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(54) **AEROSOL GENERATING DEVICE**

(57) An aerosol generating device (10), comprising a heating base (17) and a heating member (19), wherein the heating base (17) is provided with a heating cavity (173); the heating member (19) is used for accommodating and heating an aerosol generating matrix (11); the heating member (19) is arranged in the heating cavity (173); the heating member (19) comprises a first side wall (191); a first airflow channel (21) is formed between the first side wall (191) and an inner surface of the heating cavity (173); an inner surface of the first side wall (191) is provided with protrusions (193); a second airflow channel (20) is formed between the first side wall (191) and the aerosol generating matrix (11) by the protrusions (193); and the first airflow channel (21) and the second airflow channel (20) both lead to the bottom of the heating cavity (173) from the outside of the aerosol generating device (10). The aerosol generating device (10) can solve the problem of the temperature of the inner periphery and of the outer periphery not being uniform when an aerosol generating matrix is heated.

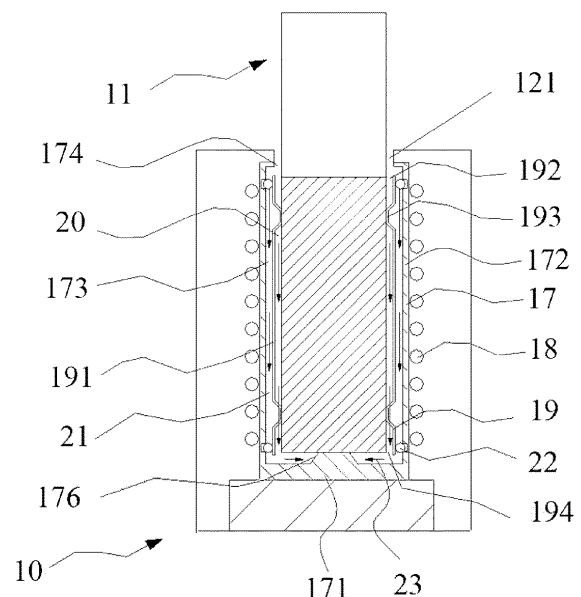


FIG. 7

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Chinese Patent Application 2021202863453 filed on January 29, 2021, which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to the field of aerosol-generating technologies, and in particular, to an aerosol-generating device.

BACKGROUND

[0003] Traditional products produce aerosols by burning, and when baked at a high temperature of more than 800°C, a large quantity of harmful substances are easily volatilized. In order to meet the needs of people and reduce the harm caused by the harmful substances caused by burning, an aerosol-generating device of a "heat-not-burn" type emerges.

[0004] The aerosol-generating device of the "heat-not-burn" type generates aerosols by heating and baking different forms of aerosol-generating substrates (such as grass leaf materials), and transmits the aerosol to a user for inhalation. In this "heat-not-burn" manner, the aerosol-generating substrate is heated only at a lower temperature (200°C-400°C), does not burn and does not generate an open flame, and effectively avoids generation of harmful substances caused by the aerosol-generating substrate.

[0005] Currently, electromagnetic induction heating or resistive material heating is commonly used in the "heat-not-burn" aerosol-generating device. The electromagnetic induction heating is as follows: A coil is disposed around a heating member that contains the aerosol-generating substrate, the heating member heats up by means of electromagnetic induction, heat is conducted to the aerosol-generating substrate, and baking and heating are performed on the aerosol-generating substrate.

[0006] The aerosol-generating substrate is usually formed into a close fit with the heating member for baking and heating. As electromagnetic induction heating efficiency is fast, the heating member is able to reach a very high temperature at a moment, and the outer periphery of the aerosol-generating substrate that is in direct contact with the heating member is able to easily reach a high temperature. However, as inner heat transfer efficiency of the aerosol-generating substrate is low, baking of the inner aerosol-generating substrate is insufficient, and temperature distribution of the inner and outer periphery of the aerosol-generating substrate is uneven.

SUMMARY

[0007] According to the aerosol-generating device provided in the present disclosure, the aerosol-generating device is able to resolve the problem that the inner and outer peripheral temperatures are uneven when the aerosol-generating substrate is heated.

[0008] In order to resolve the foregoing technical problem, the present disclosure adopts a technical solution as follows. An aerosol-generating device is provided. The aerosol-generating device includes a heating base and a heating member. The heating base has a heating cavity; and the heating member is configured to accommodate and heat an aerosol-generating substrate, where the heating member is disposed in the heating cavity; where the heating member includes a first sidewall, and a first airflow channel is formed between the first sidewall and the inner surface of the heating cavity; and a protrusion is disposed on the inner surface of the first sidewall, the protrusion makes a second airflow channel formed between the first sidewall and the aerosol-generating substrate, and both the first airflow channel and the second airflow channel are led from the outside of the aerosol-generating device to the bottom of the heating cavity.

[0009] In some embodiments, a proportion of an area of the surface of the protrusion for contacting the aerosol-generating substrate to an area of the inner surface of the first sidewall is 5%-15%.

[0010] In some embodiments, the maximum height of the protrusion is 2 mm-5 mm.

[0011] In some embodiments, the first sidewall is disposed in a ring shape; and the protrusion is spirally disposed on the inner surface of the first sidewall; or a plurality of strip-shaped protrusions are disposed on the inner surface of the first sidewall at intervals in the circumferential direction; or a plurality of arcuate protrusions are disposed on the inner surface of the first sidewall at intervals in the circumferential direction; or a plurality of dotted protrusions are distributed in an array on the inner surface of the first sidewall; or a plurality of annular protrusions are disposed on the inner surface of the first sidewall at intervals in the axial direction, and each annular protrusion has a groove or a through hole.

[0012] In some embodiments, a part of the first sidewall portion is concave to form the protrusion.

[0013] In some embodiments, the first sidewall is disposed in a ring shape, and the heating member is disposed coaxially with the heating base.

[0014] In some embodiments, the heating base includes a second sidewall, a first limiting member is disposed between the first sidewall and the second sidewall, and the first limiting member spaces the first sidewall from the second sidewall to form the first airflow channel between the first sidewall and the inner surface of the heating cavity.

[0015] The outer surface of the first sidewall is protruded to form the first limiting member; and/or the inner sur-

face of the second sidewall is protruded to form the first limiting member.

[0016] In some embodiments, the heating base includes a second sidewall and a bottom wall, and the second sidewall and the bottom wall surround to form the heating cavity; and a third airflow channel is formed between the bottom wall and the aerosol-generating substrate, and the third airflow channel communicates with the first airflow channel and the second airflow channel.

[0017] In some embodiments, a first limiting member is disposed between the first sidewall and the second sidewall, and the first limiting member is configured to limit the heating member for the third airflow channel to communicate with the first airflow channel.

[0018] In some embodiments, the first sidewall abuts against the bottom wall, and one end of the first sidewall close to the bottom wall has an opening for the third airflow channel to communicate with the first airflow channel.

[0019] In some embodiments, the bottom wall or the first sidewall or the second sidewall is provided with a second limiting member; and the second limiting member spaces the aerosol-generating substrate from the bottom wall to form the third airflow channel.

[0020] Beneficial effects of the present disclosure are as follows.

