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(54) **HEATING ASSEMBLY AND VAPING DEVICE COMPRISING THE SAME**

(57) A heating assembly includes a heating element and a base. The base includes a bottom wall and a side wall; a space is surrounded by the bottom wall and the side wall. The heating element is distributed on the bot-

tom wall and configured to heat air in the space; and the bottom wall includes at least one air outlet through which the air flows out of the space.



**FIG. 3**

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## Description

**[0001]** The disclosure relates to a heating assembly and a vaping device comprising the same.

**[0002]** Conventionally, a heating assembly is disposed in the tobacco material. When the heating assembly is energized, the tobacco material is unevenly heated, which may affect the taste of the tobacco smoke.

**[0003]** To solve the aforesaid problems, the first objective of the disclosure is to provide a heating assembly for heating tobacco material.

**[0004]** The second objective of the disclosure is to provide a vaping device comprising the heating assembly.

**[0005]** The following advantages are associated with the heating assembly and the vaping device of the disclosure: the heating assembly allows the hot air to pass through the tobacco material and enables uniform heat transfer. Heating components are evenly disposed on a bottom wall of a base to give the maximum heating area which allows the heat to be conducted rapidly through the bottom wall of the base. Then the heat is transferred rapidly to the tobacco material to maintain the taste of the tobacco smoke.

**[0006]** FIG. 1 is a cross-sectional view of a vaping device according to one example of the disclosure;

**[0007]** FIG. 2 is an exploded view of a heating assembly according to one example of the disclosure;

**[0008]** FIG. 3 is a perspective view of a heating assembly according to one example of the disclosure;

**[0009]** FIG. 4 is a cross-sectional view of a heating assembly according to one example of the disclosure;

**[0010]** FIG. 5 is a bottom perspective view of a heating assembly according to one example of the disclosure;

**[0011]** FIG. 6 is a perspective view of a base assembled with a heating element according to one example of the disclosure;

**[0012]** FIG. 7 is a top view of a base according to one example of the disclosure; and

**[0013]** FIG. 8 is a cross-sectional view including arrows showing the direction of air flow in a heating element according to one example of the disclosure.

**[0014]** In the drawings, the following reference numbers are used: 1. Tobacco chamber; 2. Heating assembly; 3. Control assembly; 24. Cover; 25. Heating element; 26. Base; 260. Partition; 2401. Air inlet; 2604. Air outlet; 2601. Separate space; 2603. Side wall; 2605. Space; 2606. Opening; 2607. Main partition; 2609. Bottom wall; 2610. Flange; 2611. Protruding part; 2607a. First main partition; 2607b. Second main partition; 2607c. Third main partition; 2608a. First auxiliary partition; and 2608a. Second auxiliary partition.

**[0015]** To further illustrate the disclosure, embodiments detailing a heating assembly and a vaping device are described below. It should be noted that the following embodiments are intended to describe and not to limit the disclosure.

**[0016]** As shown in FIG. 1, a vaping device comprises a tobacco chamber 1 for holding tobacco material, a heat-

ing assembly 2 for heating the tobacco material, and a control assembly 3 for regulating the operation of the heating assembly 2. The control assembly 3 is disposed on the heating assembly 2, and the heating assembly 2 is disposed on the tobacco chamber 1. The control assembly comprises a circuit control board, and optionally further comprises a battery.

**[0017]** As shown in FIGS. 2-6, the heating assembly 2 comprises a heating element 25 and a base 26. The base 26 comprises a bottom wall 2609 and a side wall 2603. A space 2605 is surrounded by the bottom wall 2609 and the side wall 2603. The heating element 25 is distributed on the bottom wall 2609 and configured to heat air in the space 2605. The bottom wall 2609 comprises at least one air outlet 2604 through which the heat flows out of the space 2605. The tobacco chamber 1 comprises an open top through which the tobacco material is inserted into the tobacco chamber 1. The bottom wall 2609 is disposed on the tobacco chamber 1 to cover the open top. The focused stream of hot air in the space 2605 flows down through the at least one air outlet 2604 into the tobacco chamber 1, thus warming up evenly throughout the tobacco material. The heating element 25 is distributed on the bottom wall 2609 so as to quickly transfer heat to the bottom wall 2609 and raise the temperature in the tobacco material, thus maintaining the taste of the tobacco smoke. The heating element 25 comprises conductive materials including but not limited to, conductive metals, graphene, and carbon nanomaterials. The heating element is energized to produce the heat; optionally, an electromagnetic field is produced in a coil and causes heat generation in the heating element 25.

