave-feeding portion. The second microwave emission source is connected to the second microwave-feeding portion, and the microwave generated by the second microwave emission source may be fed to the bottom of the resonant cavity through the second microwave-feeding portion.

[0021] In this way, microwaves are generated by the first microwave emission source and the second microwave emission source that are independent of each other, such that the aerosol-forming substrate may be heated according to actual needs of the user. Specifically, the top of the aerosol-forming substrate may be heated through the first microwave emission source and the first microwave-feeding portion. Alternatively, the bottom of the aerosol-forming substrate may also be heated through the second microwave emission source and the second microwave-feeding portion. Alternatively, the top and bottom of the aerosol-forming substrate may also be heated through the first microwave emission source and the first microwave-feeding portion, and through the second microwave emission source and the second microwave-feeding portion.

[0022] In some possible examples, the first microwave-feeding portion is arranged on a side wall of the resonant cavity; and/or the second microwave-feeding portion is arranged on the side wall of the resonant cavity.

[0023] In this example, the first microwave-feeding portion is arranged on the side wall of the resonant cavity, such that the microwave generated by the microwave assembly is fed from the side of the resonant cavity to the interior of the resonant cavity. Correspondingly, the second microwave-feeding portion is arranged on the side wall of the resonant cavity, such that the microwave generated by the microwave assembly is fed into the interior of the resonant cavity from the side of the resonant cavity. Furthermore, the first microwave-feeding portion and the second microwave-feeding portion are arranged on the side wall of the resonant cavity, thereby reasonably arranging the positions of the first microwave-feeding portion and the second microwave-feeding portion, and reducing the length of the whole aerosol generating device.

[0024] In some possible examples, a feeding end of the first microwave-feeding portion is disposed towards the first resonant column; and/or a feeding end of the second microwave-feeding portion is disposed towards the second resonant column.

[0025] In this example, the feeding end of the first microwave-feeding portion is disposed towards the first resonant column, and the feeding end of the first microwave-feeding portion is directly in conduction with the first resonant column, such that part of the microwaves gener-

ated by the microwave assembly may be directly fed to the first resonant column through the first microwave-feeding portion. Correspondingly, the feeding end of the second microwave-feeding portion is disposed towards the second resonant column, and the feeding end of the second microwave-feeding portion is directly in conduction with the second resonant column, such that part of the microwaves generated by the microwave assembly may be directly fed to the second resonant column through the second microwave-feeding portion.

[0026] In this way, the microwaves fed through the first microwave-feeding portion and second microwave-feeding portion may directly act on the first resonant column and on the second resonant column, such that, on one hand, lengths of the first microwave-feeding portion and second microwave-feeding portion may be reduced, and on the other hand, the microwaves may be quickly fed to the first resonant column and second resonant column, thereby avoiding the microwave loss.

[0027] In some possible examples, a feeding end of the first microwave-feeding portion is disposed towards the top wall of the resonant cavity; and/or a feeding end of the second microwave-feeding portion is disposed towards the bottom wall of the resonant cavity.

[0028] In this example, the first microwave-feeding portion is L-shaped, the feeding end of the first microwave-feeding portion is disposed towards the top wall of the resonant cavity, and the feeding end of the first microwave-feeding portion is directly in conduction with the top wall of the resonant cavity, such that part of the microwaves generated by the microwave assembly may be directly fed to the top wall of the resonant cavity through the first microwave-feeding portion. Correspondingly, the second microwave-feeding portion is L-shaped, the feeding end of the second microwave-feeding portion is directly in conduction with the bottom wall of the resonant cavity, and the feeding end of the second microwave-feeding portion is disposed towards the bottom wall of the resonant cavity, such that part of the microwaves generated by the microwave assembly may be directly fed to the bottom wall of the resonant cavity through the second microwave-feeding portion.

[0029] In some possible examples, the top wall of the resonant cavity comprises a first recess, and the feeding end of the first microwave-feeding portion is arranged in the first recess; and/or the bottom wall of the resonant cavity comprises a second recess, and the feeding end of the second microwave-feeding portion is arranged in the second recess.

[0030] In this example, the top wall of the resonant cavity comprises the first recess, and the feeding end of the first microwave-feeding portion is arranged in the first recess, such that the first recess can protect the feeding end of the first microwave-feeding portion, prevent the feeding end of the first microwave-feeding portion from contacting other components, and improve the structural stability of the microwave atomizing and heating device.

[0031] In this example, the bottom wall of the resonant cavity comprises the second recess, and the feeding end of the second microwave-feeding portion is arranged in the second recess, such that the second recess can protect the feeding end of the second microwave-feeding portion, prevent the feeding end of the second microwave-feeding portion from contacting other components, and improve the structural stability of the microwave atomizing and heating device.

[0032] In some possible examples, a central axis of the first resonant column and a central axis of the resonant cavity coincide; and a central axis of the second resonant column and the central axis of the resonant cavity coincide.

[0033] In this example, the first resonant column and the resonant cavity both have regular shapes. Exemplarily, the first resonant column and the resonant cavity each are in the shape of a cylinder. The central axis of the first resonant column and the central axis of the resonant cavity coincide. That is, the axis of the first resonant column coincides with the axis of the resonant cavity. By arranging the center lines of the first resonant column and resonant cavity to coincide, the centers of the first resonant column and aerosol-forming substrate coincide, such that more microwaves transmitted by the first resonant column can act on the aerosol-forming substrate. By concentrating the microwave to act on the aerosol-forming substrate, the aerosol-forming substrate can be heated within a relatively short time, which is beneficial to realizing instant heating.

[0034] In this example, the second resonant column and the resonant cavity both have regular shapes. Exemplarily, the second resonant column and the resonant cavity each are in the shape of the cylinder. The central axis of the second resonant column and the central axis of the resonant cavity coincide. That is, the axis of the second resonant column coincides with the axis of the resonant cavity. By arranging the center lines of the second resonant column and resonant cavity to coincide, the centers of the second resonant column and the aerosol-forming substrate coincide, such that more microwaves conducted by the second resonant column can act on the aerosol-forming substrate. By concentrating the microwaves to act on the aerosol-forming substrate, the aerosol-forming substrate can be heated within a relatively short time, which is beneficial to realizing instant heating.

[0035] In some possible examples, the first resonant column is connected to the top wall of the resonant cavity; and/or the second resonant column is connected to the bottom wall of the resonant cavity.

[0036] In this example, the first resonant column is connected to the top wall of the resonant cavity, such that, on one hand, the first resonant column is ensured to be stably connected, and on the other hand, the first resonant column may directly convey microwaves through the top of the resonant cavity, thereby improving the effect of conveying microwaves.

[0037] In this example, the second resonant column is

connected to the bottom wall of the resonant cavity, such that, on one hand, the second resonant column is ensured to be stably connected, and on the other hand, the second resonant column may directly convey microwaves through the bottom wall of the resonant cavity, thereby improving the effect of conveying microwaves.

[0038] In some possible examples, there is a second space between the first resonant column and the inner side wall of the resonant cavity; and/or there is a third space between the second resonant column and the inner side wall of the resonant cavity.

[0039] In this example, there is the second space between the first resonant column and the inner side wall of the resonant cavity, thereby ensuring that there is a certain space between the first resonant column and the inner side of the resonant cavity. There is the third space between the second resonant column and the inner side wall of the resonant cavity, thereby ensuring that there is a certain space between the second resonant column and the inner side of the resonant cavity.

[0040] In some possible examples, the resonant cavity is a cylindrical cavity.

[0041] In this example, the resonant cavity is the cylindrical cavity. In addition, the first resonant column and the second resonant column both have cylindrical structures. The central axis of the first resonant column and the central axis of the resonant cavity coincide, and the central axis of the second resonant column and the central axis of the resonant cavity coincide. During the transmission of the microwave, it is ensured that the microwave evenly heats the whole aerosol-forming substrate, thereby improving the heating effect for the aerosol-forming substrate.

[0042] In some possible examples, the housing is a metal housing.

[0043] In this example, the housing is a metal housing. Exemplarily, the housing is made of copper, aluminum, iron, etc., or an alloy thereof.

[0044] The second aspect of the present application provides a control method for an aerosol generating device, which can be used in any one of the aerosol generating devices described above. The control method includes: controlling at least one of the first microwave-feeding portion and the second microwave-feeding portion to feed microwave into the resonant cavity in response to an atomization instruction.

[0045] The control method for aerosol generating device proposed in the present application may be used in any one of the aerosol generating devices described above. Specifically, in the working process, in response to the atomization instruction, at least one of the first microwave-feeding portion and the second microwave-feeding portion is controlled to feed microwave into the resonant cavity. The microwave fed into the resonant cavity through the first microwave-feeding portion may heat the first portion of the aerosol-forming substrate, and the microwave fed into the resonant cavity through the second microwave-feeding portion may heat the second portion of the aerosol-forming substrate. Moreover, the first portion is higher than the second portion.

