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(54) **ELECTRONIC VAPORIZATION DEVICE AND VAPORIZER THEREOF**

(57) The present disclosure relates to an electronic vaporization device and a vaporizer thereof. The vaporizer includes a liquid storage housing having a liquid storage cavity formed therein, a base arranged at one end of the liquid storage housing, and a seal member arranged in the liquid storage housing and sleeved on the base. The seal member is provided with an air inlet through hole. The air inlet through hole includes an air inlet section facing the base and an air outlet section away from the base. A cross-sectional area of the air inlet section is greater than a cross-sectional area of the air outlet section. During air intake, the airflow can be gathered when flowing from the air inlet section to the air outlet section to increase the flow rate, so that the aerosol can be quickly taken out by the airflow. When the inhalation is stopped, the vapor refluxes under the action of negative pressure, and the flow rate of the vapor decreases from the air outlet section to the air inlet section, thereby reducing the vapor reflux, and further reducing the condensate generated by the refluxed vapor. In addition, the cross-sectional area of the air outlet section is relatively small, the condensate is not easy to leak out through the air outlet section, thereby reducing the liquid leakage.

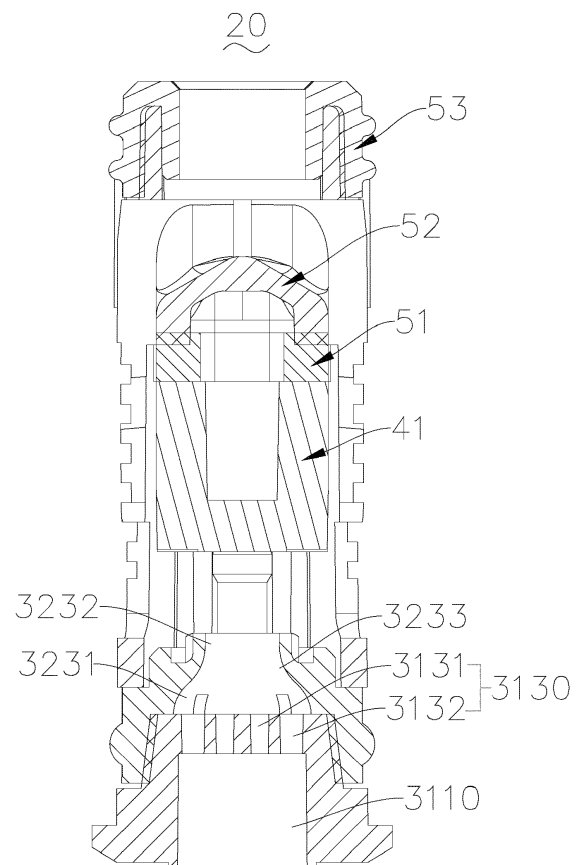


FIG. 5

Description

FIELD

[0001] The present disclosure relates to the field of vaporization, and more specifically, to an electronic vaporization device and a vaporizer thereof.

BACKGROUND

[0002] An electronic vaporization device mainly includes a vaporizer and a power supply device. A base in the existing vaporizer is usually sealed by a seal ring. An air inlet hole formed on the seal ring is mostly a straight hole, and the liquid leakage prevention effect is poor.

SUMMARY

[0003] The technical problem to be resolved by the present disclosure is to provide an improved vaporizer and an electronic vaporization device having the vaporizer for the foregoing defects in the related art.

[0004] A technical solution adopted by the present disclosure to resolve the technical problem thereof is as follows. A vaporizer is provided, including a liquid storage housing having a liquid storage cavity formed therein, a base arranged at one end of the liquid storage housing, and a seal member arranged in the liquid storage housing and sleeved on the base, where

the seal member is provided with an air inlet through hole, the air inlet through hole includes an air inlet section facing the base and an air outlet section away from the base, and a cross-sectional area of the air inlet section is greater than a cross-sectional area of the air outlet section.

[0005] In some embodiments, the air inlet section and the air outlet section are in a smooth transition connection.

[0006] In some embodiments, a cross-sectional shape of the air inlet section is the same as or different from a cross-sectional shape of the air outlet section.

[0007] In some embodiments, the seal member includes a body portion and a protruding stage portion, the body portion is annular and hermetically sleeved between the base and the liquid storage housing, two opposite sides of the protruding stage portion are respectively connected with two opposite sides of the body portion, and the air inlet through hole is formed on the protruding stage portion.

[0008] In some embodiments, the upper end surface of the air inlet through hole is higher than the upper end surface of the protruding stage portion.

[0009] In some embodiments, the two opposite sides of the protruding stage portion are respectively connected with the two sides of the body portion in the short-side direction.

[0010] In some embodiments, avoidance holes are formed respectively between the other two opposite sides of the protruding stage portion and the other two

opposite sides of the body portion.

[0011] In some embodiments, the protruding stage portion is provided with an airflow guide groove communicating the air inlet through hole with the avoidance holes.

[0012] In some embodiments, the seal member includes two sleeve portions respectively extending from the other two opposite sides of the body portion away from the base.

[0013] In some embodiments, the two sleeve portions are respectively arranged in the long-side direction of the body portion.

[0014] In some embodiments, the two sleeve portions, the body portion and the protruding stage portion are integrated formed.

[0015] In some embodiments, the base is provided with an air inlet channel in communication with the air inlet section.

[0016] In some embodiments, the base includes an air inlet protruding stage, and the air inlet channel includes a plurality of air inlet holes formed on the air inlet protruding stage.

[0017] In some embodiments, a cross-sectional area of an air outlet at the end of the air outlet section away from the air inlet section is less than a cross-sectional area of the air inlet protruding stage.

[0018] In some embodiments, the plurality of air inlet holes includes one or more first air inlet holes and one or more second air inlet holes arranged around the one or more first air inlet holes, and the air inlet holes and the air inlet holes have different cross-sectional areas.

[0019] In some embodiments, the side surface of the air inlet protruding stage facing the liquid storage cavity is in a shape of a protrusion.

[0020] In some embodiments, the vaporizer further includes a liquid absorbing body arranged in the liquid storage housing, and a vaporization cavity in communication with the air outlet section is formed between the liquid absorbing body and the seal member.

[0021] In some embodiments, the vaporizer further includes a heating base arranged in the liquid storage housing and mated with the base, and the liquid absorbing body is accommodated between the heating base and the base.

[0022] The present disclosure further provides an electronic vaporization device, including the vaporizer according to any one of the foregoing and a power supply device that is electrically connected to the vaporizer.

[0023] Implementation of the present disclosure at least has the following beneficial effects: during air intake, the airflow can be gathered in the process of flowing from the air inlet section to the air outlet section to increase the flow rate, so that the aerosol can be quickly taken out by the airflow; when the inhalation is stopped, the the vapor refluxes under the action of negative pressure, and the flow rate of the vapor decreases from the air outlet section to the air inlet section, thereby reducing the vapor reflux, and further reducing the condensate generated

by the refluxed vapor; in addition, the cross-sectional area of the air outlet section is relatively small, the condensate is not easy to leak out through the air outlet section, thereby reducing the liquid leakage.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The present disclosure is further described below with reference to the accompanying drawings and embodiments. In the accompanying drawings:

FIG. 1 is a three-dimensional schematic structural diagram of an electronic vaporization device according to some embodiments of the present disclosure;

FIG. 2 is a schematic longitudinal cross-sectional structural view of a vaporizer according to a first embodiment of the present disclosure;

FIG. 3 is a three-dimensional schematic structural diagram of a heating component in FIG. 2;

FIG. 4 is a schematic cross-sectional structural view of the heating component along A-A shown in FIG. 3;

FIG. 5 is a schematic cross-sectional structural view of the heating component along B-B shown in FIG. 3;

FIG. 6 is a schematic exploded structural view of the heating component shown in FIG. 3;

FIG. 7 is a three-dimensional schematic structural diagram of a base in FIG. 6;

FIG. 8 is a simulated noise distribution cloud diagram of the base shown in FIG. 7;

FIG. 9 is a three-dimensional schematic structural diagram of a seal member in FIG. 6;

FIG. 10 is a three-dimensional schematic structural diagram of a heating base in FIG. 6;

FIG. 11 is a side view of the heating base shown in FIG. 10;

FIG. 12 is a gas-liquid two-phase distribution diagram of a liquid storage and vent structure when the heating component shown in FIG. 3 stops inhalation in a simulation analysis;

FIG. 13 shows a vent pressure curve of the heating component shown in FIG. 3;

FIG. 14 is a three-dimensional schematic structural diagram of a heating component in some embodiments in the related art;

FIG. 15 shows a vent pressure curve of the heating component shown in FIG. 14;

FIG. 16 is a top view of a base in a first alternative solution of the present disclosure;

FIG. 17 is a simulated noise distribution cloud diagram of the base shown in FIG. 16;

FIG. 18 is a top view of a base in some embodiments in the related art;

FIG. 19 is a simulated noise distribution cloud diagram of the base shown in FIG. 18;

FIG. 20 is a three-dimensional schematic structural diagram of a base in a second alternative solution of the present disclosure;

FIG. 21 is a schematic longitudinal structural diagram of the base shown in FIG. 20;

FIG. 22 is a schematic diagram of flowing of condensate of the base shown in FIG. 21;

FIG. 23 is a three-dimensional schematic structural diagram of a seal member in a third alternative solution of the present disclosure; and

FIG. 24 is a three-dimensional schematic structural diagram of a seal member in a fourth alternative solution of the present disclosure.

DETAILED DESCRIPTION

[0025] To provide a clearer understanding of the technical features, objectives, and effects of the present disclosure, specific implementations of the present disclosure are described in detail with reference to the accompanying drawings. In the following description, many specific details are described for thorough understanding of the present disclosure. However, the present disclosure may be implemented in many other manners different from those described herein. A person skilled in the art may make similar improvements without departing from the connotation of the present disclosure. Therefore, the present disclosure is not limited to the specific embodiments disclosed below.

[0026] In the description of the present disclosure, it should be understood that, orientation or position relationships indicated by terms such as "center", "longitudinal", "transverse", "length", "width", "thickness", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "axial", "radial", and "circumferential" are orientation or position relationship shown based on the accompanying drawings or orientation or position relationship that the product of the present disclosure is usually placed in use, and are merely used

for describing the present disclosure and simplifying the description, rather than indicating or implying that the mentioned apparatus or element should have a particular orientation or be constructed and operated in a particular orientation, and therefore, should not be construed as a limitation to the present disclosure.

[0027] In addition, the terms "first" and "second" are used for descriptive purposes only and should not be construed as indicating or implying relative importance or implicitly indicating the number of technical features indicated. Therefore, features defined by "first" or "second" may explicitly indicate or implicitly include at least one of the features. In the description of the present disclosure, unless otherwise explicitly defined, "a plurality of" means at least two, for example, two, three, and the like.

[0028] In the present disclosure, unless otherwise explicitly specified and defined, terms such as "mounted", "connected", "connection", and "fixed" should be understood in a broad sense. For example, the connection may be a fixed connection, a detachable connection, or an integral connection; or the connection may be a mechanical connection or an electrical connection; or the connection may be a direct connection, an indirect connection through an intermediate medium, or internal communication between two elements or a mutual action relationship between two elements, unless otherwise explicitly specified. A person of ordinary skill in the art may understand the specific meanings of the foregoing terms in the present disclosure according to specific situations.

[0029] In the present disclosure, unless otherwise explicitly specified and defined, a first feature "on" or "below" a second feature may mean that the first feature and the second feature are in direct contact, or the first feature and the second feature are in indirect contact through an intermediary. In addition, that the first feature is "above", "over", or "on" the second feature may indicate that the first feature is directly above or obliquely above the second feature, or may merely indicate that a horizontal height of the first feature is higher than that of the second feature. That the first feature is "below", "under", and "beneath" the second feature may indicate that the first feature is directly below or obliquely below the second feature, or may merely indicate that the horizontal height of the first feature is lower than that of the second feature.

[0030] FIG. 1 shows an electronic vaporization device 1 according to some embodiments of the present disclosure. The electronic vaporization device 1 may be used for aerosol inhalation, and may include a vaporizer 100 and a power supply device 200 electrically connected to the vaporizer 100. The power supply device 200 is configured to supply power to the vaporizer 100, and the vaporizer 100 is configured to accommodate a liquid substrate and heat and vaporize the liquid substrate after power-on to generate aerosols. The vaporizer 100 is arranged above the power supply device 200 in a longitudinal direction, and may be connected with the power supply device 200 in a detachable or non-detachable

manner.