[0021] According to the aerosol-generating device provided in the present disclosure, a first airflow channel and a second airflow channel are formed on two sides of a heating member. A protrusion in the second airflow channel changes a heat transfer mode of the heating member for heating the aerosol-generating substrate from heat conduction to a combination of heat conduction and heat convection, in which heat convection takes a main heat transfer manner. Heat transfer efficiency of heat convection is lower than heat transfer efficiency of heat conduction, and therefore, the heat transfer rate of the heat from the heating member to the outer periphery of the aerosol-generating substrate is able to be effectively slowed down. In addition, a cold airflow passes through the first airflow channel and the second airflow channel, such that the heating rate of air in the first airflow channel and the second airflow channel is able to be slower, and the heat transfer rate of the heating member to the outer periphery of the aerosol-generating substrate is close to the heat transfer rate of the outer periphery of the aerosol-generating substrate. Therefore, the temperature difference between the inner and outer periphery of the aerosol-generating substrate is effectively reduced, thereby resolving the problem of uneven temperature distribution between the inner and outer periphery of the aerosol-generating substrate during heating.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] To describe the technical solutions of the embodiments of the present disclosure more clearly, the fol-

lowing briefly introduces the accompanying drawings required for describing the embodiments. Apparently, the accompanying drawings in the following description show only some embodiments of the present disclosure, and a person of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

FIG. 1 is a structural schematic view of an aerosol-generating device according to the present disclosure.

FIG. 2 is a cross-sectional structural schematic view of an aerosol-generating device according to the present disclosure.

FIG. 3 is an enlarged structural schematic view of part A as shown in FIG. 2.

FIG. 4 is a structural schematic view of an aerosol-generating device and an aerosol-generating substrate assembled together according to the present disclosure.

FIG. 5 is a cross-sectional structural schematic view of an aerosol-generating device and an aerosol-generating substrate assembled together according to the present disclosure.

FIG. 6 is another cross-sectional structural schematic view of an aerosol-generating device and an aerosol-generating substrate assembled together according to the present disclosure.

FIG. 7 is a schematic view of a flow path of an airflow in an aerosol-generating device according to the present disclosure.

FIG. 8 is a structural schematic view of a heating member according to the present disclosure.

FIG. 9 is another structural schematic view of a heating member according to the present disclosure.

FIG. 10 is another structural schematic view of a heating member according to the present disclosure.

FIG. 11 is another structural schematic view of a heating member according to the present disclosure.

FIG. 12 is another structural schematic view of a heating member according to the present disclosure.

DETAILED DESCRIPTION

[0023] The technical solutions in embodiments of the present disclosure are clearly and completely described in the following with reference to the accompanying drawings in the embodiments of the present disclosure. Apparently, the described embodiments are merely some rather than all of the embodiments of the present disclosure. All other embodiments obtained by a person of ordinary skill in the art based on the embodiments of the present disclosure without creative efforts shall fall within the protection scope of the present disclosure.

[0024] In the following description, for the purpose of illustration rather than limitation, specific details such as the specific system structure, interface, and technology are proposed to thoroughly understand the present dis-

closure.

[0025] The term "and/or" in this specification is merely an association relationship for describing associated objects, and indicates that there may be three relationships. For example, A and/or B may indicate the following three cases: only A exists, both A and B exist, and only B exists. In addition, the character "/" in this specification generally indicates an "or" relationship between the associated objects. In addition, "a plurality of" in this specification means two or more than two.

[0026] The terms "first", "second", and "third" in the present disclosure are merely intended for a purpose of description, and shall not be understood as an indication or implication of relative importance or implicit indication of the number of indicated technical features. Therefore, features defining "first", "second", and "third" may explicitly or implicitly include at least one feature. In description of the present disclosure, "plurality of" means at least two, such as two and three unless it is specifically defined otherwise. All directional indications (for example, up, down, left, right, front, back...) in the embodiments of the present disclosure are only used for explaining relative position relationships, movement situations, or the like between the various components in a specific posture (as shown in the accompanying drawings). If the specific posture changes, the directional indications change accordingly. In the embodiments of the present disclosure, the terms "include", "have", and any variant thereof are intended to cover a non-exclusive inclusion. For example, a process, method, system, product, or device that includes a series of steps or units is not limited to the listed steps or units, but further optionally includes a step or unit that is not listed, or further optionally includes another step or component that is intrinsic to the process, method, product, or device.

[0027] Embodiments mentioned in the specification means that particular features, structures, or characteristics described with reference to the embodiments may be included in at least one embodiment of the present disclosure. A term appearing at different positions of this specification may not refer to the same embodiment or an independent or alternative embodiment that is mutually exclusive with some embodiments. A person skilled in the art explicitly or implicitly understands that the embodiments described in the specification may be combined with other embodiments.

[0028] The following describes the present disclosure in detail with reference to the accompanying drawings and embodiments.

[0029] It should be noted in advance that generally, the outside of an aerosol-generating substrate has a housing. For example, the outside is provided with a paper package, but to make the description of the embodiments more simplified, an aerosol-generating substrate described below generally refers to an aerosol-generating substrate including a housing.

[0030] As illustrated in FIG. 1 to FIG. 4, FIG. 1 is a structural schematic view of an aerosol-generating de-

vice 10 according to the present disclosure, FIG. 2 is a cross-sectional structural schematic view of the aerosol-generating device 10 shown in FIG. 1, FIG. 3 is an enlarged structural schematic view of part A shown in FIG. 2, and FIG. 4 is a structural schematic view of an aerosol-generating device 10 and an aerosol-generating substrate 11 assembled together.

[0031] In the present embodiment, the aerosol-generating device 10 is provided. The aerosol-generating device 10 may be configured to heat and bake the aerosol-generating substrate 11 and generate an aerosol for a user to inhale. The aerosol-generating device 10 includes a housing 12 and a heating switch 13. The heating switch 13 is disposed on the outer surface of the housing 12, and is configured to control on and off of the aerosol-generating device 10. Various components of the aerosol-generating device 10 are disposed in the housing 12. In the present embodiment, the shape of the housing 12 is cylindrical. In other embodiments, the housing 12 may also be other shapes. The housing 12 may be made of the same material, or may be made of multiple materials. For example, the housing 12 includes a plastic outer layer and a metal inner layer, and the user is only able to contact the plastic outer layer when using it. Heat generated inside the aerosol-generating device 10 is evenly distributed in the metal inner layer due to the property of rapid heat conduction of the metal, so as to prevent scalding hands of the user as a result of the heated plastic outer layer being touched by the user, and is able to further prevent softening of the plastic outer layer.

[0032] The aerosol-generating device 10 further includes an atomizer 14, a battery assembly 15, and a controller 16. The atomizer 14 is electrically connected to the battery assembly 15. Specifically, a top of the housing 12 has a first opening 121, the inside of the housing 12 has a mounting cavity 122, both the atomizer 14 and the battery assembly 15 are disposed in the mounting cavity 122, and the atomizer 14 is disposed on one side of the battery assembly 15 close to the first opening 121. The atomizer 14 is configured to heat and bake the aerosol-generating substrate 11 and generate an aerosol, and the battery assembly 15 is configured to provide a power supply for the atomizer 14.

