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## AEROSOL GENERATION DEVICE AND MICROWAVE HEATING ASSEMBLY THEREOF

### Abstract


A microwave heating assembly for an aerosol generation device includes: an outer conductor unit having a tubular shape and having an open end and a closed end; and an inner conductor unit arranged in the outer conductor unit, and including: a first fixed end connected to the closed end; and a first free end extending toward the open end, a groove recessed toward the closed end being formed on a surface of the first free end toward the open end, the groove being used to adjust an energy field in the outer conductor unit.



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## Background/Summary

CROSS-REFERENCE TO PRIOR APPLICATION [0001] This application is a continuation of International Patent Application No. PCT/CN2022/129371, filed on Nov. 2, 2022. The entire disclosure is hereby incorporated by reference herein.

FIELD
[0002] The present invention relates to the field of electronic atomization, and in particular, to an aerosol generation device and a microwave heating assembly thereof.
BACKGROUND
[0003] An aerosol generation device heats and atomizes an aerosol generation product through microwave heating. The aerosol generation device generally includes a microwave heating assembly. The microwave heating assembly forms a microwave interaction region, to transfer microwave energy to the aerosol generation product. In this process, a microwave energy distribution field determines an effect of the microwave heating.
[0004] In the related art, the microwave heating assembly is inserted and arranged in the aerosol generation product by using a probe structure, to heat the aerosol generation product. However, during heating, because microwave energy heats the aerosol generation product based on inherent distribution, energy utilization efficiency is not high, or the energy is excessively dispersed, resulting in a possibility that an amount of vapor generated by the aerosol generation product is small or an aerosol generation speed is slow.
SUMMARY
[0005] In an embodiment, the present invention provides a microwave heating assembly for an aerosol generation device, comprising: an outer conductor unit having a tubular shape and comprising an open end and a closed end; and an inner conductor unit arranged in the outer conductor unit, and comprising: a first fixed end connected to the closed end; and a first free end extending toward the open end, a groove recessed toward the closed end being formed on a surface of the first free end toward the open end, the groove being configured to adjust an energy field in the outer conductor unit.

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## Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0006] Subject matter of the present disclosure will be described in even greater detail below based on the exemplary figures. All features described and/or illustrated herein can be used alone or combined in different combinations. The features and advantages of various embodiments will become apparent by reading the following detailed description with reference to the attached drawings, which illustrate the following:
[0007] FIG. **1** is a schematic diagram of an external structure of a microwave heating assembly according to an embodiment of the present invention;
[0008] FIG. **2** is a longitudinal structural cross-sectional view of the microwave heating assembly shown in FIG. **1**;
[0009] FIG. **3** is a longitudinal structural cross-sectional view of the microwave heating assembly shown in FIG. **1** in a disassembled state;
[0010] FIG. **4** is a schematic diagram of a structure of a probe element cooperating with an inner conductor unit according to an embodiment of the present invention;
[0011] FIG. **5** is an energy distribution diagram obtained by testing a microwave heating assembly according to the present invention; and
[0012] FIG. **6** is a schematic diagram that is as a comparison experiment and that is of an energy

distribution diagram obtained through testing when a groove is removed according to a structure of a microwave heating assembly of the present invention.

DETAILED DESCRIPTION

[0013] In an embodiment, the present invention provides an improved aerosol generation device and a microwave heating assembly thereof.

[0014] In an embodiment, the present invention provides a microwave heating assembly, used in an aerosol generation device, and the microwave heating assembly includes: [0015] an outer conductor unit, being in a tubular shape, and including an open end and a closed end; and [0016] an inner conductor unit, arranged in the outer conductor unit, and including: [0017] a first fixed end, connected to the closed end; and [0018] a first free end, extending toward the open end, a groove recessed toward the closed end being formed on the surface of the first free end toward the open end, and the groove being configured to adjust an energy field in the outer conductor unit.

[0019] In some embodiments, the groove is in a cylindrical shape.

[0020] In some embodiments, the depth of the groove ranges from 1 mm to 5 mm.