[0031] As shown in FIG. 2, the vaporizer 100 in a first embodiment of the present disclosure may include a liquid storage housing 10 and a heating component 20 accommodated in the liquid storage housing 10. A liquid storage cavity 110 for storing the liquid substrate and an air outlet channel 120 for outputting the aerosols are formed in the liquid storage housing 10. The heating component 20 includes a base component 30, a vaporization core 40, and a heating base component 50, where the vaporization core 40 is accommodated in a space formed between the base component 30 and the heating base component 50. The vaporization core 40 is in communication with the liquid storage cavity 110 in a liquid guiding manner and is in communication with the air outlet channel 120 in an air guiding manner, and is configured to heat and vaporize the liquid substrate absorbed from the liquid storage cavity 110 to generate aerosols. A vaporization cavity 420 is formed between the base component 30 and the vaporization core 40 to mix the aerosols and air. Specifically, the liquid storage housing 10 may include a housing 11 opening at a lower end and an air outlet tube 12 arranged in the housing 11 in a longitudinal direction. The housing 11 is cylindrical, and a cross section thereof may be roughly in a shape of a narrow and long ellipse, a racetrack, or the like. An annular liquid storage cavity 110 is defined between an inner wall surface of the housing 11 and an outer wall surface of the air outlet tube 12.

[0032] The air outlet tube 12 is connected to an inner side of a top wall of the housing 11 and may be coaxially arranged with the housing 11, and an inner wall surface of the air outlet tube 12 defines the air outlet channel 120. In this embodiment, the air outlet tube 12 is integrally formed with the housing 11, for example, which be integrally formed through injection molding. In other embodiments, the air outlet tube 12 and the housing 11 may also be formed separately and then assembled together.

[0033] As shown in FIG. 2 to FIG. 7, the vaporization core 40 includes a liquid absorbing body 41 and a heating body 42 arranged in the liquid absorbing body 41. The liquid absorbing body 41 is in communication with the liquid storage cavity 110 in a liquid guiding manner, and is configured to absorb the liquid substrate from the liquid storage cavity 110 and transmit the liquid substrate to the heating body 42. The heating body 42 is electrically connected to the power supply device 200, and is configured to heat and vaporize the liquid substrate absorbed in the liquid absorbing body 41 to generate aerosols after being powered to generate heat.

[0034] The liquid absorbing body 41 may be made of materials with a porous capillary structure such as a porous liquid-absorbing ceramic or a liquid-absorbing cotton.

[0035] The liquid absorbing body 41 has a liquid absorbing surface 411 and a heating surface 412. The heating surface 412 is configured to arrange the heating body 42, and the liquid absorbing surface 411 is configured to

absorb the liquid substrate from the liquid storage cavity 110 and transmit the liquid substrate to the heating surface 412 through the porous capillary structure inside the liquid absorbing body 41. Specifically, in this embodiment, the liquid absorbing body 41 is a bowl-shaped porous liquid absorbing ceramic. The liquid absorbing surface 411 is arranged on one side of the liquid absorbing body 41 facing the liquid storage cavity 110, and the heating surface 412 is arranged on one side of the liquid absorbing body 41 facing away from the liquid storage cavity 110. The heating body 42 is arranged on the heating surface 412, that is, the heating body 42 is arranged on one side of the liquid absorbing body 41 facing the base component 30.

[0036] The base component 30 may include a base 31 and an electrode column 33 which is arranged in the base 31 in a longitudinal direction. The base 31 is embedded at the lower end opening of the housing 11 to seal the lower end opening of the housing 11. The base 31 may include a plate-shaped main body portion 311, a cylindrical side wall 312 extending upward from an outer periphery of the main body portion 311, and two supporting arms 314 arranged at intervals and extending upward from an upper end surface of the main body portion 311. The two supporting arms 314 may be respectively arranged on two opposite sides of the main body portion 311 in a length direction, and may be configured to engage with the heating base 52. The upper end surface of the main body portion 311 and an inner wall surface of the cylindrical side wall 312 define a liquid storage space 3120, and the liquid storage space 3120 may store a certain amount of condensate, thereby further reducing liquid leakage.

[0037] Further, the base 31 further includes an air inlet protruding stage 313 formed by upward extension of the upper end surface of the main body portion 311. The air inlet protruding stage 313 is arranged in the cylindrical side wall 312, and outer wall surfaces on two sides of the air inlet protruding stage in a width direction may be respectively integrated with inner wall surfaces on two sides of the cylindrical side wall 312 in a width direction. A top surface of the air inlet protruding stage 313 recesses downward to form a plurality of air inlet holes 3130, so that external air can enter the vaporization cavity 420. The plurality of air inlet holes 3130 may be distributed in an array, and in addition to ensuring sufficient air intake, a surface tension film formed on the plurality of air inlet holes 3130 can also play a role of reducing liquid leakage. In addition, the air inlet holes 3130 are formed on the air inlet protruding stage 313, so that the upper end surface of each of the air inlet holes 3130 is higher than a bottom surface of the liquid storage space 3120, thereby further reducing a risk of liquid leaking from the air inlet holes 3130.

[0038] Further, the plurality of air inlet holes 3130 may include one or more first air inlet holes 3131 and one or more second air inlet holes 3132 surrounding the one or more first air inlet holes 3131. The one or more first air

inlet holes 3131 and the one or more second air inlet holes 3132 may be respectively distributed in annular (for example, circular annular, elliptical annular, square annular, or polygonal annular) arrays at equal intervals.

5 The number of the first air inlet holes 3131 may be less than the number of the second air inlet holes 3132. In some embodiments, the number of the first air inlet holes 3131 may range from 3 to 6, and the number of the second air inlet holes 3132 may range from 6 to 15. In this embodiment, there are four first air inlet holes 3131, and the four first air inlet holes 3131 are evenly and symmetrically distributed around the center of the air inlet protruding stage 313; and there are ten second air inlet holes 3132, and the ten second air inlet holes 3132 are evenly and symmetrically distributed around the center of the air inlet protruding stage 313.

[0039] The first air inlet holes 3131 and the second air inlet holes 3132 have different air intake cross-sectional areas. Pneumatic noise may be reduced by setting the plurality of air inlet holes 3130 to have different cross-sectional areas. Further, in this embodiment, the air intake cross-sectional area of the first air inlet hole 3131 is less than the air intake cross-sectional area of the second air inlet hole 3132, and both the one or more first air inlet holes 3131 and the one or more second air inlet holes 3132 are distributed in an annular array. That is, a structural form of the air inlet holes 3130 in this embodiment is a form of "large holes on the periphery with small holes in the middle". The air intake cross-sectional areas of the one or more first air inlet holes 3131 provided in an inner circle is smaller, so that condensate leakage can be effectively reduced; and the air intake cross-sectional areas of the one or more second air inlet holes 3132 provided in an outer circle is larger, so that the inhalation resistance and noise may be balanced to ensure a sufficient air intake area and suitable inhalation resistance.

[0040] A lower end surface of the main body portion 311 may also recess upward to form an air intake port 3110. The air intake port 3110 extends in a longitudinal direction, and an upper end of the air intake port 3110 is in communication with lower ends of the plurality of air inlet holes 3130, thereby forming an air inlet channel 315 that causes external air to enter the vaporization cavity 420. Further, an air intake cross-sectional area of the air intake port 3110 is greater than a sum of air intake cross-sectional areas of the plurality of air inlet holes 3130.

[0041] The main body portion 311 is further provided with an electrode via 3111 for the electrode column 33 to pass through. There are usually two electrode columns 33, and the two electrode columns 33 are electrically connected with two poles of the heating body 42 respectively. The upper end surface of the electrode column 33 is in contact with the heating body 42 for conduction. In addition, the electrode column 33 also plays a role of supporting the vaporization core 40.

[0042] Correspondingly, there are two electrode vias 3111, and the two electrode columns 33 are respectively

arranged in the two electrode vias 3111 in a run-through manner in a longitudinal direction. In this embodiment, the two electrode vias 3111 are provided in the cylindrical side wall 312 and may be separately located on the two sides of the air inlet protruding stage 313 in the length direction. Further, the upper end surface of each electrode via 3111 may be higher than the bottom surface of the liquid storage space 3120, thereby reducing a risk of liquid leaking from the electrode via 3111.

[0043] The vaporizer 100 may also include a fixing cover 60 in some embodiments, and the fixing cover 60 is sleeved outside the base 31 and sleeved on the lower end of the housing 11 to fix the base 31. Further, the fixing cover 60 may be in a buckle connection with the housing 11, so as to realize fixing between the fixing cover 60 and the housing 11. The fixing cover 60 may be made of a metal material, and the metal material has smaller deformation of thermal expansion and cold contraction as temperature changes, so that fixing between various parts of the vaporizer 100 is more stable and reliable, and the seal performance is better. In addition, the metal fixing cover 60 may further be configured to be magnetically connected to the power supply device 200. It may be understood that in other embodiments, the fixing cover 60 may not be arranged, and the base 31 and the housing 11 may also be fixed to each other in a buckle connection, screw connection, or interference fit connection manner.

[0044] Further, as shown in FIG. 3 to FIG. 6 and FIG. 9, the base component 30 further includes a seal member 32 sleeved outside the base 31. The seal member 32 is hermetically arranged between the inner wall surface of the housing 11 and an outer wall surface of the base 31, and may be integrally formed by an elastic material such as silica gel. The seal member 32 may include a body portion 321, two sleeve portions 322 formed by upward extension of two opposite sides the body portion 321 respectively, and a protruding stage portion 323 arranged between the other two opposite sides of the body portion 321. The body portion 321 is annular and is hermetically sleeved between an outer wall surface of the cylindrical side wall 312 and the inner wall surface of the housing 11. An outer circumferential surface of the body portion 321 may be in interference fit with an inner circumferential surface of a bottom end of the housing 11 to further improve the seal performance.

[0045] The two sleeve portions 322 are respectively formed by upward extension of two outer edges of the body portion 321 in a long-side direction (length direction). The two sleeve portions 322 are respectively sleeved outside two sides of the heating base 52, and can limit a long-side direction of the seal member 32 and prevent the long-side direction of the seal member 32 from being assembled obliquely. The two sleeve portions 322 only occupy a space in the housing 11 in a long-side direction, but do not occupy a space in the housing 11 in a short-side direction, therefore, this structure is conducive to realize a thin and light design of the vaporizer 100.

[0046] Outer wall surfaces on two sides of the protruding stage portion 323 are integrated with inner wall surfaces on two sides of the body portion 321 in a short-side direction (width direction) respectively. The protruding stage portion 323 can be embedded in a bottom of the heating base 52, so as to limit a short-side direction of the seal member 32 and prevent the short-side direction of the seal member 32 from being assembled obliquely.

[0047] At least one air inlet through hole 3230 in communication with the plurality of air inlet holes 3130 and the vaporization cavity 420 respectively is formed on the protruding stage portion in a longitudinal direction. In this embodiment, there is one air inlet through hole 3230, and the one air inlet through hole 3230 is provided coaxially with the protruding stage portion 323 and the body portion 321. It may be understood that in other embodiments, the number of the air inlet through holes 3230 is not limited to one, and the air inlet through holes may not be provided coaxially with the protruding stage portion 323 and/or the body portion 321. The protruding stage portion 323 is arranged above the plurality of air inlet holes 3130. In a case that liquid explosion occurs on the heating surface 412 of the liquid absorbing body 41, the protruding stage portion 323 can block some droplets of the liquid explosion from directly exploding into surfaces of the plurality of air inlet holes 3130, thereby reducing liquid leakage. In addition, when inhalation is stopped, vapor refluxes under the action of negative pressure. Affected by the protruding stage portion 323, most of the refluxed vapor is not in direct contact with the air inlet holes 3130, thereby reducing formation of condensate at the air inlet holes 3130 and reducing a risk of liquid leakage.

[0048] The air inlet through hole 3230 may include an air inlet section 3231 in communication with the plurality of air inlet holes 3130 and an air outlet section 3232 in communication with the vaporization cavity 420. In this embodiment, the air inlet through hole 3230 is in a shrunk shape, that is, a cross-sectional area of the air inlet section 3231 is greater than a cross-sectional area of the air outlet section 3232. The air inlet through hole 3230 in a shrunk shape can gather airflows during air intake to increase a flow rate, so that the aerosols in the vaporization cavity 420 are quickly taken out by the airflows. When inhalation is stopped, the vapor refluxes under the action of negative pressure, and a flow rate of the vapor decreases from the air outlet section 3232 to the air inlet section 3231, thereby reducing vapor reflux. In addition, the cross-sectional area of the air outlet section 3232 arranged on an upper part is relatively small, and the condensate can hardly leak out, thereby reducing liquid leakage. Further, a cross-sectional area at an air outlet on an upper end of the air outlet section 3232 (an end away from the air inlet section 3231) may be less than the cross-sectional area of the air inlet protruding stage 313.

[0049] To further reduce liquid leakage, the upper end surface of the air outlet section 3232 (an end surface facing the vaporization cavity 420) may be higher than

the upper end surface of the surrounding protruding stage portion 323. Further, a smooth curved surface transition connection may be used between the air inlet section 3231 and the air outlet section 3232, so as to reduce airflow resistance at a junction between the air inlet section 3231 and the air outlet section 3232, thereby avoiding generation of a vortex flow at the junction, and further effectively reducing airflow noise.