**[0018]** In certain examples, the bottom wall 2609 comprises a plurality of partitions 260 dividing the space 2605 into a plurality of separate spaces 2601. The heating element 25 is disposed in the plurality of separate spaces 2601. The plurality of partitions 260 is erected on the bottom wall 2609 using any desired method, such as integral formation or assembly. The plurality of partitions 260 is configured to prevent changes in the position of the heating element 25, thus preventing short circuit. The plurality of partitions 260 is configured to reduce heat loss in the plurality of separate spaces 2601.

**[0019]** In certain examples, the plurality of separate spaces 2601 communicates with one another to form a passage; two ends of the heating element 25 extend in the passage so that the heating element stretches in each separate space. In certain examples, the vaping device comprises only one heating element 25 provided with two pins; the heating element 25 extends along the passage to have a maximum length, and is soldered to the two pins for electricity conducting. The maximum length of the heating element 25 causes a rise in voltage and maximizes the amount of heat produced. In certain examples, the plurality of separate spaces 2601 need not communicate with one another; a plurality of heating elements 25 is inserted through plurality of partitions 260 and disposed on the bottom wall 2609; the plurality of

partitions 260 is formed integrally with or connected to one another.

**[0020]** In certain examples, as shown in FIG. 6, the plurality of partitions 260 comprises a plurality of main partitions 2607 with different sizes. The separate space 2601 is formed between every two adjacent main partitions 2607. Each of the plurality of main partitions 2607 is in the shape of a ring with an opening 2606. A smaller main partition 2607 is disposed in an adjacent larger main partition, and the openings of the smaller main partition 2607 and the adjacent larger main partition 2607 are disposed in two opposite directions. Understandably, the plurality of main partitions 2607 can be any shape or form including a circular shape, an elliptical shape, and a polygonal shape (for examples, a rectangular shape, a triangular shape, and a diamond shape). Referring to FIG. 2, in certain examples, the plurality of main partitions 2607 comprises a first main partition 2607a, a second main partition 2607b, and a third main partition 2607c, which are disposed in turn outward from the same center point; the first main partition 2607a comprises a first opening; the second main partition 2607b comprises a second opening; and the third main partition 2607c comprises a third opening; the first main partition 2607 is surrounded by the second main partition 2607b, and the first opening and the second opening are disposed in two opposite directions; the second main partition 2607b is surrounded by the third main partition 2607c, and the second opening and the third opening are disposed in two opposite directions; the first opening and the third opening are disposed in the same direction. In certain examples, each of the plurality of main partitions 2607 is in the form of a sheet with a flat surface (as shown in FIG. 7), and need not comprises any opening 2606. In certain examples, the plurality of main partitions 2607 is spirally disposed on the bottom wall 2609 and need not comprise any opening 2606; and the heating element 25 is matched with the plurality of separate spaces 2601 in shape and size to ensure that it can be disposed therein.