[0021] In some embodiments, the inner conductor unit includes: [0022] a conductor column, including a second fixed end and a second free end opposite to the second fixed end, the second fixed end being fixed to the closed end; and [0023] a conductor disk, combined on the second free end, the groove being formed on the surface of the conductor disk that faces away from the second fixed end.

[0024] In some embodiments, the conductor disk is integrally formed with the conductor column, or the conductor disk is in ohmic contact with the conductor column.

[0025] In some embodiments, the conductor column is in a cylindrical shape, the conductor disk is in a disk shape, and the diameter of the conductor disk is greater than the diameter of the conductor column and less than the inner diameter of the outer conductor unit.

[0026] In some embodiments, the groove, the conductor disk, the conductor column, and the outer conductor unit are coaxial.

[0027] In some embodiments, the conductor disk is made of a metal material, or the surface of the conductor disk is covered with a conductive coating.

[0028] In some embodiments, the metal material includes aluminum alloy or copper.

[0029] In some embodiments, the conductive coating includes a silver coating or a gold coating.

[0030] In some embodiments, the microwave heating assembly further includes a probe element arranged in the outer conductor unit; and [0031] the probe element is in a longitudinal shape, one end of the probe element passes through the conductor disk and is embedded on the conductor column, and is in ohmic contact with the conductor column, and the other end of the probe element extends toward the open end.

[0032] In some embodiments, the microwave heating assembly further includes an accommodating base mounted at the open end, the accommodating base includes an accommodating portion configured to accommodate an aerosol generation product, the accommodating portion is arranged in the outer conductor unit, and one end of the accommodating portion that is adjacent to the conductor disk extends into and is arranged in the groove.

[0033] In some embodiments, the spacing is provided between the outer wall surface of the accommodating portion and the inner wall surface of the groove.

[0034] In some embodiments, the microwave heating assembly further includes a microwave feeding unit, and the microwave feeding unit includes: [0035] an outer conductor, mounted on the outer conductor unit, and being in ohmic contact with the outer conductor unit; [0036] an inner conductor, arranged in the outer conductor, and being in ohmic contact with the inner side of the outer conductor unit or the inner conductor unit; and [0037] a medium layer, located between the outer conductor and the inner conductor.

[0038] In some embodiments, the outer periphery side wall of the outer conductor unit is provided with a feeding hole that communicates the interior of the outer conductor unit with the outside;

[0039] the outer conductor is embedded in the feeding hole, and is in ohmic contact with the inner wall surface of the feeding hole; and [0040] the inner conductor passes through the feeding hole, and extends into the outer conductor unit.
[0041] The present invention further provides an aerosol generation device. The aerosol generation device includes a microwave generation device, and further includes the foregoing microwave heating assembly. The microwave heating assembly is connected to the microwave generation device.
Beneficial Effects
[0042] Implementation of the present invention has the following beneficial effects: In the present invention, the groove is provided at a corresponding position of the first free end of the inner conductor unit, to adjust energy field distribution inside the outer conductor unit, so that microwave energy is concentrated, and an amount of vapor generated is increased.
[0043] In the drawings: microwave heating assembly **100**; outer conductor unit **11**; inner conductor unit **12**; accommodating base **13**; probe element **14**; microwave feeding device **2**; closed end **111**; open end **112**; conductor side wall **113**; conductor end wall **114**; feeding hole **115**; mounting hole **116**; conductor column **121**; insertion hole **122**; conductor disk **123**; screw rod **124**; groove **1231**; accommodating portion **131**; fixed portion **132**; positioning rib **133**; supporting rib **134**; accommodating cavity **1311**; through hole **1321**; outer conductor **21**; inner conductor **22**; medium layer **23**; connection end **221**; and feeding end **222**.
[0044] To provide a clearer understanding of technical features, objectives, and effects of the present invention, specific implementations of the present invention are described in detail with reference to the accompanying drawings. In the following descriptions, it should be understood that, orientation or position relationships indicated by the terms such as “front”, “rear”, “upper”, “lower”, “left”, “right”, “longitudinal”, “transverse”, “vertical”, “horizontal”, “top”, “bottom”, “inner”, “outer”, “head”, and “tail” are based on orientation or position relationships shown in the accompanying drawings and structures and operations in specific orientations, and are used only for ease of description of the technical solutions, rather than indicating that the mentioned device or element needs to have a specific orientation. Therefore, such terms should not be construed as a limitation to the present invention.
[0045] It should be further noted that, unless otherwise clearly specified and limited, terms such as “mounted”, “connected”, “connection”, “fixed”, and “arranged” should be understood in a generalized manner, for example, may be understood as a fixed connection, a detachable connection, or integration; or may be understood as a mechanical connection or an electrical connection; or may be understood as a direct connection, an indirect connection via a medium, an internal communication of two elements, or a mutual relationship between two elements. When an element is referred to as being “upper” or “lower” another element, the element can be “directly” or “indirectly” located above the another element, or one or more intervening elements may also exist. The terms “first”, “second”, “third”, and the like are merely for ease of describing the technical solutions, and should not be understood as indicating or implying relative importance or implicitly specifying the quantity of the indicated technical features. Therefore, a feature limited to “first”, “second”, “third”, and the like may explicitly or implicitly include one or more such features. A person of skilled in the art may understand the specific meanings of the foregoing terms in the present invention based on specific situations.
[0046] In the following descriptions, for the purpose of illustration rather than limitation, specific details such as the specific system structure and technology are provided, to thoroughly understand the embodiments of the present invention. However, it should be clear to a person skilled in the art that the present invention may also be implemented in other embodiments without these specific details. In other cases, detailed descriptions of well-known systems, devices, circuits, and methods are omitted, so as not to obscure the descriptions of the present invention with unnecessary details.
[0047] According to the present invention, an aerosol generation device is provided. The aerosol

