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(71) Applicant: **Shenzhen Merit Technology Co., Ltd.**
Shenzhen, Guangdong 518000 (CN)

(72) Inventors:
- **YUAN, Yongbao**
  Shenzhen, Guangdong 518000 (CN)
- **LIAO, Yancheng**
  Shenzhen, Guangdong 518000 (CN)

(74) Representative: **Westphal, Mussgnug & Partner, Patentanwälte mbB**
Werinherstraße 79
81541 München (DE)

(54) AEROSOL GENERATING DEVICE

(57) The present invention relates to an aerosol generating device, comprising a fixing tube (20) for fixing an aerosol forming substrate (200), a heating assembly (50), and an air flow channel (213),wherein the fixing tube (20) is of a hollow structure, with one end thereof being provided with a first opening (211) for insertion into the aerosol forming substrate; the heating assembly (50) is inserted into the aerosol forming substrate (200) from an end of the fixing tube (20) that is away from the first opening; and the air flow channel (213) is arranged on an inner side of a tube wall of the fixing tube (20) to allow external air to enter into the aerosol forming substrate (200). According to the aerosol generating device, the air flow channel is shortened,which prevents blocking of the air flow channel and prevents direct transfer of heat to the wall.

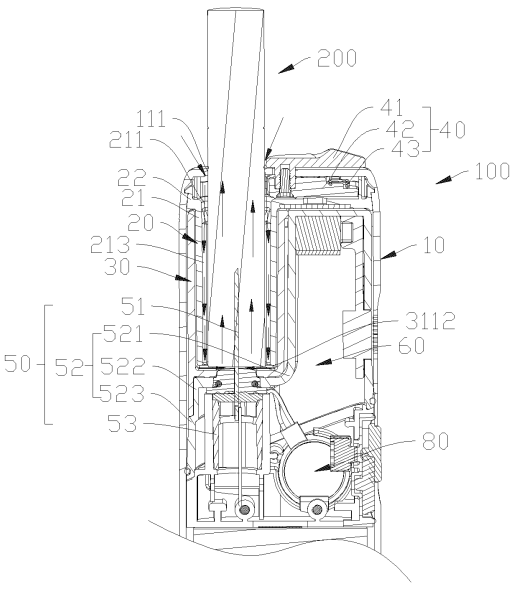

FIG. 3

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a heat-not-burning atomization device, and more particularly to an aerosol generating device.

DESCRIPTION OF THE RELATED ART

[0002] A current aerosol forming device comprises a fixing tube for receiving and holding an aerosol forming substrate and a lower casing for receiving and holding a battery. A heating element is arranged inside the fixing tube, and the battery supplies electricity to the heating element. The lower casing defines a gas inlet opening and a gas passage in communication with the gas inlet opening and the fixing tube. When the aerosol forming substrate is being heated and a user is inhaling cigarette gas, external air is drawn through the gas inlet opening into the gas passage then get into the fixing tube to pass through the interior of the aerosol forming substrate to bring the cigarette gas into the mouth of the user.

[0003] However, in such a structure, a distance from the heating element to a tube wall of the fixing tube is short. Thus, the heat of the heating element can be readily transmitted to the tube wall of the fixing tube to cause a high temperature, and this may easily result in the user's hand feeling uncomfortable. On the other hand, the gas passage is arranged in the lower casing, and the structure is complicated and the path being long, so that it is easy to get blocked.

SUMMARY OF THE INVENTION

[0004] The technical problem that the present invention is made to overcome is to provide an improved aerosol generating device.

[0005] The technical solution that the present invention adopts to overcome the technical problem is to construct an aerosol forming device, which comprises a fixing tube for fixing an aerosol forming substrate and a heating assembly;

the fixing tube being of a hollow structure and having an end that is formed with a first opening for insertion of the aerosol forming substrate;

an end of the outer tube being provided with a supporting wall that supports the aerosol generation base; the supporting wall being arranged to correspond to a second opening;

the heating assembly being insertable from an end of the fixing tube that is distant from the first opening into the aerosol forming substrate;

the aerosol forming device further comprising an air flow channel arranged on the inner side of a tube wall of the fixing tube to allow external air to get into the aerosol forming substrate.

[0006] Preferably, the air flow channel comprises a first air flow channel arranged on the inner side of the tube wall of the fixing tube and the first opening and extending toward and in communication with an end distant from the first opening to allow the external air to get into the aerosol forming substrate.

[0007] Preferably, the aerosol forming device further comprises an outer tube sleeved over an outer circumference of the fixing tube; and
the air flow channel further comprises a second air flow channel arranged in the outer tube and in communication with the first air flow channel to allow gas from the first air flow channel to get into the aerosol forming substrate.

[0008] Preferably, an end of the fixing tube that is distant from the first opening is formed with a second opening that is in communication with the first opening;

an end of the outer tube is provided with a supporting wall that supports the aerosol forming substrate; the supporting wall is arranged to correspond to the second opening; the heating assembly perforates through the supporting wall to insert from the second opening into the aerosol forming substrate; and
the second air flow channel is arranged on the supporting wall and in communication with the first air flow channel and the second opening.

[0009] Preferably, the first air flow channel is arranged in a longitudinal direction of the fixing tube;
and/or, the fixing tube is provided, at an end thereof that is distant from the first opening, with a bottom wall.

[0010] Preferably, the fixing tube has a cross section that is of a non-circular shape; and
the first air flow channel is formed by recessing of a portion of the tube wall of the fixing tube.

[0011] Preferably, the fixing tube comprises a fixing section that is hollow and has two penetrating ends; the first opening and the second opening are both arranged at the two ends of the fixing section;

the fixing section has a cross section that is in an elliptical shape;

the cross section of the fixing section comprises a major axis and a minor axis that is arranged to intersect the major axis; and

two ends of the major axis are both provided with the first air flow channel.

[0012] Preferably, the fixing tube comprises a circular internal tube wall and an external tube wall arranged on the outer circumference of the internal tube wall and spaced from the internal tube wall; and

the first air flow channel is arranged on the inner side of the external tube wall and is located between the external tube wall and the internal tube wall.

[0013] Preferably, the internal tube wall comprises a plurality of internal tube wall units that are arranged at intervals and circumferentially enclosing to define a columnar structure;

spacing between two adjacent ones of the internal tube wall units forms a slit that is in communication with the first air flow channel and enables the two adjacent ones of the internal tube wall units to apply a compressing force to the aerosol forming substrate; and

the slit is arranged to be in communication with the first opening and the second opening.

[0014] Preferably, the fixing tube further comprises a linking section provided on the internal tube wall to connect the internal tube wall and the external tube wall.

[0015] Preferably, the internal tube wall and the external tube wall are integrally formed as one piece;
or alternatively, the internal tube wall and the external tube wall are connected in a detachable manner.

[0016] Preferably, a top cover is further included and is sleeved over the outer circumference of the fixing tube; the internal tube wall integrally formed with the top cover as one piece.

[0017] Preferably, the supporting wall is provided with a plurality of platforms arranged thereon at intervals; two adjacent ones of the platforms define therebetween the second air flow channel in communication with the first air flow channel.

[0018] Preferably, the supporting wall is formed with a through hole to receive the heating assembly to perforate therethrough.

[0019] Preferably, the heating assembly comprises a heating body that perforates through the supporting wall to insert from the second opening into the aerosol forming substrate.

[0020] Preferably, a cross section of a fixing section of the fixing tube comprises a major axis and a minor axis that is arranged to intersect the major axis; two ends of the major axis are both provided with the first air flow channel of the gas flow channel; and

[0021] the heating body is of a form of a plate, and when the heating body is inserted into the aerosol forming substrate, the width direction of the heating body coincides with the length direction of the minor axis.

[0022] Preferably, the heating body is of a form of a pillar.

[0023] Preferably, the heating body comprises a cylindrical main section and a sharp tip structure arranged at one end of the main section and having a conical form.

[0024] Preferably, a top cover is further included and is sleeved over the outer circumference of the fixing tube; the top cover formed with an insertion opening that corresponds to the first opening to allow the aerosol forming substrate to insert into the fixing tube.