[0046] Therefore, the control method for aerosol generating device proposed in the present application may heat the aerosol-forming substrate according to an actual selection of the user. Specifically, the top of the aerosol-forming substrate may be heated through the first microwave-feeding portion. Alternatively, the bottom of the aerosol-forming substrate may be heated through the second microwave-feeding portion. Alternatively, the top and bottom of the aerosol-forming substrate may be heated through the first microwave-feeding portion, the second microwave emission source and the second microwave-feeding portion.

[0047] Therefore, at least two positions of the aerosol generating device of the present application can be heated, and the top and bottom of the aerosol-forming substrate may be heated simultaneously, thereby greatly improving the heating efficiency for the aerosol-forming substrate, accelerating the generation of the aerosol, and improving the working efficiency of the aerosol generating device.

[0048] In some possible examples, the control method specifically includes: controlling the first microwave-feeding portion and the second microwave-feeding portion to feed microwave into the resonant cavity simultaneously in response to the atomization instruction.

[0049] In this example, in the process of heating the aerosol-forming substrate, in response to the atomization instruction, the first microwave-feeding portion and the second microwave-feeding portion are controlled to feed microwaves into the resonant cavity simultaneously, such that the microwave fed into the resonant cavity through the first microwave-feeding portion may heat the first portion of the aerosol-forming substrate, and at the same time, the microwave fed into the resonant cavity through the second microwave-feeding portion may heat the second portion of the aerosol-forming substrate.

[0050] That is, in this example, the top and bottom of the aerosol-forming substrate may be heated simultaneously, thereby greatly improving the heating efficiency for the aerosol-forming substrate, accelerating the generation of the aerosol, and improving the working efficiency of the aerosol generating device.

[0051] In some possible examples, the control method for aerosol generating device specifically includes: controlling the first microwave-feeding portion to feed microwave into the resonant cavity to heat a first portion of the aerosol-forming substrate to a first temperature in response to the atomization instruction; and controlling the second microwave-feeding portion to feed microwave into the resonant cavity after the first microwave-feeding portion works for a preset time period to heat a second portion of the aerosol-forming substrate to a second temperature. Where, the second temperature is higher than or equal to the first temperature.

[0052] In this example, in the process of heating the aerosol-forming substrate, in response to the atomization

instruction, the first microwave-feeding portion is controlled to feed microwave into the resonant cavity firstly, and the first portion of the aerosol-forming substrate is heated to the first temperature. Then, after the first microwave-feeding portion works for the preset time period, the second microwave-feeding portion is controlled to feed microwave into the resonant cavity, and the second portion of the aerosol-forming substrate is heated to a second temperature. Moreover, the second temperature is higher than the first temperature.

[0053] That is, in this example, the microwave is fed into the top of the resonant cavity through the first microwave-feeding portion firstly, but the microwave is not fed into the bottom of the resonant cavity, and at this time, the upper half portion of the aerosol-forming substrate is heated, and it is ensured that the temperature of the upper half portion of the aerosol-forming substrate is the first temperature. Then, after the upper half portion of the aerosol-forming substrate is heated to a certain extent, the microwave is fed into the bottom of the resonant cavity through the microwave-feeding portion, and at this time, the lower half portion of the aerosol-forming substrate is heated, and it is ensured that the temperature of the lower half portion of the aerosol-forming substrate is the second temperature.

[0054] In some possible examples, while the second microwave-feeding portion is controlled to feed microwave into the resonant cavity, the first microwave-feeding portion is controlled to feed microwave into the resonant cavity to heat the first portion of the aerosol-forming substrate to a third temperature, the third temperature is less than or equal to the first temperature.

[0055] In this example, while the second microwave-feeding portion is controlled to feed microwave into the resonant cavity, the microwave may be fed into the top of the resonant cavity through the microwave-feeding portion, and it is ensured that the first portion of the aerosol-forming substrate is heated to the third temperature, where the third temperature is less than or equal to the first temperature.

[0056] In some possible examples, while the second microwave-feeding portion is controlled to feed microwave into the resonant cavity, the first microwave-feeding portion is controlled to stop working.

[0057] In this example, while the second microwave-feeding portion is controlled to feed microwave into the resonant cavity, the first microwave-feeding portion may be controlled to stop working. At this time, the microwave is fed into the resonant cavity only through the second microwave-feeding portion.

[0058] The third aspect of the present application provides a control device for aerosol generating device, which can be used in any one of the aerosol generating devices described above. The control device includes a control unit configured to control at least one of the first microwave-feeding portion and the second microwave-feeding portion to feed microwave into the resonant cavity in response to an atomization instruction.

[0059] The control device for aerosol generating device proposed in the present application may be used in any one of the aerosol generating devices above. Specifically, the control device for aerosol generating device includes the control unit.

[0060] In a working process, in response to the atomization instruction, the control unit controls at least one of the first microwave-feeding portion and the second microwave-feeding portion to feed microwaves into the resonant cavity. The microwave fed into the resonant cavity through the first microwave-feeding portion may heat the first portion of the aerosol-forming substrate, and the microwave fed into the resonant cavity through the second microwave-feeding portion may heat the second portion of the aerosol-forming substrate. Moreover, the first portion is higher than the second portion.

[0061] Therefore, in the control device for aerosol generating device proposed in the present application, the aerosol-forming substrate may be heated according to an actual selection of the user. Specifically, the top of the aerosol-forming substrate may be heated via the first microwave-feeding portion. Alternatively, the bottom of the aerosol-forming substrate may be heated via the second microwave-feeding portion. Alternatively, the top and bottom of the aerosol-forming substrate may be heated via the first microwave-feeding portion, the second microwave emission source, and the second microwave-feeding portion.

[0062] Therefore, at least two positions of the aerosol generating device of the present application may be heated, and the top and bottom of the aerosol-forming substrate may be heated simultaneously, thereby greatly improving the heating efficiency for the aerosol-forming substrate, accelerating the generation of the aerosol, and improving the working efficiency of the aerosol generating device.

[0063] The fourth aspect of the present application provides a readable storage medium, on which a program is stored. When the program is executed by a processor, steps of any one of the control methods for aerosol generating device are implemented.

[0064] For the readable storage medium proposed in the fourth aspect of the present application, when the program stored thereon is executed, the steps of any one of the control methods for aerosol generating device are implemented. Therefore, the readable storage medium can achieve all the same beneficial effects as the control method for aerosol generating device, which will not be described in detail herein.

[0065] The additional aspects and advantages of the present application will become apparent from the description below, or may be learned by practice of the present application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0066] The above aspects and/or additional aspects and advantages of the present application will become

apparent and better understood from the description of the embodiments in conjunction with the following drawings, where:

FIG. 1 is a schematic structural view of an aerosol generating device according to an embodiment of the present application;
FIG. 2 is a sectional view of the aerosol generating device shown in FIG. 1;
FIG. 3 is one schematic view of an aerosol generating device according to an embodiment of the present application;
FIG. 4 is a second schematic view of the aerosol generating device according to an embodiment of the present application;
FIG. 5 is a schematic view showing one working status of the aerosol generating device according to an embodiment of the present application;
FIG. 6 is a schematic view showing a second working status of the aerosol generating device according to an embodiment of the present application;
FIG. 7 is a schematic view showing a third working status of the aerosol generating device according to an embodiment of the present application;
FIG. 8 is a schematic view showing a fourth working status of the aerosol generating device according to an embodiment of the present application;
FIG. 9 is a schematic view showing a working status of aerosol heated by the aerosol generating device according to an embodiment of the present application;
FIG. 10 is a schematic diagram showing temperatures at a first portion and at a second portion of the aerosol during usage of the aerosol generating device according to an embodiment of the present application;
FIG. 11 is a flow chart of a control method for an aerosol generating device according to an embodiment of the present application;
FIG. 12 is a schematic view showing a structure of a control device for an aerosol generating device according to an embodiment of the present application.

[0067] Where, corresponding relationships between reference signs in FIGS. 1 to 9 and names of components are:
102 housing, 104 resonant cavity, 106 first resonant column, 108 second resonant column, 110 microwave assembly, 112 first microwave-feeding portion, 114 second microwave-feeding portion, 116 first recess, 118 second space, 120 third space, 200 aerosol-forming substrate, 202 first portion, 204 second portion, 300 aerosol, 400 installing structure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0068] To make the purposes, features, and advantages of the present application to be more clearly understood, the present application will be further described in detail hereinafter in conjunction with the accompanying drawings and specific embodiments. It should be noted that, as long as there is no conflict, the embodiments of the present application and the features in the embodiments can be combined with each other.

[0069] Many details are set forth in the following description to make the present application to be fully understood. However, the present application may also be implemented in other ways different from those described hereinafter. Therefore, the protection scope of the present application is not limited to the specific embodiments disclosed below.

[0070] An aerosol generating device, a control method and a control device for the aerosol generating device, and readable storage medium of the present application are described hereinafter with reference to FIGS. 1 to 12. In FIG. 1 and FIG. 2, a second microwave-feeding portion 114 is not shown. In FIG. 10, a line segment L1 shows a relationship between a heating temperature of the first portion 202 and a heating time. In FIG. 10, a line segment L2 shows a relationship between a heating temperature of the second portion 204 and a heating time.