generation device heats an aerosol generation product through microwaves, to form an aerosol for a user to inhale. In some embodiments, the aerosol generation product is a solid-state aerosol generation product such as a processed plant leaf product. It may be understood that, in some other embodiments, the aerosol generation product may alternatively be a liquid aerosol generation product.

[0048] The aerosol generation device includes a microwave generation device and a microwave heating assembly **100**. The microwave generation device can generate the microwaves. The microwave heating assembly **100** is connected to the microwave generation device to access the microwave formed by the microwave generation device, and the microwave heating assembly **100** forms a microwave field inside the cavity of the microwave heating assembly **100**. The microwave field is used for the aerosol generation substrate, to implement microwave heating on the aerosol generation substrate.

[0049] As shown in FIG. **1**, in some embodiments, the overall shape of the microwave heating assembly **100** is substantially in a cylindrical shape. Certainly, the microwave heating assembly **100** is not limited to being in a cylindrical shape, and may alternatively be in another shape such as a square columnar shape or an elliptical columnar shape.

[0050] As shown in FIG. **2**, the microwave heating assembly **100** includes an outer conductor unit **11**, an inner conductor unit **12**, a probe element **14**, an accommodating base **13**, and the microwave feeding device **2**.

[0051] The outer conductor unit **11** is in a tubular shape (preferably a cylindrical tube), includes a closed end **111** and an open end **112** opposite to the closed end **111**, and is defined with a semi-closed cavity. The cavity is in a cylindrical shape.

[0052] The inner conductor unit **12** is configured to adjust a resonance frequency and microwave distribution in the cavity, and the inner conductor unit **12** is coaxially arranged in the cavity of the outer conductor unit **11**. One end of the inner conductor unit **12** is connected to the closed end **111** of the outer conductor unit **11**, and is in ohmic contact with the end wall of the closed end **111**, to form a short-circuit end of the microwave heating assembly **100**. The other end of the inner conductor unit **12** extends toward the open end **112** of the outer conductor unit **11**, and is not in contact with the outer conductor unit **11**, to form an open-circuit end of the microwave heating assembly **100**.

[0053] The accommodating base **13** is configured to receive an aerosol generation substrate, and is fixedly or detachably mounted at the open end **112** of the outer conductor unit **11**. When being inserted and arranged in the accommodating base **13**, the aerosol generation substrate is located in a region in which the microwave field is mainly formed.

[0054] The probe element **14** is configured to adjust microwave field distribution and microwave feeding frequency, and is coaxially arranged in the cavity. The probe element **14** is used as an independent structure, and is coaxially embedded on the inner conductor unit **12** with one end of the probe element **14** extending from the inner conductor unit **12** toward the open end **112** of the outer conductor unit **11**. The other end of the probe element **14** extends into the interior of the accommodating base **13**, so that one end of the probe element **14** penetrates into the interior of the aerosol generation substrate.