[0025] Preferably, the shape of the insertion opening matches a cross-sectional shape of the fixing tube.

[0026] Preferably, the insertion opening is provided with a guide slope surface for guiding the insertion of the aerosol forming substrate; and
the guide slope surface is extended from an end face of an end of the insertion opening that is distant from the fixing tube in a direction toward the fixing tube.

[0027] The aerosol generating device according to the present invention possesses the following efficacy. The aerosol generating device is structured to include an air flow channel arranged on the inner side of the tube wall of the fixing tube to conduct external air to enter the aerosol forming substrate, so as to make it easy for users to inhale and to reduce the air flow channel and avoid blocking of the gas flow channel, and also to prevent heat from directly transmitting to the tube wall to thereby avoid being hard to be held by the users or causing discomfort during inhaling. The aerosol generating device possesses advantages of simple structure, high gas conveyance efficiency, being not easy to get blocked, and excellent users' experience.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] In the following, the present invention will be further described, with reference to the attached drawings and, and in the drawings:

FIG. 1 is a schematic view showing an aerosol generating device according to a first embodiment of the present invention;

FIG. 2 is a longitudinal cross-sectional view showing the aerosol generating device according to the present invention shown in FIG. 1;

FIG. 3 is an enlarged view of a partial structure of the aerosol generating device according to the embodiment of the present invention shown in FIG. 2;

FIG. 4 is an exploded view showing the aerosol generating device according to the present invention shown in FIG. 1;

FIG. 5 is a schematic view showing a combination of a cover and a fixing tube of the aerosol generating device according to present invention shown in FIG. 1;

FIG. 6 is a schematic view showing the top cover of the aerosol generating device according to the present invention shown in FIG. 4;

FIG. 7 is a schematic view showing the fixing tube of the aerosol generating device according to the

present invention shown in FIG. 4;

FIG. 8 is a schematic view showing an outer tube of the aerosol generating device according to the present invention shown in FIG. 4;

FIG. 9 is a schematic view showing a state of combination of a heating assembly and an electricity supply assembly of the aerosol generating device according to the present invention shown in FIG. 4;

FIG. 10 is a schematic view showing a combination of a top cover and a fixing tube of an aerosol generating device according to a second embodiment of the present invention;

FIG. 11 is an exploded view showing the fixing tube of the aerosol generating device according to the second embodiment shown in FIG. 10;

FIG. 12 is a schematic view showing a state of combination of a heating assembly and an electricity supply assembly of the aerosol generating device according to the second embodiment shown in FIG. 10; and

FIG. 13 is a partial cross-sectional view showing a fixing tube of an aerosol generating device according to a third embodiment of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

[0029] For better understanding of the technical features, objectives, and the efficacy of the present invention, a detailed description of specific embodiments of the present invention will be provided with reference to the attached drawings.

[0030] It is noted that the terms, "front", "rear", "left", "right", "up", "down", "first", and "second", as used herein, are adopted for easy description of the technical solution of the present invention, and are not to intended to indicate a designated device or element must bear specific distinction, and thus should not be construed as being limitative to the present invention. It is noted that when an element is considered "connecting" to another element, it can be directly connected to said another element or there may also be an intermediate element. Unless otherwise defined, all the technical and scientific terminology used in the disclosure bear the same meaning as that is commonly appreciated by those skill in the art to which the present invention belongs. The terminology used in the disclosure of the present invention is adopted for the purposes of illustrating the specific embodiments, and is not to limit the present invention.

[0031] FIGS. 1 and 2 shows an aerosol generating device according to a first embodiment of the present invention. The aerosol generating device 100 may adopt a low temperature heating but not burning manner to heat the aerosol forming substrate 200. In the instant embodiment, the aerosol forming substrate 200 may be of a cylindrical form, and specifically, the aerosol forming substrate 200 may be a cigarette.

[0032] As shown in FIGS. 1-3, the aerosol generating device comprises a top cover 10, a fixing tube 20, and a heating assembly 50. The top cover 10 is fit over the outer circumference of the fixing tube 20. The top cover 10 in combination with the fixing tube 20 forms a top cover assembly. The top cover assembly receives and holds therein the aerosol forming substrate 200. The fixing tube 20 is arranged in the top cover 10 to receive the aerosol forming substrate 200 to insert therein in order to fix the aerosol forming substrate 200 in position. The heating assembly 50 is arranged to insert into the aerosol forming substrate 200 received in the fixing tube 10 and is operable to heat the aerosol forming substrate 200. As shown in FIGS. 3-6, further, in this embodiment, the top cover 10 and the fixing tube 20 are connected to each other in a detachable manner, and are connected, by means of a connecting assembly, to form an integral structure. It can be appreciated that in other embodiments, the top cover 10 and the fixing tube 20 can alternatively be formed integrally as one piece by means of casting or injection molding. The top cover 10 comprises a top wall 11 and a tubular sidewall 12 that is mounted to the top wall 11 and is extended downward from the circumference of the top wall 11. The inner side of the tubular sidewall 12 circumferentially delimits and defines a receiving chamber. The top wall 11 has a cross section that is substantially of an elliptical shape, but is not limited to elliptical shape. The top cover 10 is formed with an insertion opening 111, and the insertion opening 111 is configured for receiving the aerosol forming substrate 200 to insert into the fixing tube 20. Specifically, the insertion opening 111 is formed in the top wall 11 of the top cover 10. In this, a shape of the insertion opening 11 is corresponded to a cross-sectional shape of the fixing tube 20. Specifically, the shape of the insertion opening 11 is corresponded to a cross-sectional shape of a fixing section 21 of the fixing tube 20. The insertion opening 11 is substantially of an elliptical shape, but is not limited thereto. The insertion opening 11 is provided with a guide slope surface. The guide slope surface extends from an end face of an end of the insertion opening 11 that is distant from the fixing tube 20 in a direction toward the fixing tube 20, so that the insertion opening 11is generally of a shape of a frustum. The guide slope surface functions to guide the insertion of the aerosol forming air 100. It is appreciated that in other embodiments, the guide slope surface may be omitted.

[0033] As shown in FIGS. 3-5 and 7, further, in the instant embodiment, the fixing tube 20 is of a structure that is hollow and has two ends that are open for receiving the aerosol forming substrate 200 therein. The fixing tube 20 further comprises a fixing section 21 and a mounting section 22. The fixing section 21 is provided for fixing the aerosol forming substrate 200. The mounting section 22

is arranged at an end of the fixing section 21 and may be mounted in combination with the top cover 10.

[0034] In the instant embodiment, the fixing section 21 is in a tubular configuration. The fixing section 21 is a hollow and two-end-perforating structure, and an insertion passage 210 is formed in the interior of the fixing section 21. The two ends of the fixing tube 20 are respectively formed as a first opening 211 and a second opening 212. In some embodiments, the first opening 211 and the second opening 212 are respectively formed in the two ends of the fixing section 21 and are arranged symmetric about an axis and are in communication with the insertion passage 210. The aerosol forming substrate 200 is insertable from the first opening 211 into the fixing tube, and is extractable from the fixing tube 212 toward the first opening 211 for removal. Specifically, the aerosol forming substrate 200 can be inserted to reach the second opening 212, and can be extracted from the second opening 212 toward the first opening 211 for removal. In other embodiments, the aerosol forming substrate 200 has a length that is greater than the distance between the first opening 211 and the second opening 212. The aerosol forming substrate 200 can alternatively be arranged to exceed the second opening 212. In other embodiments, the aerosol forming substrate 200 may alternatively not reach the second opening. In some embodiments, the first opening 211 is a frustum-like opening, and a radial dimension of the first opening 211 is arranged to gradually reduce in a direction toward the second opening 212, to facilitate the insertion of the aerosol forming substrate 200. It is appreciated that in other embodiments, an end of the fixing section 21 that is distant from the first opening 211 may be provided with a bottom wall.