[0050] Cross-sectional shapes of the air inlet section 3231 and the air outlet section 3232 may be the same or may be different. In this embodiment, the cross-sectional shape of the air inlet section 3231 is a circle, and a pore size of the air inlet section 3231 gradually decreases from bottom to top (from an end away from the air outlet section 3232 to an end close to the air outlet section 3232). The air outlet section 3232 is a straight through hole whose cross-sectional shape is a racetrack-shaped circle, that is, a length of a long axis and a length of a short axis of the air outlet section 3232 remain unchanged in a longitudinal direction. The air inlet section 3231 and the air outlet section 3232 are in a smooth transition connection through a connecting section 3233. The connecting section 3233 has a first end in communication with the air inlet section 3231 and a second end in communication with the air outlet section 3232. A cross-sectional shape and size of the first end are consistent with a cross-sectional shape and size of an upper end of the air inlet section 3231. A cross-sectional shape and size of the second end are consistent with the cross-sectional shape and size of the lower end of the air outlet section 3232. A cross-sectional shape of the connecting section 3233 gradually changes from a circle at the first end to a race-track-shaped circle at the second end. It may be understood that in other embodiments, the cross-sectional shapes of the air inlet section 3231 and the air outlet section 3232 may also be a circle, an elliptical circle, a square, or other shapes.

[0051] The protruding stage portion 323 is further provided with two electrode holes 3236 for the two electrode columns 33 to pass through respectively. The two electrode holes 3236 may be respectively provided on two sides of the air inlet through hole 3230 in a length direction. Two avoidance holes 3210 are further formed on the seal member 32 corresponding to the two supporting arms 314 respectively, and the two supporting arms 314 may pass through the two avoidance holes 3210 respectively so as to be engaged with the heating base 52. Specifically, an extending length of the protruding stage portion 323 in a length direction is less than an extending length of the body portion 321 in a length direction. The two avoidance holes 3210 are respectively formed between the outer wall surfaces on the two sides of the protruding stage portion 323 in the length direction and inner wall surfaces on the two sides of the body portion 321 in the length direction.

[0052] Further, a top surface of the protruding stage portion 323 recesses downward and/or a bottom surface of the protruding stage portion 323 recesses downward

to form one or more airflow guide grooves 3234. The one or more airflow guide grooves 3234 communicate the air inlet through hole 3230 and the two electrode holes 3236 with the avoidance holes 3210. The airflow guide groove 3234 is a tiny fine groove structure, which may apply a strong capillary force on the liquid substrate, and may absorb leaked liquid at the air inlet through hole 3230 and the two electrode holes 3236 under the action of the capillary force and guide the leaked liquid to the avoidance holes 3210. Therefore, the leaked liquid falls into the liquid storage space 3120 through the avoidance holes 3210, so as to further reduce liquid leakage.

[0053] As shown in FIG. 3 to FIG. 6 and FIG. 10 to FIG. 11, the heating base component 50 includes a heating base 52, where the heating base 52 is mated with the base 31 to fix the vaporization core 40. In this embodiment, both the heating base 52 and the base 31 are made of a plastic material, and the heating base 52 and the base 31 are buckled to each other.

[0054] At least one liquid inlet hole 520 which communicates the liquid absorbing body 41 with the liquid storage cavity 110 is formed on the heating base 52, and the liquid substrate in the liquid storage cavity 110 can supply liquid to the liquid absorbing surface 411 of the liquid absorbing body 41 through the at least one liquid inlet hole 520. The vaporization core 40 may be accommodated in the heating base 52, and at least one opening 527 is further formed on a side wall of the heating base 52, so that at least a part of a side surface of the liquid absorbing body 41 is exposed to the outside. In this embodiment, there are two liquid inlet holes 520, and the two liquid inlet holes 520 are respectively provided on two sides of the heating base 52 in a length direction.

[0055] There are two openings 527, and the two openings 527 are respectively provided on two sides of the heating base 52 in a width direction.

[0056] Further, at least one liquid storage and vent structure 521 in communication with the liquid storage cavity 110 is further formed on an outer surface of the heating base 52, where the at least one liquid storage and vent structure 521 may be configured to balance air pressure in the liquid storage cavity 110. In a case that the air pressure in the liquid storage cavity 110 is excessively low, external air may enter the liquid storage cavity 110 through the liquid storage and vent structure 521, so as to avoid occurrence of non-smooth liquid supplying caused by excessively low air pressure in the liquid storage cavity 110 and prevent dry burning.

[0057] Specifically, in this embodiment, there are two liquid storage and vent structures 521. The two liquid storage and vent structures 521 are respectively formed on the two sides of the heating base 52 in the length direction, and the two liquid storage and vent structures 521 may be arranged rotationally and symmetrical relative to a central axis of the heating base 52.

[0058] Each liquid storage and vent structure 521 includes a vent channel 522 formed on an end of the heating base 52 close to the liquid storage cavity 110, a liquid

storage groove 524 and a tension isolation groove 526 formed on an end of the heating base 52 away from the liquid storage cavity 110, a liquid absorbing groove opening 523 communicating the vent channel 522 with the liquid storage groove 524, and a vent entrance 525 communicating the vent channel 522 with the tension isolation groove 526. One end of the vent channel 522 is in communication with the liquid storage cavity 110, and the other end is in communication with the liquid storage groove 524 and the tension isolation groove 526 respectively through the liquid absorbing groove opening 523 and the vent entrance 525. The vent entrance 525 is configured to introduce the external air into the vent channel 522, and the liquid absorbing groove opening 523 is configured to absorb the liquid substrate by capillary force (such as condensate or leaked liquid in the vent channel 522, condensate or leaked liquid formed on the vaporization core 40, or condensate or leaked liquid formed on other parts) to the liquid storage groove 524, thereby isolating ventilation from liquid storage and preventing the liquid substrate from blocking the vent channel 522. In addition, a width of the vent entrance 525 is greater than a width of the liquid absorbing groove opening 523, so that the liquid absorbing groove opening 523 forms a stronger capillary force, thereby absorbing the liquid substrate in the vent channel 522 to the liquid storage groove 524 through the liquid absorbing groove opening 523 to achieve gas-liquid separation.

[0059] Specifically, the vent channel 522 includes one or more vent grooves 5221 extending in a circumferential direction of the heating base 52, an air guide groove 5222 in communication with the one or more vent grooves 5221 and extending in a longitudinal direction, and an air reflux groove 5223 in communication with the air guide groove 5222 and extending in a horizontal direction. The plurality of vent grooves 5221 may be formed through inward recessing of an outer peripheral surface of an end of the heating base 52 close to the liquid storage cavity 110, and the one or more vent grooves 5221 may be arranged at intervals in parallel. The air guide groove 5222 is formed through inward recessing of a side surface of the heating base 52, one end of the air guide groove 5222 is in communication with the uppermost vent groove 5221, and the other end extends upward to a top surface of the heating base 52. The air reflux groove 5223 is formed through inward recessing of the top surface of the heating base 52, one end of the air reflux groove 5223 is in communication with the air guide groove 5222, and the other end is in communication with a liquid inlet hole 520 on a corresponding side.

[0060] The vent groove 5221, the air guide groove 5222, and the air reflux groove 5223 are all tiny fine groove structures, which cannot block flowing of air but can block flowing of the liquid substrate, thereby ensuring that the vent channel 522 has a function of ventilation and liquid blocking, and reducing a possibility of leakage of the liquid substrate in the liquid storage cavity 110 through the vent channel 522. In some embodiments,

widths of the vent groove 5221, the air guide groove 5222, and the air reflux groove 5223 may range from 0.3 mm to 0.6 mm, and depths thereof may range from 0.3 mm to 0.6 mm.

[0061] The liquid storage groove 524 includes a plurality of liquid storage sub-grooves 5241 extending in the circumferential direction of the heating base 52.

[0062] The plurality of liquid storage sub-grooves 5241 may be formed through inward recessing of an outer peripheral surface of an end of the heating base 52 away from the liquid storage cavity 110, and the plurality of liquid storage sub-grooves 5241 may be provided at intervals in parallel. Further, two circumferential ends of each liquid storage sub-groove 5241 may extend to two openings 527 and to be in communication with the two openings 527 respectively, so that the liquid storage sub-groove 5241 is in communication with the liquid absorbing body 41. After the liquid storage groove 524 stores condensate (or the liquid substrate leaks from the vent channel 522 to the liquid storage groove 524), the capillary force of a gap between the liquid absorbing body 41 and the liquid storage groove 524 absorbs the condensate (or the liquid substrate) to the liquid absorbing body 41, thereby reducing a risk of the condensate being absorbed back from the vent channel 522 to the liquid storage cavity 110 and leaking into the power supply device 200.

[0063] The liquid storage sub-groove 5241 is a tiny fine groove structure, which applies a strong capillary force to the liquid substrate, and may absorb the condensate in the vent groove 5221 under the action of the capillary force. In some embodiments, a width of the liquid storage sub-groove 5241 may range from 0.3 mm to 0.6 mm, and a depth thereof may range from 0.3 mm to 0.6 mm.

[0064] The tension isolation groove 526 has a larger width than the vent channel 522 and the liquid storage groove 524, and is configured to prevent condensate in the liquid storage groove 524 from being absorbing back to the liquid storage cavity 110 to cause pressure fluctuation in the liquid storage cavity 110 and affect liquid supplying, so that ventilation pressure is more stable. The tension isolation groove 526 may extend in a longitudinal direction, a lower end thereof may be in communication with a lowermost liquid storage sub-groove 5241, and an upper end may be in communication with an uppermost liquid storage sub-groove 5241, so that the plurality of liquid storage sub-grooves 5241 are in communication with each other through the tension isolation groove 526.

[0065] A width of the tension isolation groove 526 may be greater than a width of the vent entrance 525. In some embodiments, the width of the tension break groove 526 may range from 1 mm to 3 mm, and a depth thereof may range from 0.5 mm to 1.2 mm.

[0066] The liquid absorbing groove opening 523 and the vent entrance 525 may be in communication with two circumferential sides on one end of the vent channel 522 away from the liquid storage cavity 110 respectively. In some embodiments, the vent entrance 525 may be in

communication with one of the one or more vent grooves 5221, and the liquid absorbing groove opening 523 may be in communication with another of the one or more vent grooves 5221.

[0067] Specifically, in this embodiment, the one or more vent grooves 5221 may include a lowermost first vent groove 5224 and a second vent groove 5225 provided above the first vent groove 5224 and neighboring to the first vent groove 5224. An upper end of the liquid absorbing groove opening 523 may be in communication with one side in a circumferential direction of the first vent groove 5224, and a lower end thereof may extend downward in a longitudinal direction to an uppermost liquid storage sub-groove 5241 and be in communication with the liquid storage sub-groove 5241. An upper end of the vent entrance 525 may be in communication with another side in a circumferential direction of the second vent groove 5225, and a lower end thereof may extend downward in a longitudinal direction to be in communication with an upper end of the tension isolation groove 526. As shown by arrows in FIG. 11, the air enters the second vent groove 5225 from the vent entrance 525, then flows to the air guide groove 5222 through the one or more vent grooves 5221 provided above the second vent groove 5225 sequentially, and finally enters the liquid storage cavity 110 through the air reflux groove 5223, thereby balancing the air pressure in the liquid storage cavity 110. In some embodiments, a width of the liquid absorbing groove opening 523 may range from 0.3 mm to 0.6 mm, and a depth thereof may range from 0.3 mm to 0.6 mm. A width of the vent entrance 525 may range from 0.6 mm to 1.5 mm, and a depth thereof may range from 0.3 mm to 0.6 mm.

[0068] It may be understood that in other embodiments, the vent inlet 525 and the liquid absorbing groove opening 523 may also be in communication with a same vent groove 5221, and the vent entrance 525 and the liquid absorbing groove opening 523 may be in communication with two ends in a circumferential direction of the same vent groove 5221 (for example, the first vent groove 5224) respectively.

[0069] During the inhalation, the liquid substrate is absorbed from the liquid storage cavity 110 to the vent channel 522, and the surface tension needs to be overcome when the liquid substrate is absorbed to the vent entrance 525. In this case, the vent entrance 525 plays a role of preventing the liquid substrate from being absorbed out of the vent channel 522, and at the same time, the first vent groove 5224 at the bottom circle may absorb a part of the liquid substrate. FIG. 12 is a gas-liquid two-phase distribution diagram in a liquid storage and vent structure 521 at a moment at which inhalation is stopped. A test condition is inhaling for 3s and stopping for 27s, and a liquid phase volume fraction in the liquid storage and vent structure 521 at a moment after inhalation is performed for 3s is tested. It can be seen from the gas-liquid two-phase distribution diagram that at the moment at which inhalation is stopped, the liquid phase (mainly leaked

from the liquid storage cavity 110 during inhalation) is mainly distributed in the vent channel 522, and there is little or no liquid phase distributed in the liquid storage groove 524, so that the liquid substrate can be well prevented from flowing out of the vent channel 522.

