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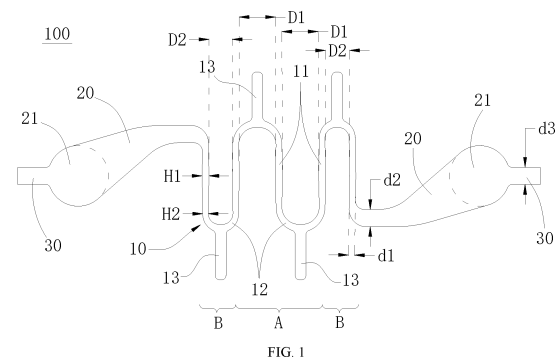
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(54) **HEAT-GENERATING BODY**

(57) The present application relates to a heat-generating body (100), the heat-generating body (100) is a flat sheet shaped structure, and includes a heating section (10) and conductive sections (20) extending from both lateral ends of the heating section (10) respectively, one or more fixing sections (13) are connected to the heating section (10) on each side of the heating section (10) in a longitudinal direction, and a cross-sectional area of each fixing section (13) is at least 10% larger than a cross-sectional area of a heating segment in the heating section (10). According to heat-generating body (100) in the present application, through setting the fixing sections (13) on both sides of the heating section (10) in the longitudinal direction, when the heat-generating body (100) is assembled into an atomization assembly of an atomizer, it is able to provide sufficient support strength to the heating section (10) through the fixing sections (13), thereby preventing the heating section (10) from deforming and ensuring that the heating section (10) is entirely attached to the oil-guiding body. Hence, it is able to keep the heating section (10) flat, so as to ensure that the heating section (10) is not separated from the oil-guiding body.



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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application claims a priority to Chinese Patent Application No. 202210021904.7 filed on January 10, 2022, and entitled "HEAT-GENERATING BODY", which is incorporated by reference herein in its entirety. The present application claims a priority to Chinese Patent Application No. 202220052154.5 filed on January 10, 2022, and entitled "HEAT-GENERATING BODY", which is incorporated by reference herein in its entirety.

TECHNICAL FIELD

[0002] The present application relates to the field of atomization technologies, in particular to a heat-generating body.

BACKGROUND

[0003] Currently, an atomization assembly of an electronic atomizer typically uses a stacked assembly manner, namely, from top to bottom, the atomization assembly includes a bracket, an oil guiding member, a heat-generating body and a base laminated one on another sequentially. The bracket is secured to the base, so as to clamp the oil guiding member and the heat-generating body in place. However, because the oil guiding member is usually made of an oil-guiding cotton, it can compress to a certain extent by applying certain pressure. A heating wire of the heat-generating body is usually very thin, and after assembly, a case where the oil guiding member presses against the heating wire occurs. A middle portion of the heating wire is squeezed and deformed, which may cause the heating wire and the oil guide body to not fit well enough, resulting in burnt cores phenomenon.

SUMMARY

Technical Problem

[0004] An objective of the present application is to provide a heat-generating body that can, to at least some extent, address the technical issue of burnt cores in the electronic atomizer.

Solution to Problem

[0005] To address the above-mentioned drawbacks, solutions of the present application are as follows.

[0006] The present application provides a heat-generating body, the heat-generating body is a flat sheet shaped structure, and includes a heating section and conductive sections extending from both lateral ends of the heating section respectively, one or more fixing sections are connected to the heating section on each

side of the heating section in a longitudinal direction, and a cross-sectional area of each fixing section is at least 10% larger than a cross-sectional area of a heating segment in the heating section.

[0007] In one embodiment, the fixing sections are flush with the heating section and the conductive sections, and a width of each fixing section is greater than a width of the heating segment in the heating section.

[0008] In one embodiment of the present application, the fixing sections protrude in a vertical direction from one side of a plane where the heating section and the conductive sections are located, and a protruding height is less than 1mm.

[0009] In one embodiment of the present application, a cross-sectional area of each conductive section gradually increases from one end adjacent to the heating section to the opposite end, and a minimum cross-sectional area of each conductive section is greater than the cross-sectional area of the heating segment in the heating section.

[0010] In one embodiment of the present application, one end of each conductive section away from the heating section extends to form an extension segment, and a cross-sectional area of the extension segment is smaller than the minimum cross-sectional area of each conductive section.

[0011] In one embodiment of the present application, the heating section is divided into a first heating region located in the middle and second heating regions located on both sides of the first heating region, and a spacing between two adjacent heating segments in the first heating region is greater than a spacing between two adjacent heating segments in the second heating regions.

[0012] In one embodiment of the present application, the heating section is a heating wire that is S-shaped or continuously S-shaped, including a plurality of first heating segments spaced apart from each other in the longitudinal direction and extending in a lateral direction, ends of two adjacent first heating segments are connected to each other through a second heating segment, the other ends of the two adjacent first heating segments are spaced apart from each other, and two free ends of the heating section are respectively connected to two conductive sections.

[0013] In one embodiment of the present application, the heating section is a heating wire that is S-shaped or continuously S-shaped, including a plurality of first heating segments spaced apart from each other in the lateral direction and extending in the longitudinal direction, ends of two adjacent first heating segments are connected to each other through a second heating segment, the other ends of the two adjacent first heating segments are spaced apart from each other, and two free ends of the heating section are respectively connected to two conductive sections. A spacing between two adjacent first heating segments in the first heating region is D1, a spacing between two adjacent first heating segments in the second heating region is D2, and D1 is greater

than D2.

[0014] In one embodiment of the present application, the heating section includes a plurality of rectangular-shaped heating wires spaced apart from each other in the lateral direction and sequentially connected to each other in series between the two conductive sections; each heating wire includes two first heating segments that extend in the longitudinal direction and are parallel and opposite to each other, and ends of the two first heating segments are correspondingly connected to each other through a second heating segment. A spacing between the two first heating segments of each heating wire in the first heating region is D3, a spacing between the two first heating segments of each heating wire in the second heating region is D4, and D3 is greater than D4.

[0015] In one embodiment of the present application, a spacing between two adjacent heating wires in the first heating region is D5, a spacing between two adjacent heating wires in the second heating region is D6, and D5 is greater than D6.

[0016] In one embodiment of the present application, cross-sectional areas of each first heating segment and the second heating segment are identical and smaller than the minimum cross-sectional area of each conductive section.

[0017] In one embodiment of the present application, each second heating segment is connected to one fixing section.

[0018] In one embodiment of the present application, the fixing sections extend in the longitudinal direction.

[0019] In one embodiment of the present application, a part of the fixing sections extend obliquely adjacent to one end of the heat-generating body, and another part of the fixing sections extend obliquely adjacent to the other end of the heat-generating body.

[0020] In one embodiment of the present application, each second heating segment has an outwardly convex arc shape in the middle.

[0021] In one embodiment of the present application, a cross-sectional area of each first heating segment gradually decreases from the middle towards both ends.

[0022] In one embodiment of the present application, the heating section includes a plurality of diamond-shaped heating wires sequentially connected to each other in series in the lateral direction between the two conductive sections. Each heating wire has a diamond-shaped hole, the diamond-shaped hole of each heating wire in the first heating region has a maximum spacing of D7 in the lateral direction, the diamond-shaped hole of each heating wire in the second heating region has a maximum spacing of D8 in the lateral direction, and D7 is greater than D8.

[0023] In one embodiment of the present application, the plurality of heating wires are arranged with minor axes in the lateral direction and major axes in the longitudinal direction, and each end of each heating wire is connected to one fixing section in a major axis direction.

[0024] In one embodiment of the present application,

the heat-generating body is one piece formed from a metal sheet through an etching process.

[0025] In one embodiment of the present application, a thickness of the heat-generating body is between 0.05mm and 0.2mm.