[0055] The microwave feeding device **2** is configured to feed the microwaves generated by the microwave generation device into the cavity (a feeding manner includes an electric feeding manner or a magnetic feeding manner, and the electric feeding manner is preferably used). The microwave feeding device **2** is detachably mounted on the outer peripheral wall of the outer conductor unit **11**.

[0056] As shown in FIG. **3**, in some embodiments, the outer conductor unit **11** includes a conductive conductor side wall **113** and a conductive conductor end wall **114**. The conductor side wall **113** is in a tubular shape (preferably a cylindrical tube), and includes two ends that are oppositely arranged. The conductor end wall **114** is closed on the first end of the conductor side wall **113**, to form the closed end **111**, and the second end of the conductor side wall **113** of the conductor is of an open structure, to form the open end **112**, so that the accommodating base **13** can be mounted in the conductor side wall **113**. In addition, a radially penetrating feeding hole **115** is provided at a position close to the conductor end wall **114** of the conductor side wall **113**. The feeding hole **115** is configured for the microwave feeding device **2** to be inserted and arranged in the interior of the outer conductor unit **11**. The aperture of the feeding hole **115** matches the outer diameter of an outer conductor **21** of the microwave feeding device **2**. An axially penetrating mounting hole **116** is further provided at a central position of the conductor end wall **114**. The mounting hole **116** is configured for the inner conductor unit **12** to be mounted on the mounting hole, to fix one end of the inner conductor unit **12** to the conductor end wall **114**.

[0057] In some embodiments, the outer conductor unit **11** is integrally made of a conductive metal material, and preferably, the metal material is aluminum alloy or copper. It may be understood that, the outer conductor unit **11** is not limited to being integrally made of a conductive material, and may alternatively be implemented by plating a first conductive coating on the inner wall surface of a non-conductive cylinder. The material of the first conductive coating includes gold, silver, a conductive metal oxide, or the like. Preferably, the first conductive coating is a silver coating or a gold coating.

[0058] As shown in FIG. **3**, in some embodiments, the inner conductor unit **12** includes a conductor column **121** and a conductor disk **123** arranged above the conductor column **121**. Preferably, the axis of the conductor column **121**, the axis of the conductor disk **123**, and the axis of the outer conductor unit **11** coincide with each other.

[0059] The conductor column **121** is in a cylindrical shape. One end (bottom end) of the conductor column **121** that is away from the open end **112** of the outer conductor unit **11** is a fixed end, and is coaxially fixed to the conductor end wall **114** of the outer conductor unit **11**. The other end (top end) of the conductor column **121** that is close to the open end **112** is a free end, and extends toward the open end **112** of the outer conductor unit **11**. The diameter of the conductor column **121** is less than the inner diameter of the outer conductor unit **11**. It may be understood that, the conductor column **121** is not limited to being in a cylindrical shape, and may alternatively be in another shape such as a square columnar shape, an elliptical columnar shape, a staircase columnar shape, or an irregular columnar shape. In addition, an axially extending screw rod **124** is further arranged at the bottom end of the conductor column **121**. The screw rod **124** is integrally formed with the conductor column **121**, and is configured to be mounted on the mounting hole **116** located on the conductor end wall **114** of the outer conductor unit **11**, to fix the conductor column **121** to the conductor end wall **114**, so that the conductor column **121** is in reliable ohmic contact with the outer conductor unit **11**.

[0060] In some embodiments, the conductor column **121** is integrally made of a conductive metal material, and preferably, the metal material is aluminum alloy or copper. It may be understood that, the conductor column **121** is not limited to being integrally made of a conductive material, and may alternatively be implemented by plating a second conductive coating on the external surface of a non-conductor. Preferably, the second conductive coating is plated with a silver coating or a gold coating.