[0070] Further, as shown in FIG. 4 to FIG. 6, the heating base component 50 further includes a seal sleeve 53 sleeved above the heating base 52 and a seal gasket 51 accommodated in the heating base 52 and arranged between the heating base 52 and the liquid absorbing body 41. Both the seal sleeve 53 and the seal gasket 51 may be made of an elastic material such as silica gel. The seal gasket 51 may be in a shape of an annular sheet, and the seal gasket 51 is hermetically pressed between the heating base 52 and the liquid absorbing body 41, so as to play a role of buffering, ensuring sealing performance, and preventing liquid leakage. The seal sleeve 53 is sleeved on an upper part of the heating base 52, and is configured to seal a lower end of the liquid storage cavity 110 and seal and isolate the vaporization cavity 420 from the liquid storage cavity 110. An outer peripheral surface of the seal sleeve 53 may be in interference fit with an inner peripheral surface of the housing 11 to further improve the sealing performance. A top surface of the seal sleeve 53 may further recess downward to form a vent hole 530, a lower end of the air outlet tube 12 may be embedded in the vent hole 530, and an outer peripheral surface of the lower end of the air outlet tube 12 is in sealing fit with a hole wall of the vent hole 530, thereby sealing and isolating the air outlet channel 120 from the liquid storage cavity 110.

[0071] FIG. 14 shows a heating component in some embodiments in the related art. The heating component includes a vaporization top base 115, a vaporization core 12, and a vaporization bottom base 116. An outer surface of the vaporization top portion 115 is provided with a vent groove 112, and the vent groove 112 includes a first vent sub-groove 1121 and a second vent sub-groove 1122. An outer surface of the vaporization base 116 is provided with an airflow guiding groove 114 and a liquid storage groove 113. One end of the airflow guiding groove 114 is in communication with the vent groove 112, and the other end of the airflow guiding groove 114 is in communication with the liquid storage groove 113. The liquid storage groove 113 includes a plurality of liquid storage sub-grooves 1131.

[0072] FIG. 13 and FIG. 15 show vent pressure curves of the heating components shown in FIG. 3 and FIG. 14, where a horizontal axis is an inhalation time, and a vertical axis is pressure of the liquid storage cavity. In this test, a test condition is inhaling for 3s and stopping for 27s at a power of 6 W. In the heating component shown in FIG. 3, there are four vent grooves 5221, each vent groove 5221 has a width of 0.35 mm and a depth of 0.4 mm, the vent entrance 525 has a width of 1 mm and a depth of 0.4 mm, and the tension isolation groove 526 has a width of 2 mm and a depth of 0.8 mm; and in the heating component shown in FIG. 14, there are four sec-

ond vent sub-grooves 1122, each second vent sub-groove 1122 has a width of 0.35 mm and a depth of 0.4 mm, and an entrance of an end of the airflow guiding groove 114 in communication with the second vent sub-groove 1122 has a width of 0.6 mm and a depth of 0.4 mm. It can be seen from FIG. 13 and FIG. 15 that a fluctuation range of the ventilation pressure of the heating component shown in FIG. 3 is smaller, and most cases are one ventilation for one inhalation (that is, a ventilation time is shorter and a ventilation rate is faster); and a fluctuation range of the ventilation pressure of the heating component shown in FIG. 14 is larger, and most cases are one ventilation for two inhalations (that is, the ventilation time is longer, and the ventilation rate is slower). In comparison, the heating component shown in FIG. 3 has higher ventilation stability. In addition, because the heating component has a shorter ventilation path without passing through the first vent groove 5224 at the bottom circle during ventilation, the ventilation pressure is smaller and the ventilation rate is faster, which can effectively avoid a case of a burnt flavor and a reduced amount of vapor due to poor ventilation.

[0073] FIG. 16 shows a base 31 in a first alternative solution of the present disclosure, and a main difference from the foregoing first embodiment lies in that, in this embodiment, the air intake cross-sectional area of the first air inlet hole 3131 is greater than the air intake cross-sectional area of the second air inlet hole 3132, that is, the structure form of the air inlet hole 3130 is a form of "small holes on the periphery with large holes in the middle".

[0074] FIG. 18 shows a base 31 in some embodiments of the related art. In the base 31, the air intake cross-sectional area of the first air inlet hole 3131 is equal to the air intake cross-sectional area of the second air inlet hole 3132.

[0075] FIG. 8, FIG. 17, and FIG. 19 are simulated noise distribution cloud diagrams of the bases shown in FIG. 7, FIG. 16, and FIG. 18. In tests, the bases shown in FIG. 7, FIG. 16, and FIG. 18 all include four first air inlet holes 3131 and ten second air inlet holes 3132; in FIG. 7, a pore size of the first air inlet hole 3131 is 3.5 mm, a pore size of the second air inlet hole 3132 is 4.5 mm, and maximum pneumatic noise is 61.37 dB; in FIG. 16, the pore size of the first air inlet hole 3131 is 4.5 mm, the pore size of the second air inlet hole 3132 is 3.5 mm, and the maximum pneumatic noise is 66.52 dB; and in FIG. 18, the pore sizes of both the first air inlet hole 3131 and the second air inlet hole 3132 are 3.5 mm, and the maximum pneumatic noise is 70.83 dB. It can be seen from FIG. 8, FIG. 17, and FIG. 19 that the air inlet hole structures shown in FIG. 7 and FIG. 16 with staggered large and small holes can significantly reduce the pneumatic noise during inhalation, and the air inlet hole structure shown in FIG. 18 has larger pneumatic noise.

[0076] In addition, the air inlet hole structure shown in FIG. 7 with the form of "large holes on the periphery with small holes in the middle" has minimum pneumatic noise

during inhalation and a best uniform airflow guiding effect on airflows. Therefore, during designing, the air intake cross-sectional area of the first air inlet hole 3131 may be caused to be less than the air intake cross-sectional area of the second air inlet hole 3132 by selecting the first air inlet holes 3131 and the second air inlet holes 3132 with appropriate numbers and sizes (for example, the pore sizes or the air intake cross-sectional areas), so that the pneumatic noise of the vaporizer 100 during operation is less than 61.4 dB.

[0077] FIG. 20 to FIG. 21 show a base 31 in a second alternative solution of the present disclosure, and a main difference from the foregoing first embodiment lies in that, in this embodiment, an upper surface 3133 of an air inlet protruding stage 313 is in a convex shape. Specifically, the upper surface 3133 may be a spherical surface. The plurality of air inlet holes 3130 on the air inlet protruding stage 313 are formed through downward extension of the upper surface 3133. In other embodiments, the upper surface 3133 may also be in another shape such as a truncated cone. The second air inlet holes 3132 provided on the periphery may be provided close to an outer edge of the upper surface 3133.

[0078] With reference to FIG. 22, by designing the air inlet protruding stage 313 into a convex shape with small holes on an inner side and large holes on an outer side, a condensate film boundary 35 formed at the second air inlet holes 3132 on the periphery has a substantially spherical shape and is in communication with the condensate stored in the liquid storage space 3120, so that the condensate has a tendency to flow to an outer side of the air inlet holes 3130, and a flow direction of the condensate is shown by arrows in FIG. 22. When the air inlet holes 3130 are covered by the condensate, because the first air inlet holes 3131 in the middle have small pore sizes, it is difficult for the condensate to flow out; and the condensate of the second air inlet holes 3132 on the periphery is in communication with the condensate stored in the base 31, and is easily taken away by the condensate stored in the base 31, so that the condensate may be spread in the liquid storage space 3120 of the base 31 in time, and the air inlet holes 3130 can be hardly blocked.

[0079] FIG. 23 shows a seal member 32 in a third alternative solution of the present disclosure, and a main difference from the foregoing first embodiment lies in that, in this embodiment, the protruding stage portion 323 is not provided with the electrode hole 3236. In addition, two side surfaces on two sides of the protruding stage portion 323 in a length direction recess inward respectively to form avoidance grooves 3235 in communication with the avoidance holes 3210. This structure may reduce impact on a shape and a size of the air inlet through hole during designing.

[0080] FIG. 24 shows a seal member 32 in a fourth alternative solution of the present disclosure, and a main difference from the foregoing first embodiment lies in that, in this embodiment, the protruding stage portion 323 is

not provided with the electrode hole 3236, and this structure may reduce impact on the shape and the size of the air inlet through hole 3230 during designing.

[0081] It may be understood that, the above technical features may be used in any combination without limitation.

[0082] The foregoing embodiments only describe preferred implementations of the present disclosure, and the description is specific and detailed, but cannot therefore be understood as a limitation to the patent scope of the present disclosure. It should be noted that, for a person of ordinary skill in the art, the foregoing technical features may be combined freely, and several transformations and improvements may be further made without departing from the idea of the present disclosure. These transformations and improvements all fall within the protection scope of the present disclosure. Therefore, any equivalent change or modification made according to the scope of the claims of the present disclosure shall fall within the scope of the claims of the present disclosure.

Claims

1. A vaporizer, comprising:

a liquid storage housing (10) having a liquid storage cavity (110) formed therein;
a base (31) arranged at one end of the liquid storage housing (10); and
a seal member (32) arranged in the liquid storage housing (10) and sleeved on the base (31), wherein the seal member (32) is provided with an air inlet through hole (3230), wherein the air inlet through hole (3230) comprises an air inlet section (3231) facing the base (31) and an air outlet section (3232) away from the base (31), and
wherein a cross-sectional area of the air inlet section (3231) is greater than a cross-sectional area of the air outlet section (3232).

2. The vaporizer of claim 1, wherein the air inlet section (3231) and the air outlet section (3232) are in a smooth transition connection.

3. The vaporizer of claim 1, wherein a cross-sectional shape of the air inlet section (3231) is the same as or different from a cross-sectional shape of the air outlet section (3232).

4. The vaporizer of claim 1, wherein the seal member (32) comprises a body portion (321) and a protruding stage portion (323),

wherein the body portion (321) is annular and hermetically sleeved between the base (31) and the liquid storage housing (10),

wherein two opposite sides of the protruding stage portion (323) are respectively connected with two opposite sides of the body portion (321), and

wherein the air inlet through hole (3230) is formed on the protruding stage portion (323).

5. The vaporizer of claim 4, wherein the upper end surface of the air inlet through hole (3230) is higher than the upper end surface of the protruding stage portion (323).

6. The vaporizer of claim 4, wherein avoidance holes (3210) are formed respectively between the other two opposite sides of the protruding stage portion (323) and the other two opposite sides of the body portion (321).

7. The vaporizer of claim 6, wherein the protruding stage portion (323) is provided with an airflow guide groove (3234) communicating the air inlet through hole (3230) with the avoidance holes (3210).

8. The vaporizer of claim 4, wherein the seal member (32) comprises two sleeve portions (322) respectively extending from the other two opposite sides of the body portion (321) away from the base (31).

9. The vaporizer of claim 8, wherein the two sleeve portions (322), the body portion (321) and the protruding stage portion (323) are integrated formed.

10. The vaporizer of any one of claims 1 to 9, wherein the base (31) is provided with an air inlet channel (315) in communication with the air inlet section (3231),

wherein the base (31) comprises an air inlet protruding stage (313), and
wherein the air inlet channel (315) comprises a plurality of air inlet holes (3130) formed on the air inlet protruding stage (313).

11. The vaporizer of claim 10, wherein the air outlet section (3232) comprises an air outlet arranged at the end of the air outlet section (3232) away from the air inlet section (3231), and a cross-sectional area of the air outlet is less than a cross-sectional area of the air inlet protruding stage (313).

12. The vaporizer of claim 10, wherein the plurality of air inlet holes (3130) comprises one or more first air inlet holes (3131) and one or more second air inlet holes (3132) arranged around the one or more first air inlet holes (3131), and
wherein the air inlet holes (3131) and the air inlet holes (3132) have different cross-sectional areas.

13. The vaporizer of claim 10, wherein the side surface of the air inlet protruding stage (313) facing the liquid storage cavity (110) is in a shape of a protrusion.
14. The vaporizer of any one of claims 1 to 9, further comprising:
- a liquid absorbing body (41) arranged in the liquid storage housing (10), and
 - a heating base (52) arranged in the liquid storage housing (10) and mated with the base (31), wherein a vaporization cavity (420) in communication with the air outlet section (3232) is formed between the liquid absorbing body (41) and the seal member (32), and wherein the liquid absorbing body (41) is accommodated between the heating base (52) and the base (31).
15. An electronic vaporization device, comprising:
- the vaporizer of any one of claims 1 to 14; and
 - a power supply device that is electrically connected to the vaporizer.