**[0021]** In certain examples, each of the plurality of partitions 260 further comprises a joint and an auxiliary partition 2608; the joint is disposed opposite to the opening; and the auxiliary partition extends from the joint through the opening of adjacent larger main partition. In certain examples, the plurality of main partitions 2607 comprises a first main partition 2607a, a second main partition 2607b, and a third main partition 2607c, which are disposed in turn outward from the same center point; the first main partition 2607a comprises a first opening and a first joint disposed opposite to the first opening; the second main partition 2607b comprises a second opening and a second joint disposed opposite to the second opening; and the third main partition 2607c comprises a third opening and a third joint disposed opposite to the third opening; the first main partition 2607 is surrounded by the second main partition 2607b, and the first opening and the second opening are disposed in two opposite directions; the second main partition 2607b is surrounded

by the third main partition 2607c, and the second opening and the third opening are disposed in two opposite directions; the first auxiliary partition 2608a extends from the first joint to the third joint through the second opening; the second auxiliary partition 2608b extends from the second joint to the side wall 2603 through the second opening. The plurality of auxiliary partitions 2608 is configured to prevent short circuit caused by the heating element 25.

**[0022]** In certain examples, the base 26 comprises a plurality of air outlets 2604 evenly distributed on the bottom wall 2609; preferably, the plurality of air outlets 2604 is evenly distributed, thus allowing the hot air to pass through the tobacco material and enabling uniform heat transfer.

**[0023]** In certain examples, the base 26 further comprises at least one protruding part 2611 disposed on the outer surface of the bottom wall 2609; and a gap is formed between the at least one protruding part 2611 and the tobacco material. Since the tobacco material may burn and stick to the surface of the heating element 25, the gap reduces contact between the tobacco material and the heating element 25, which leads to an increased service life of the heating element 25.

**[0024]** In certain examples, the side wall 2603 comprises a distal end away from the bottom wall 2609; the distal end extends radially to form a flange 2610; the flange 2610 is disposed on the open top of the tobacco chamber to prevent the base 26 from moving.

**[0025]** In certain examples, the heating assembly further comprises a cover 24 disposed on the distal end of the side wall 2603 to cover the space 2605. The cover 24 comprises at least one air inlet 2401 through which the air is conducted into the space 2605. The projection of the at least one air inlet 2401 does not overlap with the at least one air outlet 2604. The at least one air inlet 2401 communicates with the at least one air outlet 2604 through the space 2605. The number of the at least one air inlet 2401 is determined by demand. Since the projection of the at least one air inlet 2401 does not overlap with the at least one air outlet 2604, a vortex is formed as a result of the heat flow, which allows the hot air to flow along the space 2605, reduces heat loss, and improves heat utilization. Optionally, the cover 25 is disposed on the flange 2610.

**[0026]** In certain examples, the cover 24 is made of a thermal insulating material including not limited to mica, agate, jade, and crystal. Preferably, the thermal insulating material is made of mica which helps to minimize heat loss. The base 26 and the plurality of partitions 260 are separately made of a thermally-conductive electrically-insulating material including but not limited to, ceramic, glass, and quartz. Preferably, the base 26 and the plurality of partitions 260 are separately made of ceramic.

**[0027]** In certain examples, the heating element 25 comprises a heating wire and/or a heating tube in a spiral shape that maximizes the heating area. Preferably, the heating wire is in the shape of a spiral which gives the

maximum length, offering advantages such as low electrical resistivity, high heat generation, and low power consumption. The heat is transferred rapidly to the tobacco material to make an improvement on the tobacco smoke.

**[0028]** In certain examples, the tobacco chamber 1 comprises the open top; the heating assembly 2 is disposed on the open top; the bottom wall 2609 covers the open top, and the at least one air outlet is oriented toward the tobacco material; almost all the heat flows to the tobacco material to achieve a good heating efficiency.

**[0029]** FIG. 8 is a cross-sectional view including arrows showing the direction of the heat flow in the vaping device of the disclosure. The heating element 25 is energized to produce the heat, and allows the heat to be conducted through the plurality of separate spaces 2601. External air flows through the at least one air inlet 2401 into the plurality of separate spaces 2601, and forces the heat through the at least one air outlet 2604 to heat the tobacco material.