[0061] The conductor column **121** is further provided with an insertion hole **122** corresponding to the feeding hole **115**. The insertion hole **122** is configured to cooperate with the microwave feeding device **2**, to implement microwave conduction. The insertion hole **122** is a blind hole, is in a shape of a straight cylindrical channel, and radially extends toward the interior of the conductor column **121** along the outer peripheral wall of the conductor column **121**. Preferably, the aperture of the insertion hole **122** matches the diameter of the inner conductor **22** of the microwave feeding device **2**.

[0062] The conductor disk **123** is configured to conduct microwaves, further increases inductance and capacitance of the conductor disk **123**, and reduces the resonance frequency, thereby facilitating further reduction of the cavity size. The conductor disk **123** is in a disk shape, the diameter of the conductor disk **123** is greater than the diameter of the conductor column **121**, and the conductor disk **123** is coaxially arranged on a top end of the conductor column **121**. The conductor disk **123** is integrally formed with the conductor column **121**, or is in ohmic contact with the conductor column **121**.

[0063] In some embodiments, the conductor disk **123** is integrally made of a conductive metal material, and preferably, the metal material is aluminum alloy or copper. It may be understood that, the conductor disk **123** is not limited to being integrally made of a conductive material, and may alternatively be implemented by plating a third conductive coating on the external surface of the non-conductor. Preferably, the third conductive coating is plated with a silver coating or a gold coating.

[0064] Referring to FIG. **4**, the conductor disk **123** is provided with a groove **1231** recessed along the disk surface of the conductor disk **123** facing away from the conductor column **121**. The groove **1231** is configured to adjust energy field distribution. During assembling, the lower portion of the accommodating base **13** extends into the groove **1231**, and the spacing is provided between the lower portion of the accommodating base **13** and the groove **1231**.

[0065] In some embodiments, the groove **1231** is in a cylindrical shape, and is coaxial with the conductor disk **123**. The diameter of the groove **1231** is greater than the outer diameter of the lower portion of the accommodating base **13**, and the depth of the groove **1231** ranges from 1 mm to 5 mm.

[0066] It may be understood that, the groove **1231** is provided, and the depth of the groove **1231** is adjusted, so that the energy field distribution can be adjusted, and microwave energy is concentrated to an upper region of the aerosol generation substrate, thereby facilitating rapid aerosol generation when energy is limited. In addition, after the energy field distribution is adjusted, problems such as localized tobacco scorching, low aerosol generation speed, and a small amount of vapor can also be resolved/relieved. Then, because the conductor disk **123** is provided with the groove, the partial structure of the accommodating base **13** can be accommodated in the conductor disk **123**, so that the height of the entire microwave heating assembly **100** is correspondingly reduced, thereby reducing the size of the microwave heating assembly **100**.

[0067] As shown in FIG. **3** and FIG. **4**, the probe element **14** includes a longitudinal probe. The lower end of the probe passes through the conductor disk **122**, and is coaxially embedded in the conductor column **121** from the top end of the conductor column **121**, to be in good ohmic contact with the conductor column **121**. The upper end of the probe extends upward into the accommodating base **13**. It may be understood that, when extending into the accommodating base **13**, the aerosol generation substrate is arranged on the outer periphery of the upper end of the probe. In this case, when the microwaves are fed into the microwave heating assembly **100**, a microwave field is formed when the probe element **14** extends into a periphery of the partial structure of the accommodating base **13**, to perform microwave heating on the aerosol generation substrate.

[0068] The probe element **14** further includes a temperature measurement element arranged in the probe. The temperature measurement element is configured to monitor the internal temperature of an aerosol generation material inserted into the accommodating base **13**, to facilitate temperature control. It may be understood that, when the temperature is not need to be measured, the probe is a solid structure; and when the temperature needs to be measured, the probe is a hollow probe.

[0069] Optionally, the shape of the end portion of the upper end of the probe includes one of a plane, a sphere, an ellipsoid, a cone, or a frustum of a cone. The shape of a frustum of a cone is preferred because a local field strength can be enhanced in this shape, thereby increasing an atomization speed of an aerosol generation medium.

[0070] In some embodiments, the probe is integrally made of a conductive metal material, and preferably, is made of stainless steel, aluminum alloy, or copper. It may be understood that, the probe is not limited to being integrally made of a conductive material, and may alternatively be implemented by plating a fourth conductive coating on the external surface of the non-conductor. Preferably, the fourth conductive coating is plated with a silver coating or a gold coating.