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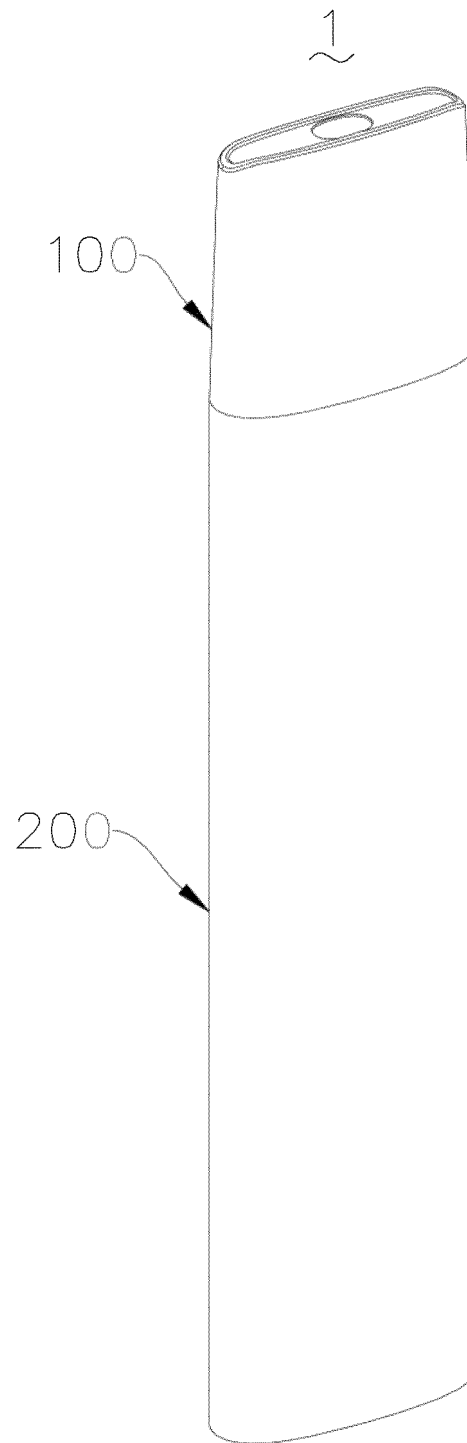