[0033] Further, the atomizer 14 includes a heating base 17, a coil 18, and a heating member 19. The controller 16 is disposed on one side of the battery assembly 15 close to the first opening 121, and the controller 16 is electrically connected to the coil 18, the heating switch 13, and the battery assembly 15. The controller 16 is configured to control start and stop of heating of the coil 18 and the heating member 19 by means of electromagnetic induction, and is able to control parameters such as a heating power and a temperature. When the user needs to use the aerosol-generating device 10, the heating switch 13 of the housing 12 may be pressed. When the controller 16 receives a request of start using from the user, the battery assembly 15 is controlled to supply power to the coil 18, such that the coil 18 and the heating

member 19 heat the aerosol-generating substrate by means of electromagnetical induction. When the user presses the heating switch 13 of the housing 12 again, the controller 16 receives a request of stop using from the user, and controls the battery assembly 15 to stop supplying power to the coil 18, then the coil 18 stops working. The controller 16 further has other functions, and details are not described herein.

[0034] The heating base 17 is configured to fasten the aerosol-generating substrate 11. The heating base 17 is disposed at one end of the mounting cavity 122 close to the first opening 121, and the heating base 17 has a bottom wall 171 and a second sidewall 172. In the present embodiment, the second sidewall 172 of the heating base 17 is arranged in a ring shape and is shaped as a cylinder, the second sidewall 172 is disposed at one end of the bottom wall 171 close to the first opening 121, and the second sidewall 172 and the bottom wall 171 of the heating base 17 surround to form the heating cavity 173. The thickness of the bottom wall 171 is greater than the thickness of the second sidewall 172, such that the structural strength of the heating base 17 is higher. Further, the second sidewall 172 and the bottom wall 171 are integrally formed, and the material of the second sidewall 172 and the bottom wall 171 may be a thermally conductive material such as a metal or an alloy.

[0035] A top of the second sidewall 172 of the heating base 17 abuts against a top of the housing 12, and the heating base 17 is coaxially disposed with the housing 12. One end of the second sidewall 172 close to the first opening 121 has a second opening 174, and the caliber of the second opening 174 is greater than or equal to the caliber of the first opening 121. Therefore, the heating base 17 separates the mounting cavity 122 from the heating cavity 173, and the heating cavity 173 communicates with the outside of the aerosol-generating device 10 through the second opening 174 and the first opening 121. In the present embodiment, the caliber of the second opening 174 is the same as the caliber of the first opening 121 and less than the inner diameter of the second sidewall 172, and shapes of both the second opening 174 and the first opening 121 are circular. In some embodiments, the heating base 17 is not limited to the structure described in the present embodiment.

[0036] The coil 18 is configured to heat the aerosol-generating substrate 11. In the present embodiment, the coil 18 is sleeved on the outer periphery of the second sidewall 172 of the heating base 17, so as to heat the aerosol-generating substrate 11 in the heating member 19. In the present embodiment, the coil 18 is a spirally wound coil, and a changing magnetic field is generated after the coil is energized, forming an eddy current which penetrates the metal heating member 19, such that the metal heating member 19 heats up and heats the aerosol-generating substrate 11. In other embodiments, other heating manners, for example, a resistance wire, may be used to heat the aerosol-generating substrate 11.

[0037] The heating member 19 is disposed in the heat-

ing cavity 173. The heating member 19 includes a first sidewall 191. Further, the first sidewall 191 of the heating member 19 is annularly arranged, and one end of the first sidewall 191 close to the second opening 174 has a third opening 192. Therefore, the inside of the heating member 19 communicates with the heating cavity 173, and communicates with the outside of the aerosol-generating device 10.

[0038] As illustrated in FIG. 4, FIG. 5, and FIG. 6, the heating member 19 is configured to accommodate and heat the aerosol-generating substrate 11, and the aerosol-generating substrate 11 may be disposed inside the heating member 19. When the user uses the aerosol-generating device 10, the aerosol-generating substrate 11 is inserted from the first opening 121 of the aerosol-generating device 10, and is disposed inside a heat conductive body after successively passing through the second opening 174 of the heating base 17 and the third opening 192 of the heating member 19.

[0039] In the present embodiment, the shape of the heating member 19 may be cylindrical, or certainly, may be other shapes, such as a cylinder-like shape or a cube. The heating member 19 is coaxial with the heating base 17. Therefore, the coil 18 is able to evenly heat the outer periphery of the first sidewall 191, and is further able to evenly heat the outer periphery of the aerosol-generating substrate 11.

[0040] As illustrated in FIG. 3 and FIG. 7, FIG. 7 is a schematic view of a flow path of an airflow in the aerosol-generating device 10 according to the present disclosure. Further, a protrusion 193 is provided on the inner surface of the first sidewall 191 of the heating member 19. A part of the surface of the protrusion 193 is in contact with the outer periphery of the aerosol-generating substrate 11, and heat is transferred to the aerosol-generating substrate 11 in a heat conduction manner. When the aerosol-generating substrate 11 is disposed inside the heating member 19, the protrusion 193 of the first sidewall 191 is able to form a gap between the aerosol-generating substrate 11 and the inner surface of the first sidewall 191, and form a second airflow channel 20. The second airflow channel 20 is led from the outside of the aerosol-generating device 10 to the bottom of the heating cavity 173, such that air flows from the third opening 192 into the second airflow channel 20, flows to the bottom of the heating cavity 173 through the second airflow channel 20, and finally flows to one end of the aerosol-generating substrate 11 away from the third opening 192. When the airflow flows through the protrusion 193 on the first sidewall 191, the airflow flows from two sides of the protrusion 193 to the bottom of the aerosol-generating substrate 11.

[0041] There is a gap between the outer surface of the first sidewall 172 and the inner surface of the heating cavity 173, such that the outer surface of the first sidewall 172 and the inner surface of the heating cavity 173 form a first airflow channel 21. The first airflow channel 21 is led from the outside of the aerosol-generating device 10 to the bottom of the heating cavity 173, such that air flows

from the second opening 174 into the second airflow channel 20, flows to the bottom of the heating cavity 173 through the second airflow channel 20, and finally flows to one end of the aerosol-generating substrate 11 away from the third opening 192.

[0042] In the present embodiment, the second airflow channel 20 and the protrusion 193 are disposed to change the heat transfer mode of the heating member 19 to the aerosol-generating substrate 11 from heat conduction to a combination of heat conduction and heat convection, and heat convection is the main heat transfer manner. Heat transfer efficiency of heat convection is lower than heat transfer efficiency of heat conduction, and therefore, a heat transfer rate of the heat from the heating member 19 to the outer periphery of the aerosol-generating substrate 11 is effectively slowed down. Therefore, the heat transfer rate of the heating member 19 to the outer periphery of the aerosol-generating substrate 11 is close to the heat transfer rate of the outer periphery of the aerosol-generating substrate 11 to the inside of the aerosol-generating substrate 11. Thus, the temperature difference between the inner and outer periphery of the aerosol-generating substrate 11 is effectively reduced, thereby resolving the problem of uneven temperature between the inner and outer periphery of the aerosol-generating substrate 11 during heating.