[0071] As shown in FIG. **2** and FIG. **3**, in some embodiments, the accommodating base **13** includes an accommodating portion **131** and a fixed portion **132** integrally connected to the accommodating portion **131**. The accommodating portion **131** is configured to accommodate the aerosol generation substrate. The fixed portion **132** is configured to be axially blocked on the open end **112** of the outer conductor unit **11** and enable the accommodating portion **131** to extend into the cavity.

[0072] In some embodiments, the accommodating portion **131** is in a tubular shape (preferably a cylindrical tube), and the outer diameter of the accommodating portion **131** is less than the inner diameter of the outer conductor unit **11**. The accommodating portion **131** includes an axial accommodating cavity **1311** configured to accommodate the aerosol generation substrate. The fixed portion **132** is in an annular shape, and is coaxially connected to the accommodating portion **131**. The fixed portion **132** is coaxially blocked on the open end **112** of the outer conductor unit **11**, so that the accommodating portion **131** is coaxially arranged in the cavity. The fixed portion **132** includes an axial through hole **1321** that communicates the accommodating cavity **1311** with an external environment, and the aerosol generation substrate is inserted into the accommodating cavity **1311** through the through hole **1321**.

[0073] In some embodiments, the accommodating base **13** further includes several longitudinal positioning ribs **133**. These positioning ribs **133** are evenly spaced apart on the periphery of the wall surface of the accommodating cavity **1311** and/or the through hole **1321**. Each positioning rib **133** extends along the direction parallel to the axis of the accommodating base **13**. The positioning ribs **133** are configured to clamp the aerosol generation substrate inserted into the accommodating cavity **1311** and/or the through hole **1321**. In addition, a longitudinally extending air inlet channel is formed between every two adjacent positioning ribs **133**, to facilitate ambient air to be inhaled into the bottom portion of the aerosol generation substrate, and then the ambient air enters the aerosol generation substrate, to take away the aerosol generated by the microwaves.

[0074] In some embodiments, the accommodating base **13** further includes several longitudinal supporting ribs **134**. These supporting ribs **134** are evenly spaced apart, and are radially distributed on the bottom surface of the accommodating cavity **1311**. It may be understood that, the supporting rib **134** is configured to support the aerosol generation material. In addition, the supporting rib **134** forms several radiated second air inlet channels. These second air inlet channels are respectively in communication with these first air inlet channels, to facilitate the ambient air to be inhaled into the bottom portion of the aerosol generation material, and then the ambient air enters the aerosol generation material, to take away the aerosol generated by the microwaves.

[0075] In some embodiments, the accommodating base **13** is made of a high temperature resistant material with low dielectric loss, and the material can be a polymer material (such as polytetrafluoroethylene (PTFE) and polyether-ether-ketone (PEEK)), or a ceramic material (such as glass, quartz glass, aluminum oxide, and zirconium oxide).

[0076] As shown in FIG. **2**, in some embodiments, the microwave feeding device **2** is a coaxial connector, is inserted from the feeding hole **115** located on the peripheral side of the outer conductor unit **11**, and is mounted on the outer conductor unit **11**. The microwave feeding device **2** includes an outer conductor **21**, an inner conductor **22** arranged in the outer conductor **21**, and a medium layer **23** between the inner conductor **22** and the outer conductor **21**.

[0077] In some embodiments, the outer conductor **21** is of a straight cylindrical structure with an opening structure at two ends. When the microwave feeding device **2** is mounted on the outer conductor unit **11**, the side wall of the outer conductor **21** is in ohmic contact with the inner wall surface of the feeding hole **115** located on the outer conductor unit **11**.