### Claims

1. A heating assembly, comprising a heating element and a base; wherein the base comprises a bottom wall and a side wall; a space is surrounded by the bottom wall and the side wall; the heating element is distributed on the bottom wall and configured to heat air in the space; and the bottom wall comprises at least one air outlet through which the air flows out of the space.
2. The heating assembly of claim 1, wherein the bottom wall comprises a plurality of partitions dividing the space into a plurality of separate spaces; and the heating element is disposed in the plurality of separate spaces.
3. The heating assembly of claim 2, wherein the plurality of separate spaces communicates with one another to form a passage; and two ends of the heating element extend in the passage so that the heating element stretches in each separate space.
4. The heating assembly of claim 2, wherein the plurality of partitions comprises a plurality of main partitions with different sizes; the separate spaces are formed between every two adjacent main partitions; each of the plurality of main partitions is in the shape of a ring with an opening; a smaller main partition is disposed in an adjacent larger main partition, and the opening of the smaller main partition and the opening of the adjacent larger main partition are disposed in two opposite directions.
5. The heating assembly of claim 4, wherein each of the plurality of partitions further comprises a joint and an auxiliary partition; the joint is disposed opposite to the opening; and the auxiliary partition extends from the joint through the opening of adjacent larger main partition.
6. The heating assembly of claim 2, wherein the base comprises a plurality of air outlets evenly distributed on the bottom wall; the base further comprises at least one protruding part disposed on an outer surface of the bottom wall; the side wall comprises a distal end away from the bottom wall; and the distal end extends radially to form a flange.
7. The heating assembly of claim 6, wherein the heating assembly further comprises a cover disposed on the distal end of the side wall to cover the space; the cover comprises at least one air inlet through which the air is conducted into the space; the projection of the at least one air inlet does not overlap with the at least one air outlet; and the at least one air inlet communicates with the at least one air outlet through the space.
8. The heating assembly of claim 7, wherein the cover comprises a thermal insulating material; and the base and the plurality of partitions comprise a thermally-conductive electrically-insulating material.
9. The heating assembly of claim 1, wherein the heating element comprises a heating wire and/or a heating tube in a spiral shape.
10. A vaping device, comprising the heating assembly of claim 1 and a tobacco chamber, wherein the tobacco chamber comprises an open top; the heating assembly is disposed on the open top; the bottom wall covers the open top, and the at least one air outlet is oriented toward a tobacco material.