[0043] The first airflow channel 21 and the second airflow channel 20 are disposed on two sides of the heating member 19, such that the heating rate of air in the first airflow channel 21 and in the second airflow channel 20 is slower. The airflow flows from the outside of the aerosol-generating device 10 through the first airflow channel 21 and the second airflow channel 20 to the bottom of the heating cavity 173, and heat in the first airflow channel 21 and the second airflow channel 20 is taken away, such that heat generated by the heating member 19 and heat radiated by the first sidewall 191 on the inner surface of the heating base 17 are reduced. Therefore, the heat transfer rate of the heat to the outer periphery of the aerosol-generating substrate 11 is slower, the temperature difference between the outer periphery of the aerosol-generating substrate 11 and the inside of the aerosol-generating substrate 11 is smaller, and uniformity of temperature distribution between the inner periphery and the outer periphery of the aerosol-generating substrate 11 is better, thereby resolving the problem of uneven temperature between the inner and outer periphery of the aerosol-generating substrate during heating.

[0044] In addition, cold air flows through the first airflow channel 21 and the second airflow channel 20, and takes away some heat in the first airflow channel 21 and the second airflow channel 20, such that heat transferred by the heating cavity 173 to the housing 12 of the aerosol-generating device 10 is reduced. Therefore, the housing 12 of the aerosol-generating device 10 is able to be insulated.

[0045] Moreover, the first airflow channel 21 and the second airflow channel 20 are disposed on two sides of

the heating member 19, such that flow of the airflow in the heating cavity 173 is able to be increased, and the airflow may simultaneously flow from two sides of the first sidewall 191. Therefore, inhalation resistance inside the aerosol-generating device 10 is smaller, and the user inhales more easily when using the aerosol-generating device 10.

[0046] The protrusion 193 is able to further reduce a contact area between the heating member 19 and the aerosol-generating substrate 11, and an aerosol condensate is less likely to adhere to the first sidewall 191, thereby reducing adhesion of stains on the heating member 19. In some embodiments, when the housing of the aerosol-generating substrate 11 is a paper outer wall, the arrangement of the protrusion 193 is also able to reduce a contact area between the heating member 19 and the paper outer wall, so as to prevent the paper outer wall from being baked and pasted due to overheating, and prevent a pungent smell from forming, which improves user experience.

[0047] In some embodiments, the area of the surface of the protrusion 193 in contact with the aerosol-generating substrate 11 to the area of the inner surface of the first sidewall 191 is in a ratio of 5%-15%. For example, the ratio may be 5%, 10%, or 15%. The surface of the protrusion 193 in contact with the aerosol-generating substrate 11 means: the surface of one end of the protrusion 193 in contact with the surface of the aerosol-generating substrate 11 when the aerosol-generating substrate 11 is disposed in the heating member 19. The smaller the area ratio of the contact surface to the inner surface of the first sidewall 191 is, the smaller the heat transfer area of the heat conduction is, in the common heat transfer manner, the smaller the proportion of heat conduction to heat convection is. When the area ratio is between 5%-15%, heat convection is the main heat transfer mode in the common heat transfer mode, and the heat transfer rate of the heat to the aerosol-generating substrate 11 is greatly reduced. As the heat transfer rate between the aerosol-generating substrate 11 and the first sidewall 191 is reduced, the heat transfer rate of the heating member 19 toward the outer periphery of the aerosol-generating substrate 11 is gradually similar to the heat transfer rate of the outer periphery of the aerosol-generating substrate 11 toward the inside of the aerosol-generating substrate 11, and the temperature difference between the inner and outer periphery of the aerosol-generating substrate 11 is reduced, thereby effectively resolving the problem of uneven temperature distribution on the inner periphery and outer periphery of the aerosol-generating substrate 11 during heating. In some cases, the heat transfer rate inside the aerosol-generating substrate 11 is greater than the heat transfer rate between the heating member 19 and the outer periphery of the aerosol-generating substrate 11, and the temperature difference between the inside and outside of the aerosol-generating substrate 11 tends to be 0 after heating for a period of time, and the inner and outer periphery temper-

ature are more evenly distributed.

[0048] The area ratio of the contact surface to the inner surface of the first sidewall 191 may not be too high or too low, and when the area ratio is too high, the proportion of heat convection in the common heat transfer manner is reduced, and the heat transfer rate of the heat to the aerosol-generating substrate 11 is not able to be reduced. Too low an area ratio makes the proportion of heat conduction too low and the heating effect is not good.

[0049] In the present embodiment, a part of the first sidewall 191 is concave toward the aerosol-generating substrate 11 to form the protrusion 193. In this manner, a mold is used to stamp the outer surface of the first sidewall 191 to the inside of the first sidewall 191 to form the protrusion 193. A processing process of the protrusion 193 is simple, and costs are relatively low. In some embodiments, the protrusion 193 may be a bump, and the bump is disposed on the inner surface of the first sidewall 191. The material of the bump may be the same as the material of the first sidewall 191, and the bump and the first sidewall 191 are integrally formed. The bump may alternatively be made of a material different from the material of the first sidewall 191, and the bump may be made of a material with relatively poor heat conductivity. Therefore, when the heat is transferred from the protrusion 193 to the aerosol-generating substrate 11 in the heat conduction manner, As heat conductivity of the bump is relatively poor, the speed of heat conduction may be reduced, such that the heat transfer rate of the heating member 19 to the outer periphery of the aerosol-generating substrate 11 and the heat transfer rate of the outer periphery of the aerosol-generating substrate 11 to the inside of the aerosol-generating substrate 11 are closer to each other. Therefore, the temperature difference between the inner and outer periphery of the aerosol-generating substrate 11 is effectively reduced, and the temperature of the inner and outer periphery of the aerosol-generating substrate 11 is more uniform.

[0050] In some embodiments, the maximum height of the protrusion 193 is 2 mm-5 mm. The maximum height of the protrusion 193 refers to the maximum height at which the protrusion 193 protrudes relative to the inner surface of the first sidewall 191. The maximum height of the protrusion 193 may be adjusted to adjust the width of the gap between the heating member 19 and the aerosol-generating substrate 11, so as to control the size of the airflow in the second airflow channel 20, thereby achieving the effect of adjusting the inhalation resistance. The smaller the maximum height of the protrusion 193, the larger the inhalation resistance. Conversely, the larger the maximum height of the protrusion 193, the smaller the inhalation resistance.

[0051] There may be one or more protrusions 193, and one protrusion 193 may be spirally disposed on the inner surface of the first sidewall 191. A plurality of protrusions 193 may be circumferentially distributed on the inner surface of the first sidewall 191, and/or the plurality of pro-

trusions 193 are axially distributed on the inner surface of the first sidewall 191. The greater the quantity of protrusions 193, the greater the proportion of heat conduction between the heating member 19 and the aerosol-generating substrate 11 in the common heat transfer of heat conduction and heat convection. When there are three or more protrusions 193, the plurality of protrusions 193 may be evenly distributed along the circumferential direction at intervals, and the plurality of protrusions 193 are in contact with the peripheral edge of the aerosol-generating substrate 11, so as to limit the aerosol-generating substrate 11.

[0052] The shape of the protrusion 193 may be a regular shape, such as a strip shape, a dot shape, or a ring shape, or may be an irregular shape. In the present disclosure, four types of heating members 19 with different shapes and distributed protrusions 193 are shown in FIG. 8 to FIG. 11.

[0053] The protrusion 193 in FIG. 8 is strip-shaped, and the strip-shaped protrusion 193 extends from the third opening 192 to one end facing away from the third opening 192, that is, extends from the top of the first sidewall 191 to the bottom. The plurality of strip-shaped protrusions 193 are distributed on the inner surface of the first sidewall 191 at intervals in the circumferential direction. Specifically, the four strip-shaped protrusions 193 are evenly circumferentially distributed on the inner surface of the first sidewall 191. The extending direction of the strip-shaped protrusion 193 may be parallel to the axial direction of the heating member 19.