[0078] The inner conductor **22** is in a straight needle-like structure. One end of the inner conductor **22** is a connection end **221** located in the outer conductor **21**, and the other end of the inner conductor **22** is a feeding end **222** located outside the outer conductor **21**. The connection end **221**

is configured to be connected to the microwave generation device, to access the microwaves. A connection manner is a coaxial connection manner or a microstrip connection manner. The feeding end **222** is relatively adjacent to the inner conductor unit **12** when the microwave feeding device **2** is mounted on the outer conductor unit **11**, and is configured to be inserted into the insertion hole **122** located on the conductor column **121**, to implement electric coupling or magnetic coupling, thereby guiding the microwaves to the inner conductor unit **12**.
[0079] In some other embodiments, the inner conductor **22** may alternatively be in an L-shape, and includes a first segment that is perpendicular to the axis of the microwave heating assembly **100** and a second segment that is parallel to the axis of the microwave heating assembly **100**. The first segment is partially located in the outer conductor **21**, and one end thereof which is configured to connect to the second segment extend out of the outer conductor **21**. Preferably, the first segment and the second segment are integrally formed.
[0080] In this embodiment, one end of the second segment that is away from the first segment is in direct ohmic contact with the conductor end wall **114** of the outer conductor unit **11**, and an insertion hole **122** does not need to be provided on the conductor column **121**. Certainly, the position of the insertion hole may alternatively be changed to the conductor end wall **114** of the outer conductor unit **11**. In this case, the insertion hole is axially recessed in the conductor end wall **114**.
[0081] The following specifically describes functions of the groove **1231** through a comparison experiment.
[0082] First, a comparison test is performed on the microwave heating assembly provided with the groove **1231** and the microwave heating assembly **100** not provided with the groove **1231**. The depth of the groove **1231** is 4 mm, and the diameter of the groove is 9.6 mm.
[0083] Referring to FIG. **5** and FIG. **6**, an energy field distribution diagram of microwave heating assembly provided with the groove **1231** and an energy field distribution diagram of the microwave heating assembly **100** not provided with the groove **1231** are compared. It may be obtained that, in FIG. **6**, a dark-colored region surrounding the probe element **14** occupies a significantly reduced area in a bottom region of the aerosol generation substrate, and energy (dark-colored region) concentrates toward an upper region (located above the bottom region) of the aerosol generation substrate. It may be obtained after calculation based on test data that an energy absorption ratio of the upper region of the aerosol generation substrate increases from 61% to 77%.
[0084] Then, a comparison test is performed on the microwave heating assemblies **100** provided with the grooves **1231** having different depths. When the depth of the groove **1231** is 2 mm, the energy absorption ratio of the upper region of the aerosol generation substrate is 68%, and compared to the microwave heating assembly **100** provided with the groove having the depth of 4 mm, the energy absorption ratio of the upper region of the aerosol generation substrate is reduced by 9%.
[0085] It may be obtained after an experiment that, energy distribution is adjusted mainly by adjusting the depth of the groove **1231**, and an impact of the diameter of the groove **1231** on the energy distribution can be ignored. As the depth of the groove **1231** is deeper, the energy is more concentrated toward the upper region of the aerosol generation substrate.
[0086] In conclusion, in the present invention, the conductor disk **123** of the inner conductor unit **12** is provided with the groove **1231** to adjust cavity energy field distribution, so that the microwave energy is concentrated on the upper region of the aerosol generation substrate, thereby facilitating rapid aerosol generation when the energy is limited. In addition, after the energy field distribution is adjusted, a problem of a small amount of vapor or a low aerosol generation speed of the aerosol generation substrate may also be resolved.
[0087] In addition, because the conductor disk **123** is provided with the groove, the partial structure of the aerosol generation substrate can be accommodated in the conductor disk **123**, so that the height of the entire microwave heating assembly **100** is correspondingly reduced, thereby reducing

the size of the microwave heating assembly **100**.

[0088] While the invention has been illustrated and described in detail in the drawings and foregoing description, such illustration and description are to be considered illustrative or exemplary and not restrictive. It will be understood that changes and modifications may be made by those of ordinary skill within the scope of the following claims. In particular, the present invention covers further embodiments with any combination of features from different embodiments described above and below. Additionally, statements made herein characterizing the invention refer to an embodiment of the invention and not necessarily all embodiments.