[0035] Further, in the instant embodiment, the cross section of the fixing tube 20 can be of a non-circular shape, and specifically, the cross section of the fixing tube 20 is in an elliptical shape, but is not limited thereto. Specifically, the cross section of the fixing section 21 is substantially elliptical in shape, but is not limited thereto. In other embodiments, the cross section of the fixing tube 21 can be circular or non-circular. A cross-sectional size of the fixing section 21 is corresponded to a cross-sectional size of the aerosol forming substrate 200, and specifically, the cross section of the fixing section 21 may have a major axis and a minor axis intersect the major axis. The length of the major axis is greater than a radial size of the aerosol forming substrate 200, while the length of the minor axis is substantially equal to the radial size of the aerosol forming substrate 200, so that surface contact can be formed between a major portion of the outer surface of a lateral side of the aerosol forming substrate 200 and the inside surface of the insertion passage 210, so as to prevent the aerosol forming substrate 200 from being compressed by the fixing tube 20, which results in deformation of the aerosol forming substrate 200.

[0036] Further, in the instant embodiment, the mounting section 22 is arranged at the first opening 211 of the fixing section 21 and has a cross section that is in an elliptical shape, and the shape and size of the cross section is corresponded to a shape and a size of a cross section of the inside of the top cover 10. The mounting section 22 is provided, in the inside thereof, with a hollow compartment 221 having an opening. The hollow compartment 221 has a top in which the opening is formed and the opening is in communication with the insertion opening 111 of the top cover 10 and is also in communication, by way of the first opening 211, with the insertion passage 210 of the fixing section 21. In some embodiments, the mounting section 22 and the fixing section 21 are integrally formed as one piece by means of casting or injection molding.

[0037] Further, in the instant embodiment, the mounting section 22 is connected, in a detachable manner, to the top cover 10 by means of an arrangement of connecting structure. Of course, in other embodiments, the mounting section 22 can be integrally formed with the top cover 10 as one piece. In some embodiments, the connecting structure comprises snap hooks 222 and snap slots 121. The snap hooks 222 are arranged on a sidewall 122 of the mounting section 22 and are arranged as plural ones, and specifically, in some embodiments, the snap hooks 222 are plural, and the plural snap hooks 222 are arranged, at intervals, along the circumference of the sidewall 122. The snap slots 121 are formed in the inner side of the top cover 10 and are adjacent to the top wall of the top cover 10, and may also be arranged as plural ones, and correspond to the snap hooks 222 and are snap-engageable with the snap hooks 222. In assembly, the top cover 10 is fit, along the mounting section 22 to the outer circumference of the fixing section 21, and the snap hooks 222 of the mounting section 22 are put into engagement with the snap slots 121 respectively. By means of the connecting structure, when the top cover 10 is slid, the fixing tube 20 is simultaneously moved out.

[0038] As shown in FIGS. 3-5 and 8, further, in the instant embodiment, the aerosol generating device may further comprise an outer tube 30. The outer tube 30 is disposed inside the top cover 10 and is sleeved over and spaced to an outer circumference of the fixing tube 20, which is applied to isolate heat and to prevent thermal energy from directly transmitting to the top cover. The heat may make a temperature of the top cover excessively high to make a user hard to hold or uncomfortable. And the outer tube 30 forms, in combination with the fixing tube 20, a gas flow channel. In other embodiments, the outer tube 30 can be omitted.

[0039] In the instant embodiment, the outer tube 30 is sleeved over the outer circumference of the fixing section 21, so as to, on the one hand, provide a heat isolation effect during heating, and, on the other hand, receive a residue generated through heating of the aerosol forming substrate 200. To clean up the residue, the top cover 10 is slid out to simultaneously withdraw the fixing tube 10 from the outer tube 30, and then, the residue can be dumped out of the outer tube 30.

[0040] The outer tube 30 comprises a tubular body 31.

The tubular body 31 is sleeved over the outer circumference of the fixing section 21. The tubular body 31 has an inside that is of a columnar form. A shape and a size of a cross section of the outer tube 30 is corresponded, respectively, to the shape and size of the cross section of the fixing section 21. Specifically, in the instant embodiment, the cross section of the outer tube 30 is generally of an elliptical shape. A supporting wall 311 is provided at an end of the outer tube 30. Specifically, in some embodiments, the supporting wall 311 is arranged at one end of the tubular body 31 and corresponds to the second opening 212 for supporting the aerosol forming substrate 200. The supporting wall 311 is further formed with a through hole 3111, and a cross-sectional shape of the through hole 3111 is corresponded to a cross-sectional shape of the heating body 51 of the heating assembly 50. In some embodiments, the through hole 3111 is circular for receiving extension of the heating assembly 50 therethrough into the fixing tube 10, in order to ease insertion of the heating body 51 of the heating assembly 50 into the aerosol forming substrate 200. In some embodiments, the cross-sectional size of the through hole 3111 is smaller than the cross-sectional size of the second opening 212, in order to prevent the aerosol forming substrate 200 from extending out of the outer tube 30. In the instant embodiment, the supporting wall 311 is provided with a plurality of platforms 312 arranged thereon. The plurality of platforms 312 are arranged at intervals. The plurality of platforms 312 support the aerosol forming substrate 200. In the instant embodiment, the plurality of platforms 312 are integrally formed with the supporting wall 311 as one piece by means of injection molding or casting. In some embodiments, the outer tube 30 further comprises a first extended section 32 that is arranged at one side of the tubular body 31 and projects outward, and a second extended section 33 that is arranged at an end of the tubular body 31 and projects outward. The first extended section 32 and the second extended section 33 are both slidable to snap-engage with the heating assembly 50, so that the outer tube 30, in the entirety thereof, is detachably connectable with the heating assembly 50.

[0041] As shown in FIGS. 2, 3, 5, 7, and 8, in the instant embodiment, the air flow channel is arranged in the inner side of a tube wall of the fixing tube 20 and the supporting wall 311, and is in communication with the first opening 211 and the second opening 212. The air flow channel functions to receive external air to enter the aerosol forming substrate 200. By forming the air flow channel in the inner side of the tube wall of the fixing tube 20 and the supporting wall 311, a gas flow conveyance path can be reduced to increase a gas flow conveyance efficiency and to reduce occurrence of blocking situation, and also to prevent heat from directly transmitting to the tube wall to help avoid being hard to be held by a user or causing discomfort during inhaling.

[0042] In the instant embodiment, the air flow channel comprises first air flow channels 213 and second air flow channels 3112. The first air flow channels 213 are arranged in the inner side of the tube wall of the fixing tube 20 and are in communication with the first opening 211, and are extended in a longitudinal direction of the fixing tube 20 toward the end away from the first opening 211, namely the second opening 212. Specifically, the first air flow channels 213 are arranged at two ends of the major axis and are formed by recessing portions of the tube wall of the fixing tube 20. In the instant embodiment, the first air flow channels 213 are respectively formed of recesses on the tube wall that are located at and correspond to the two ends of the major axis of the fixing section 21. The second air flow channels 3112 are arranged in the supporting wall 311 and are in communication with the first air flow channels 213 and the second opening 212. In the instant embodiment, specifically, the second air flow channels 3112 are formed of spacings between two adjacent ones of the platforms 312. When users are inhaling, external air passes through the insertion opening 111 of the top cover 10 to get into the fixing tube 20 and moves through the first air flow channels 213 to reach the second air flow channels 3112, and then moves through the second air flow channels 3112 to get into the aerosol forming substrate 200 in order to bring out atomized gas that is formed through heating of the aerosol forming substrate 200.

[0043] As further shown in FIGS. 1-4, further, in the instant embodiment, the aerosol generating device further comprises a protection cover 40. The protection cover 40 is slidably mounted on the top cover 10 and is selectively slid to block the insertion opening 111 when the aerosol forming substrate 200 is not yet inserted into the fixing tube 10, in order to prevent dusts from entering the fixing tube 10. In some embodiments, the protection cover 40 comprises a cover body 41. The cover body 41 is disposed on the top wall 11 of the top cover 10, and is reciprocally slidable in a direction toward the insertion opening 111. The top cover 10 is formed with a guide opening 112, and the guide opening 112 is set in communication with the insertion opening 111. The guide opening 112 can be an elongated opening. The cover body 41 is provided with a connection peg 411, and the connection peg 411 is inserted through the guide opening 112 into the top cover 10. A slide block 42 is arranged in the hollow compartment 121 of the mounting section 12, and the slide block 42 is arranged to be slidable in a direction toward the insertion opening 111. The connection peg 411 is connected to the slide block 42 and may drive the slide block 42 to slide. An elastic element 43 is arranged between the slide block 42 and the sidewall of the mounting section 12. The elastic element 43 generates a spring force for easing sliding and position restoring of the slide block 42.