[0071] As shown in FIG. 1 and FIG. 2, a first embodiment of the present application proposes an aerosol generating device, including a housing 102, a first resonant column 106, a second resonant column 108, and a microwave assembly 110.

[0072] As shown in FIG. 3 and FIG. 4, a resonant cavity 104 is formed inside the housing 102, and an inside of the resonant cavity 104 is conductive. The first resonant column 106 and the second resonant column 108 are both arranged in the resonant cavity 104, and the first resonant column 106 and the second resonant column 108 are configured to transmit microwave and adjust a resonant frequency, and the first resonant column 106 and the second resonant column 108 each are in conductive contact with an inner wall of the resonant cavity 104. Outer walls of the first resonant column 106 and second resonant column 108 are conductive. The first resonant column 106 is disposed at the top of the resonant cavity 104, and the second resonant column 108 is disposed at the bottom of the resonant cavity 104.

[0073] In addition, as shown in FIG. 3 and FIG. 4, the first resonant column 106 is hollow, such that the aerosol-forming substrate 200 may be installed inside the first resonant column 106, and it is ensured that at least part of the aerosol-forming substrate 200 is located inside the resonant cavity 104. In addition, the second resonant column 108 may be solid or hollow.

[0074] Further, as shown in FIG. 3 and FIG. 4, the microwave assembly 110 includes a first microwave-feeding portion 112 and a second microwave-feeding portion 114. The first microwave-feeding portion 112 is arranged at the top of the housing 102 and engages with the first resonant column 106, and the second microwave-feeding portion 114 is arranged at the top of the housing 102 and engages with the second resonant column 108. Dur-

ing usage of the aerosol generating device, the first microwave-feeding portion 112 feeds the microwave generated by the microwave assembly 110 to the top of the resonant cavity 104, and the second microwave-feeding portion 114 feeds the microwave generated by the microwave assembly 110 to the bottom of the resonant cavity 104.

[0075] In this way, as shown in FIGS. 5, 6, 7 and 8, the microwave fed into the resonant cavity 104 by the first microwave-feeding portion 112 may heat a first portion 202 of the aerosol-forming substrate 200, and the microwave fed into the resonant cavity 104 by the second microwave-feeding portion 114 may heat a second portion 204 of the aerosol-forming substrate 200. Furthermore, the first portion 202 is higher than the second portion 204.

[0076] That is, during usage, the aerosol generating device proposed in the present application may heat at least two positions of the aerosol-forming substrate 200, and may heat the top and bottom of the aerosol-forming substrate 200 at the same time, thus greatly improving the heating efficiency for the aerosol-forming substrate 200, accelerating the generation of the aerosol 300, and improving the working efficiency of the aerosol generating device.

[0077] In addition, the first resonant column 106 and the second resonant column 108 may serve as conductors, and the first resonant column 106 and the second resonant column 108 may be made of metallic materials. For example, the first resonant column 106 and the second resonant column 108 are made of copper, aluminum, iron, etc., or an alloy thereof. The first resonant column 106 and the second resonant column 108 are configured to transmit microwave and improve the microwave transmission rate. The microwave is not prone to attenuation when it is transmitted inside the resonant cavity 104.

[0078] Moreover, the first resonant column 106 and the second resonant column 108 may guide transmission of the microwave to the aerosol-forming substrate 200, so that the microwave may act on the aerosol-forming substrate 200. The aerosol-forming substrate 200 absorbs the microwave, and polar molecules in the aerosol-forming substrate 200 vibrate rapidly to generate thermal energy, thereby heating the aerosol-forming substrate 200. What's more, part of the aerosol-forming substrate 200 may also extend into the resonant cavity 104, thus preventing the microwave from being transmitted to the outside of the housing 102 to cause a leakage, and avoiding harm to a user.

[0079] A second embodiment of the present application further proposes an aerosol generating device based on the first embodiment.

[0080] As shown in FIGS. 2, 5, 6, 7 and 8, the first resonant column 106 comprises a first opening and a second opening. The first opening at the top of the first resonant column 106 allows the user to insert the aerosol-forming substrate 200 into the first resonant column 106. The second opening at the bottom of the first resonant column 106 is connected with the resonant cavity 104. There is a first space between the second opening and the top of the second resonant column 108 at the bottom of resonant cavity 104.

[0081] In this way, at least part of the aerosol-forming substrate 200 located inside the first resonant column 106 extends into the resonant cavity 104 through the first opening, such that, during the usage of the aerosol generating device, the microwave provided by the microwave assembly 110 may be ensured to act on the aerosol-forming substrate 200, thus causing the polar molecules in the aerosol-forming substrate 200 to vibrate rapidly to generate heat energy to heat the aerosol-forming substrate 200.

[0082] Specifically, as shown in FIG. 9, the aerosol-forming substrate 200 includes the first portion 202 of the top and the second portion 204 of the bottom. In addition, during usage, the aerosol-forming substrate 200 needs to be installed inside the installing structure 400. That is, in the working process of the aerosol generating device, the user inserts the installing structure 400 installed with the aerosol-forming substrate 200 into the first resonant column 106, so that the aerosol-forming substrate 200 is located inside the resonant cavity 104 and located between the first resonant column 106 and the second resonant column 108, such that the microwave conveyed through the first resonant column 106 directly acts on the first portion 202 at the top of the aerosol-forming substrate 200, and the microwave conveyed through the second resonant column 108 directly acts on the second portion 204 of the top of the aerosol-forming substrate 200.

[0083] A third embodiment of the application further proposes an aerosol generating device based on the first embodiment.

[0084] The microwave assembly 110 further includes a microwave emission source (not shown in the figures). The microwave emission source is connected to the first microwave-feeding portion 112 and the second microwave-feeding portion 114, respectively, such that the microwave generated by the microwave emission source is fed into the resonant cavity 104 through the first microwave-feeding portion 112 and second microwave-feeding portion 114, respectively.

[0085] In this embodiment, further, the microwave emission source includes a first microwave emission source (not shown in the figures) and a second microwave emission source (not shown in the figures). The first microwave emission source is connected to the first microwave-feeding portion 112, and the microwave generated by the first microwave emission source may be fed to the top of the resonant cavity 104 through the first microwave-feeding portion 112. The second microwave emission source is connected to the second microwave-feeding portion 114, and the microwave generated by the second microwave emission source may be fed to the bottom of the resonant cavity 104 through the second microwave-feeding portion 114.

[0086] In this way, microwaves are generated by the

first microwave emission source and the second microwave emission source that are independent of each other, such that the aerosol-forming substrate 200 may be heated according to actual needs of the user. Specifically, as shown in FIG. 7, the top of the aerosol-forming substrate 200 may be heated through the first microwave emission source and the first microwave-feeding portion 112, so that the aerosol 300 is firstly generated from the first portion 202. Alternatively, as shown in FIG. 6, the bottom of the aerosol-forming substrate 200 may also be heated through the second microwave emission source and the second microwave-feeding portion 114, so that the aerosol 300 is firstly generated in the second portion 204. Alternatively, as shown in FIG. 8, the top and bottom of the aerosol-forming substrate 200 may also be heated through the first microwave emission source and the first microwave-feeding portion 112, and through the second microwave emission source and the second microwave-feeding portion 114, so that the aerosol 300 is generated at the same time from the first portion 202 and from the second portion 204.

[0087] A fourth embodiment of the application further proposes an aerosol generating device based on the first embodiment.

[0088] As shown in FIGS. 1 and 2, the first microwave-feeding portion 112 is arranged on the side wall of the resonant cavity 104, such that the microwave generated by the microwave assembly 110 is fed from the side of the resonant cavity 104 to the interior of the resonant cavity 104. Correspondingly, the second microwave-feeding portion 114 is arranged on the side wall of the resonant cavity 104, such that the microwave generated by the microwave assembly 110 is fed into the interior of the resonant cavity 104 from the side of the resonant cavity 104. Furthermore, the first microwave-feeding portion 112 and the second microwave-feeding portion 114 are arranged on the side wall of the resonant cavity 104, thereby reasonably arranging the positions of the first microwave-feeding portion 112 and the second microwave-feeding portion 114, and reducing the length of the whole aerosol generating device.

[0089] A fifth embodiment of the present application further proposes an aerosol generating device based on the first embodiment.

[0090] As shown in FIG. 3, a feeding end of the first microwave-feeding portion 112 is disposed towards the first resonant column 106, and the feeding end of the first microwave-feeding portion 112 is directly in conduction with the first resonant column 106, such that part of the microwaves generated by the microwave assembly 110 may be directly fed to the first resonant column 106 through the first microwave-feeding portion 112.

[0091] Correspondingly, as shown in FIG. 3, a feeding end of the second microwave-feeding portion 114 is disposed towards the second resonant column 108, and the feeding end of the second microwave-feeding portion 114 is directly in conduction with the second resonant column 108, such that part of the microwaves generated by the microwave assembly 110 may be directly fed to the second resonant column 108 through the second microwave-feeding portion 114.

[0092] In this way, the microwaves fed through the first microwave-feeding portion 112 and second microwave-feeding portion 114 may directly act on the first resonant column 106 and on the second resonant column 108, such that, on one hand, lengths of the first microwave-feeding portion 112 and second microwave-feeding portion 114 may be reduced, and on the other hand, the microwaves may be quickly fed to the first resonant column 106 and second resonant column 108, thereby avoiding a microwave loss.