[0054] The protrusion 193 in FIG. 9 is arcuate, one end of the arcuate protrusion 193 extends in the circumferential direction to another end, and a plurality of arcuate protrusions 193 are distributed on the inner surface of the first sidewall 191 at intervals in the circumferential direction. Specifically, the four arcuate protrusions 193 are evenly circumferentially distributed on the inner surface of the first sidewall 191. The distribution of the protrusions 193 shown in FIG. 9 may also be considered as an annular protrusion 193 being broken into four arcuate protrusions 193 in the circumferential direction. The plurality of annular protrusions 193 may be disposed at intervals in the axial direction of the heating member 19, and each annular protrusion 193 has a groove or a through hole, so as to form the second airflow channel 20.

[0055] The protrusions 193 shown in FIG. 10 are dot-shaped, and the dot-shaped protrusions 193 are distributed in an array on the inner surface of the first sidewall 191. Specifically, twelve dot-shaped protrusions 193 are distributed in an array on the inner surface of the first sidewall 191. In some embodiments, the dot-shaped protrusions 193 may alternatively be irregularly distributed on the inner surface of the first sidewall 191. The plurality of dot-shaped protrusions 193 may be distributed in a plurality of rows, each row of dot-shaped protrusions 193 is arranged along the axial direction of the heating member 19, and the plurality of rows of dot-shaped protrusions 193 are disposed at intervals in the circumferential direc-

tion of the heating member 19.

[0056] The protrusions 193 shown in FIG. 11 and FIG. 12 are spirally shaped. FIG. 11 is a front view of the heating member 19 provided with the spirally shaped protrusions 193. FIG. 12 is a structural schematic view of the heating member 19 provided with the spirally shaped protrusions 193. The spiral protrusion 193 of the present embodiment is a non-closing ring, such that the second airflow channel 20 is able to be formed between the inner surface of the first sidewall 191 and the aerosol-generating substrate 11, and is led from the third opening 192 to one end of the aerosol-generating substrate 11 facing away from the third opening 192. In some embodiments, the spiral protrusions 193 may alternatively be disconnected and axially distributed on the inner surface of the first sidewall 191.

[0057] In conclusion, the shape and distribution of the protrusions 193 need to enable the second airflow channel 20 to be formed between the inner surface of the heating member 19 and the aerosol-generating substrate 11, and the second airflow channel 20 is led from the top of the heating member 19 to the bottom of the aerosol-generating substrate 11. In some embodiments, the shape and distribution of the protrusions 193 are not limited to the foregoing manners, and may alternatively be in other manners.

[0058] As illustrated in FIG. 7, in some embodiments, a first limiting member 22 is disposed between the outer surface of the first sidewall 191 and the inner surface of the second sidewall 172. The first limiting member 22 limits the heating member 19 to the inside of the heating cavity 173, such that the first airflow channel 21 is formed between the first sidewall 191 and the inner surface of the heating cavity 173.

[0059] In the present embodiment, the first limiting member 22 is circumferentially sleeved on the outer surface of the first sidewall 191, such that there is a gap between the first sidewall 191 and the heating cavity 173, and the first airflow channel 21 is formed between the first sidewall 191 and the inner surface of the heating cavity 173. The first limiting member 22 has an air hole, and the air hole in the first limiting member 22 is able to enable an airflow to flow in from the second opening 174, and then flow through the first airflow channel 21 via the air hole in the first limiting member 22, and finally flow to the bottom of the aerosol-generating substrate 11.

[0060] The quantity of the first limiting members 22 may be one or more. In the present embodiment, there are two first limiting members 22, which are respectively disposed at one end close to the second opening 174 and one end away from the second opening 174, and simultaneously limit an upper end and a lower end of the heating member 19, such that an airflow is able to flow from the upper end of the heating member 19 into the first airflow channel 21, and is able to flow from the lower end of the heating member 19 into the bottom of the aerosol-generating substrate 11.

[0061] The first limiting member 22 may be a rubber

ring, and the first limiting member 22 may be fastened between the heating base 17 and the heating member 19 in a close fitting and bonding manner. Alternatively, the first limiting member 22 is protruded on the outer surface of the heating member 19, and the first limiting member 22 and the outer surface of the heating member 19 are integrally formed. Alternatively, the first limiting member 22 is protruded on the inner surface of the heating cavity 173, and the first limiting member 22 and the inner surface of the heating cavity 173 are integrally formed. In some embodiments, the first limiting member 22 is protruded on the inner surface of the heating cavity 173 or the outer surface of the heating member 19, the shape and distribution of the first limiting member 22 are the same as those in the above manners in which the protrusion 193 is disposed. That is, the protrusion 193 is disposed on the outer surface of the heating member 19 to form the first limiting member 22. The shape and distribution of the first limiting member 22 are not described herein again.

[0062] In some embodiments, there is a gap between the bottom wall 171 and the aerosol-generating substrate 11, a third airflow channel 23 is formed between the bottom wall 171 and the aerosol-generating substrate 11, and the third airflow channel 23 communicates with the first airflow channel 21 and the second airflow channel 20. The third airflow channel 23 is disposed such that an airflow passing through the first airflow channel 21 and the second airflow channel 20 finally flows to one end of the aerosol-generating substrate 11 facing away from the third opening 192.

[0063] In some embodiments, the first sidewall 191 abuts against the bottom wall 171, and one end of the first sidewall 191 close to the bottom wall 171 has an opening, and the opening penetrates through the first sidewall 191 and communicates with the third airflow channel 23 and the first airflow channel 21, such that the airflow of the first airflow channel 21 is able to lead to the third airflow channel 23, and finally flows to one end of the aerosol-generating substrate 11 facing away from the third opening 192.

[0064] In the present embodiment, the first limiting member 22 is disposed between the first sidewall 191 and the second sidewall 172, and the first limiting member 22 is configured to limit a radial direction of the heating member 19 in the heating cavity 173, such that the first sidewall 191 and the bottom wall 171 are disposed at an interval, and the third airflow channel 23 communicates with the first airflow channel 21. The airflow of the first airflow channel 21 is able to lead to the third airflow channel 23, and finally flow to one end of the aerosol-generating substrate 11 facing away from the third opening 192.

[0065] In the present embodiment, a second limiting member 176 is protruded at one end of the bottom wall 171 opposite to the second opening 174, the second limiting member 176 has a through hole, and a fourth opening 194 is formed at one end of the heating member 19

opposite to the third opening 192. The second limiting member 176 is configured to limit the axial direction of the aerosol-generating substrate 11 in the heating cavity 173. The aerosol-generating substrate 11 is inserted into the heating cavity 173 and abuts against the second limiting member 176, such that a gap exists between the bottom of the aerosol-generating substrate 11 and the inner surface of the bottom wall 171, and the third airflow channel 23 is formed. The airflow is able to flow from the first airflow channel 21 and the second airflow channel 20 into the third airflow channel 23, and finally flows to the bottom of the aerosol-generating substrate 11.