[0044] As shown in FIGS. 2-4 and 9, the heating assembly 50 comprises a heating body 51. The heating body 51 perforates through the supporting wall 311 and extends through the second opening 212 to insert into the aerosol forming substrate 200. In the instant embod-

iment, the heating body 51 is of a form of a plate. When the heating body 51 is inserted into the aerosol forming substrate 200, a width direction of the heating body 52 coincides a length direction of the minor axis. The thickness direction of the heating body 52 is parallel to the major axis direction of the fixing section 21, so that the first air flow channels 213 are located at two opposite sides of the heating body 51 to allow a gas flow to more uniformly flow toward the two sides of the heating body 52 during heating of the aerosol forming substrate 200, thereby making heating by the heating body 52 more uniform and mouthfeel of the atomization gas tasting better. Of course, it is appreciated that in other embodiments, the heating body 51 is not limited to be in the form of a plate and can be of a form of peg or a needle.

[0045] Further, in some embodiments, the heating assembly 50 further comprises a retaining frame 52. The retaining frame 52 is configured for mounting the heating body 51 and is slidable to engage with the gas channel tube 20 and receives thetop cover 30 to fit thereto. The retaining frame 52 comprises a sleeve body, and the sleeve body comprises a first sleeve section 521 and a second sleeve section 522. The first sleeve section 521 and the second sleeve section 522 are arranged side by side in a transverse direction and are integrally formed as one piece. Specifically, in some embodiments, the first sleeve section 521 and the second sleeve section 522 are integrally formed as one piece by means of injection molding or casting. A control circuit board 60 is received and held inside of the first sleeve section 521. The control circuit board 60 is connected with the heating assembly 50 to activate or deactivate the heating assembly 50. A coupling section 5211 is arranged on a sidewall of the first sleeve section 521 that is adjacent to the second sleeve section 522. The coupling section 5211 is arranged as a snap-connecting platform on the first sleeve section 521 and is snap-connectable with the first extended section 32 of the outer tube 30. Specifically, the first extended section 32 may define a sliding trough, and the sliding trough is snap-connected with the snap-connecting platform. In some embodiments, the retaining frame 52 further comprises a flange 523 matching the top cover 10. The flange 523 is arranged as being raised from an outer circumference of the first sleeve section 521, and is located at one end of the first sleeve section 521 that is distant from the second sleeve section 522.

[0046] Further, in some embodiments, the heating assembly 50 further comprises a supporting frame 53 mounted in combination with the retaining frame 52. The retaining frame 52 is fit on the supporting frame 53. The heating body 51 is disposed on the supporting frame 53.

[0047] Further, in some embodiments, the aerosol generating device further comprises an electricity supply assembly 70. The electricity supply assembly 70 is mechanically and electrically connected with the heating assembly 50 to supply electricity to the heating assembly 50. The electricity supply assembly 70 comprises a power supply casing 71 and a battery 72 arranged in the power supply casing 71. The retaining frame 52 is arranged at an open end of the power supply casing 71. An ON-OFF switch 711 is provided on the power supply casing 71, and the ON-OFF switch 711 is connected with the control circuit board 60. The battery 72 is connected with the heating assembly 50 and supplies electricity to the heating assembly 50. Specifically, in some embodiments, the battery 72 is connected, by means of the control circuit board 60, to the heating assembly 50.

[0048] FIGS. 10 and 11 show an aerosol generating device according to a second embodiment of the present invention, which is different from the first embodiment in that the fixing tube 20 comprises circular internal tube wall 20a and external tube wall 20b. The internal tube wall 20a is configured to receive the aerosol forming substrate 200 to insert therein. A shape and size of the internal tube wall 20a match a shape and size of the aerosol forming substrate 200. The external tube wall 20b is sleeved around the internal tube wall 20a, and the external tube wall 20b cooperates with the internal tube wall 20a to form the first air flow channel 213.

[0049] In the instant embodiment, the internal tube wall 20a forms the fixing section 21 and the mounting section 22, and the internal tube wall 20a comprises a plurality of internal tube wall units 210a that are arranged at intervals and circumferentially enclose and define a columnar structure. In the instant embodiment, a cross section of the columnar structure may be circular in shape having a radial dimension that matches a radial dimension of the aerosol forming substrate 200. The internal tube wall units 210a have one end connected to the mounting section 22. A slit 214 is formed between two adjacent ones of the internal tube wall units 210a, and the slits 214 is in communication with the first opening 211 and the second opening 212. When the aerosol forming substrate 200 is inserted into the internal tube wall 20a, the internal tube wall units 210a is in contact with the aerosol forming substrate 200, and due to the slits 214, any two of the internal tube wall units 210a that are adjacent can apply a compressing force to the aerosol forming substrate 200, so as to deform the aerosol forming substrate 200. In some embodiments, the internal tube wall 20a is integrally formed with the top cover 10 as one piece, and of course, it is appreciated that in other embodiments, the internal tube wall 20a can be connected with the top cover 10 in a detachable manner.

[0050] In the instant embodiment, the external tube wall 20b can be a metal tube, and specifically, the external tube wall 20b can be a stainless steel tube. The external tube wall 20b and the internal tube wall 20a can be of a splitable structure. Of course, it is appreciated that in other embodiments, the external tube wall 20b can be integrally formed with the internal tube wall 20a as one piece. The external tube wall 20b can be of a hollow structure having two ends that are formed with openings and can be in a cylindrical form. A cross-sectional size of the external tube wall 20b can be greater than a cross-sectional size of the internal tube wall 20a,

so that spacing is present between the external tube wall 20b and the internal tube wall 20a. The first air flow channel 213 is arranged in an inner side of the external tube wall 20b, and is located between the external tube wall 20b and the internal tube wall 20a as being formed by the spacing between the external tube wall 20b and the internal tube wall 20a. The slits 214 are arranged to be in communication with the first air flow channel 213 to allow gas to flow into the first air flow channel 213.

[0051] In the instant embodiment, the fixing tube 20 may further comprises linking sections 211a. The linking sections 211a are arranged on the internal tube wall 20a, and, specifically, are arranged to be located on an outside wall of each of the internal tube wall units 210a and projecting from the outside walls of the internal tube wall units 210a. The linking sections 211a are of a form of an elongate strip and are arranged to extend in a longitudinal direction of the internal tube wall units 210a for connecting the internal tube wall 20a and the external tube wall 20b and for mounting and positioning the external tube wall 20b.

[0052] FIG. 12 shows the aerosol generating device according to the second embodiment of the present invention, which is different from the first embodiment in that the heating body 51 is made in a form of a needle. The heating body 51 comprises a cylindrical main section 511 and a sharp tip structure 512. The sharp tip structure 512 is arranged at one end of the main section 511 to allow the heating body 51 to easily insert into the aerosol forming substrate 200. The sharp tip structure 512 can be of a conical form. By shaping the main section 511 of the heating body 51 as a cylindrical form and shaping the sharp tip structure 512 as a conical form, the aerosol forming substrate 200 can be withdrawn, through rotating thereof, from the second opening 212 toward the first opening 211 to be separated from the heating body 51 so as to facilitate removal and replacement of the aerosol forming substrate 200.

[0053] FIG. 13 shows an aerosol generating device according to a third embodiment of the present invention, which is different from the first embodiment in that the fixing tube 20 is provided, at the end thereof that is distant from the first opening 211, with a bottom wall 24, and the first air flow channel 213 is arranged to extend from the first opening of the fixing tube 20 toward an end that is distant from the first opening, namely arranged to extend toward the bottom wall 24, and then curves to extend from the bottom of the aerosol forming substrate 200 into the aerosol forming substrate.