[0093] A sixth embodiment of the present application further proposes an aerosol generating device based on the first embodiment.

[0094] As shown in FIG. 4, the first microwave-feeding portion 112 is L-shaped, the feeding end of the first microwave-feeding portion 112 is disposed towards the top wall of the resonant cavity 104, and the feeding end of the first microwave-feeding portion 112 is directly in conduction with the top wall of the resonant cavity 104, such that part of the microwaves generated by the microwave assembly 110 may be directly fed to the top wall of the resonant cavity 104 through the first microwave-feeding portion 112.

[0095] Correspondingly, as shown in FIG 4, the second microwave-feeding portion 114 is L-shaped, the feeding end of the second microwave-feeding portion 114 is directly in conduction with the bottom wall of the resonant cavity 104, and the feeding end of the second microwave-feeding portion 114 is disposed towards the bottom wall of the resonant cavity 104, such that part of the microwaves generated by the microwave assembly 110 may be directly fed to the bottom wall of the resonant cavity 104 through the second microwave-feeding portion 114.

[0096] In this embodiment, further, as shown in FIG. 2, the top wall of the resonant cavity 104 comprises a first recess 116, and the feeding end of the first microwave-feeding portion 112 is arranged in the first recess 116, such that the first recess 116 can protect the feeding end of the first microwave-feeding portion 112, prevent the feeding end of the first microwave-feeding portion 112 from contacting other components, and improve the structural stability of the microwave atomizing and heating device.

[0097] Correspondingly, the bottom wall of the resonant cavity 104 comprises a second recess (not shown in the figures), and the feeding end of the second microwave-feeding portion 114 is arranged in the second recess, such that the second recess can protect the feeding end of the second microwave-feeding portion 114, prevent the feeding end of the second microwave-feeding portion 114 from contacting other components, and improve the structural stability of the microwave atomizing and heating device.

[0098] Based on the first to sixth embodiments, further, as shown in FIG. 2, the first resonant column 106 and

the resonant cavity 104 both have regular shapes. Exemplarily, the first resonant column 106 and the resonant cavity 104 each are in a shape of a cylinder. A central axis of the first resonant column 106 and a central axis of the resonant cavity 104 coincide. That is, the axis of the first resonant column 106 coincides with the axis of the resonant cavity 104. By arranging the center lines of the first resonant column 106 and resonant cavity 104 to coincide, centers of the first resonant column 106 and aerosol-forming substrate 200 coincide, such that more microwaves conducted by the first resonant column 106 can act on the aerosol-forming substrate 200. By concentrating the microwave to act on the aerosol-forming substrate 200, the aerosol-forming substrate 200 can be heated within a relatively short time, which is beneficial to realizing instant heating.

[0099] Based on the first to sixth embodiments, further, as shown in FIG. 2, the second resonant column 108 and the resonant cavity 104 both have regular shapes. Exemplarily, the second resonant column 108 and the resonant cavity 104 each are in a shape of a cylinder. A central axis of the second resonant column 108 and the central axis of the resonant cavity 104 coincide. That is, the axis of the second resonant column 108 coincides with the axis of the resonant cavity 104. By arranging the center lines of the second resonant column 108 and resonant cavity 104 to coincide, the centers of the second resonant column 108 and the aerosol-forming substrate 200 coincide, such that more microwaves conducted by the second resonant column 108 can act on the aerosol-forming substrate 200. By concentrating the microwaves to act on the aerosol-forming substrate 200, the aerosol-forming substrate 200 can be heated within a relatively short time, which is beneficial to realizing instant heating.

[0100] Based on the first to sixth embodiments, further, as shown in FIG. 2, the second resonant column 108 is connected to the bottom wall of the resonant cavity 104, such that, on one hand, the second resonant column 108 is ensured to be stably connected, and on the other hand, the second resonant column 108 may directly convey microwaves through the bottom wall of the resonant cavity 104, thereby improving the effect of conveying microwaves.

[0101] Based on the first to sixth embodiments, further, as shown in FIG 2, there is a second space 118 between the first resonant column 106 and the inner side wall of the resonant cavity 104, thereby ensuring that there is a certain space between the first resonant column 106 and the inner side of the resonant cavity 104.

[0102] Correspondingly, as shown in FIG. 2, there is a third space 120 between the second resonant column 108 and the inner side wall of the resonant cavity 104, thereby ensuring that there is a certain space between the second resonant column 108 and the inner side of the resonant cavity 104.

[0103] Based on the first to sixth embodiments, further, as shown in FIG. 2, the resonant cavity 104 is a cylindrical cavity. In addition, the first resonant column 106 and the second resonant column 108 both have cylindrical structures. The central axis of the first resonant column 106 and the central axis of the resonant cavity 104 coincide, and the central axis of the second resonant column 108 and the central axis of the resonant cavity 104 coincide. During the transmission of the microwave, it is ensured that the microwave evenly heats the whole aerosol-forming substrate 200, thereby improving the heating effect for the aerosol-forming substrate 200.

[0104] Based on the first to sixth embodiments, further, the housing 102 is a metal housing. Exemplarily, the housing 102 is made of copper, aluminum, iron, etc., or an alloy thereof.

[0105] A seventh embodiment of the present application further proposes a control method for aerosol generating device, which may be used in any one of the aerosol generating devices described above. As shown in FIG. 11, the control method for the aerosol generating device includes following steps.

[0106] At Step 1102, in response to an atomization instruction, at least one of the first microwave-feeding portion and the second microwave-feeding portion is controlled to feed microwave into the resonant cavity.

[0107] The control method for aerosol generating device proposed in the present application may be used in any one of the aerosol generating devices described above. Specifically, in the working process, in response to the atomization instruction, at least one of the first microwave-feeding portion and the second microwave-feeding portion is controlled to feed microwave into the resonant cavity. The microwave fed into the resonant cavity through the first microwave-feeding portion may heat the first portion of the aerosol-forming substrate, and the microwave fed into the resonant cavity through the second microwave-feeding portion may heat the second portion of the aerosol-forming substrate. Moreover, the first portion is higher than the second portion.

[0108] Therefore, the control method for aerosol generating device proposed in the present application may heat the aerosol-forming substrate according to an actual selection of the user. Specifically, the top of the aerosol-forming substrate may be heated through the first microwave-feeding portion. Alternatively, the bottom of the aerosol-forming substrate may be heated through the second microwave-feeding portion. Alternatively, the top and bottom of the aerosol-forming substrate may be heated through the first microwave-feeding portion, the second microwave emission source and the second microwave-feeding portion.

[0109] Therefore, at least two positions of the aerosol generating device of the present application can be heated, and the top and bottom of the aerosol-forming substrate may be heated simultaneously, thereby greatly improving the heating efficiency for the aerosol-forming substrate, accelerating the generation of the aerosol, and improving the working efficiency of the aerosol generating device.

[0110] An eighth embodiment of the present applica-

tion further proposes a control method for aerosol generating device based on the seventh embodiment.

[0111] In the process of heating the aerosol-forming substrate, in response to the atomization instruction, the first microwave-feeding portion and the second microwave-feeding portion are controlled to feed microwaves into the resonant cavity simultaneously, such that the microwave fed into the resonant cavity through the first microwave-feeding portion may heat the first portion of the aerosol-forming substrate, and at the same time, the microwave fed into the resonant cavity through the second microwave-feeding portion may heat the second portion of the aerosol-forming substrate.

[0112] That is, in this embodiment, the top and bottom of the aerosol-forming substrate may be heated simultaneously, thereby greatly improving the heating efficiency for the aerosol-forming substrate, accelerating the generation of the aerosol, and improving the working efficiency of the aerosol generating device.

[0113] A ninth embodiment of the application further proposes a control method for aerosol generating device based on the eighth embodiment.

[0114] As shown in FIG 10, in the process of heating the aerosol-forming substrate, in response to the atomization instruction, the first microwave-feeding portion is controlled to feed microwave into the resonant cavity firstly, and the first portion of the aerosol-forming substrate is heated to a first temperature T1. Then, after the first microwave-feeding portion works for a preset time period, the second microwave-feeding portion is controlled to feed microwave into the resonant cavity, and the second portion of the aerosol-forming substrate is heated to a second temperature T2. Moreover, the second temperature T2 is higher than the first temperature T 1.

[0115] That is, as shown in FIG. 10, in this embodiment, the microwave is fed into the top of the resonant cavity through the first microwave-feeding portion firstly, but the microwave is not fed into the bottom of the resonant cavity, and at this time, an upper half portion of the aerosol-forming substrate is heated, and it is ensured that the temperature of the upper half portion of the aerosol-forming substrate is the first temperature T1. Then, after the upper half portion of the aerosol-forming substrate is heated to a certain extent, the microwave is fed into the bottom of the resonant cavity through the microwave-feeding portion, and at this time, the lower half portion of the aerosol-forming substrate is heated, and it is ensured that the temperature of the lower half portion of the aerosol-forming substrate is a second temperature T2.