[0066] In some embodiments, the second limiting member 176 is disposed on the bottom wall 171, a part or an entirety of the second limiting member 176 protrudes into the fourth opening 194 and abuts against the bottom of the aerosol-generating substrate 11, or one end of the second limiting member 176 close to the fourth opening 194 is flush with the fourth opening 194 and abuts against the bottom of the aerosol-generating substrate 11. That is, the maximum height of the second limiting member 176 is higher than or equal to the maximum distance between the fourth opening 194 and the bottom of the heating cavity 173. In this way, one end of the aerosol-generating substrate 11 away from the fourth opening 194 is able to be disposed inside the heating member 19, and the first airflow channel 21 and the second airflow channel 20 is able to be more fully used, such that overall temperature distribution of the aerosol-generating substrate 11 is more uniform. The maximum height of the second limiting member 176 may not be excessively high, the aerosol-generating substrate 11 is able to be fully baked, and the first airflow channel 21 and the second airflow channel 20 are fully used.

[0067] In some embodiments, the second limiting member 176 may be protruded at one end of the first sidewall 191 close to the bottom wall 171, and the second limiting member 176 abuts against the bottom surface of the aerosol-generating substrate 11, such that the aerosol-generating substrate 11 is limited in the heating member 19. The first limiting member 22 limits the heating member 19 in the axial direction of the heating cavity 173. And at the same time, the aerosol-generating substrate 11 is limited in the heating cavity 173, such that a gap exists between the bottom of the aerosol-generating substrate 11 and the inner surface of the bottom wall 171, and the third airflow channel 23 is formed. The airflow is able to flow from the first airflow channel 21 and the second airflow channel 20 into the third airflow channel, and finally flows to the bottom of the aerosol-generating substrate 11.

[0068] In some embodiments, the second limiting member 176 may be protruded at one end of the second sidewall 172 close to the bottom wall 171. The second limiting member 176 abuts against the bottom surface of the aerosol-generating substrate 11 and the end of the first sidewall 191 close to the bottom wall 171, that is, the second limiting member 176 simultaneously limits the

aerosol-generating substrate 11 and the axial direction of the heating member 19 in the heating cavity 173. In this implementation, the second limiting member 176 makes a gap between the bottom of the aerosol-generating substrate 11 and the inner surface of the bottom wall 171, and forms the third airflow channel 23. In addition, a gap is formed between the first sidewall 191 and the bottom wall 171, such that the airflow is able to flow from the first airflow channel 21 to the third airflow channel, and finally flow to the bottom of the aerosol-generating substrate 11.

[0069] The foregoing descriptions are merely implementations of the present disclosure, and the patent scope of the present disclosure is not limited thereto. All equivalent structure or process changes made according to the content of this specification and accompanying drawings in the present disclosure or by directly or indirectly applying the present disclosure in other related technical fields shall similarly fall within the patent protection scope of the present disclosure.

Claims

1. An aerosol-generating device, comprising:

a heating base, having a heating cavity; and
a heating member, configured to accommodate and heat an aerosol-generating substrate, wherein the heating member is disposed in the heating cavity;
wherein the heating member comprises a first sidewall, and a first airflow channel is formed between the first sidewall and the inner surface of the heating cavity; and a protrusion is disposed on the inner surface of the first sidewall, the protrusion makes a second airflow channel formed between the first sidewall and the aerosol-generating substrate, and both the first airflow channel and the second airflow channel are led from the outside of the aerosol-generating device to the bottom of the heating cavity.

2. The aerosol-generating device of claim 1, wherein a proportion of an area of the surface of the protrusion for contacting the aerosol-generating substrate to an area of the inner surface of the first sidewall is 5%-15%.

3. The aerosol-generating device of claim 1, wherein the maximum height of the protrusion is 2 mm-5 mm.

4. The aerosol-generating device of claim 1, wherein the first sidewall is disposed in a ring shape and the protrusion is spirally disposed on the inner surface of the first sidewall; or a plurality of strip-shaped protrusions are disposed on the inner surface of the first sidewall at intervals in the circumferential direction;

or a plurality of arcuate protrusions are disposed on the inner surface of the first sidewall at intervals in the circumferential direction; or a plurality of dotted protrusions are distributed in an array on the inner surface of the first sidewall; or a plurality of annular protrusions are disposed on the inner surface of the first sidewall at intervals in the axial direction, and each annular protrusion has a groove or a through hole.

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5. The aerosol-generating device of claim 1, wherein a part of the first sidewall is concave to form the protrusion.
6. The aerosol-generating device of claim 1, wherein the first sidewall is disposed in a ring shape, and the heating member is disposed coaxially with the heating base.
7. The aerosol-generating device of claim 1, wherein the heating base comprises a second sidewall, a first limiting member is disposed between the first sidewall and the second sidewall, and the first limiting member spaces the first sidewall from the second sidewall to form the first airflow channel between the first sidewall and the inner surface of the heating cavity.
8. The aerosol-generating device of claim 7, wherein the outer surface of the first sidewall is protruded to form the first limiting member; and/or the inner surface of the second sidewall is protruded to form the first limiting member.
9. The aerosol-generating device of claim 1, wherein the heating base comprises a second sidewall and a bottom wall, and the second sidewall and the bottom wall surround to form the heating cavity; and a third airflow channel is formed between the bottom wall and the aerosol-generating substrate, and the third airflow channel communicates with the first airflow channel and the second airflow channel.
10. The aerosol-generating device of claim 9, wherein a first limiting member is disposed between the first sidewall and the second sidewall, and the first limiting member is configured to limit the heating member for the third airflow channel to communicate with the first airflow channel.
11. The aerosol-generating device of claim 9, wherein the first sidewall abuts against the bottom wall, and one end of the first sidewall close to the bottom wall has an opening for the third airflow channel to communicate with the first airflow channel.
12. The aerosol-generating device of any one of claims 9-11, wherein the bottom wall or the first sidewall or

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the second sidewall is provided with a second limiting member and the second limiting member spaces the aerosol-generating substrate from the bottom wall to form the third airflow channel.