[0026] In one embodiment of the present application, at least one hollowed-out hole is provided in a region of each conductive section adjacent to the heating section.

Advantageous Effects

[0027] The heat-generating body in the embodiments of the present application has the following advantageous effects. Through setting the fixing sections on both sides of the heating section in the longitudinal direction, when the heat-generating body is assembled into an atomization assembly of an atomizer, it is able to provide sufficient support strength to the heating section through the fixing sections, thereby preventing the heating section from deforming and ensuring that the heating section is entirely attached to the oil-guiding body. Hence, it is able to keep the heating section flat, so as to ensure that the heating section is not separated from the oil-guiding body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] In order to illustrate the technical solutions of the embodiments of the present application or the prior art in a clearer manner, the drawings required for the description of the embodiments of the present application or the prior art will be described hereinafter briefly. Apparently, the following drawings merely relate to some embodiments of the present application, and based on these drawings, a person of ordinary skill in the art may obtain other drawings without any creative effort.

FIG. 1 is a structural diagram of one embodiment of a heat-generating body according to the present application;

FIG. 2 is a schematic view showing the heat-generating body in FIG. 1 after assembly;

FIG. 3 is a schematic view showing the heat-generating body in FIG. 1 during mass production;

FIG. 4 is a structural diagram of an alternative embodiment of the heat-generating body in FIG. 1;

FIG. 5 is a schematic view showing the heat-generating body in FIG. 4 after assembly;

FIG. 6 is a structural diagram of another embodiment of the heat-generating body according to the present application;

FIG. 7 is a structural diagram of yet another embodiment of the heat-generating body according to the present application;

FIG. 8 is a structural diagram of still yet another embodiment of the heat-generating body according to the present application.

DETAILED DESCRIPTION

[0029] The embodiments of the present application will be described hereinafter, and examples of the embodiments are shown in the drawings. Identical or similar reference numbers in the drawings represent an identical or similar element or elements having an identical or similar function. The following embodiments are for illustrative purposes only, but shall not be construed as limitation to the present application. Based on the embodiments of the present application, a person skilled in the art may, without any creative effort, obtain the other embodiments, which also fall within the scope of the present application.

[0030] In the descriptions of the present application, it should be appreciated that, when such terms as "central", "longitudinal", "transversal", "length", "width", "thickness", "on/above", "under/below", "front", "back", "left", "right", "vertical", "horizontal", "top", "bottom", "inside", "outside", "clockwise", "counterclockwise", "axial", "circumferential" and "radial" are used to indicate orientation or positional relationships, they are based on orientation or positional relationships shown in the accompanying drawings, which are solely used to facilitate describing the present application and simplify the descriptions, and do not indicate or imply that a device or element as referred to should have a specific orientation, be constructed and operated in a specific orientation, and therefore shall not be construed as limitation to the present application.

[0031] In addition, such words as "first" and "second" are merely for illustrative purposes, rather than to implicitly or explicitly indicate the number of the defined technical features. In this regard, the technical features defined with such words as "first" and "second" may implicitly or explicitly include one or more technical features. Further, such a phrase as "a plurality of" is used to indicate that there are at least two, e.g., two or more, unless otherwise specified.

[0032] Please refer to FIG. 1 and FIG. 2, the embodiments of the present application provides a heat-generating body 100. The heat-generating body 100 is a flat sheet shaped structure, and includes a heating section 10 and conductive sections 20 extending from both lateral ends of the heating section 10 respectively. One or more fixing sections 13 are connected to the heating section 10 on each side of the heating section 10 in a longitudinal direction, and a cross-sectional area of each fixing section 13 is at least 10%, e.g., 50%, larger than a cross-sectional area of a heating segment in the heating section 10, so as to ensure that when the heat-generating body 100 is powered on, only the heating section 10 generates heat, while the fixing sections 13 do not generate heat or only generate a small amount of heat.

[0033] In practical applications, when the heat-generating body 100 is assembled into an atomization assembly of an atomizer, it is attached to or embedded in an atomization surface of an oil-guiding body in the atomi-

zation assembly. The conductive sections 20 are in electrical contact with electrodes of the atomizer, so as to be electrically connected to a power source and a control circuit through the electrodes. The control circuit controls the power source to apply energy to the heat-generating body 100, so that the heating section 10 of the heat-generating body 100 heats and atomizes atomization liquid absorbed by the oil-guiding body, thereby producing an aerosol for a user to inhale.

[0034] Specifically, the fixing sections 13 are substantially flush with the heating section 10 and the conductive sections 20, i.e., they have a same thickness and lie in a same plane, and a width of each fixing section is greater than a width of the heating segment in the heating section. For example, the width of each fixing section 13 is between 0.15mm and 2mm, e.g., 1.5mm. When the heat-generating body 100 is assembled into the atomizer, it is fixed in place between the oil-guiding body and a supporting body 300 to form a heat-generating assembly. The heat-generating assembly is installed at the top of an atomization base 200. The supporting body 300 has a channel at a position corresponding to the heating section 10, which communicates with an atomization chamber 201 at the top of the atomization base 200. The supporting body 300 provides support for the conductive sections 20 and the fixing sections 13. It is able to provide sufficient support strength to the heating section 10 through the fixing sections 13, thereby preventing the heating section 10 from deforming and ensuring that the heating section 10 is entirely attached to the oil-guiding body. Hence, it is able to keep the heating section 10 flat, so as to ensure that the heating section 10 is not separated from the oil-guiding body.

[0035] It should be noted that, in a case where the width of each fixing section 13 is less than 0.15mm, the fixing sections 13 also generate heat and become a heating region when the heat-generating body 100 is energized. This enlarges an overall heating region of the heating section 10, thereby dispersing the heat generated by the heat-generating body 100 to the conductive sections 20. Consequently, an atomization efficiency is low due to that the heat is not concentrated, thereby adversely affecting the flavor of the produced aerosol.

[0036] In a case where the width of each fixing section 13 is greater than 2mm, although the low resistance prevents the fixing section 13 from generating heat when the heat-generating body 100 is energized, a large contact area with the heating section 10 causes the heat generated by the heating section 10 to conduct toward the fixing section 13. Consequently, an issue of low atomization efficiency also occurs due to that the heat is not concentrated, thereby adversely affecting the flavor of the produced aerosol.

[0037] In other embodiments, the fixing sections 13 may protrude in a vertical direction from one side of a plane where the heating section 10 and the conductive sections 20 are located, and a protruding height is less than 1mm. In other words, a height difference between

the fixing sections 13 and the heating section 10 is less than 1mm, and a protruding direction of the fixing sections 13 is away from the oil-guiding body. This ensures that when the heat-generating body 100 is clamped between the oil-guiding body and the supporting body 300, the heating section 10 is more closely attached to the atomization surface of the oil-guiding body.

[0038] The ends of the fixing sections 13 on both sides may protrude beyond edges of the supporting body 300. When protruding segments are bent towards the supporting body 300 to clamp and be secured to both sides of the supporting body 300, it is able to provide support and fix the heat-generating body 100 in a better manner, thereby preventing the heating section 10 from deforming or shifting.

[0039] In the embodiments of the present application, a cross-sectional area of each conductive section 20 gradually increases from one end adjacent to the heating section 10 to the opposite end, and a minimum cross-sectional area of each conductive section 20 is greater than the cross-sectional area of the heating segment in the heating section 10, that is, a minimum width d2 of each conductive section 20 is greater than a width d1 of the heating segment in the heating section 10. With this structure, while ensuring that the conductive sections 20 provide sufficient supporting strength for the heating section 10, the conductive sections 20 generate a small amount of heat when the heat-generating body 100 is energized. Since one end of each conductive section 20 connected to the heating section 10 is narrower, it reduces the conduction of heat from the heating section 10 to the conductive sections 20, so as to ensure that the heat generated by the heat-generating body 100 is concentrated in the heating section 10, thereby to provide a better atomization efficiency and improve a heat utilization efficiency.