[0054] It is appreciated that the embodiments provided above illustrate only the preferred embodiments of the present invention and should not be construed as being limitative to limit the patent scope of the present invention. It is noted that for those having ordinary skill in the field, the technical features described above can be freely combined provided they do not depart from the inventive concept of the present invention, and various deformations and improvements can also be made, all these being considered belonging to the scope of protection that the present invention pursues. Thus, equivalent substitutions and modifications, which are made within the scope of the claims of the present invention should be construed falling within the scope of protection of the claims of the present invention.

Claims

1. An aerosol generating device, **characterized by** comprising a fixing tube (20) for fixing an aerosol forming substrate (200) and a heating assembly (50);

   the fixing tube (20) being of a hollow structure and having an end formed with a first opening (211) for insertion of the aerosol forming substrate;
   the heating assembly (50) being insertable from an end of the fixing tube that is distant from the first opening into the aerosol forming substrate (200);
   the aerosol generating device further comprising an air flow channel arranged in the inner side of a tube wall of the fixing tube (20) to allow external air to flow into the aerosol forming substrate (200).

2. The aerosol generating device according to claim 1, **characterized in that** the air flow channel comprises a first air flow channel (213) arranged in the inner side of the tube wall of the fixing tube (20) and the first opening (211) and extending toward and in communication with an end distant from the first opening (211) to allow the external air to flow into the aerosol forming substrate (200).

3. The aerosol generating device according to claim 2, **characterized in that** the aerosol generating device further comprises an outer tube (30) sleeved over the outer circumference of the fixing tube (20); and
   the air flow channel further comprises a second air flow channel (3112) arranged in the outer tube (30) and in communication with the first air flow channel (213) to allow air from the first air flow channel (213) to get into the aerosol forming substrate (200).

4. The aerosol generating device according to claim 3, **characterized in that** an end of the fixing tube (20) that is distant from the first opening is formed with a second opening that is in communication with the first opening (211);

   an end of the outer tube is provided with a supporting wall (311) for supporting the aerosol forming substrate (200); the supporting wall (311) is arranged to correspond to the second opening (212); the heating assembly (50) per-

forates through the supporting wall (311) to insert from the second opening (212) into the aerosol forming substrate; and
the second air flow channel (3112) is arranged in the supporting wall (311) and in communication with the first air flow channel (213) and the second opening (212).

5. The aerosol generating device according to claim 2, **characterized in that** the first air flow channel (213) is arranged in a longitudinal direction of the fixing tube (20);
and/or, the fixing tube (20) is provided, at an end thereof that is distant from the first opening (211), with a bottom wall (24).

6. The aerosol generating device according to claim 2, **characterized in that** the fixing tube (20) has a cross section that is of a non-circular shape; and
the first air flow channel (213) is formed by recessing of a portion of the tube wall of the fixing tube (20).

7. The aerosol generating device according to claim 4, **characterized in that** the fixing tube (20) comprises a fixing section (21) that is hollow to bore two ends thereof; the first opening (211) and the second opening (212) are respectively arranged at the two ends of the fixing section (21);

the fixing section (21) has a cross section that is in an elliptical shape;
the cross section of the fixing section (21) comprises a major axis and a minor axis that is arranged to intersect the major axis; and
two ends of the major axis are both provided with the first air flow channel (213).

8. The aerosol generating device according to claim 4, **characterized in that** the fixing tube (20) comprises a circular internal tube wall (20a) and an external tube wall (20b) arranged on the outer circumference of the internal tube wall (20a) and spaced from the internal tube wall (20a); and
the first air flow channel (213) is arranged in the inner side of the external tube wall (20b) and is located between the external tube wall (20b) and the internal tube wall (20a).

9. The aerosol generating device according to claim 8, **characterized in that** the internal tube wall (20a) comprises a plurality of internal tube wall units (210a) that are arranged at intervals and circumferentially enclosing to define a columnar structure;

spacing between two adjacent ones of the internal tube wall units (210a) forms a slit (214) that is in communication with the first air flow channel (213) and enables the two adjacent ones of the internal tube wall units (210a) to apply a compressing force to the aerosol forming substrate (200); and
the slit (214) is arranged to be in communication with the first opening (211) and the second opening (212).

10. The aerosol generating device according to claim 8, **characterized in that** the fixing tube (20) further comprises a linking section (211a) provided on the internal tube wall (20a) to connect the internal tube wall (20a) and the external tube wall (20b).

11. The aerosol generating device according to claim 8, **characterized in that** the internal tube wall (20a) and the external tube wall (20b) are integrally formed as one piece; or
the internal tube wall (20a) and the external tube wall (20b) are connected in a detachable manner.

12. The aerosol generating device according to claim 10, **characterized by** further comprising a top cover (10) sleeved over the outer circumference of the fixing tube (20); the internal tube wall (20a) being integrally formed with the top cover (10) as one piece.

13. The aerosol generating device according to claim 4, **characterized in that** the supporting wall (311) is provided with a plurality of platforms (312) arranged thereon at intervals; and two adjacent ones of the platforms (312) define therebetween the second air flow channel (3112) in communication with the first air flow channel (213).

14. The aerosol generating device according to claim 4, **characterized in that** the supporting wall (311) is formed with a through hole (3111) to receive the heating assembly (50) to perforate therethrough.

15. The aerosol generating device according to claim 4, **characterized in that** the heating assembly (50) comprises a heating body (51) that perforates through the supporting wall (311) to insert from the second opening (212) into the aerosol forming substrate (200).

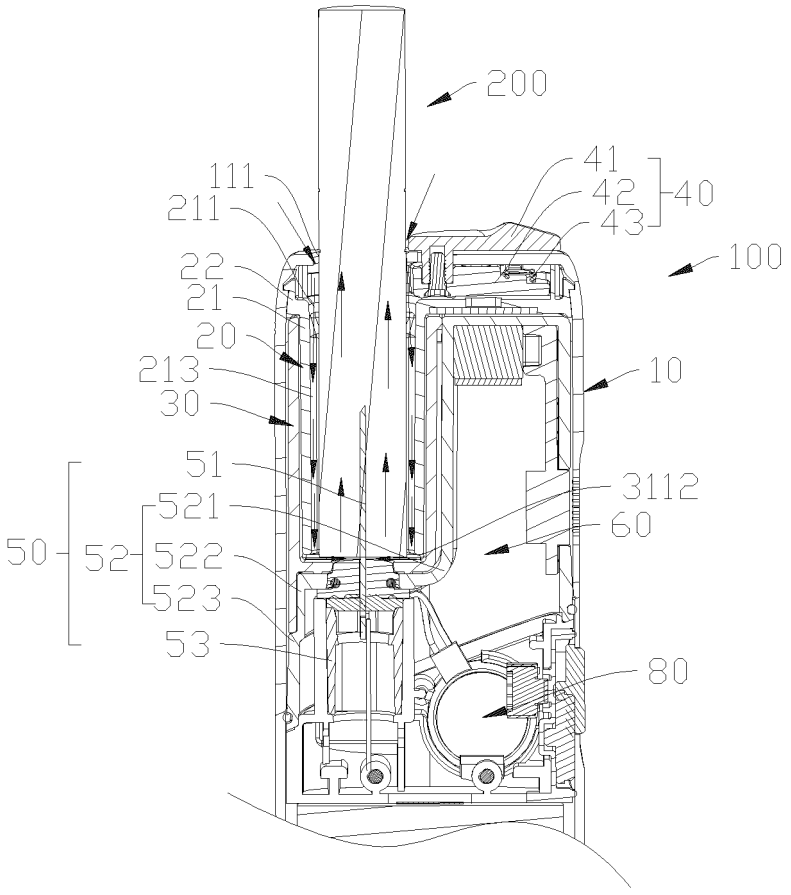
16. The aerosol generating device according to claim 15, **characterized in that** a cross section of a fixing section (21) of the fixing tube (20) comprises a major axis and a minor axis that is arranged to intersect the major axis; two ends of the major axis are both provided with the first air flow channel (213) of the air flow channel; and
the heating body (51) is of a form of a plate, and when the heating body (51) is inserted into the aerosol forming substrate (200), a width direction of the heating body (51) coincides with a length direction of the minor axis.