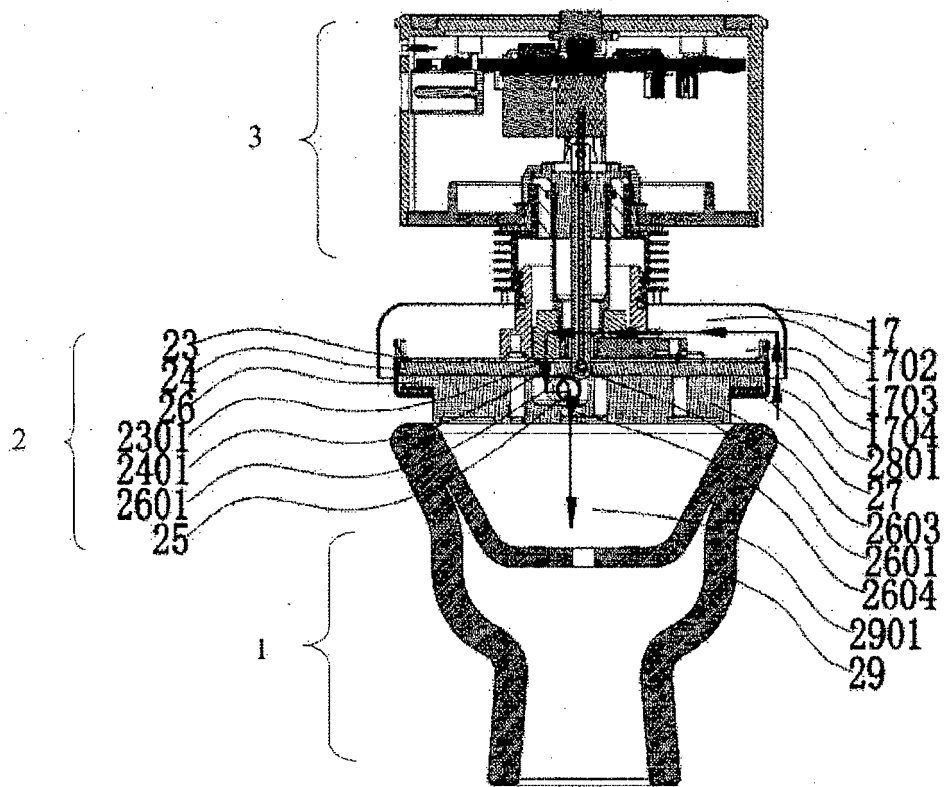


FIG. 1

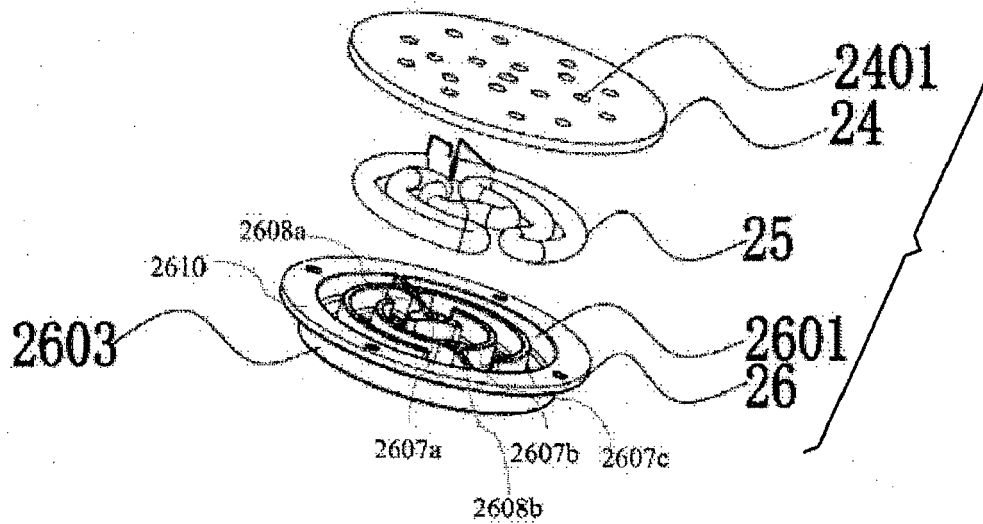


FIG. 2



FIG. 3

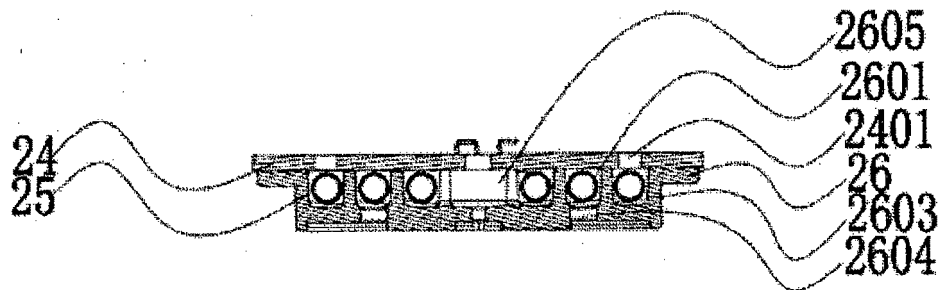


FIG. 4

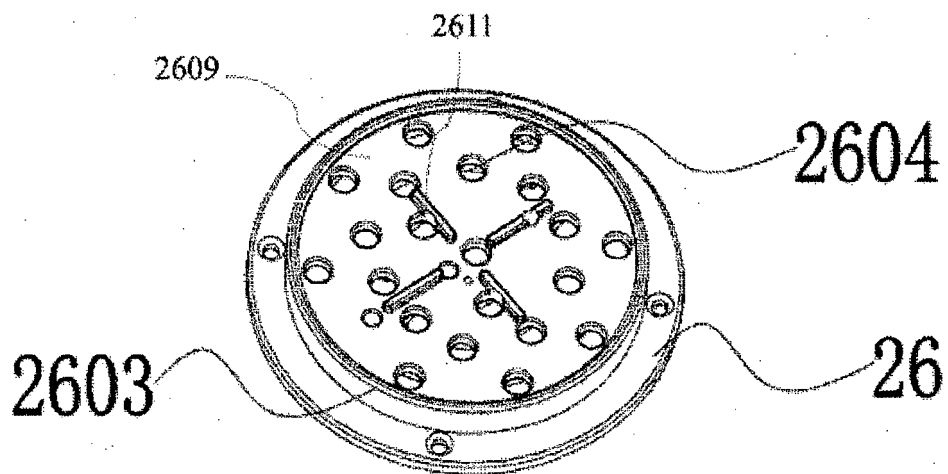


FIG. 5

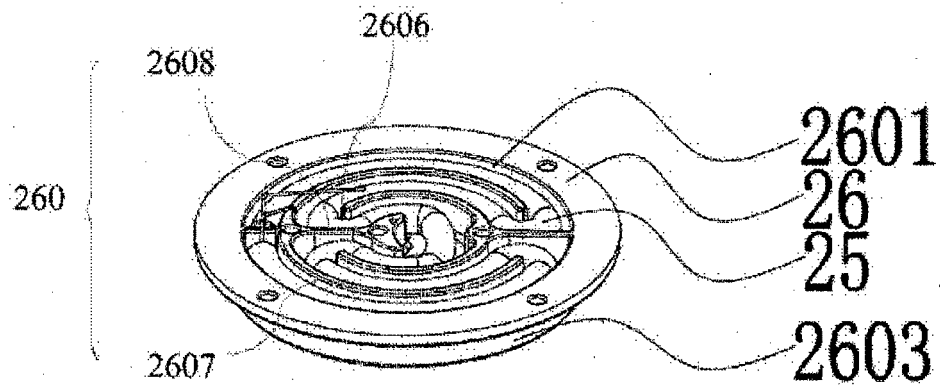


FIG. 6

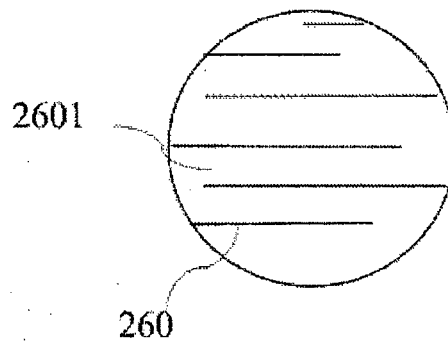


FIG. 7

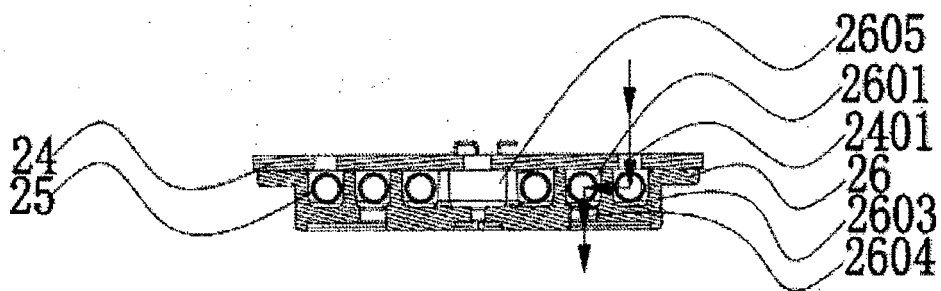


FIG. 8





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Application Number

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EPO FORM 1503 03.82 (P04C01)

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		1 September 2022	Cardan, Cosmin
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10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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