[0040] To facilitate the contact connection between the conductive sections 20 and the electrodes, one end of each conductive section 20 that is away from the heating section 10 is arc-shaped, so as to form a circular contact region 21 that matches a size of the electrode it contacts. This design ensures adequate contact area between the conductive section 20 and the electrode, as well as the overall strength of the heat-generating body 100. At least one hollowed-out hole may be provided in the conductive section 20 outside the contact region 21 to further reduce heat conduction from the heating section 10 to the conductive section 20.

[0041] One end of each conductive section 20 away from the heating section 10 extends to form an extension segment 30, and a cross-sectional area of the extension segment 30 is smaller than the minimum cross-sectional area of each conductive section 20, namely, a width d3 of the extension segment 30 is smaller than the minimum width d2 of the conductive section 20. As a result, when the heat-generating body 100 is energized, the extension segment 30 does not generate heat.

[0042] In the embodiments of the present application,

the heat-generating body 100 is one piece formed from a metal sheet through an etching process. For example, the metal sheet may be such a conductive metal sheet as a nickel sheet, a nickel-chromium sheet, an iron-chromium-aluminum sheet, a stainless steel sheet, a titanium sheet, or an alloy sheet, which may be selected based on practical considerations. A thickness of the heat-generating body 100 is between 0.05mm and 0.2mm, for example, 0.1mm. The heating section 10 of the heat-generating body 100 may take various shapes that provide relatively uniform heating, such as a mesh shape, a stripe shape, an S shape, a zigzag shape, a wavy shape, a sawtooth shape, a spiral shape, a circular shape, or a rectangular shape.

[0043] In combination with FIG. 3, in an actual manufacturing of the heat-generating body 100 in the embodiments of the present application, a large-sized metal sheet is selected and divided into etching regions 101, forming regions corresponding to the heat-generating bodies 100 respectively enclosed by the etching regions 101, and a border region 102 surrounding the forming regions and the etching regions 101. When each etching region 101 is removed, the heat-generating body 100 formed in the corresponding forming region is connected to the border region 102 through the extension segments 30 at both ends of the heat-generating body 100. This allows for the automated cutting of multiple heat-generating bodies 100 from the metal sheet, thereby realizing mass production.

[0044] In specific, at a position where each extension segment 30 is located, the border region 102 has a rectangular or triangular connection segment 103. The extension segment 30 is connected to the border region 102 through the connection segment 103, and a contact width between each extension segment 30 and the corresponding connection segment 103 is greater than 0.15mm or less than 3mm. This design reduces cutting marks on the extension segment 30, ensures the cutting marks are located on the extension segment 30 rather than in the contact region 21 that is in contact with the electrode, and guarantees a stable contact between the conductive section 20 and the electrode.

[0045] In the embodiments of the present application, the heating section 10 is divided into a first heating region A located in the middle and second heating regions B located on both sides of the first heating region A, and a spacing between two adjacent heating segments in the first heating region A is greater than a spacing between two adjacent heating segments in the second heating regions B. Thus, when the heat-generating body 100 is energized, it can lower the temperature of the first heating region A located in the middle and increase the temperature of the second heating regions B on both sides, so as to reduce the temperature difference between the center and the sides of the heating section 10, thereby to provide a more uniform overall temperature across the heating section 10. In this embodiment, when the heat-generating body 100 is used in an atomizer with dual liquid

channels, the second heating regions B on both sides are respectively closer to or correspond to regions below the two liquid channels, so as to facilitate the heating and atomization of the atomization liquid in the oil-guiding body.

[0046] As shown in FIG. 1, the heating section 10 in this embodiment is a heating wire that is S-shaped or continuously S-shaped, including a plurality of first heating segments 11 spaced apart from each other in the longitudinal direction and substantially extending in a lateral direction, ends of two adjacent first heating segments 11 are connected to each other through a second heating segment 12, the other ends of the two adjacent first heating segments 11 are spaced apart from each other, and two free ends of the heating section 10 are respectively connected to two conductive sections 20. That is, a spacing between two adjacent first heating segments 11 in the first heating region A is D1, a spacing between two adjacent first heating segments 11 in the second heating region B is D2, and D1 is greater than D2.

[0047] In this way, when the heat-generating body 100 is energized, the spacing between the two first heating segments 11 in the middle first heating region A of the heating section 10 is larger, which reduces the heat generated per unit area of the first heating region A and lowers the temperature of the first heating region A; while the spacing between the two first heating segments 11 in the second heating regions B on both sides is smaller, which increases the heat generated per unit area of the second heating regions B and increases the heat generated in the second heating regions B and raises the temperature of the second heating regions B. Consequently, the temperature difference between the middle temperature and the temperature on both sides of the heating section 10 is reduced, the temperature of the heating section 10 distributed laterally is more uniform, the atomization effect of the heat-generating body 100 is improved, and the occurrence of burnt cores due to excessive local temperature is avoided.

[0048] Cross-sectional areas of each first heating segment 11 and the second heating segment 12 are identical, with both having a width of d1, which is smaller than the minimum width d2 of each conductive section 20. In this regard, when the heat-generating body 100 is energized, the conductive sections 20 generate a small amount of heat and have low thermal conduction.

[0049] In the embodiments of the present application, the cross-sectional area of each first heating segment 11 gradually decreases from the middle towards both ends. In other words, a width of a middle portion of the first heating segment 11 is H1, a width at each of both ends of the first heating segment 11 is H2, and H1 is greater than H2. With this structure, when a voltage applied to the conductive section 20 at both ends of the heat-generating body 100 is maintained, the power at the middle portion of the first heating segment 11 is slightly reduced, and the power at each of both ends of the first heating segment 11 is slightly increased. This makes the longitudinal tem-

perature distribution of the heating section 10 more uniform. In combination with the spacing arrangement of the first heating segments 11, it is able to ensure that the overall temperature distribution of the entire heating section 10 is more uniform.

[0050] In the embodiments of the present application, a width of the second heating segment 12 is the same as the width H2 at both ends of the first heating segment 11, and the second heating segment has an outwardly convex arc shape in the middle, so as to enhance the longitudinal heat distribution uniformity of the heating section 10 when the heating section 10 generates heat. Each second heating segment 12 is connected to one fixing section 13, and the fixing sections extend in the longitudinal direction, so as to increase the support strength of the heating section 10. In other embodiments, the quantity of the fixing sections 13 may be selected as needed. For example, to ensure sufficient support strength for the heating section 10, one fixing section 13 is arranged for every other second heating segment 12.

[0051] FIG. 4 is a structural diagram of an alternative embodiment of the heat-generating body in FIG. 1. A main difference between the heat-generating body 100 in this embodiment and the heat-generating body 100 in FIG. 1 is that, to provide sufficient support strength for the heating section 10, a part of the fixing sections 13 extend obliquely adjacent to one end of the heat-generating body 100, and another part of the fixing sections 13 extend obliquely adjacent to the other end of the heat-generating body 100.

[0052] In conjunction with FIG. 5, this embodiment describes an atomizer that does not have a supporting structure. Specifically, the heat-generating body 100 is directly installed at the top of the atomization base 200. Since both sides of the atomization chamber 201 need to be penetrated through to communicate with outlet pipes of the atomizer, a top surface of the atomization base 200 is divided by the atomization chamber 201 into left and right supporting surfaces. Specifically, the fixing sections 13 located on the left half of the heat-generating body 100 extend obliquely to the left, thus being supported by the left supporting surface of the atomization base 200. The fixing sections 13 located on the right half of the heat-generating body 100 extend obliquely to the right, thus being supported by the right supporting surface of the atomization base 200. In this way, the conductive sections 20 and the fixing sections 13 are supported by the top surface of the atomization base 200, thereby ensuring that the heating section 10 is entirely attached to the oil-guiding body, maintaining the flatness of the heating section 10, and preventing separation between the heating section 10 and the oil-guiding body.