17. The aerosol generating device according to claim 15, **characterized in that** the heating body (51) is of a form of a pillar, and the heating body (51) comprises a cylindrical main section (511) and a sharp tip structure (512) arranged at one end of the main section (511) and having a conical form.

18. The aerosol generating device according to claim 1, **characterized by** further comprising a top cover (10) sleeved over the outer circumference of the fixing tube (20); the top cover (10) formed with an insertion opening (11) that corresponds to the first opening (211) to allow the aerosol forming substrate (200) to insert into the fixing tube (20).

19. The aerosol generating device according to claim 18, **characterized in that** a shape of the insertion opening (11) matches a cross-sectional shape of the fixing tube (20).

20. The aerosol generating device according to claim 18, **characterized in that** the insertion opening (11) is provided with a guide slope surface for guiding the insertion of the aerosol forming substrate (200); and the guide slope surface is extended from an end face of an end of the insertion opening (11) that is distant from the fixing tube (20) in a direction toward the fixing tube (20).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41
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43
40
100
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211
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20
213
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51
3112
521
60
50
52
522
523
53
80

FIG. 3

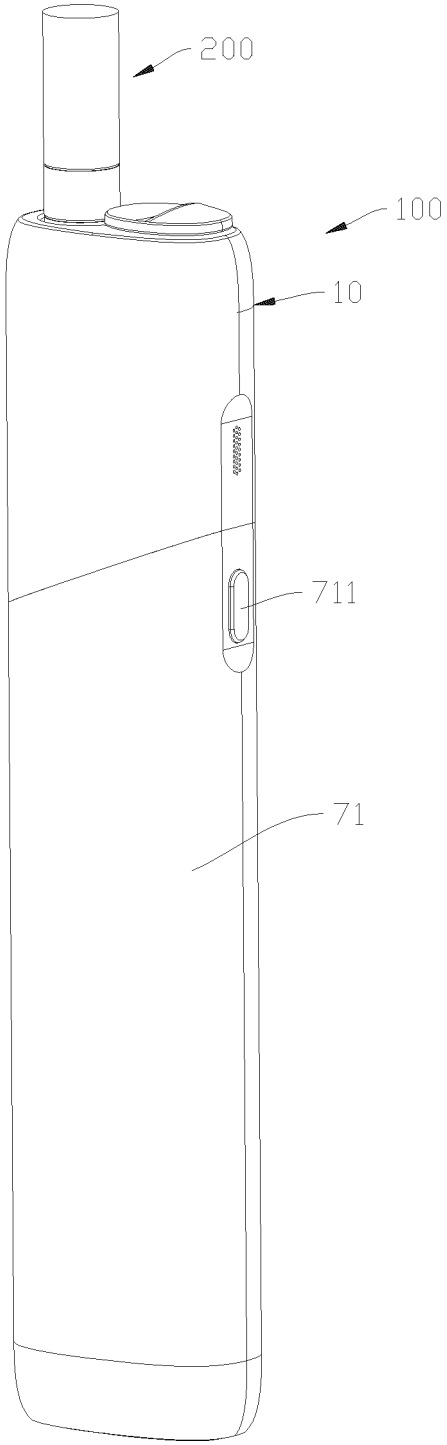


FIG. 1

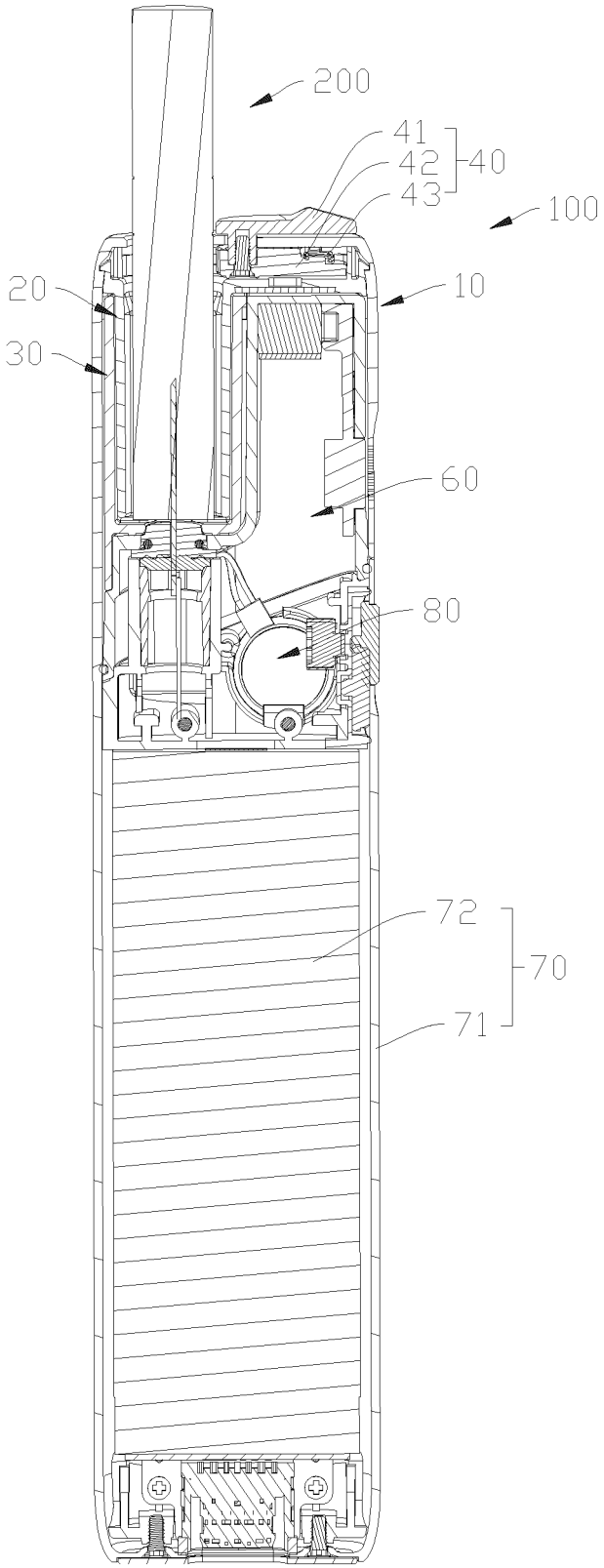
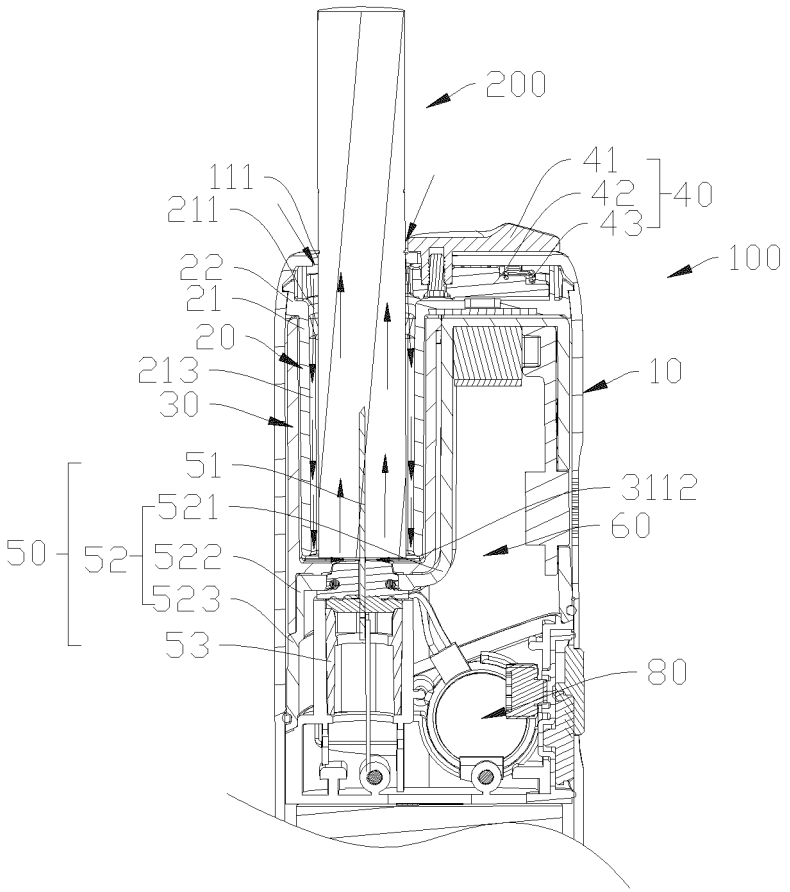