[0116] Further, as shown in FIG. 10, while the second microwave-feeding portion is controlled to feed microwave into the resonant cavity, the microwave may be fed into the top of the resonant cavity through the microwave-feeding portion, and it is ensured that the first portion of the aerosol-forming substrate is heated to a third temperature T3, where the third temperature T3 is less than or equal to the first temperature T1.

[0117] Further, while the second microwave-feeding portion is controlled to feed microwave into the resonant cavity, the first microwave-feeding portion may be controlled to stop working. At this time, the microwave is fed into the resonant cavity only through the second microwave-feeding portion.

[0118] As shown in FIG. 12, a tenth embodiment of the present application proposes a control device 1200 for aerosol generating device, which may be used in any one of the aerosol generating devices of the embodiments above. Specifically, the control device 1200 for aerosol generating device includes a control unit 1202.

[0119] In a working process, in response to the atomization instruction, the control unit 1202 controls at least one of the first microwave-feeding portion and the second microwave-feeding portion to feed microwave into the resonant cavity. The microwave fed into the resonant cavity through the first microwave-feeding portion 112 may heat the first portion of the aerosol-forming substrate, and the microwave fed into the resonant cavity through the second microwave-feeding portion 114 may heat the second portion of the aerosol-forming substrate. Moreover, the first portion is higher than the second portion.

[0120] Therefore, in the control device 1200 for aerosol generating device proposed in the present application, the aerosol-forming substrate may be heated according to an actual selection of the user. Specifically, the top of the aerosol-forming substrate may be heated via the first microwave-feeding portion. Alternatively, the bottom of the aerosol-forming substrate may be heated via the second microwave-feeding portion. Alternatively, the top and bottom of the aerosol-forming substrate may be heated via the first microwave-feeding portion, the second microwave emission source, and the second microwave-feeding portion.

[0121] Therefore, at least two positions of the aerosol generating device of the present application may be heated, and the top and bottom of the aerosol-forming substrate may be heated simultaneously, thereby greatly improving the heating efficiency for the aerosol-forming substrate, accelerating the generation of the aerosol, and improving the working efficiency of the aerosol generating device.

[0122] An eleventh embodiment of the present application further proposes a control device 1200 for aerosol generating device based on the tenth implementation.

[0123] As shown in FIG. 12, the control unit 1202 is specifically configured to, in response to the atomization instruction, control the first microwave-feeding portion and the second microwave-feeding portion to feed microwaves into the resonant cavity simultaneously.

[0124] Specifically, in the process of heating the aerosol-forming substrate, in response to the atomization instruction, the control unit 1202 controls the first microwave-feeding portion and the second microwave-feeding portion to feed microwaves into the resonant cavity simultaneously, so that the microwave fed into the resonant cavity through the first microwave-feeding portion

112 may heat the first portion of the aerosol-forming substrate, and at the same time, the microwave fed into the resonant cavity through the second microwave-feeding portion 114 may heat the second portion of the aerosol-forming substrate.

[0125] That is, in this embodiment, the top and bottom of the aerosol-forming substrate may be heated simultaneously, thereby greatly improving the heating efficiency for the aerosol-forming substrate, accelerating the generation of the aerosol, and improving the working efficiency of the aerosol generating device.

[0126] A twelfth embodiment of the present application further proposes a control device 1200 for aerosol generating device based on the tenth implementation.

[0127] As shown in FIG. 12, the control unit 1202 is specifically configured to, in response to the atomization instruction, control the first microwave-feeding portion to feed microwave into the resonant cavity to heat the first portion of the aerosol-forming substrate to the first temperature T1, and after the first microwave-feeding portion works for a preset time period, control the second microwave-feeding portion to feed microwave into the resonant cavity to heat the second portion of the aerosol-forming substrate to the second temperature T2. Where, the second temperature T2 is higher than or equal to the first temperature T1.

[0128] Specifically, in the process of heating the aerosol-forming substrate, in response to the atomization instruction, the control unit 1202 controls the first microwave-feeding portion to feed microwave into the resonant cavity to heat the first portion of the aerosol-forming substrate to the first temperature T1 firstly. Then, after the first microwave-feeding portion works for a preset time period, the control unit 1202 controls the second microwave-feeding portion to feed microwave into the resonant cavity to heat the second portion of the aerosol-forming substrate to the second temperature T2. Moreover, the second temperature T2 is higher than the first temperature T1.

[0129] That is, in this embodiment, the microwave is fed into the top of the resonant cavity through the first microwave-feeding portion firstly, and the microwave is not fed into the bottom of the resonant cavity, and at this time, an upper half portion of the aerosol-forming substrate is heated, and it is ensured that the temperature of the upper half portion of the aerosol-forming substrate is the first temperature T1. Then, after the upper half portion of the aerosol-forming substrate is heated to a certain extent, the microwave is fed into the bottom of the resonant cavity through the microwave-feeding portion, and at this time, the lower half portion of the aerosol-forming substrate is heated, and it is ensured that the temperature of the lower half portion of the aerosol-forming substrate is the second temperature T2.

[0130] Further, while controlling the second microwave-feeding portion to feed microwave into the resonant cavity, the control unit 1202 may control the microwave-feeding portion to feed microwave into the top of the resonant cavity, and it is ensured that the first portion of the aerosol-forming substrate is heated to a third temperature T3, where the third temperature T3 is less than or equal to the first temperature T1.

[0131] Further, while controlling the second microwave-feeding portion to feed microwave into the resonant cavity, the control unit 1202 may control the first microwave-feeding portion to stop working. At this time, the microwave is fed into the resonant cavity only through the second microwave-feeding portion.

[0132] A thirteenth embodiment of the present application proposes a readable storage medium. When a program stored in the storage medium is executed, the program may implement steps of any one of the control methods for aerosol generating device of the embodiments above.

[0133] Therefore, the readable storage medium can achieve all the same beneficial effects as the control method for aerosol generating device, which will not be described in detail herein.

[0134] In a specific embodiment, in the aerosol generating device proposed by the present application, the housing 102 has the coaxial resonant cavity 104 therein, the resonant cavity 104 is in a shape of a cylinder. The inside of the resonant cavity 104 is conductive, and the resonant cavity 104 is generally made of metal. The first resonant column 106 and the second resonant column 108 are arranged coaxially along the central axis of the resonant cavity 104, and are configured to transmit microwave and adjust the resonant frequency. The first resonant column 106 and the second resonant column 108 are in electrically conductive contact with the inner side of the resonant cavity 104. The second resonant column 108 at the bottom may be solid or hollow, and the outer side of the second resonant column 108 is conductive. The first resonant column 106 at the top is hollow, the outer side of the first resonant column 106 is conductive. The first resonant column 106 is hollow, thus allowing the aerosol-forming substrate 200 to be installed. The microwave assembly 110 includes two microwave-feeding portions. The second microwave-feeding portion 114 is disposed at the bottom of the resonant cavity 104, and the first microwave-feeding portion 112 is disposed at the top of the resonant cavity 104. The first microwave-feeding portion 112 and the second microwave-feeding portion 114 may be L-shaped, and the feeding ends may be (electrically) connected to the resonant cavity 104, or may be directly connected to the first resonant column 106 and the second resonant column 108. The first microwave-feeding portion 112 and the second microwave-feeding portion 114 are connected to the external microwave emission sources. In a working process, the first microwave-feeding portion 112 and the second microwave-feeding portion 114 may feed microwaves at the same time or not.

[0135] Specifically, as shown in FIGS. 10 and 11, when the aerosol generating device is working, firstly, the microwave is fed through the first microwave-feeding por-

tion 112 at the top, but not through the second microwave-feeding portion 114 at the bottom. At this time, the first portion 202 of the aerosol-forming substrate 200 is heated, so that the temperature of the first portion 202 of the aerosol-forming substrate 200 maintains the first temperature T1. Then, when the first portion 202 of the aerosol-forming substrate 200 is heated to a certain extent, the microwave is fed through the second microwave-feeding portion 114 at the bottom to heat the second portion 204 of the aerosol-forming substrate 200, so that the temperature of the first portion 202 of the aerosol-forming substrate 200 maintains the second temperature T2. Further, while the microwave is fed to the second portion 204 of the aerosol-forming substrate 200, the microwave is also fed through the first microwave-feeding portion 112 at the top, so that the temperature of the first portion 202 of the aerosol-forming substrate 200 maintains the third temperature T3. Specifically, the third temperature T3 the first temperature T1, and the second temperature T2 is higher than the temperature.

[0136] Specifically, the aerosol generating device proposed by the application can make the microwave field to be distributed more evenly when the first portion 202 and second portion 204 of the aerosol-forming substrate 200 are heated simultaneously, such that the aerosol-forming substrate 200 can be fully heated. Moreover, the first portion 202 of the aerosol-forming substrate 200 is atomized firstly, and then the second portion 204 of the aerosol-forming substrate 200 is atomized, which is beneficial to the stability of the taste.