[0053] Please refer to FIG. 6, which is a structural diagram of another embodiment of the heat-generating body according to the present application. A main difference between the heat-generating body 100 in this embodiment and the heat-generating body 100 in FIG. 1 is that, the heating section 10 is a heating wire that is S-

shaped or continuously S-shaped, including a plurality of first heating segments 11 spaced apart from each other in the longitudinal direction and extending in a lateral direction, ends of two adjacent first heating segments 11 are connected to each other through a second heating segment 12, the other ends of the two adjacent first heating segments 11 are spaced apart from each other, and two free ends of the heating section 10 are respectively connected to two conductive sections 20, namely, one end of the outermost first heating segment 11 in the longitudinal direction away from the other end of the outermost first heating segment 11 that is connected to the second heating segment 12 is connected to the conductive section 20, with a smooth transition between the first heating segment 11 and the conductive section 20.

[0054] The cross-sectional areas of each first heating segment 11 and the second heating segment 12 are identical, namely, the width d_1 of the first heating segment 11 and the second heating segment 12 is smaller than the minimum width d_2 of the conductive section 20 and the width d_3 of the extension segment 30, so that when the heat-generating body 100 is energized, the conductive sections 20 generate a small amount of heat, and the extension segment 30 does not generate heat, thereby to ensure that the heat generated by the heat-generating body 100 is concentrated in the heating section 10.

[0055] The second heating segment 12 has an outwardly convex arc shape in the middle, so as to enhance the longitudinal heat distribution uniformity of the heating section 10 when the heating section 10 generates heat.

[0056] In the embodiments of the present application, the fixing sections 13 connected to the second heating segment 12 may extend in the longitudinal direction. Alternatively, the fixing sections 13 on one side of the heat-generating body 100 may extend obliquely to the left, while the fixing sections 13 on the other side of the heat-generating body 100 may extend obliquely to the right.

[0057] In this embodiment, at the junction of the conductive section 20 and the first heating segment 11, one fixing section 13 is also formed. Together with the fixing section 13 on the second heating segment 12, it enhances the support strength and stability of the heating section 10.

[0058] Please refer to FIG. 7, which is a structural diagram of yet another embodiment of the heat-generating body according to the present application. The heating section 10 of the heat-generating body 100 includes a plurality of rectangular-shaped heating wires 14 spaced apart from each other in the lateral direction and sequentially connected to each other in series between the two conductive sections 20; each heating wire 14 includes two first heating segments 11 that extend in the longitudinal direction and are parallel and opposite to each other, and ends of the two first heating segments 11 are correspondingly connected to each other through a sec-

ond heating segment 12. In this embodiment, the second heating segment 12 is a straight-shaped segment, and each second heating segment 12 is connected to the fixing section 13 that extends in the longitudinal direction.

[0059] In specific, a spacing between the two first heating segments 11 of each heating wire 14 in the first heating region A is D_3 , a spacing between the two first heating segments 11 of each heating wire 14 in the second heating region B is D_4 , and D_3 is greater than D_4 . In this way, when the heat-generating body 100 is energized, the spacing between the heating wires 14 in the first heating region A is larger, which reduces the heat generated per unit area of the first heating region A and lowers the temperature of the first heating region A; while the spacing between the heating wires 14 in the second heating regions B on both sides is smaller, which increases the heat generated per unit area of the second heating regions B and raises the temperature of the second heating regions B. Consequently, the temperature difference between the middle temperature and the temperature on both sides of the heating section 10 is reduced, the temperature of the heating section 10 distributed laterally is more uniform.

[0060] The adjacent heating wires 14 are connected to each other through a series connection segment 15, and each of both ends of the series connection segment 15 is connected to the middle of the first heating segment 11 on one side of the corresponding heating wire 14 in the adjacent heating wires 14. That is, a straight line where the series connection segment 15 is located divides the multiple heating wires 14 into two symmetrical parts, with the upper and lower parts of each heating wire 14 forming a parallel structure, and the multiple heating wires 14 forming a series structure. In addition, there is a smooth transition between the first heating segment 11 and the second heating segment 12, which promotes uniform heat distribution and prevents heat accumulation at sharp corners, thereby avoiding oil explosions.

[0061] A spacing between two adjacent heating wires 14 in the first heating region A is greater than a spacing between two adjacent heating wires 14 in the second heating region B. That is, a length of the series connection segment 15 in the first heating region A is D_5 , a length of the series connection segment 15 in the second heating region B is D_6 , and D_5 is greater than D_6 . Thus, when the heat-generating body 100 is energized and generates heat, the temperature of the first heating region A is further slightly reduced, and the temperature of the second heating region B is slightly increased. This makes the temperature at the center of the heating section 10 more consistent with the temperature at the sides, resulting in a more uniform temperature distribution across the heating section 10.

[0062] In the embodiments of the present application, cross-sectional areas of each first heating segment and the second heating segment are identical and smaller than the minimum cross-sectional area of each conductive section. That is, a width d_1 of the first heating seg-

ment 11 and the second heating segment 12 is smaller than the minimum width d2 of the conductive section 20. This ensures that when the heat-generating body 100 is energized and generates heat, the conductive sections 20 generate a small amount of heat, thereby to ensure that the heat generated by the heat-generating body 100 is concentrated in the heating section 10.

[0063] In some embodiments, the cross-sectional area of each first heating segment 11 can adopt a gradient structure, namely, the width of the first heating segment 11 gradually decreases from the middle towards both ends. This ensures a more uniform temperature distribution along the longitudinal direction of the heating section 10.

[0064] It should be noted that a width of the series connection segment 15 in the first heating region A may be set to be greater than a width of the series connection segment 15 in the second heating region B. This further lowers the temperature at the center of the heating section 10, thereby to ensure that the overall temperature distribution of the entire heating section 10 is uniform.

[0065] Please refer to FIG. 8, which is a structural diagram of still yet another embodiment of the heat-generating body according to the present application. The heating section 10 of the heat-generating body 100 includes a plurality of diamond-shaped heating wires 14 sequentially connected to each other in series in the lateral direction between the two conductive sections 20. Each heating wire 14 has a diamond-shaped hole, the diamond-shaped hole of each heating wire 14 in the first heating region A has a maximum spacing of D7 in the lateral direction, the diamond-shaped hole of each heating wire 14 in the second heating region B has a maximum spacing of D8 in the lateral direction, and D7 is greater than D8.

[0066] Thus, when the heat-generating body 100 is energized, the heat generated per unit area of the first heating region A is reduced and the temperature of the first heating region A is lowered; while the heat generated per unit area of the second heating regions B is increased and the temperature of the second heating regions B is raised. Consequently, the temperature difference between the middle temperature and the temperature on both sides of the heating section 10 is reduced, the temperature of the heating section 10 distributed laterally is more uniform.

[0067] Specifically, in this embodiment, the heating wire 14 includes two parallel first heating segments 11 and two parallel second heating segments 12. Together, the two first heating segments 11 and the two second heating segments 12 form the diamond-shaped heating wire 14. A cross-sectional area of each first heating segment 11 is the same as each second heating segment 12, namely, a width of each first heating segment 11 and a width of each second heating segment 12 are each d1, which is smaller than the minimum width d2 of the conductive section 20. This ensures that heat-generating

body 100 is energized, the conductive sections 20 generate a small amount of heat, thereby to ensure that the heat generated by the heat-generating body 100 is concentrated in the heating section 10.