FIG. 2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43
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211
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523
53
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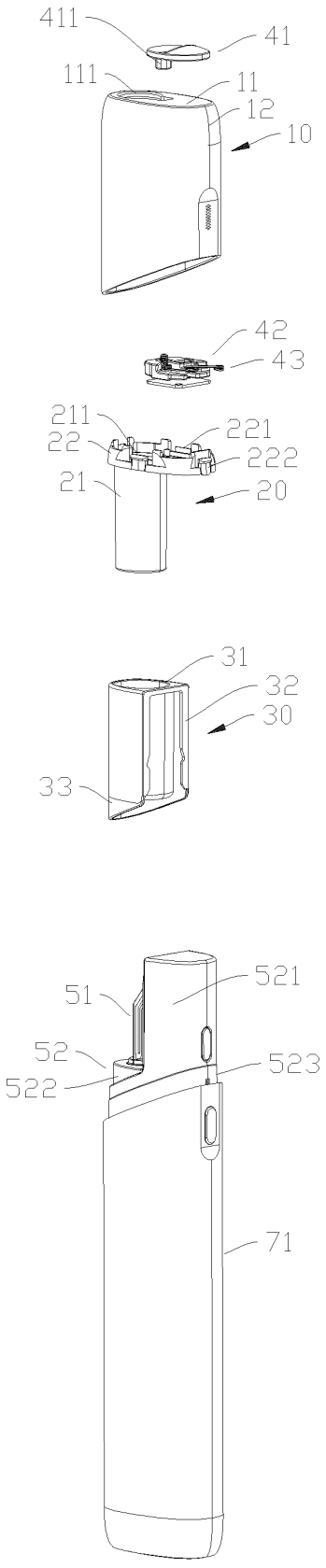
52
3112
60
80

FIG. 3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11
12
10
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523
522
71