[0089] The terms used in the claims should be construed to have the broadest reasonable interpretation consistent with the foregoing description. For example, the use of the article "a" or "the" in introducing an element should not be interpreted as being exclusive of a plurality of elements. Likewise, the recitation of "or" should be interpreted as being inclusive, such that the recitation of "A or B" is not exclusive of "A and B," unless it is clear from the context or the foregoing description that only one of A and B is intended. Further, the recitation of "at least one of A, B and C" should be interpreted as one or more of a group of elements consisting of A, B and C, and should not be interpreted as requiring at least one of each of the listed elements A, B and C, regardless of whether A, B and C are related as categories or otherwise. Moreover, the recitation of "A, B and/or C" or "at least one of A, B or C" should be interpreted as including any singular entity from the listed elements, e.g., A, any subset from the listed elements, e.g., A and B, or the entire list of elements A, B and C.

## Claims

**1**. A microwave heating assembly for an aerosol generation device, comprising: an outer conductor unit having a tubular shape and comprising an open end and a closed end; and an inner conductor unit arranged in the outer conductor unit, and comprising: a first fixed end connected to the closed end; and a first free end extending toward the open end, a groove recessed toward the closed end being formed on a surface of the first free end toward the open end, the groove being configured to adjust an energy field in the outer conductor unit.

**2**. The microwave heating assembly of claim 1, wherein the groove has a cylindrical shape.

**3**. The microwave heating assembly of claim 1, wherein a depth of the groove ranges from 1 mm to 5 mm.

**4**. The microwave heating assembly of claim 1, wherein the inner conductor unit comprises: a conductor column comprising a second fixed end and a second free end opposite the second fixed end, the second fixed end being fixed to the closed end; and a conductor disk combined on the second free end, the groove being formed on a surface of the conductor disk that faces away from the second fixed end.

**5**. The microwave heating assembly of claim 4, wherein the conductor disk is integrally formed with the conductor column, or the conductor disk is in ohmic contact with the conductor column.

**6**. The microwave heating assembly of claim 4, wherein the conductor column has a cylindrical shape, wherein the conductor disk has a disk shape, and wherein a diameter of the conductor disk is greater than a diameter of the conductor column and less than an inner diameter of the outer conductor unit.

**7**. The microwave heating assembly of claim 4, wherein the groove, the conductor disk, the conductor column, and the outer conductor unit are coaxial.

**8**. The microwave heating assembly of claim 4, wherein the conductor disk comprises a metal material, or a surface of the conductor disk is covered with a conductive coating.

**9**. The microwave heating assembly of claim 8, wherein the metal material comprises aluminum alloy or copper.

**10**. The microwave heating assembly of claim 8, wherein the conductive coating comprises a silver coating or a gold coating.

**11**. The microwave heating assembly of claim 4, further comprising: a probe element arranged in the outer conductor unit, the probe element being in a longitudinal shape, wherein one end of the probe element passes through the conductor disk, is embedded on the conductor column, and is in ohmic contact with the conductor column, and wherein an other end of the probe element extends toward the open end.

**12**. The microwave heating assembly of claim 4, further comprising: an accommodating base mounted at the open end, the accommodating base comprising an accommodating portion configured to accommodate an aerosol generation substrate, the accommodating portion being arranged in the outer conductor unit, wherein one end of the accommodating portion that is adjacent to the conductor disk extends into and is arranged in the groove.

**13**. The microwave heating assembly of claim 12, wherein spacing is provided between an outer wall surface of the accommodating portion and an inner wall surface of the groove.

**14**. The microwave heating assembly of claim 1, further comprising: a microwave feeding unit, comprising: an outer conductor mounted on the outer conductor unit and being in ohmic contact with the outer conductor unit; an inner conductor arranged in the outer conductor and being in ohmic contact with an inner side of the outer conductor unit or the inner conductor unit; and a medium layer located between the outer conductor and the inner conductor.

**15**. The microwave heating assembly of claim 14, wherein an outer periphery side wall of the outer conductor unit is provided with a feeding hole that communicates an interior of the outer conductor unit with an outside, wherein the outer conductor is embedded in the feeding hole and is in ohmic contact with an inner wall surface of the feeding hole, and wherein the inner conductor passes through the feeding hole and extends into the outer conductor unit.

**16**. An aerosol generation device, comprising: a microwave generation device; and the microwave heating assembly of claim 1, the microwave heating assembly being connected to the microwave generation device.