[0068] The plurality of heating wires 14 are arranged with minor axes in the lateral direction and major axes in the longitudinal direction, and the plurality of heating wires 14 are directly connected in series, with connection points between any two adjacent heating wires 14 located on a center line of the heating element 100 in the longitudinal direction. This ensures that the heat generated by the heating wires 14 is evenly distributed between the upper and lower parts along the longitudinal direction, promoting uniform heat distribution. Of course, in other embodiments, multiple heating wires 14 may also be spaced apart and sequentially connected in series.

[0069] In the embodiments of the present application, each end of each heating wire 14 is connected to one fixing section 13 in a major axis direction, and the fixing section 13 extends in the longitudinal direction. In other words, each fixing section 13 forms a Y-shaped structure with the connected first heating segment 11 and second heating segment 12. This design enhances the support strength for the heating section 10.

[0070] In the embodiments of the present application, the cross-sectional area of the first heating segment 11 and the cross-sectional area of the second heating segment 12 may also be configured with a gradient structure. That is, the width of the first heating segment 11 and the second heating segment 12 gradually decreases in a direction from the end away from the fixing section 13 towards the end adjacent to the fixing section 13. This helps lower the temperature at the transverse centerline position of the heating section 10, thereby ensuring a more uniform temperature distribution along the longitudinal direction of the heating section 10.

[0071] In the above embodiments, each embodiment has its emphasis during the illustration. For parts that are not detailed in a particular embodiment, a cross-reference may be made to the relevant descriptions of other embodiments.

[0072] The above is a description of the technical solution in the present application. For a person skilled in the art, there may be changes in specific implementation manners and scope of application based on the ideas of the embodiments in the present application. Therefore, the content of this specification should not be construed as limiting the present application.

Claims

1. A heat-generating body, wherein the heat-generating body is a flat sheet shaped structure, and comprises a heating section and conductive sections extending from both lateral ends of the heating section respectively, one or more fixing sections are connected to the heating section on each side of

the heating section in a longitudinal direction, and a cross-sectional area of each fixing section is at least 10% larger than a cross-sectional area of a heating segment in the heating section.

2. The heat-generating body according to claim 1, wherein the fixing sections are flush with the heating section and the conductive sections, and a width of each fixing section is greater than a width of the heating segment in the heating section. 5
3. The heat-generating body according to claim 1, wherein the fixing sections protrude in a vertical direction from one side of a plane where the heating section and the conductive sections are located, and a protruding height is less than 1mm. 10
4. The heat-generating body according to claim 1, wherein a cross-sectional area of each conductive section gradually increases from one end adjacent to the heating section to the opposite end, and a minimum cross-sectional area of each conductive section is greater than the cross-sectional area of the heating segment in the heating section. 15
5. The heat-generating body according to claim 4, wherein one end of each conductive section away from the heating section extends to form an extension segment, and a cross-sectional area of the extension segment is smaller than the minimum cross-sectional area of each conductive section. 20
6. The heat-generating body according to claim 4, wherein the heating section is divided into a first heating region located in the middle and second heating regions located on both sides of the first heating region in a lateral direction, and a spacing between two adjacent heating segments in the first heating region is greater than a spacing between two adjacent heating segments in the second heating regions. 25
7. The heat-generating body according to claim 4, wherein the heating section is a heating wire that is S-shaped or continuously S-shaped, comprising a plurality of first heating segments spaced apart from each other in the longitudinal direction and extending in a lateral direction, ends of two adjacent first heating segments are connected to each other through a second heating segment, the other ends of the two adjacent first heating segments are spaced apart from each other, and two free ends of the heating section are respectively connected to two conductive sections. 30
8. The heat-generating body according to claim 6, wherein the heating section is a heating wire that is S-shaped or continuously S-shaped, comprising a 35

plurality of first heating segments spaced apart from each other in the lateral direction and extending in the longitudinal direction, ends of two adjacent first heating segments are connected to each other through a second heating segment, the other ends of the two adjacent first heating segments are spaced apart from each other, and two free ends of the heating section are respectively connected to two conductive sections; 40

wherein a spacing between two adjacent first heating segments in the first heating region is D1, a spacing between two adjacent first heating segments in the second heating region is D2, and D1 is greater than D2.

9. The heat-generating body according to claim 6, wherein the heating section comprises a plurality of rectangular-shaped heating wires spaced apart from each other in the lateral direction and sequentially connected to each other in series between the two conductive sections; each heating wire comprises two first heating segments that extend in the longitudinal direction and are parallel and opposite to each other, and ends of the two first heating segments are correspondingly connected to each other through a second heating segment; wherein a spacing between the two first heating segments of each heating wire in the first heating region is D3, a spacing between the two first heating segments of each heating wire in the second heating region is D4, and D3 is greater than D4. 45
10. The heat-generating body according to claim 9, wherein a spacing between two adjacent heating wires in the first heating region is D5, a spacing between two adjacent heating wires in the second heating region is D6, and D5 is greater than D6. 50
11. The heat-generating body according to any one of claims 7 to 9, wherein cross-sectional areas of each first heating segment and the second heating segment are identical and smaller than the minimum cross-sectional area of each conductive section. 55
12. The heat-generating body according to any one of claims 7 to 9, wherein each second heating segment is connected to one fixing section.
13. The heat-generating body according to claim 12, wherein the fixing sections extend in the longitudinal direction.
14. The heat-generating body according to claim 12, wherein a part of the fixing sections extend obliquely adjacent to one end of the heat-generating body, and another part of the fixing sections extend obliquely adjacent to the other end of the heat-generating body.

15. The heat-generating body according to claim 12,
wherein each second heating segment has an out-
wardly convex arc shape in the middle.
16. The heat-generating body according to any one of 5
claims 7 to 9, wherein a cross-sectional area of each
first heating segment gradually decreases from the
middle towards both ends.
17. The heat-generating body according to claim 16, 10
wherein the heating section comprises a plurality
of diamond-shaped heating wires sequentially con-
nected to each other in series in the lateral direction
between the two conductive sections;
each heating wire has a diamond-shaped hole, the 15
diamond-shaped hole of each heating wire in the first
heating region has a maximum spacing of D7 in the
lateral direction, the diamond-shaped hole of each
heating wire in the second heating region has a
maximum spacing of D8 in the lateral direction, 20
and D7 is greater than D8.
18. The heat-generating body according to claim 17,
wherein the plurality of heating wires are arranged 25
with minor axes in the lateral direction and major
axes in the longitudinal direction, and each end of
each heating wire is connected to one fixing section
in a major axis direction.
19. The heat-generating body according to claim 1, 30
wherein the heat-generating body is one piece
formed from a metal sheet through an etching pro-
cess.
20. The heat-generating body according to claim 1, 35
wherein a thickness of the heat-generating body is
between 0.05mm and 0.2mm.
21. The heat-generating body according to claim 1, 40
wherein at least one hollowed-out hole is provided
in a region of each conductive section adjacent to the
heating section.