FIG. 1

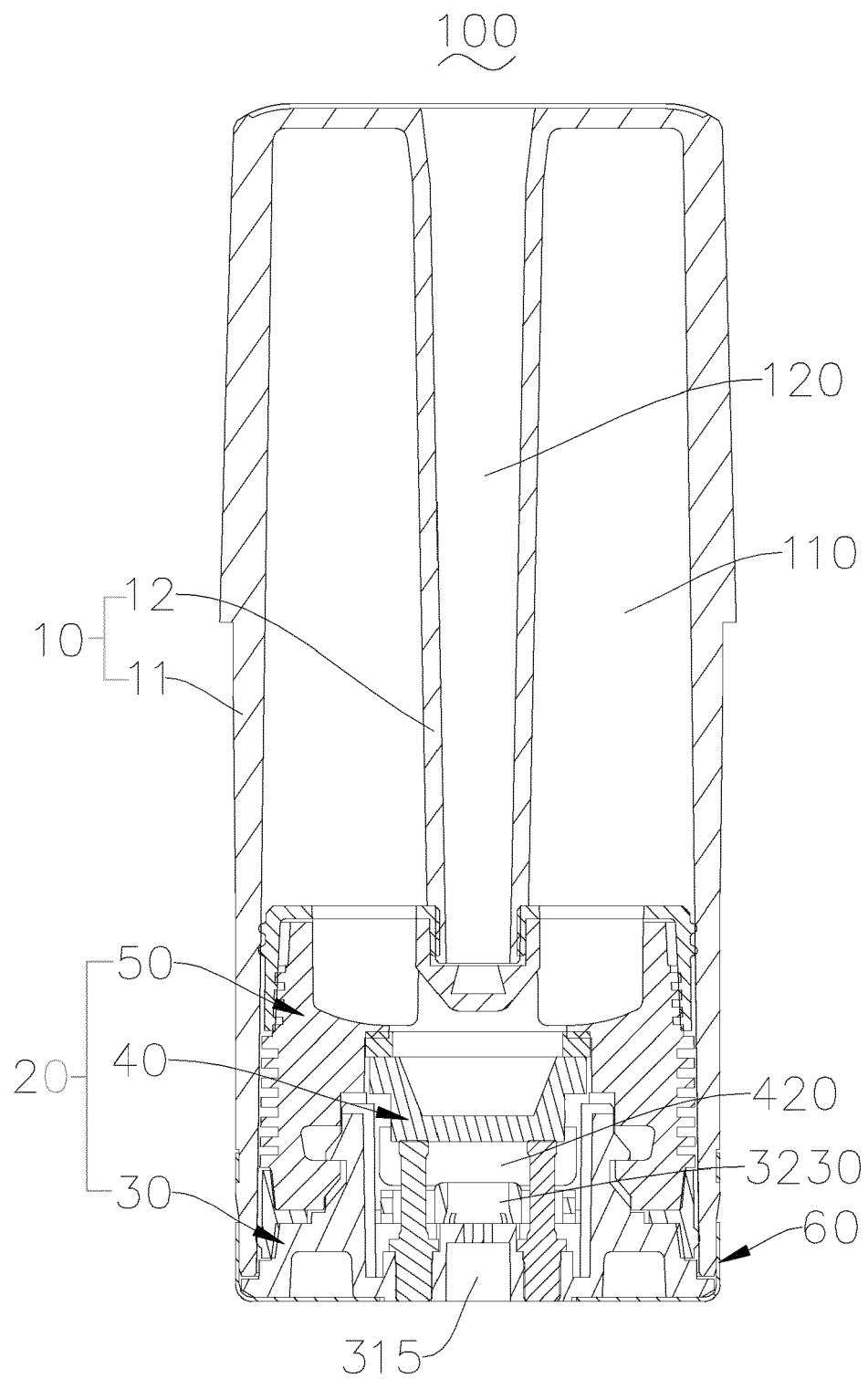


FIG. 2

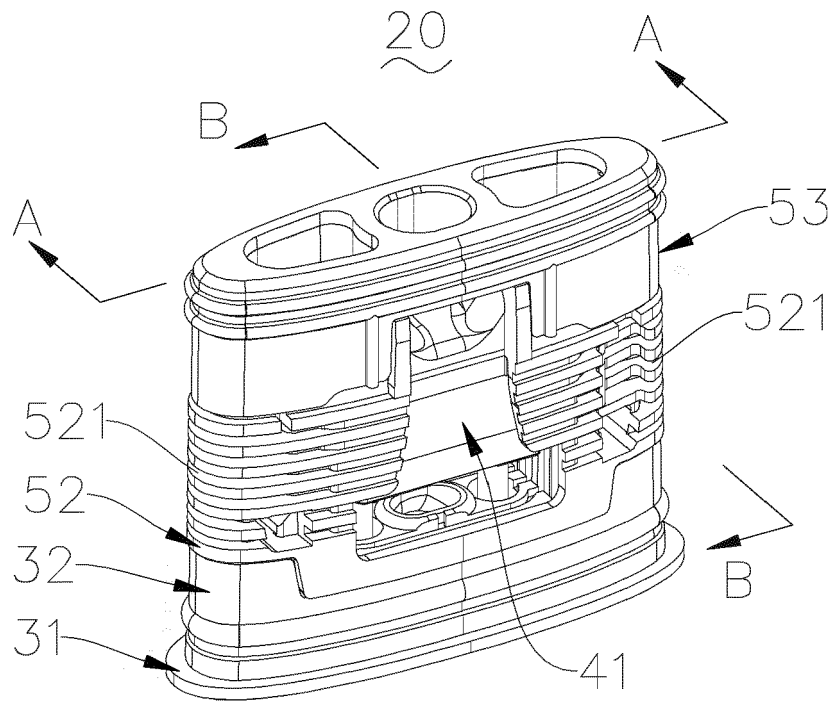


FIG. 3

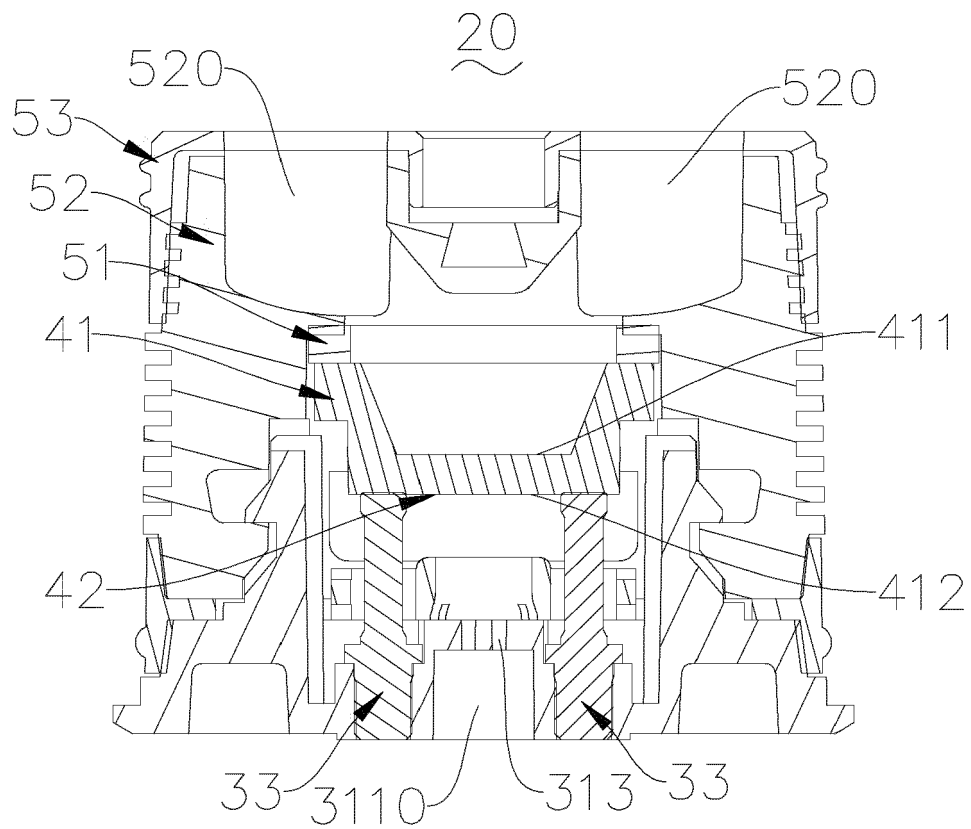


FIG. 4

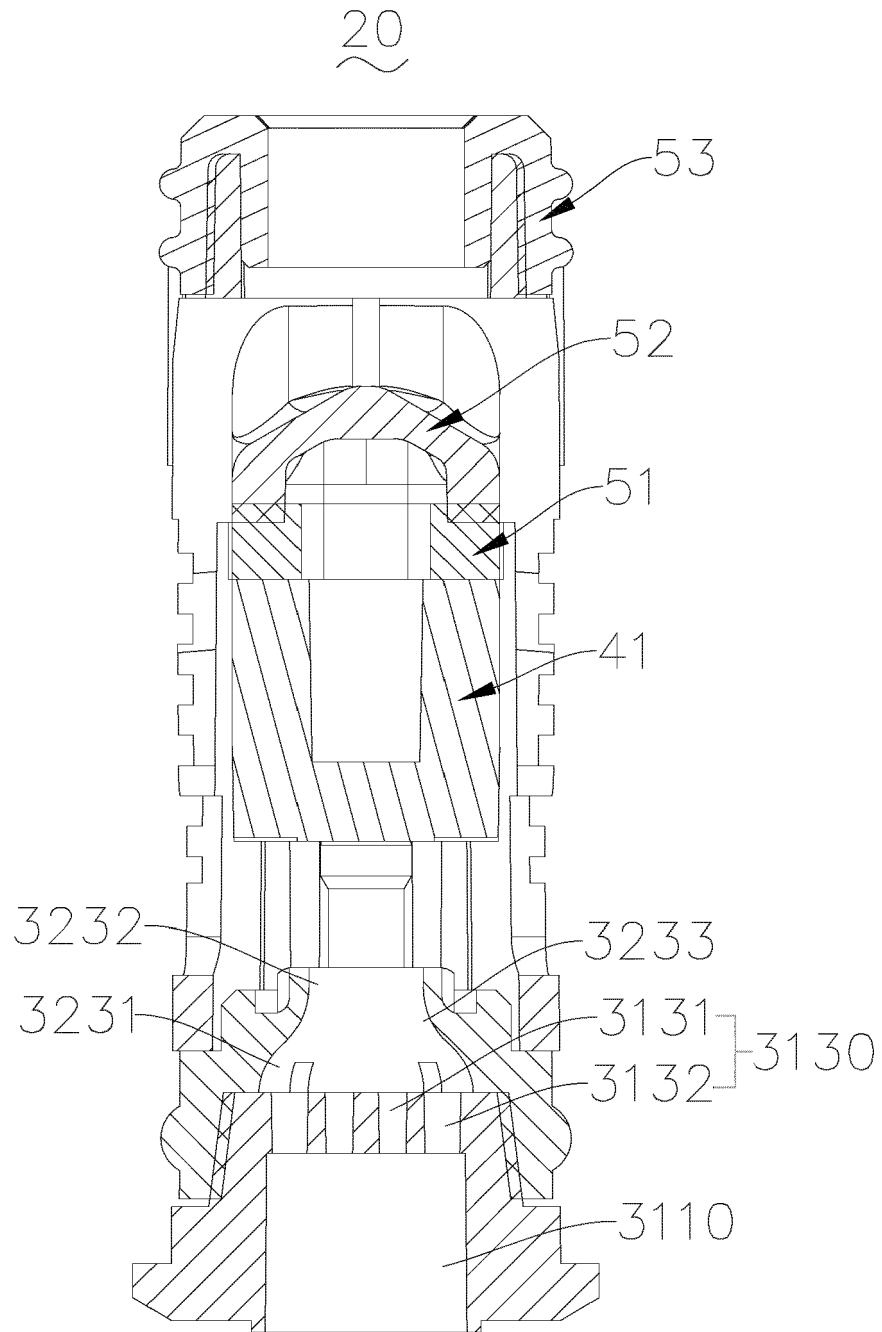


FIG. 5

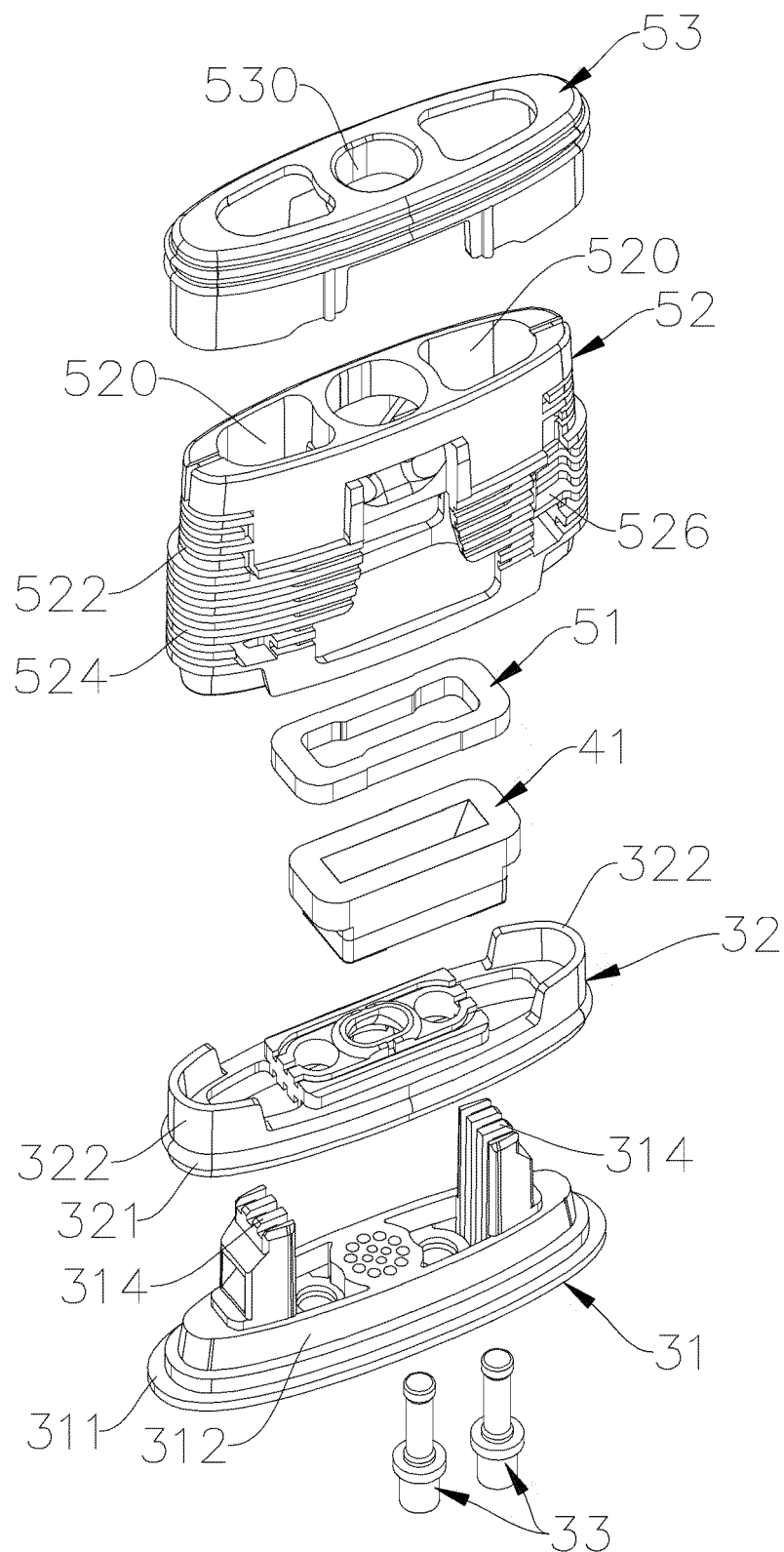


FIG. 6