[0137] In the description of the application, the term "multiple" refers to two or more than two. Unless otherwise clearly defined, the orientation or positional relationship indicated by the terms "upper", "lower", etc., is based on the orientation or positional relationship shown in the drawings. The orientation or positional relationship is only for the convenience of describing the present application and simplifying the description, but does not indicate or imply that the device or element referred to must have a specific orientation and be constructed and operated in a specific orientation, therefore the orientation or positional relationship cannot be understood as a limitation of the present application. The terms "connection", "installation", "fixing", etc., should be understood in a broad sense. For example, "connection" may be a fixed connection, a detachable connection, or an integral connection, and it may be a direct connection, or it may be an indirectly connection implemented through intermediaries. For those of ordinary skill in the art, the specific meanings of the above terms in the present application may be understood according to specific circumstances.

[0138] In the description of this specification, the terms "one embodiment", "some embodiments", "specific embodiments", etc., mean that the specific features, structures, materials or characteristics described in connection with the embodiment or example are included in at least one embodiment or example the present application. In this specification, the illustrative description of the above terms does not necessarily refer to the same embodiment or example. Furthermore, the specific features, structures, materials or characteristics described may be combined in any suitable manner in any one or more embodiments or examples.

[0139] The above embodiments are only preferred embodiments of the present application, and not intended to limit the present application. For those skilled in the art, the present application may have various modifications and changes. Any modifications, equivalent replacements, improvements, etc., made within the spirits and principles of the application shall be included in the protection scope of the application.

Claims

1. An aerosol generating device, **characterized by** comprising:

   a housing having a resonant cavity;
   a first resonant column arranged in the resonant cavity and disposed at the top of the resonant cavity, the first resonant column being hollow to allow an aerosol-forming substrate to be arranged therein;
   a second resonant column arranged in the resonant cavity and disposed at the bottom of the resonant cavity; and
   a microwave assembly arranged on the housing, wherein: the microwave assembly comprises a first microwave-feeding portion and a second microwave-feeding portion; the first microwave-feeding portion is configured to feed microwave to the top of the resonant cavity; and the second microwave-feeding portion is configured to feed microwave to the bottom of the resonant cavity.

2. The aerosol generating device according to claim 1, wherein:

   the first resonant column comprises a first opening and a second opening, the second opening is connected with the resonant cavity, and there is a first space between the second opening and the top of the second resonant column;
   at least part of the aerosol-forming substrate is capable of extending into the first resonant column through the first opening and extending into the resonant cavity through the second opening.

3. The aerosol generating device according to claim 1, wherein the microwave assembly further comprises a microwave emission source connected to the first microwave-feeding portion and connected to the second microwave-feeding portion.

4. The aerosol generating device according to claim 3, wherein the microwave emission source comprises:

a first microwave emission source connected to the first microwave-feeding portion; and
a second microwave emission source connected to the second microwave-feeding portion.

5. The aerosol generating device according to any one of claims 1 to 4, wherein:

the first microwave-feeding portion is arranged on a side wall of the resonant cavity; and/or
the second microwave-feeding portion is arranged on the side wall of the resonant cavity.

6. The aerosol generating device according to any one of claims 1 to 4, wherein:

a feeding end of the first microwave-feeding portion is disposed towards the first resonant column; and/or
a feeding end of the second microwave-feeding portion is disposed towards the second resonant column.

7. The aerosol generating device according to any one of claims 1 to 4, wherein,

a feeding end of the first microwave-feeding portion is disposed towards the top wall of the resonant cavity; and/or
a feeding end of the second microwave-feeding portion is disposed towards the bottom wall of the resonant cavity.

8. The aerosol generating device according to claim 7, wherein:

the top wall of the resonant cavity comprises a first recess, and the feeding end of the first microwave-feeding portion is arranged in the first recess; and/or
the bottom wall of the resonant cavity comprises a second recess, and the feeding end of the second microwave-feeding portion is arranged in the second recess.

9. The aerosol generating device according to any one of claims 1 to 4, wherein:

a central axis of the first resonant column and a central axis of the resonant cavity coincide; and
a central axis of the second resonant column and the central axis of the resonant cavity coincide.

10. The aerosol generating device according to any one of claims 1 to 4, wherein:

the first resonant column is connected to the top wall of the resonant cavity; and/or
the second resonant column is connected to the bottom wall of the resonant cavity.

11. The aerosol generating device according to any one of claims 1 to 4, wherein:

there is a second space between the first resonant column and the inner side wall of the resonant cavity; and/or
there is a third space between the second resonant column and the inner side wall of the resonant cavity.

12. The aerosol generating device according to any one of claims 1 to 4, wherein,

the resonant cavity is a cylindrical cavity; and/or
the housing is a metal housing.

13. A control method for aerosol generating device, used in the aerosol generating device according to any one of claims 1 to 12, **characterized by** comprising:
controlling at least one of the first microwave-feeding portion and the second microwave-feeding portion to feed microwave into the resonant cavity in response to an atomization instruction.

14. The control method for aerosol generating device according to claim 13, wherein the control method comprises:
controlling the first microwave-feeding portion and the second microwave-feeding portion to feed microwave into the resonant cavity simultaneously in response to the atomization instruction.

15. The control method for aerosol generating device according to claim 13, wherein the control method comprises:

controlling the first microwave-feeding portion to feed microwave into the resonant cavity to heat a first portion of the aerosol-forming substrate to a first temperature in response to the atomization instruction; and
controlling the second microwave-feeding portion to feed microwave into the resonant cavity after the first microwave-feeding portion works for a preset time period to heat a second portion of the aerosol-forming substrate to a second temperature;
wherein the second temperature is higher than or equal to the first temperature.

16. The control method for aerosol generating device

according to claim 15, wherein, while controlling the second microwave-feeding portion to feed microwave into the resonant cavity, controlling the first microwave-feeding portion to feed microwave into the resonant cavity to heat the first portion of the aerosol-forming substrate to a third temperature, the third temperature is less than or equal to the first temperature; or

while controlling the second microwave-feeding portion to feed microwave into the resonant cavity, controlling the first microwave-feeding portion to stop working.

17. A control device for aerosol generating device, used in the aerosol generating device according to any one of claims 1 to 12, **characterized by** comprising:
a control unit configured to control at least one of the first microwave-feeding portion and the second microwave-feeding portion to feed microwave into the resonant cavity in response to an atomization instruction.

18. A readable storage medium, having a program stored thereon, **characterized in that** when the program is executed by a processor, steps of the control method for aerosol generating device of any one of claims 13 to 16 are implemented.