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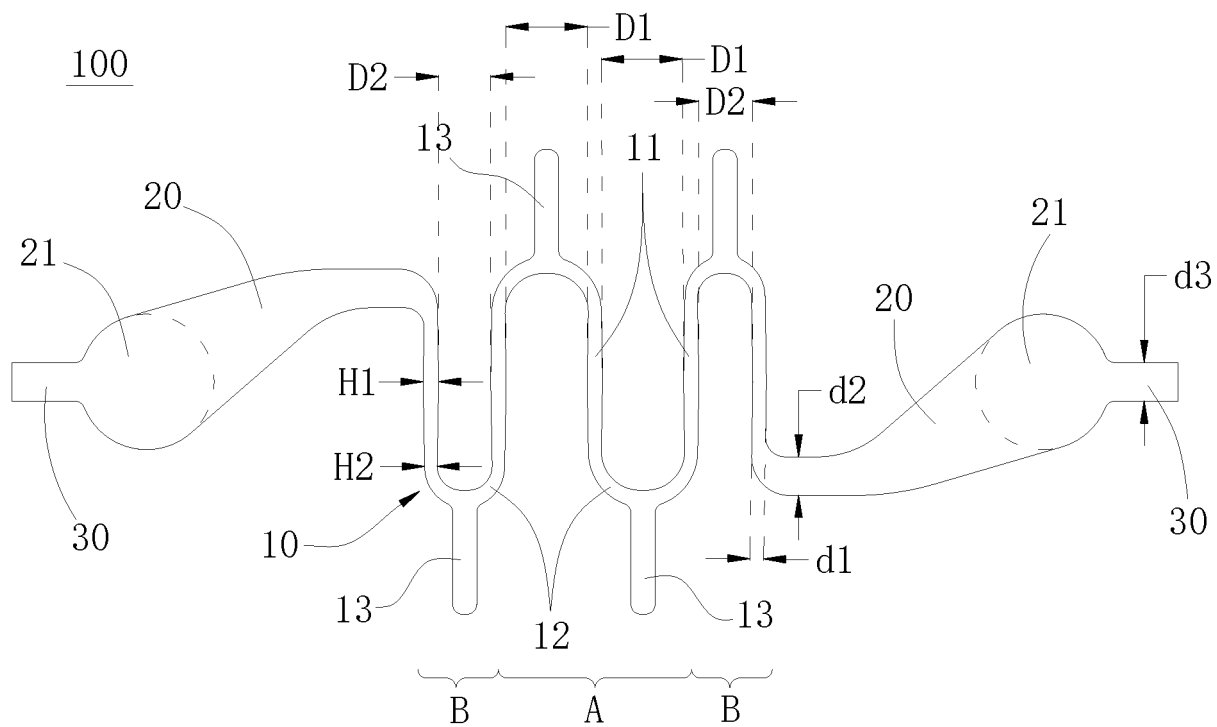