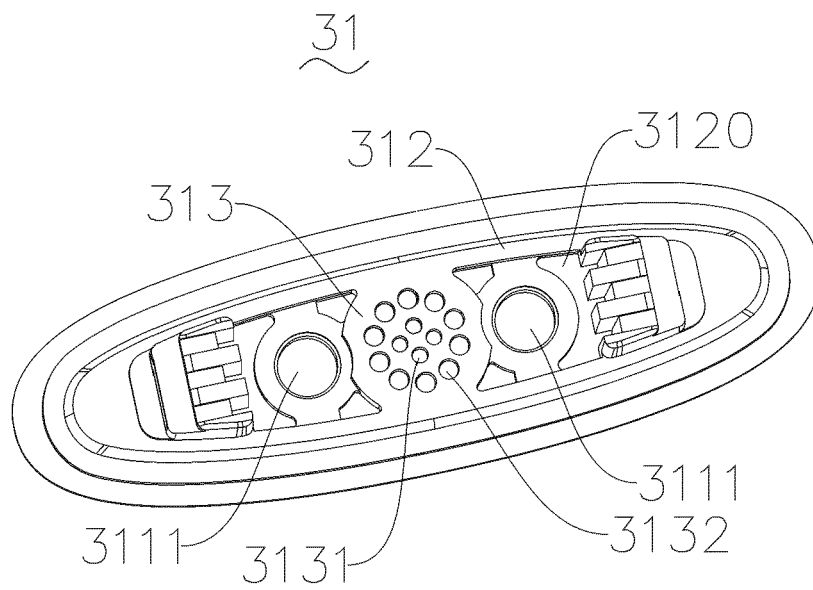


FIG. 7

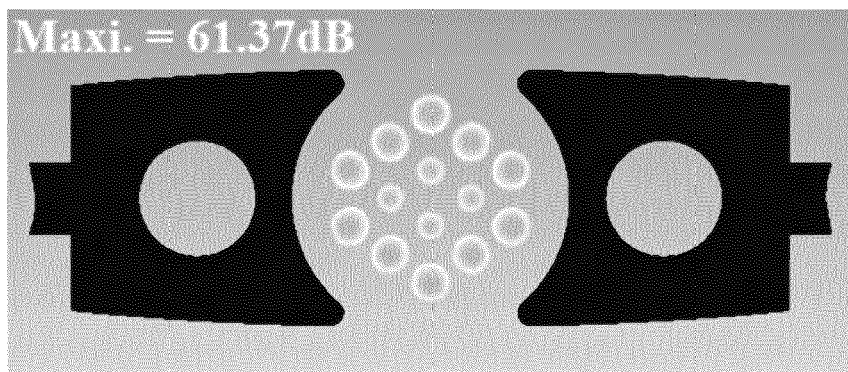


FIG. 8

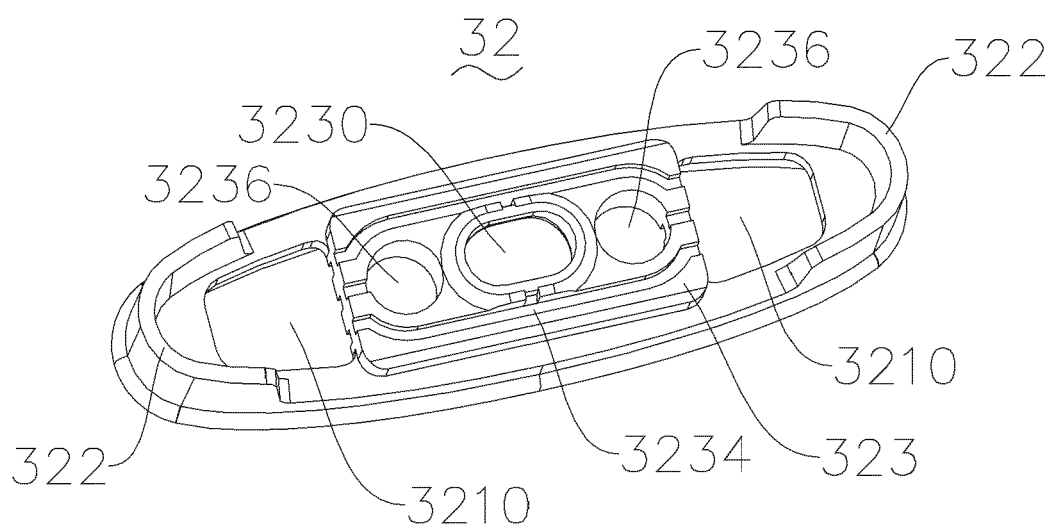


FIG. 9

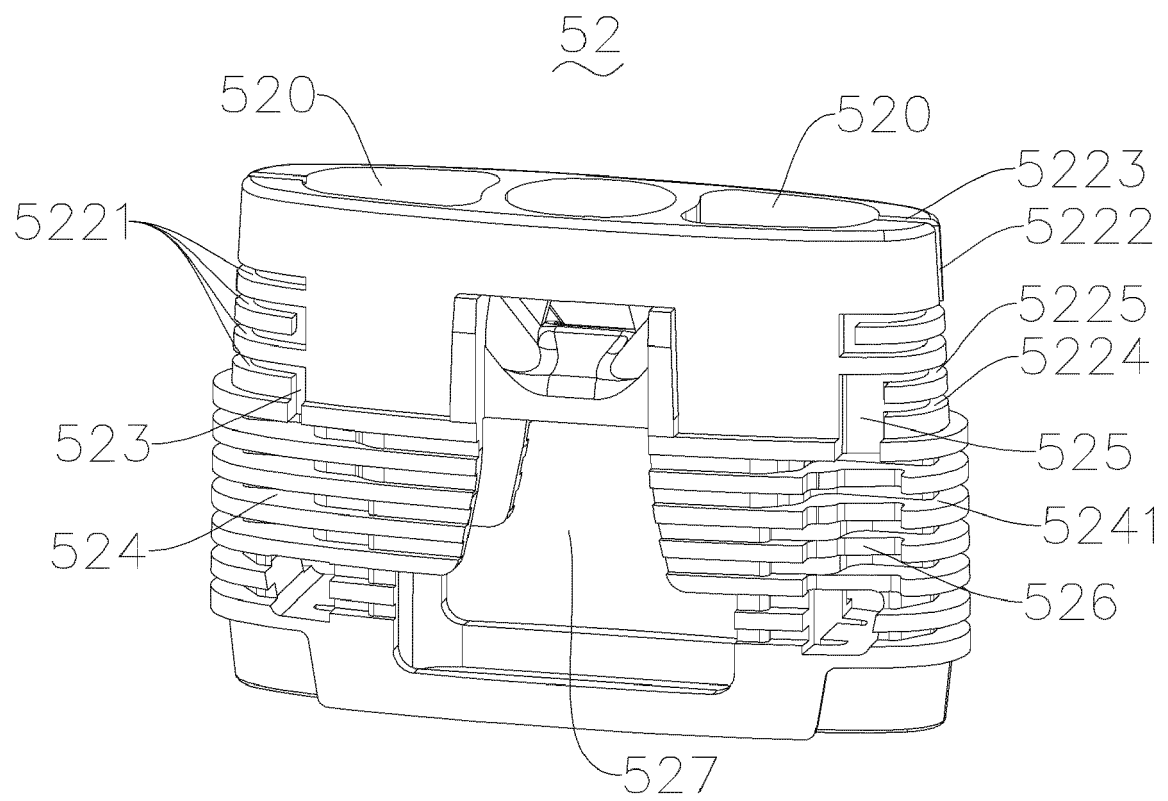


FIG. 10

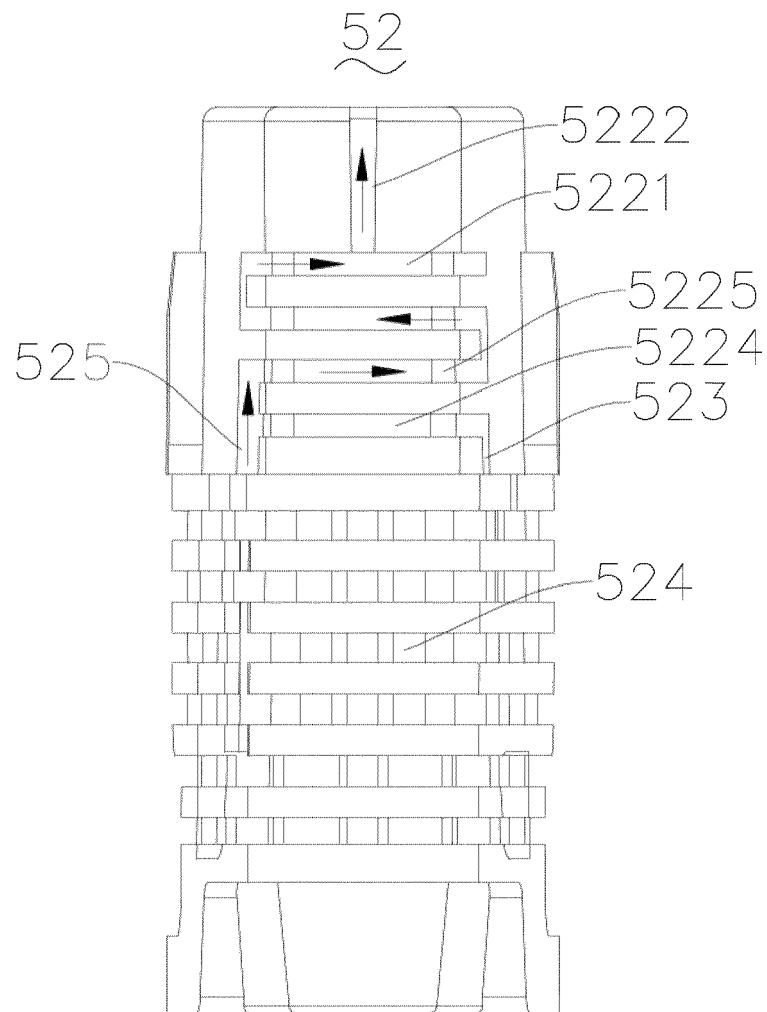


FIG. 11

Time = 3.00075 [s]