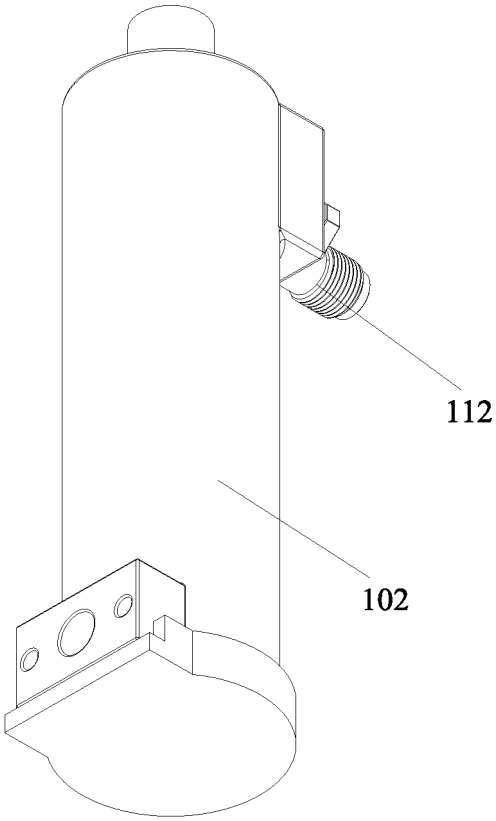

FIG. 1

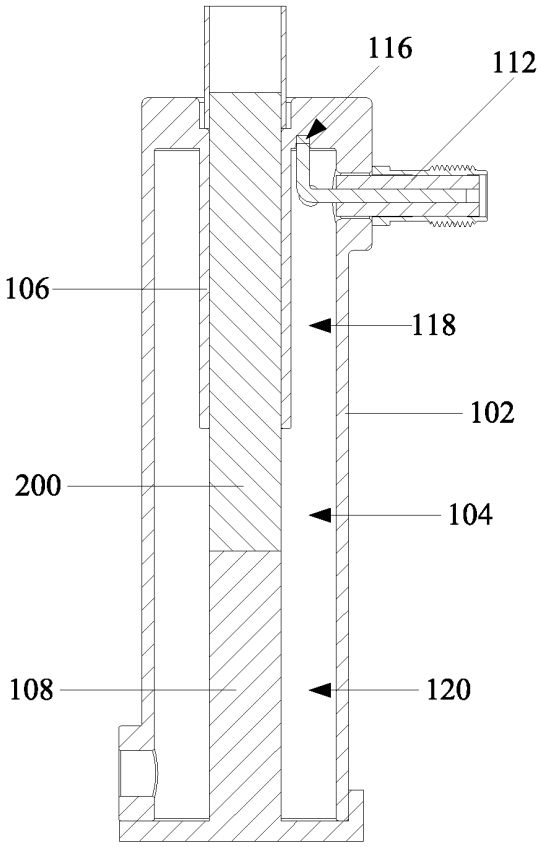
116
112
106
118
102
200
104
108
120

FIG. 2

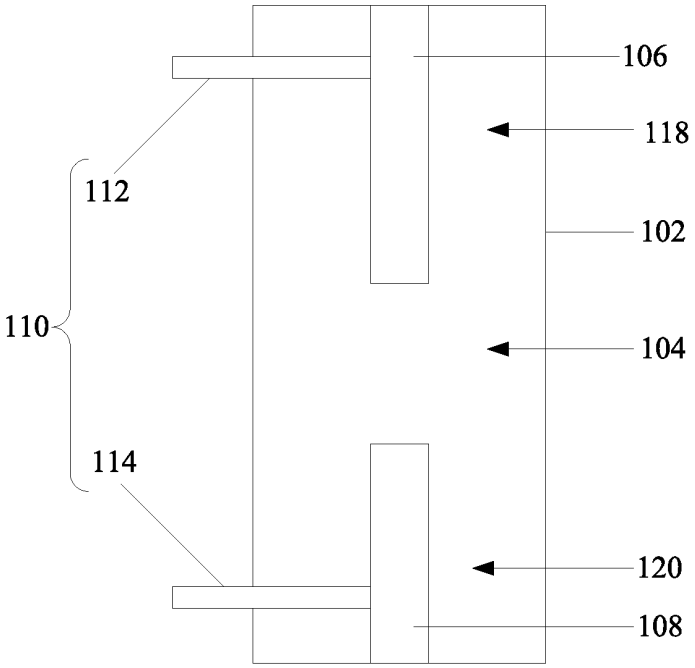
106
118
112
102
110
104
114
120
108

FIG. 3

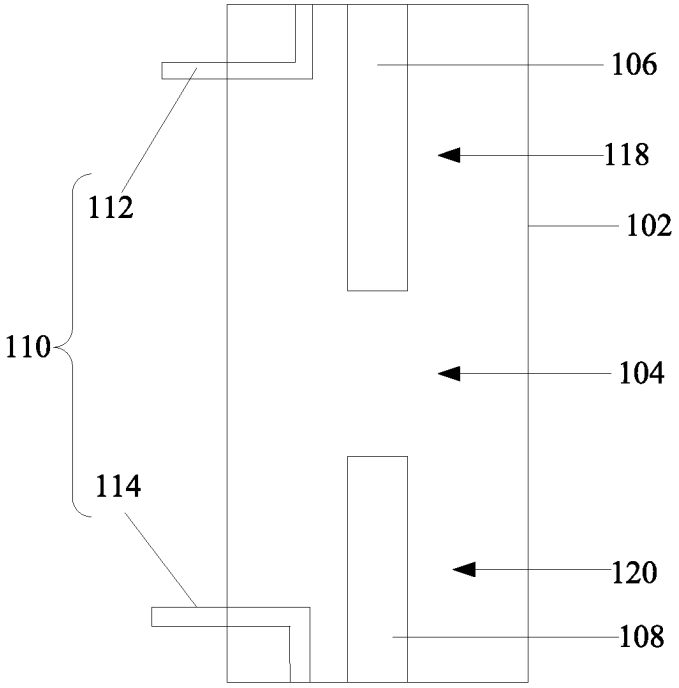
106
118
112
102
110
104
114
120
108

FIG. 4

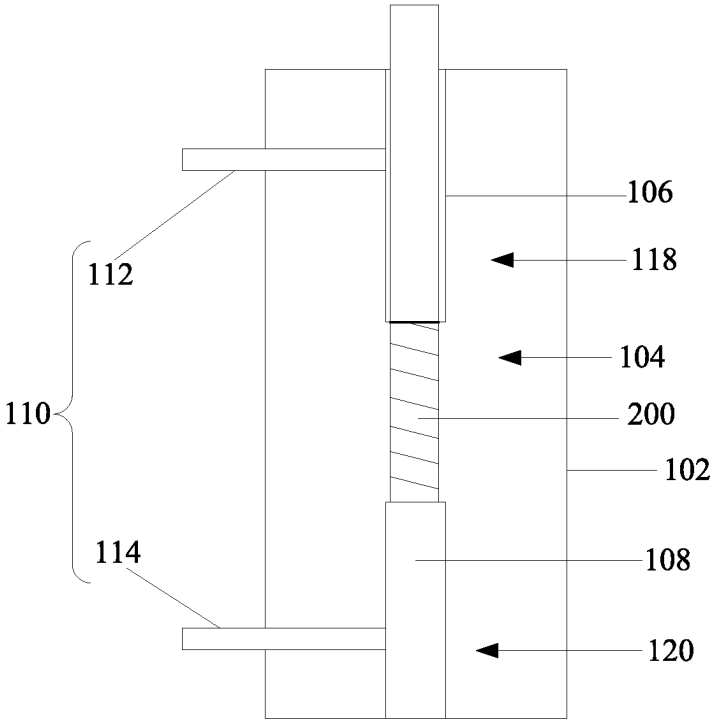
106
112
118
104
110
200
102
114
108
120

FIG. 5

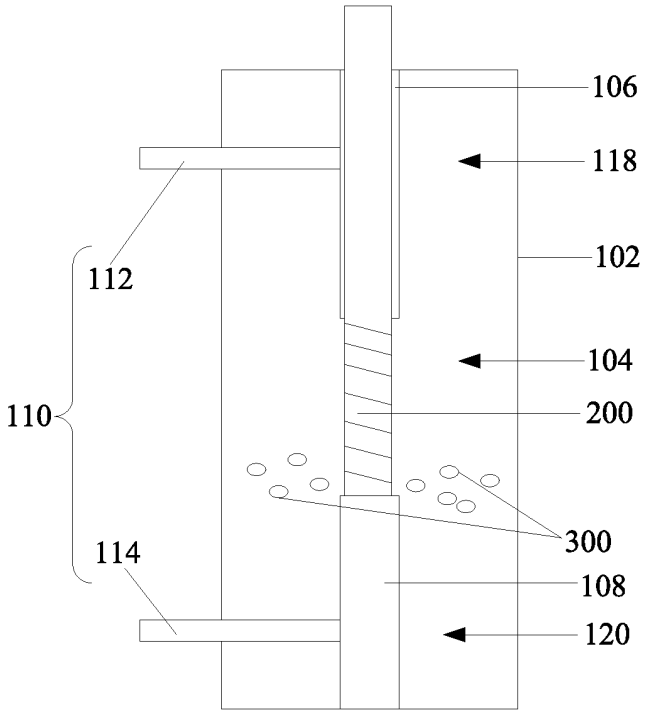
106
118
102
112
104
110
200
300
114
108
120

FIG. 6

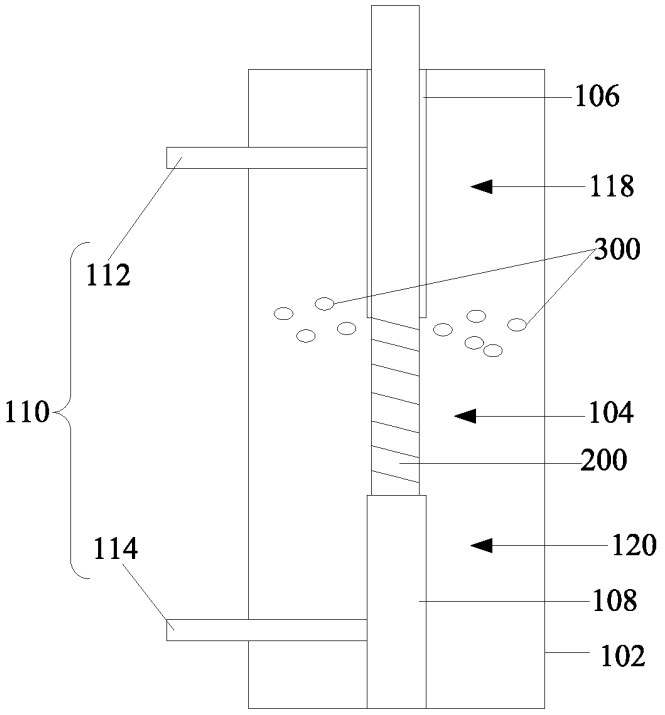
106
118
300
112
110
104
200
114
120
108
102