FIG. 1

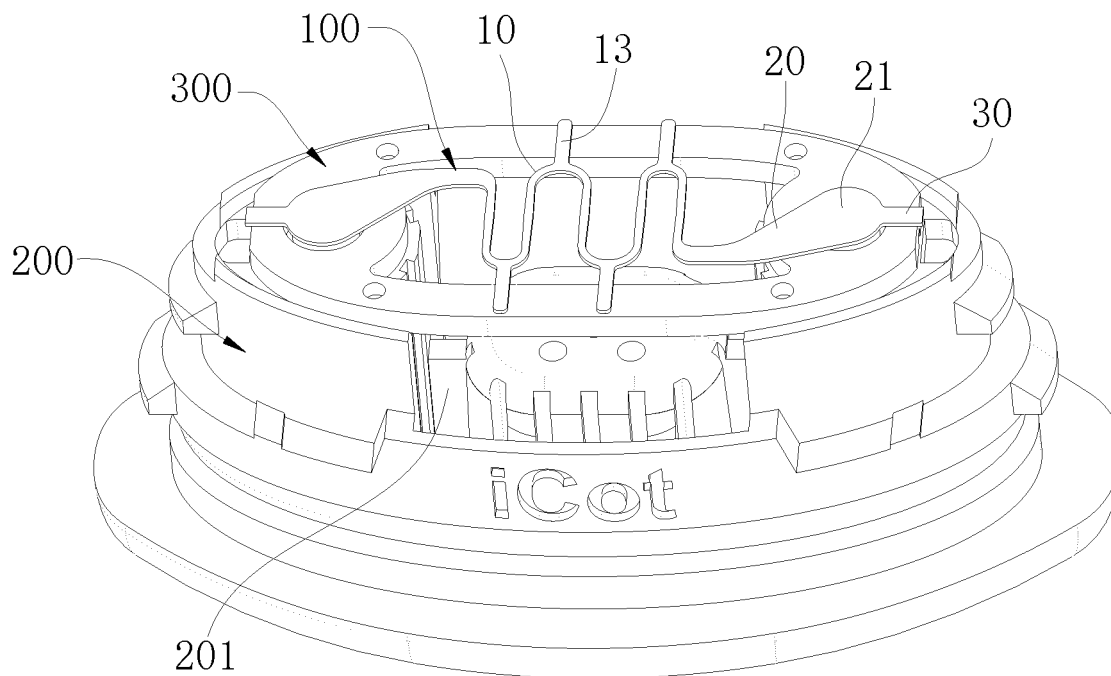


FIG. 2

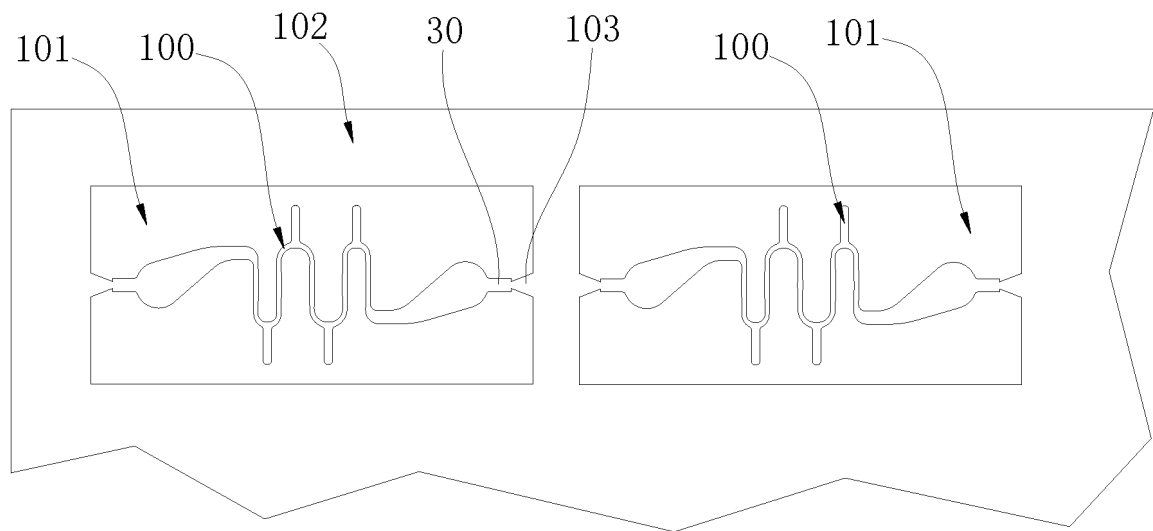


FIG. 3

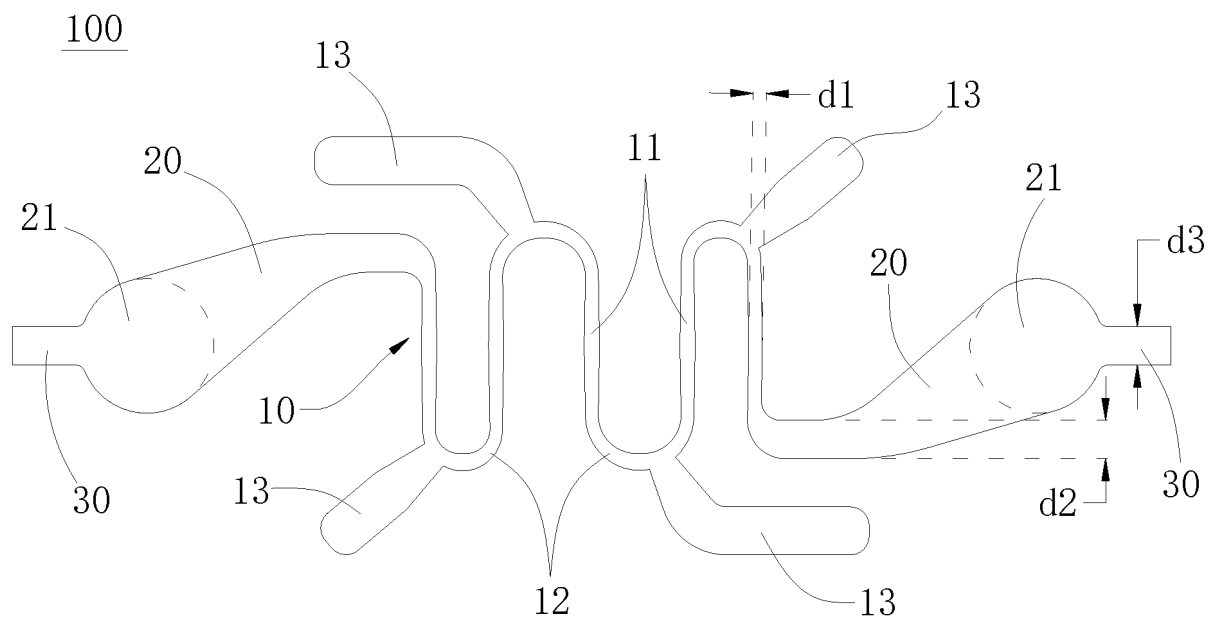


FIG. 4

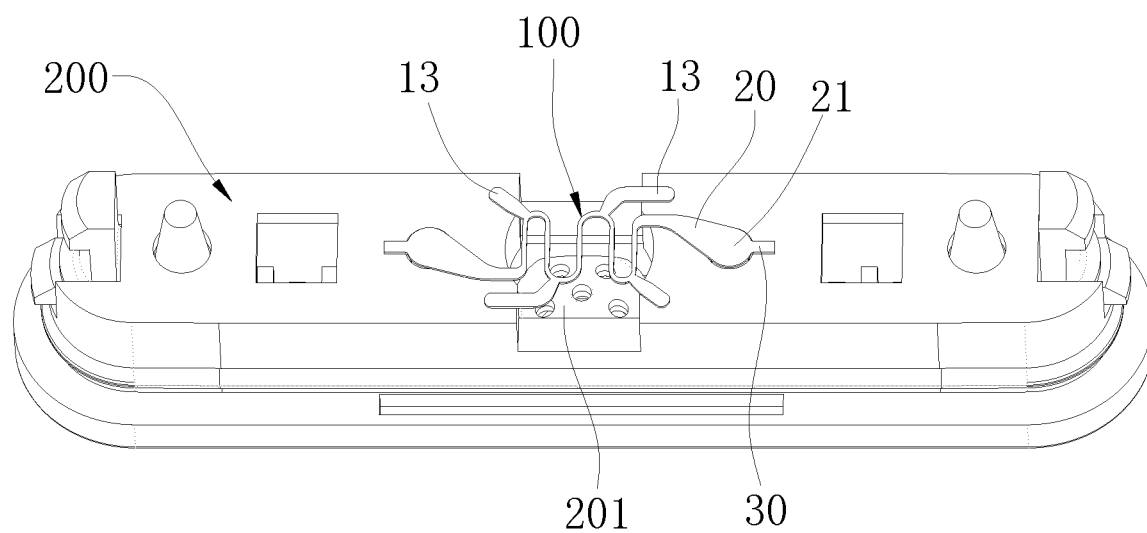


FIG. 5

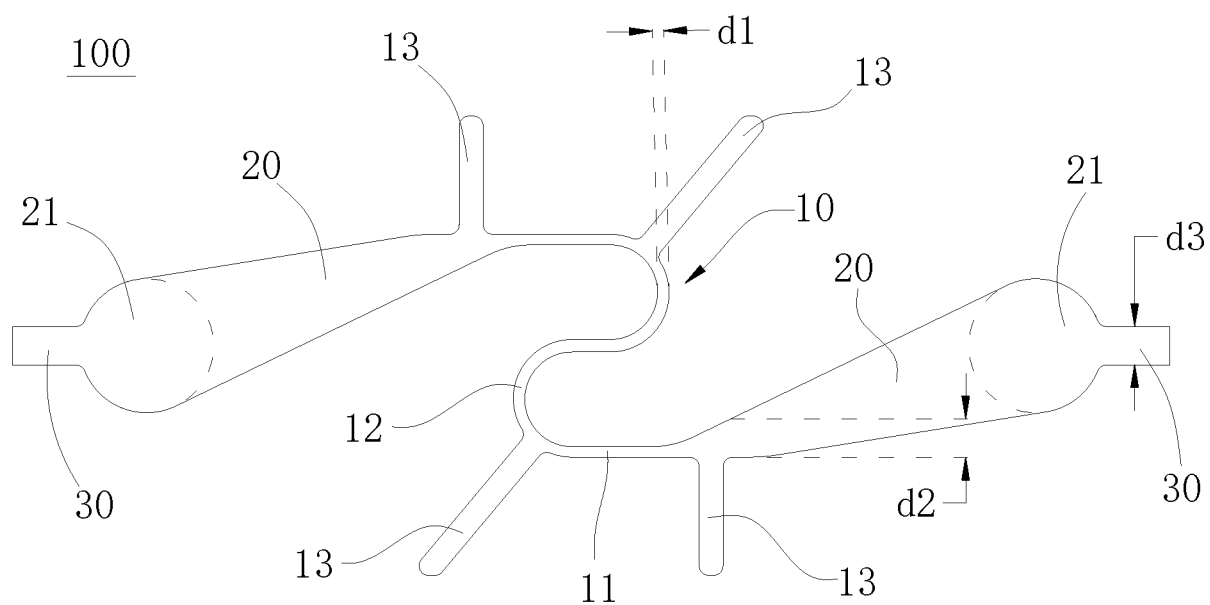


FIG. 6

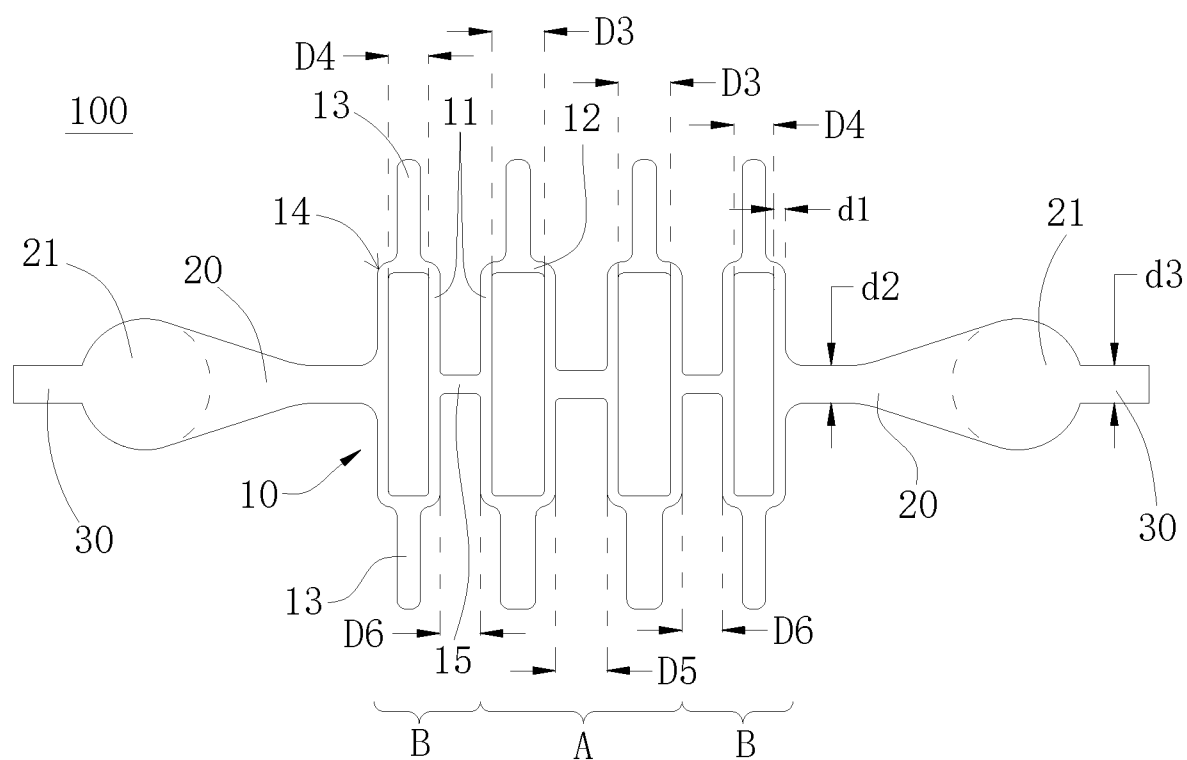


FIG. 7

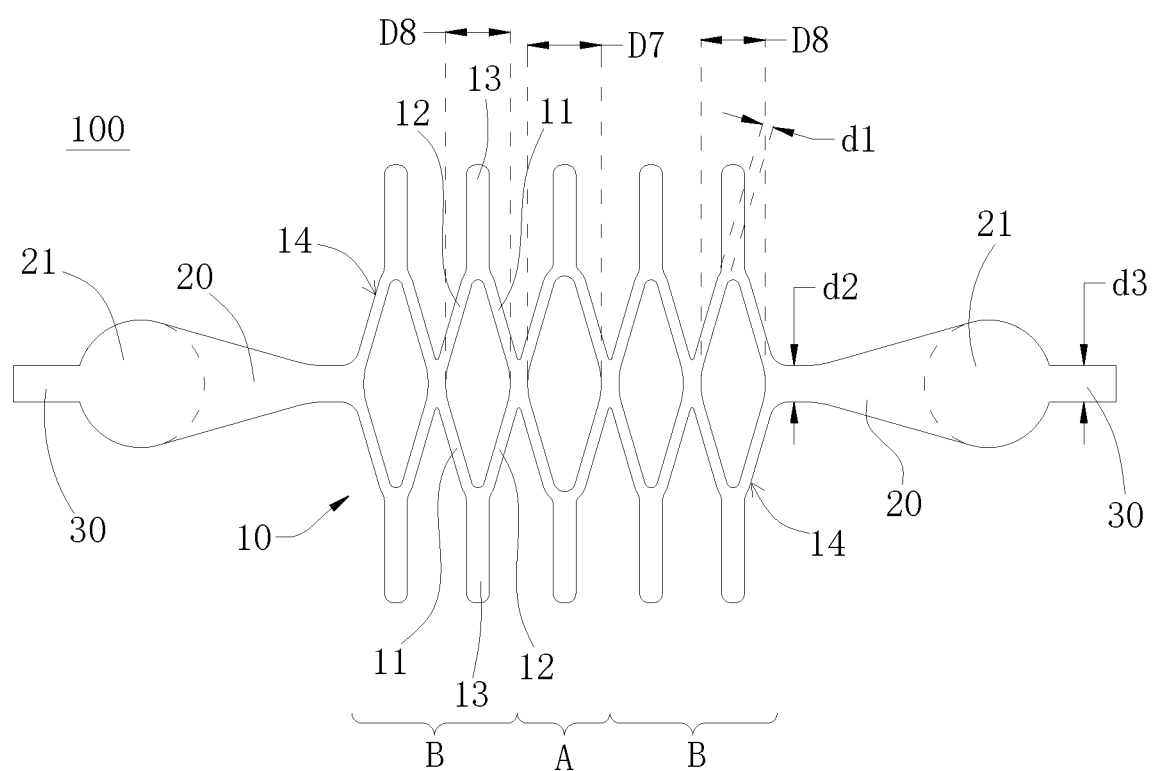


FIG. 8

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2023/071543

A. CLASSIFICATION OF SUBJECT MATTER

A24F40/40(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)

IPC:A24F47/-,A24F40/-

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, ENTXT, CNKI, VEN, CJFD: 发热体, 电子烟, 平板, 片, 层, 导电, 固定, 截面积, 支撑, S型, 弯曲, 镂空, heat generator, e-cigarette, tablet, sheet, layer, conductive, fixation, cross-sectional area, support+, S-type, bend+, stencil

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 217284771 U (ALD GROUP LIMITED) 26 August 2022 (2022-08-26) description, paragraphs 45-81, and figures 1-8	1-21
PX	CN 217284769 U (ALD GROUP LIMITED) 26 August 2022 (2022-08-26) claims 1-21	1-21
PX	CN 217284768 U (ALD GROUP LIMITED) 26 August 2022 (2022-08-26) description, paragraphs 36-62, and figures 1-7	1-21
PX	CN 217284770 U (ALD GROUP LIMITED) 26 August 2022 (2022-08-26) description, paragraphs 46-87, and figures 1-9	1-21
PX	CN 217446670 U (ALD GROUP LIMITED) 20 September 2022 (2022-09-20) description, paragraphs 36-64, and figures 1-8	1-21
X	CN 113229538 A (SHENZHEN GEEKVAPE TECHNOLOGY CO., LTD.) 10 August 2021 (2021-08-10) description, paragraphs 22-29, and figure 2	1-21

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

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“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

12 June 2023

Date of mailing of the international search report