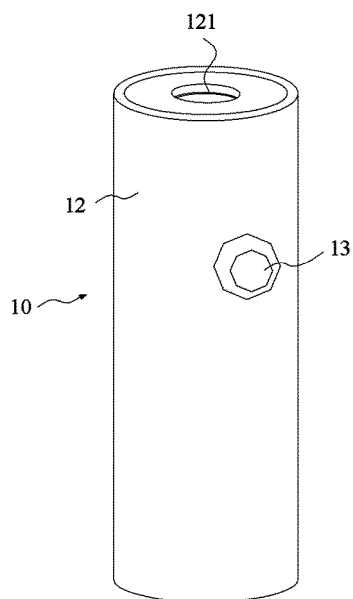


FIG. 1

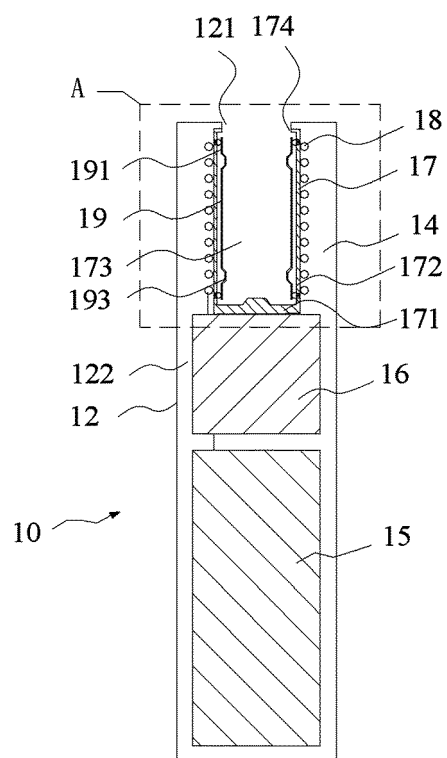


FIG. 2

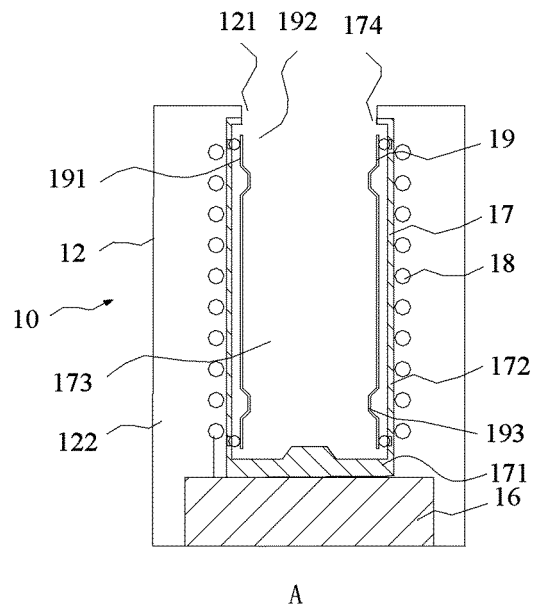


FIG. 3

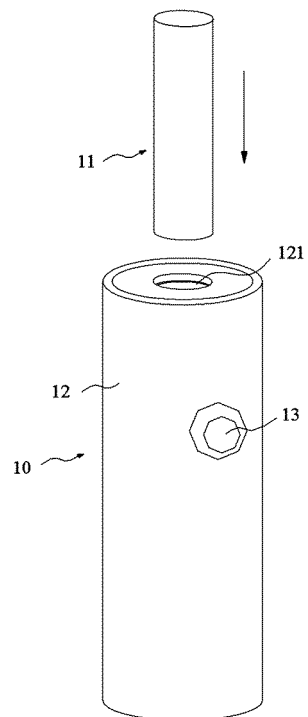


FIG. 4

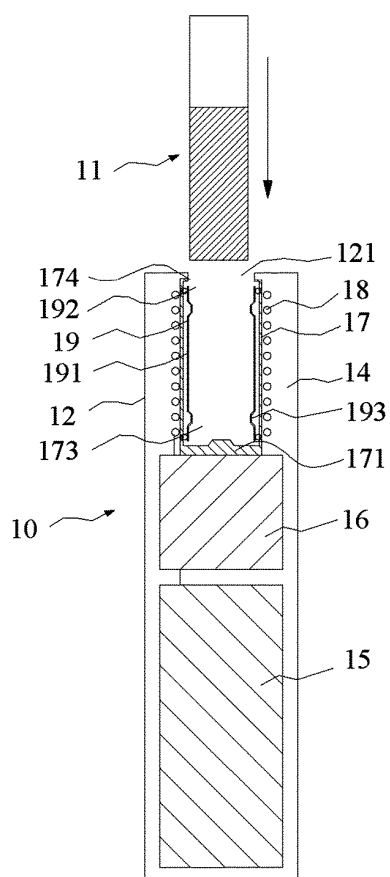


FIG. 5

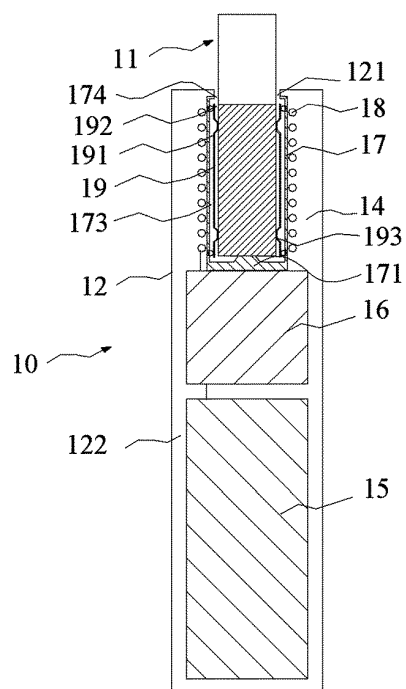


FIG. 6

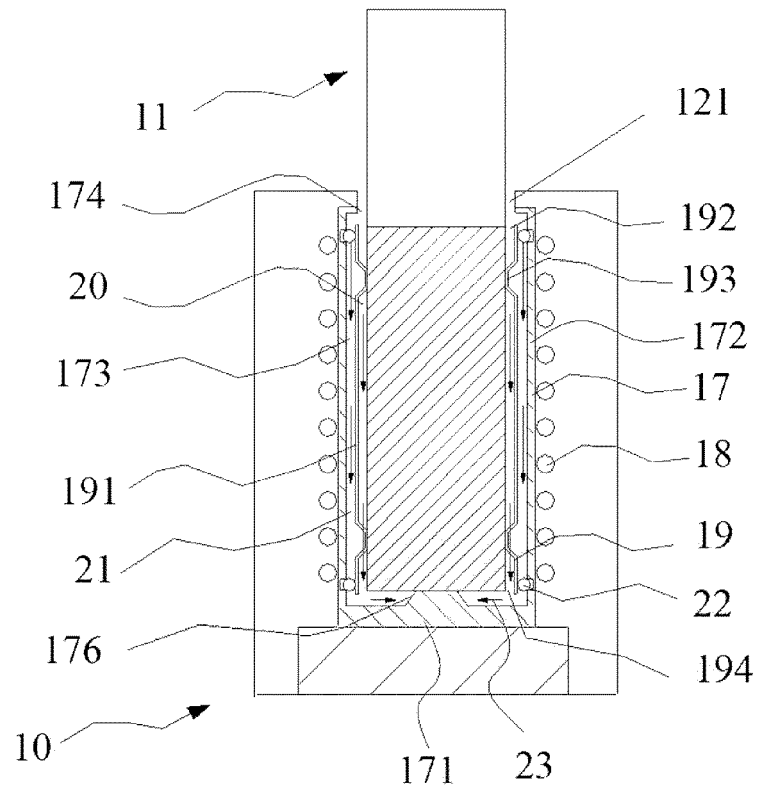


FIG. 7

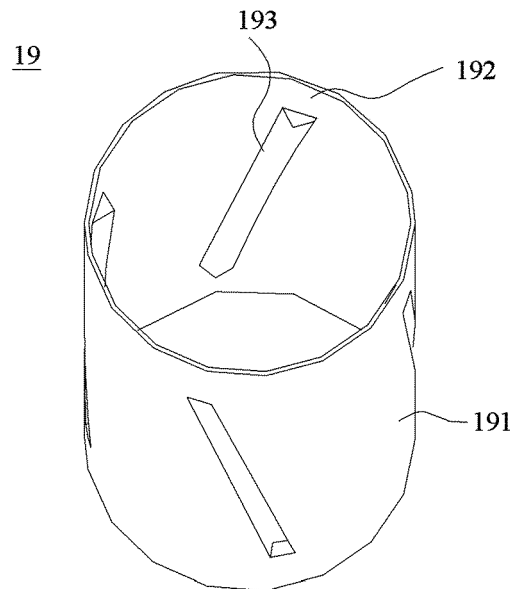


FIG. 8

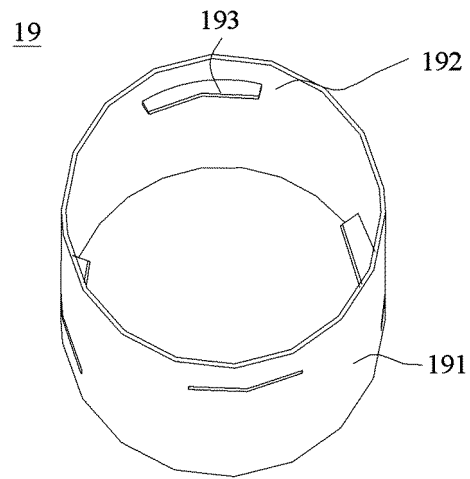


FIG. 9

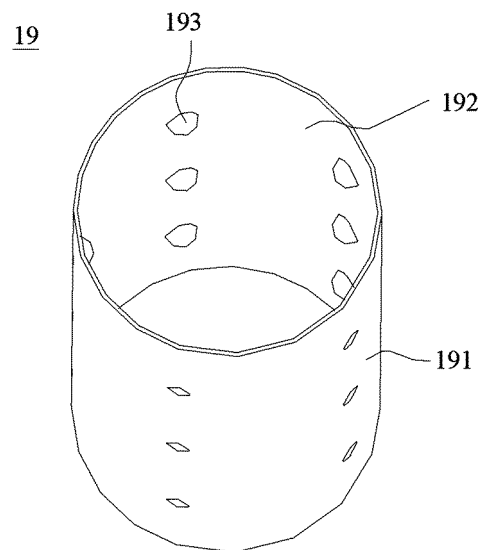


FIG. 10

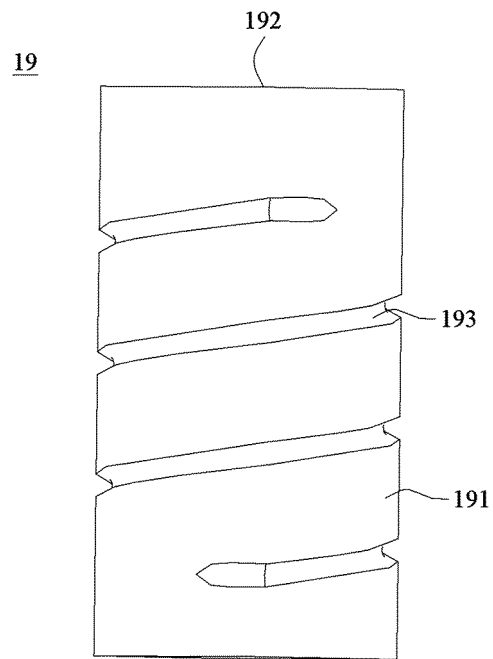


FIG. 11

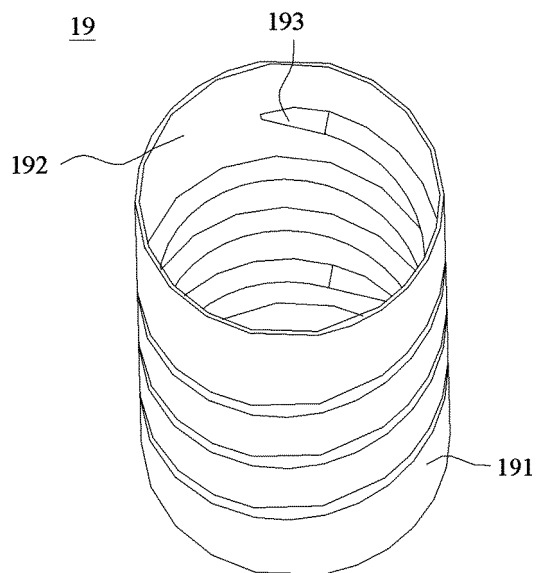


FIG. 12

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2021/140860

A. CLASSIFICATION OF SUBJECT MATTER A24F 40/42(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, VEN, USTXT, EPTXT, WOTXT, CNKI; 麦克韦尔, 周宏明, 电子烟, 气溶胶, 雾化, 加热非燃烧, 加热不燃烧, 气道, 气管, 通道, 流道, 烟道, 凸起, 凸出, 凸块, 突起, 突出, 凸, 凹, 限位, 隔开, 分隔, 热对流, 对流, 空气, 气流, 加热, 内周, 外周, 内外周, 内部, 温度, 均匀, 热, 侧壁, 第三, 第二, cigarette, smok+, nozzle, aerosol, outlet, inlet, heat+, vapour, fluid, airway, air, flow, passage, flue, protrud+, second, third, groove, bluge+, emboss+, temperature, convect+, unique, uniform																		
C. DOCUMENTS CONSIDERED TO BE RELEVANT																		
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>WO 2020074612 A1 (JT INTERNATIONAL S.A.) 16 April 2020 (2020-04-16) embodiments 1, 2, figures 1-8</td> <td>1-12</td> </tr> <tr> <td>Y</td> <td>CN 108813737 A (WEITAO ELECTRONIC TECHNOLOGY (SHENZHEN) CO., LTD.) 16 November 2018 (2018-11-16) description, paragraphs 38-58, figures 1, 3</td> <td>1-12</td> </tr> <tr> <td>A</td> <td>CN 109965350 A (CHINA TOBACCO GUIZHOU INDUSTRIAL CO., LTD.) 05 July 2019 (2019-07-05) entire