FIG. 7

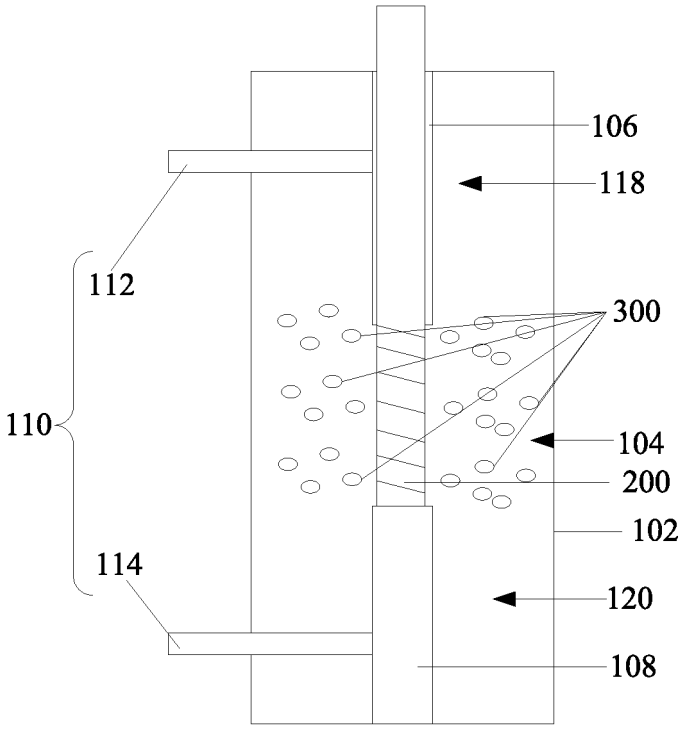
106
118
112
300
110
104
200
102
114
120
108

FIG. 8

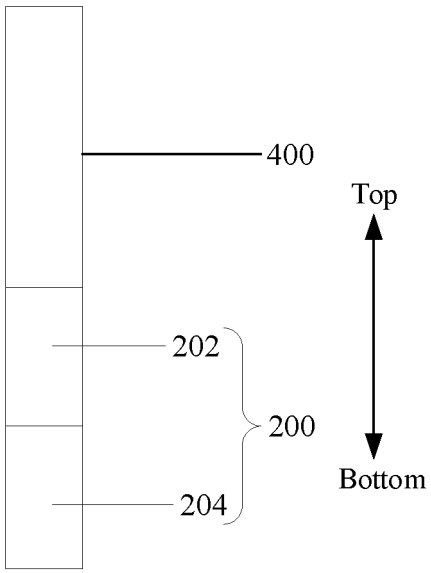
400
Top
202
200
Bottom
204

FIG. 9

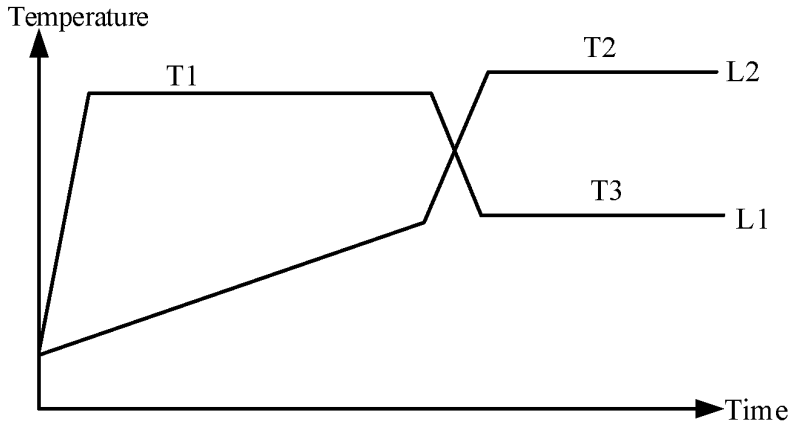

FIG. 10

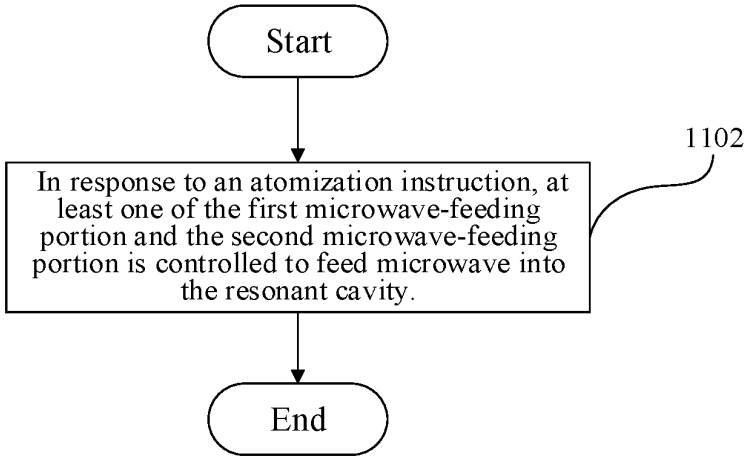

FIG. 11

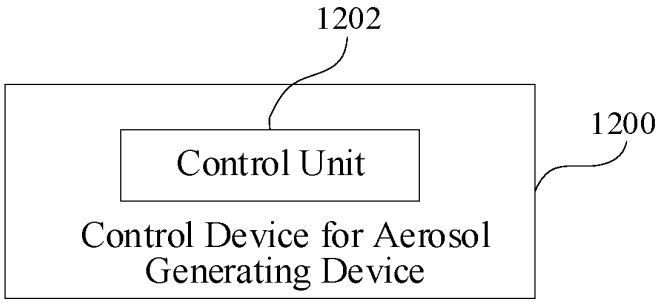

FIG. 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/119935

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/40(2020.01)i; A24F 40/50(2020.01)i; A24F 40/20(2020.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F

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

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

CNTXT: 电子烟, 气溶胶, 微波, 谐振, 共振 VEN: electronic cigarette, aerosol, microwave, resonance

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 215913314 U (SHENZHEN MAXELL TECHNOLOGY CO. LTD. et al.) 01 March 2022 (2022-03-01) description, paragraphs 56-93, and figures 1-10	1-18
X	CN 112512351 A (KT&G CORP.) 16 March 2021 (2021-03-16) description, paragraphs 98-143, and figures 1-8	13-14, 17-18
A	CN 210353180 U (BEIJING AEROSPACE RATE MECHANICAL AND ELECTRICAL ENGINEERING CO., LTD.) 21 April 2020 (2020-04-21) entire document	1-18
A	CN 113317563 A (RAI STRATEGIC HOLDINGS, INC.) 31 August 2021 (2021-08-31) entire document	1-18
A	CN 112188841 A (JT INTERNATIONAL S.A.) 05 January 2021 (2021-01-05) entire document	1-18
A	CN 108552612 A (CHINA TOBACCO YUNNAN INDUSTRIAL CO., LTD.) 21 September 2018 (2018-09-21) entire document	1-18

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 December 2022	**28 December 2022**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/119935

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 208540735 U (BEIJING AEROSPACE RATE MECHANICAL AND ELECTRICAL ENGINEERING CO., LTD.) 26 February 2019 (2019-02-26) entire document	1-18
A	CN 112056625 A (TAIXIN SEMICONDUCTOR (NANJING) CO., LTD.) 11 December 2020 (2020-12-11) entire document	1-18
A	CN 110279151 A (YUNNAN BAGU BIOTECHNOLOGY CO., LTD.) 27 September 2019 (2019-09-27) entire document	1-18
A	CN 110876492 A (SHENZHEN SMOORE TECHNOLOGY LIMITED) 13 March 2020 (2020-03-13) entire document	1-18
A	CN 108552614 A (CHINA TOBACCO YUNNAN INDUSTRIAL CO., LTD.) 21 September 2018 (2018-09-21) entire document	1-18
A	US 2019191783 A1 (PHILIP MORRIS PRODUCTS SA) 27 June 2019 (2019-06-27) entire document	1-18

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/119935

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	215913314	U	01 March 2022	None			
CN	112512351	A	16 March 2021	JP	2021531728	A	25 November 2021
				WO	2020256292	A1	24 December 2020
				JP	2022163151	A	25 October 2022
				EP	3818848	A1	12 May 2021
				US	2022132927	A1	05 May 2022
				KR	20200144403	A	29 December 2020
CN	210353180	U	21 April 2020	None			
CN	113317563	A	31 August 2021	CN	108471813	A	31 August 2018
				EP	3405051	A1	28 November 2018
				US	2017202266	A1	20 July 2017
				RU	2736106	C1	11 November 2020
				WO	2017125878	A1	27 July 2017
				PL	3405051	T3	27 July 2020
				EP	3666093	A1	17 June 2020
CN	112188841	A	05 January 2021	JP	2021522830	A	02 September 2021
				US	2021127738	A1	06 May 2021
				EP	3793380	A1	24 March 2021
				EA	202092788	A1	11 February 2021
				CA	3098268	A1	21 November 2019
				TW	202002816	A	16 January 2020
				WO	2019219740	A1	21 November 2019
				KR	20210020917	A	24 February 2021
CN	108552612	A	21 September 2018	None			
CN	208540735	U	26 February 2019	None			
CN	112056625	A	11 December 2020	None			
CN	110279151	A	27 September 2019	None			
CN	110876492	A	13 March 2020	None			
CN	108552614	A	21 September 2018	None			
US	2019191783	A1	27 June 2019	WO	2018050701	A1	22 March 2018
				RU	2711158	C1	15 January 2020
				MX	2019002789	A	09 May 2019
				JP	2019528710	A	17 October 2019
				KR	20190029702	A	20 March 2019
				CA	3030203	A1	22 March 2018
				CN	109688850	A	26 April 2019
				EP	3512364	A1	24 July 2019

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- CN 202111220248 **[0001]**
- CN 202122523317 **[0001]**