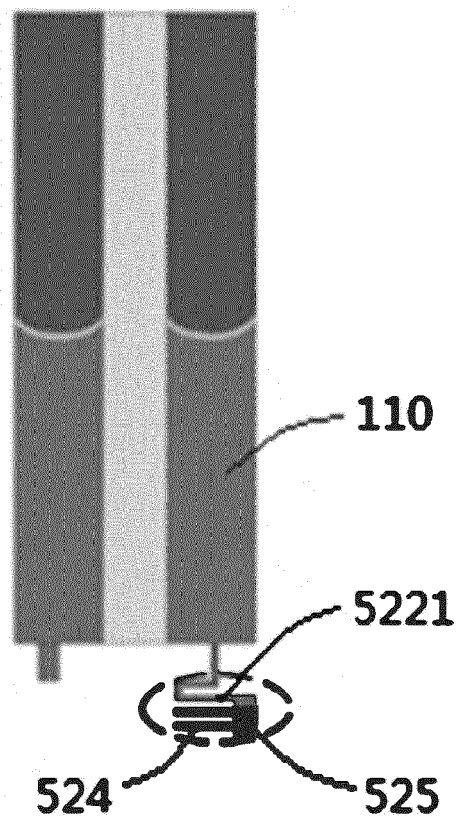


FIG. 12

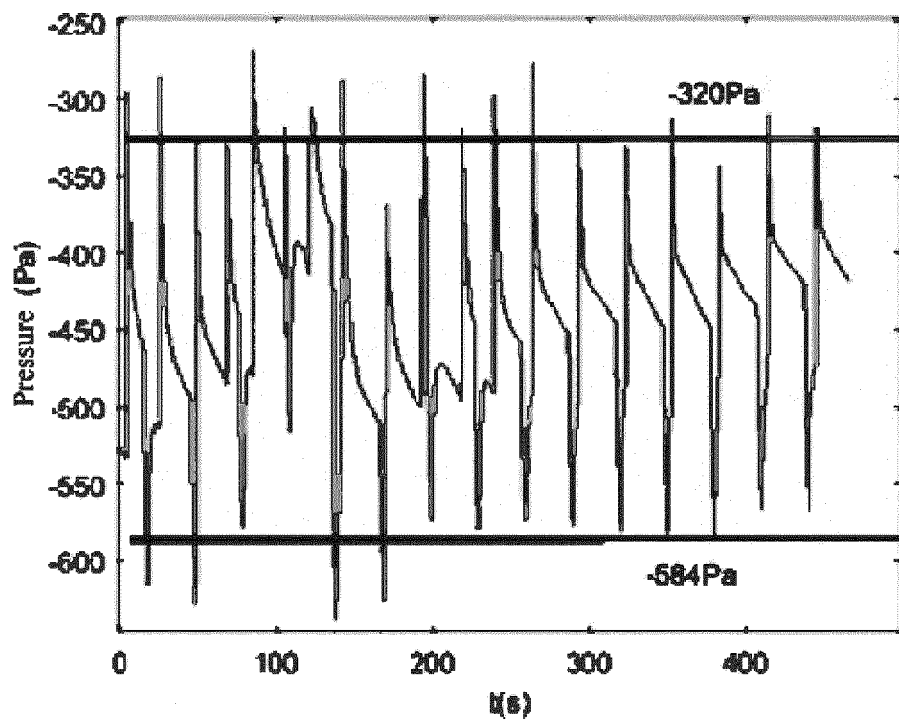


FIG. 13

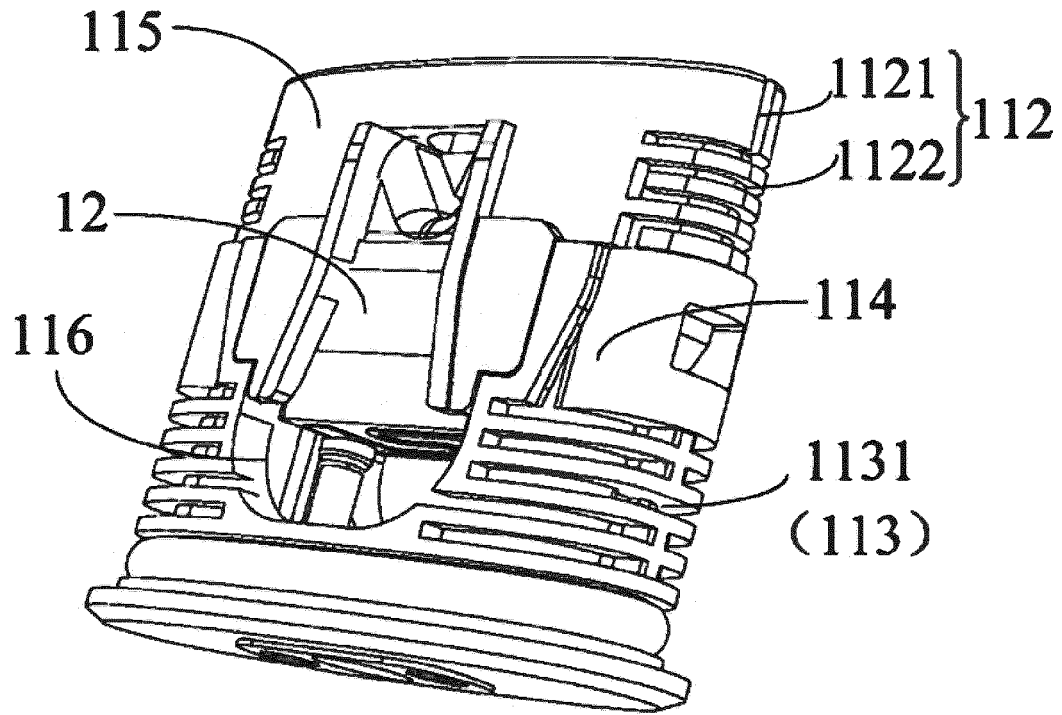


FIG. 14

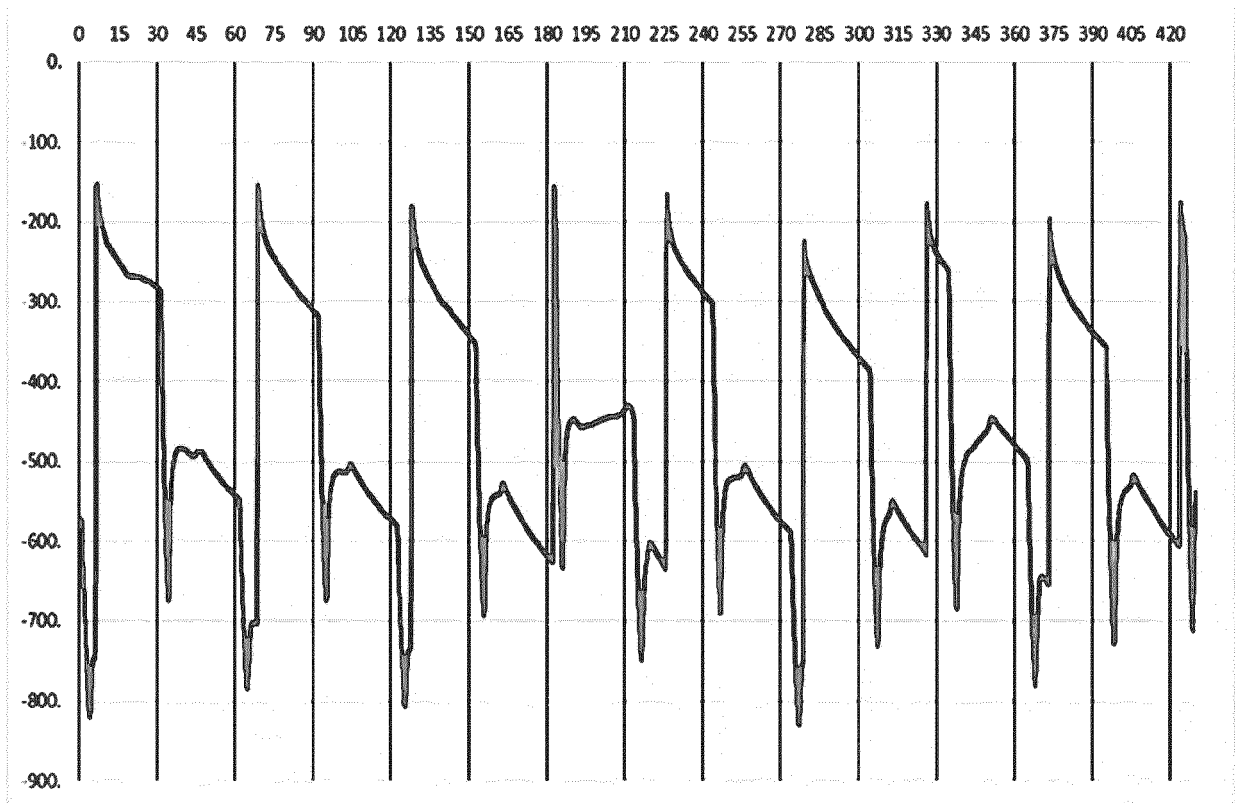


FIG. 15

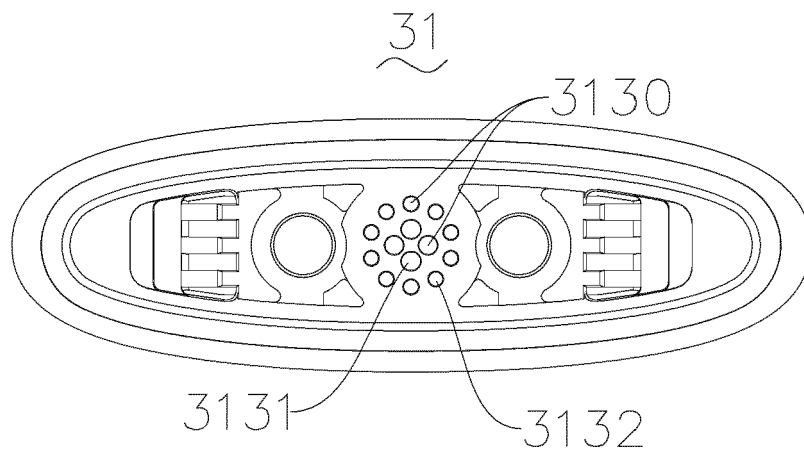


FIG. 16

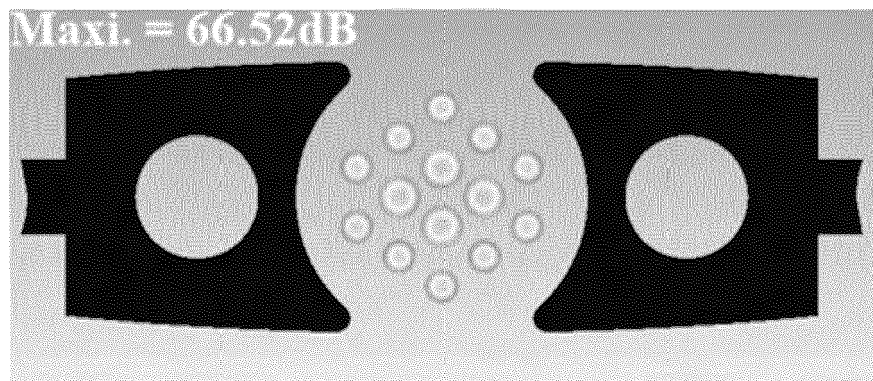


FIG. 17

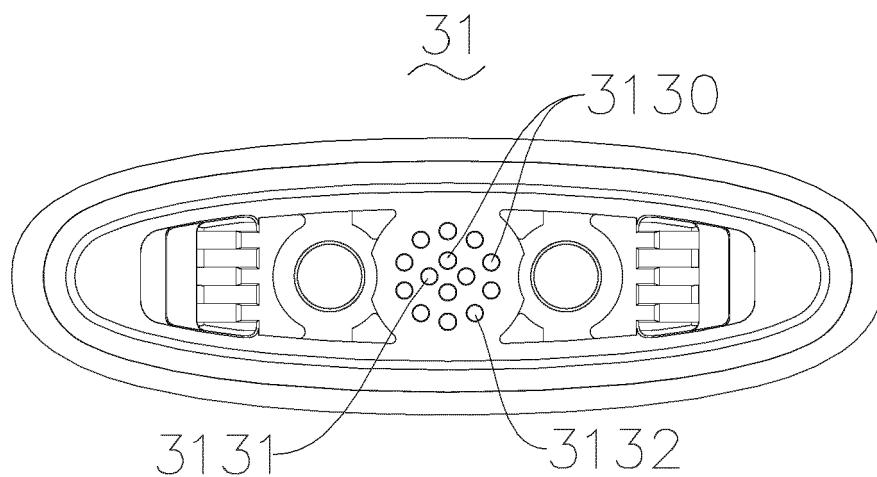


FIG. 18

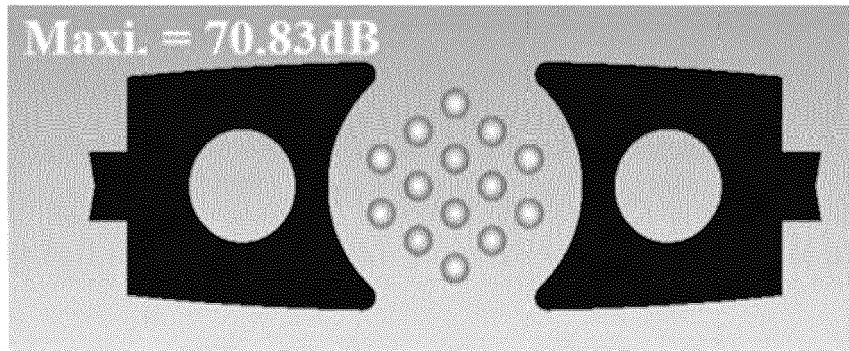


FIG. 19

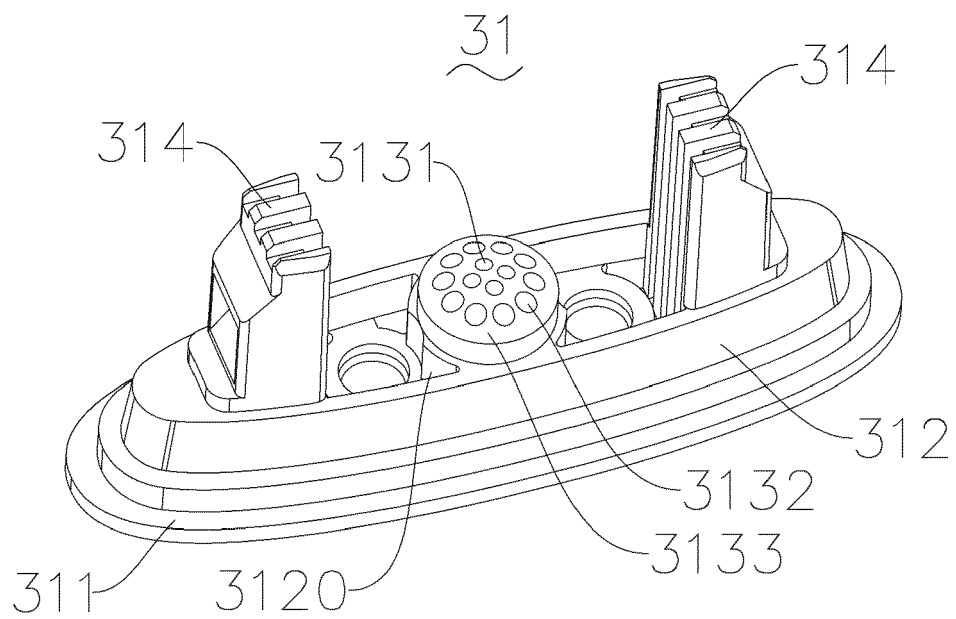


FIG. 20

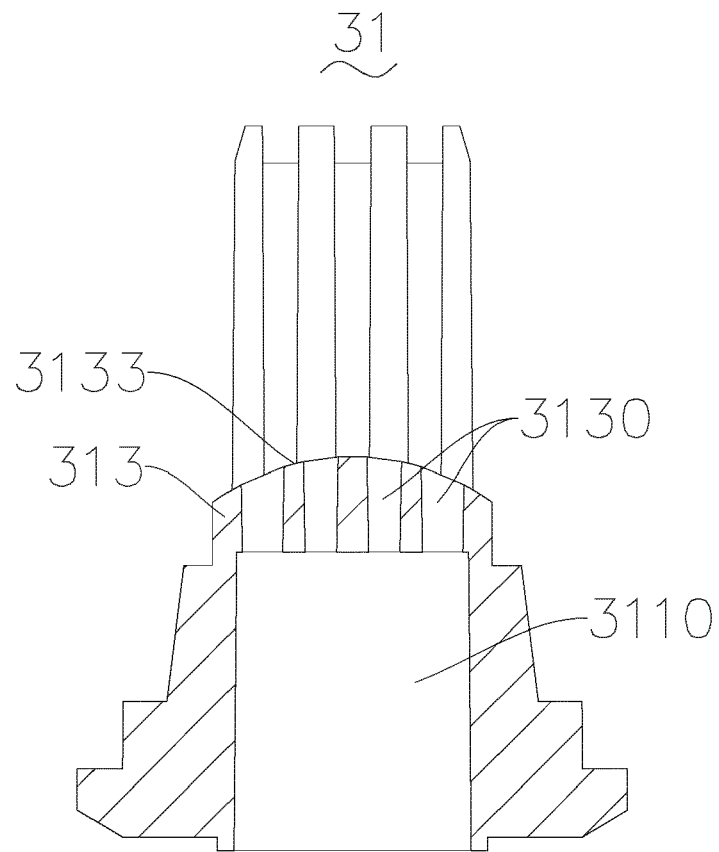


FIG. 21

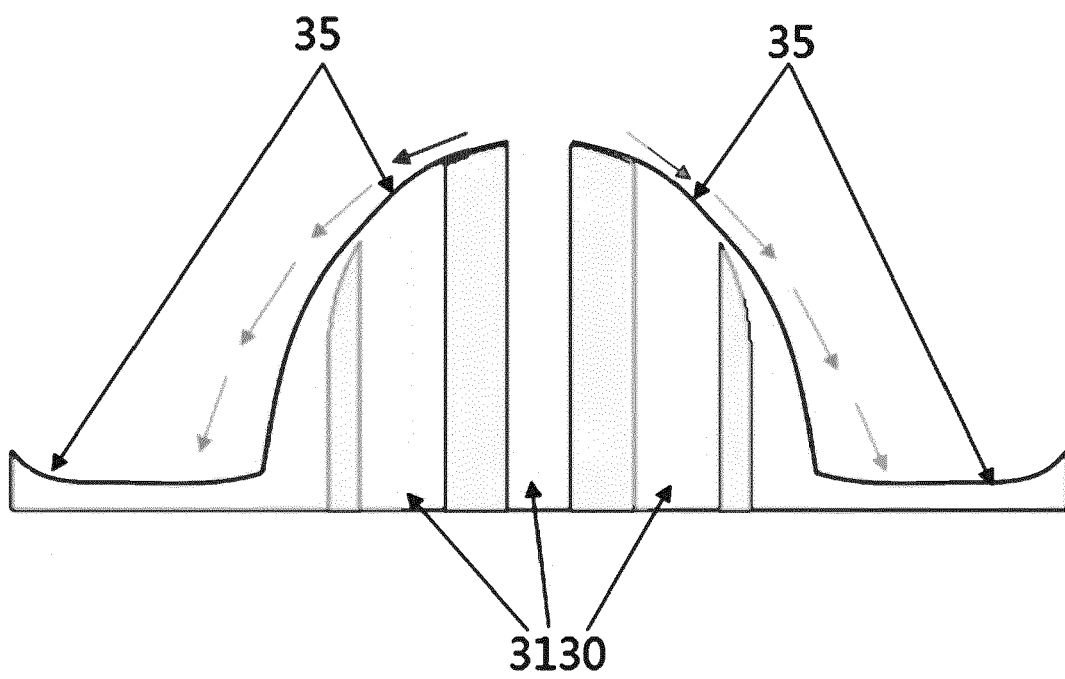


FIG. 22

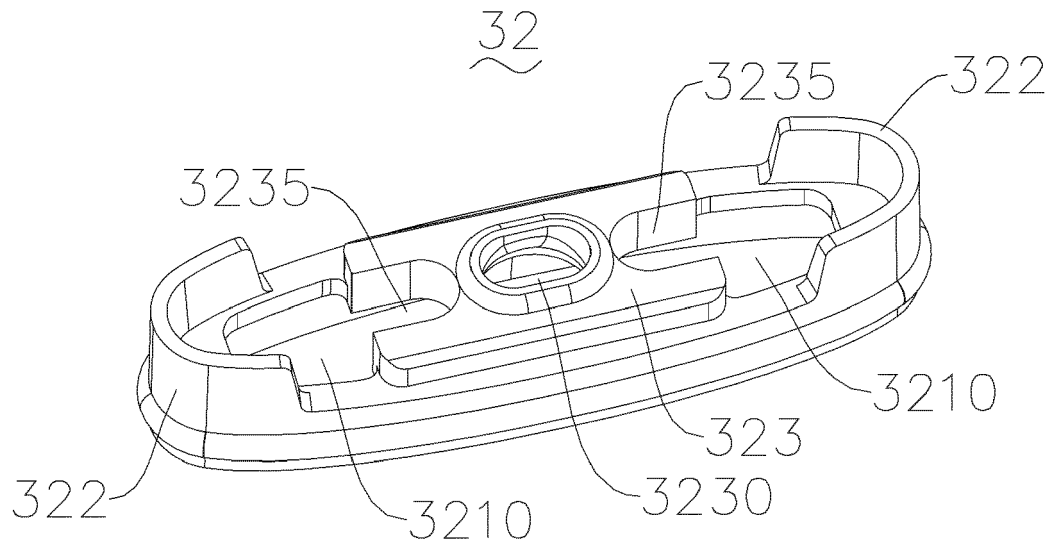


FIG. 23

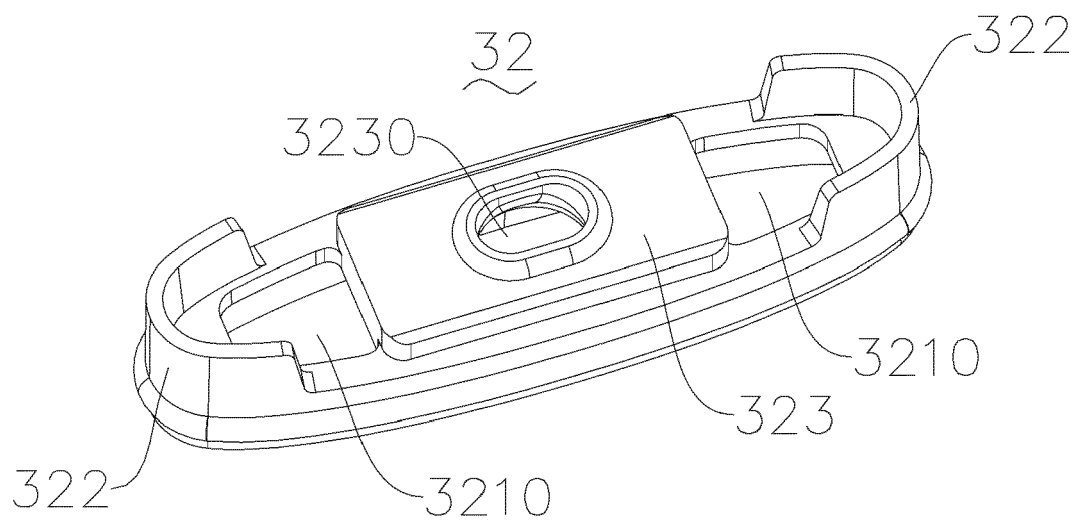


FIG. 24



EUROPEAN SEARCH REPORT

Application Number

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2021/248334 A1 (SHENZHEN HUACHENGDA PREC INDUSTRY CO LTD [CN]) 16 December 2021 (2021-12-16)	1-7, 10, 13-15	INV. A24F40/40 A24F40/10
A	* figures 1, 6, 8, 9, 22 *	8, 9, 11, 12	ADD. A24F40/485
A	----- CN 112 826 136 A (SHENZHEN SMOORE TECHNOLOGY LTD) 25 May 2021 (2021-05-25) * figure 3 *	1-15	
A	----- CN 111 671 149 A (SHENZHEN HUACHENGDA PREC INDUSTRY CO LTD) 18 September 2020 (2020-09-18) * figures 17, 22 *	1-15	

			TECHNICAL FIELDS SEARCHED (IPC)
			A24F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 7 June 2023	Examiner Schwertfeger, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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