document</td> <td>1-12</td> </tr> <tr> <td>A</td> <td>CN 108741235 A (PUWEISIXIN (BEIJING) TECHNOLOGY CO., LTD.) 06 November 2018 (2018-11-06) entire document</td> <td>1-12</td> </tr> <tr> <td>A</td> <td>CN 109363244 A (CHINA TOBACCO FUJIAN INDUSTRIAL CO., LTD.) 22 February 2019 (2019-02-22) entire document</td> <td>1-12</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	WO 2020074612 A1 (JT INTERNATIONAL S.A.) 16 April 2020 (2020-04-16) embodiments 1, 2, figures 1-8	1-12	Y	CN 108813737 A (WEITAO ELECTRONIC TECHNOLOGY (SHENZHEN) CO., LTD.) 16 November 2018 (2018-11-16) description, paragraphs 38-58, figures 1, 3	1-12	A	CN 109965350 A (CHINA TOBACCO GUIZHOU INDUSTRIAL CO., LTD.) 05 July 2019 (2019-07-05) entire document	1-12	A	CN 108741235 A (PUWEISIXIN (BEIJING) TECHNOLOGY CO., LTD.) 06 November 2018 (2018-11-06) entire document	1-12	A	CN 109363244 A (CHINA TOBACCO FUJIAN INDUSTRIAL CO., LTD.) 22 February 2019 (2019-02-22) entire document	1-12
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Date of the actual completion of the international search 28 February 2022	Date of mailing of the international search report 16 March 2022																	
Name and mailing address of the ISA/CN China National Intellectual Property Administration (ISA/CN) No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China Facsimile No. (86-10)62019451	Authorized officer Telephone No.																	

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2021/140860

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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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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

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