FIG. 4

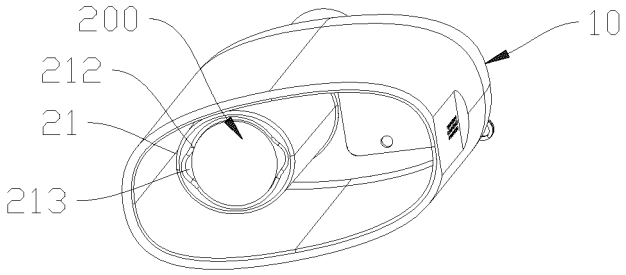

FIG. 5

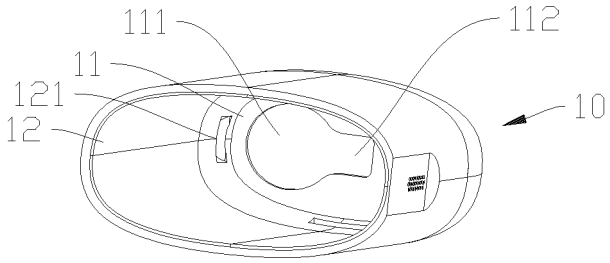

FIG. 6

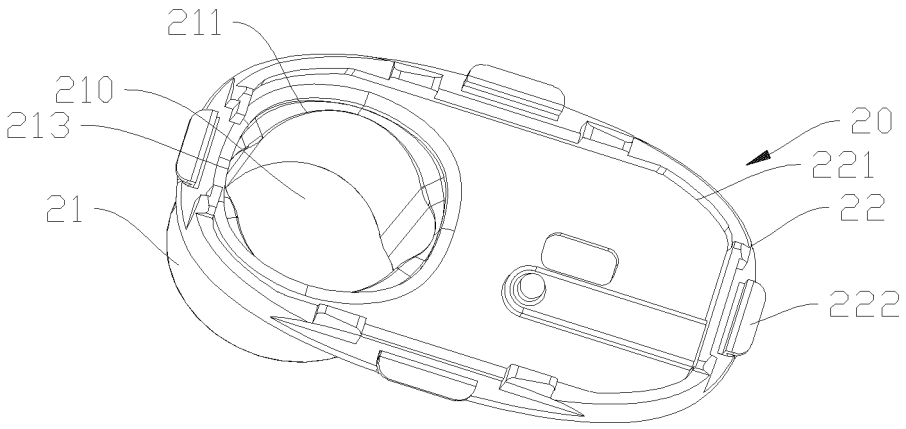

FIG. 7

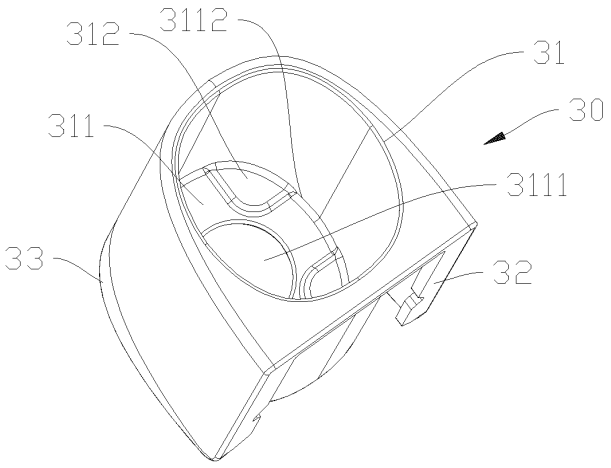

FIG. 8

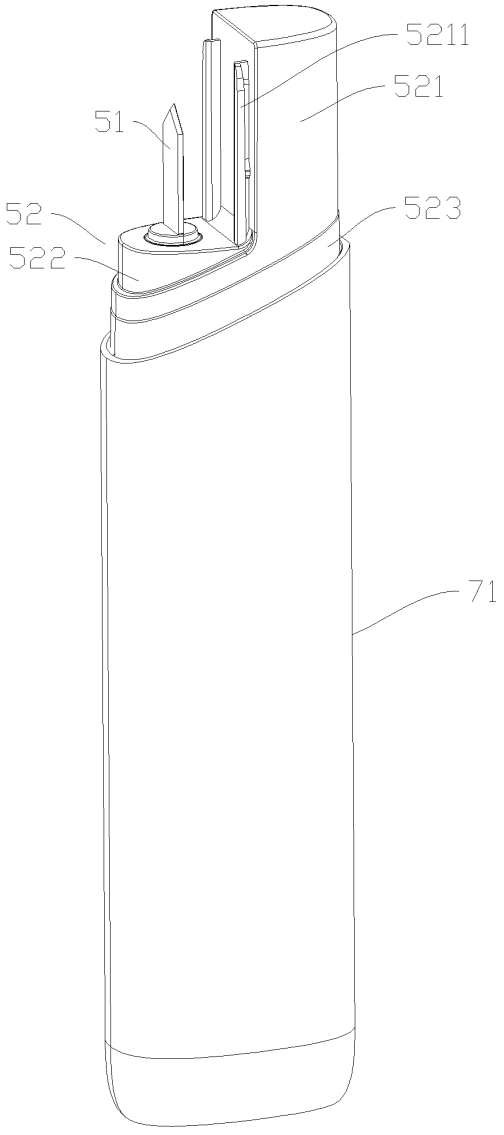

FIG. 9

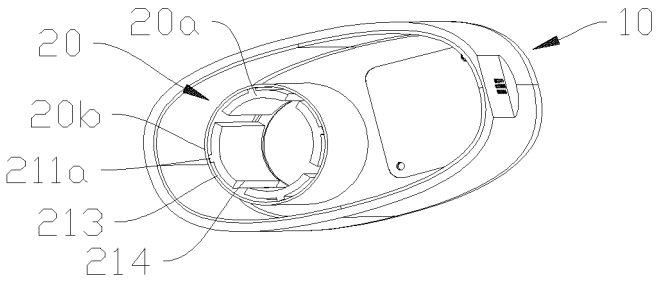
20a
20
10
20b
211a
213
214

FIG. 10

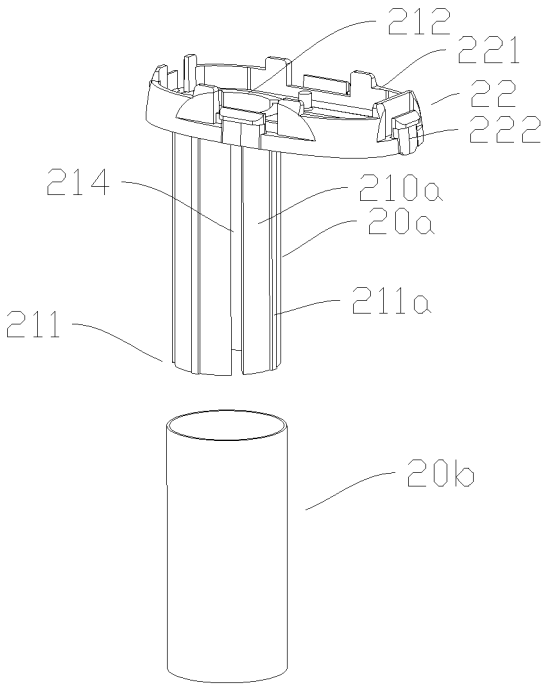
212
221
22
222
214
210a
20a
211a
211
20b

FIG. 11

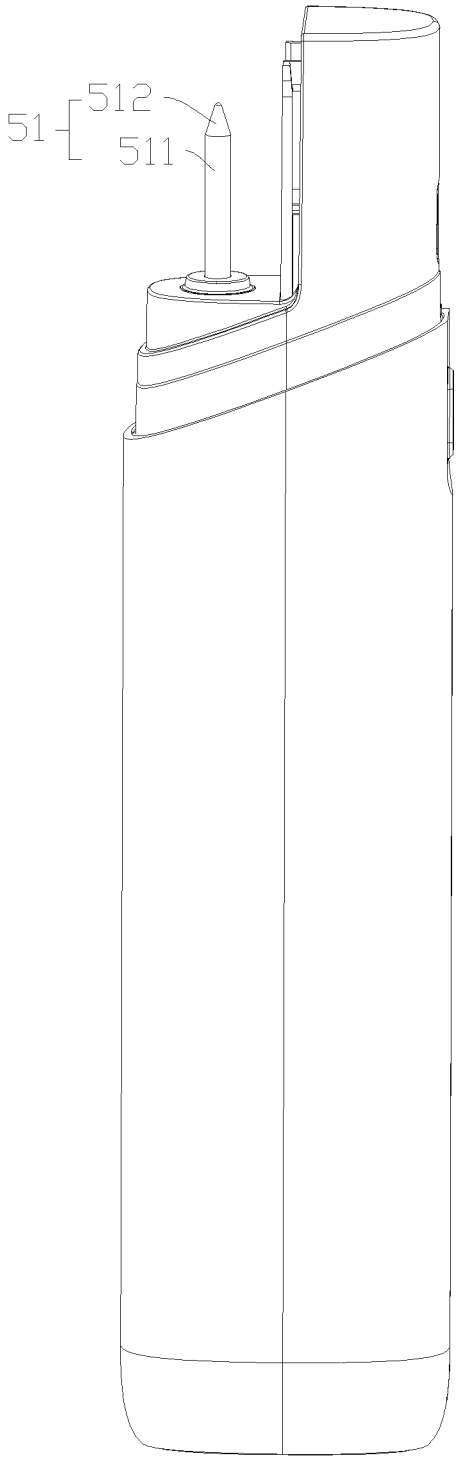

FIG. 12

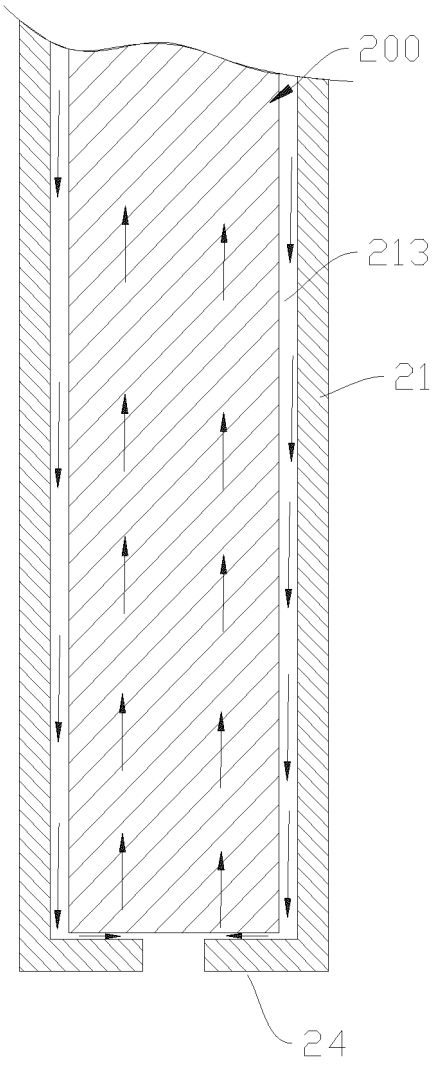

FIG. 13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2021/077279

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/48(2020.01)i; A24F 40/46(2020.01)i; A24F 40/40(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)

A24F40; A24F47

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)

CNABS, CNTXT: 发热, 衬底, 深圳麦时, 流, 气, 穿入, 电热, 加热, 路, 气溶胶, 烘烤, 雾化, 插入, 刺入, 烟, 基底, 卷烟, 基体, 基质, 袁永宝, 烟支, 道 VEN, WOTXT, USTXT, EPTXT; insert+, flow, airflow, alley+, substrate, tunnel?, heat+, path+, passage?, channel? , airstream, air stream, plug+, air-flow, route+, air

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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PX	CN 111420620 A (SHENZHEN MAISHI TECHNOLOGY CO., LTD.) 17 July 2020 (2020-07-17) claims 1-20, figures 1-7, description paragraphs 54-70	1-8, 10-20
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☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

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"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
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 April 2021	**20 May 2021**
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**	Authorized officer
Facsimile No. **(86-10)62019451**	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
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INTERNATIONAL SEARCH REPORT

International application No.
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2021/077279

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	111972712	A	24 November 2020	None			
CN	212345294	U	15 January 2021	None			
CN	212468057	U	05 February 2021	None			
CN	111420620	A	17 July 2020	None			
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				EP	2782463	B1	29 June 2016
				WO	2013076098	A3	03 April 2014
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				PT	2782463	T	02 August 2016
				IL	277293	D0	29 October 2020
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				TW	I603683	B	01 November 2017
				RS	54959	B1	30 November 2016
				AU	2012342570	B2	24 November 2016
				ZA	201403335	B	29 July 2015
				BR	112014012065	A2	13 June 2017
				PL	2782463	T3	30 December 2016
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				HU	E030095	T2	28 April 2017
				NZ	624969	A	29 July 2016
				JP	6050826	B2	21 December 2016
				CA	2856321	C	28 April 2020
				KR	101667124	B1	17 October 2016
				KR	20140093694	A	28 July 2014
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				CA	2856321	A1	30 May 2013
				MX	353367	B	10 January 2018
				AU	2012342570	A1	03 July 2014
				EP	2782463	A2	01 October 2014

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Information on patent family members

International application No.
PCT/CN2021/077279

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