13 June 2023

Name and mailing address of the ISA/CN

China National Intellectual Property Administration (ISA/
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Beijing 100088

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2023/071543

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 209498585 U (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 18 October 2019 (2019-10-18) description, paragraphs 49-53, figure 6	1-21
X	WO 2021195844 A1 (SHENZHEN SMOORE TECHNOLOGY LIMITED) 07 October 2021 (2021-10-07) description, paragraphs 57-58, and figure 10	1-21
A	CN 112568507 A (SHENZHEN SMOORE TECHNOLOGY LIMITED) 30 March 2021 (2021-03-30) entire document	1-21
A	CN 209376692 U (WEITAO ELECTRONIC TECHNOLOGY (SHENZHEN) CO., LTD.) 13 September 2019 (2019-09-13) entire document	1-21
A	CN 214592024 U (SHENZHEN HEHAN TECHNOLOGY CO., LTD.) 02 November 2021 (2021-11-02) entire document	1-21
A	CN 215224785 U (SHENZHEN HUACHENGDA PRECISION INDUSTRY CO., LTD.) 21 December 2021 (2021-12-21) entire document	1-21

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2023/071543

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 217284771 U	26 August 2022	None	
CN 217284769 U	26 August 2022	None	
CN 217284768 U	26 August 2022	None	
CN 217284770 U	26 August 2022	None	
CN 217446670 U	20 September 2022	None	
CN 113229538 A	10 August 2021	None	
CN 209498585 U	18 October 2019	None	
WO 2021195844 A1	07 October 2021	None	
CN 112568507 A	30 March 2021	None	
CN 209376692 U	13 September 2019	None	
CN 214592024 U	02 November 2021	None	
CN 215224785 U	21 December 2021	None	

Form PCT/ISA/210 (patent family annex) (July 2022)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 202210021904 [0001]
- CN 202220052154 [0001]