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(54) Title: ATOMIZER, ELECTRONIC CIGARETTE AND REPLACEABLE LIQUID STORAGE DEVICE

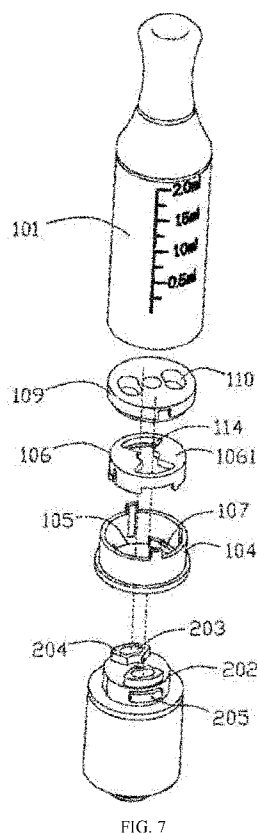


FIG. 7

(57) Abstract: The present invention relates to an atomizer, an electronic cigarette and a replaceable liquid storage device. The atomizer comprises a liquid storage device (100) and an atomizing assembly (200), the atomizing assembly comprising an atomizing chamber and an atomizing unit disposed in the atomizing chamber; the atomizing assembly has a connection part (202) for connecting to the liquid storage device, a liquid inlet (203) in communication with the atomizing chamber is provided on the connection part, a seal (109) having a liquid outlet (110) is provided on an open end of the liquid storage device, and the connection part is suited to being inserted into the open end of the liquid storage device and then rotated by a predetermined angle so as to form an engagement connection with the liquid storage device. When the connection part forms an engagement connection with the liquid storage device, the liquid outlet and liquid inlet are linked. When the connection part is being separated from the liquid storage device, the connection part can drive the rotary component to block the liquid outlet. In examples of an electronic cigarette using the atomizer, the risk that e-liquid will spill from the liquid storage device in any state can be reduced or eliminated, to give the consumer a good user experience.



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**Atomizer, electronic cigarette and replaceable liquid
storage device**

5 The present invention relates to the field of novel smoking equipment, in particular to an atomizer for use on an electronic cigarette, an electronic cigarette comprising the atomizer, and a replaceable liquid storage device.

10 The main function of an atomizer, as an important component part of an electronic cigarette, is to atomize internal e-liquid, such as a tobacco liquid from a tobacco plant, or a solution containing one or more naturally-extracted or synthetically-produced
15 tobacco ingredients, to form an aerosol for a person to inhale, and thereby simulate the smoke mist generated by a traditional cigarette; the harm to the human body can be reduced significantly compared with the traditional method of burning tobacco. At present, most
20 atomizers comprise a liquid storage device for storing e-liquid and an atomizing assembly connected to the liquid storage device. Atomizers of this type on the market are divided into two main categories; in one category, the liquid storage device and the atomizing
25 assembly form a one-piece structure, while in the other category, the liquid storage device and the atomizing assembly form a split structure. However, atomizers with both categories of structure exhibit the following deficiencies during use.

30 In the prior art, atomizers with one-piece structures are sub-divided into disposable and multiple-use atomizers. Since the e-liquid capacity inside a disposable atomizer is limited, the entire atomizer (including the liquid storage device and the
35 atomizing assembly) will be discarded when the e-liquid is used up. As a result, disposable atomizers are very

expensive to use, and cause environmental pollution. When the e-liquid in a multiple-use atomizer is used up, it is necessary to use a special e-liquid bottle to refill the atomizer with e-liquid; the operation is
5 bothersome, and causes the user inconvenience.

To seek to solve the above problem, an atomizer with a split structure has appeared in the prior art. The liquid storage device and the atomizing assembly in this atomizer are detachably connected, and when the e-
10 liquid is used up, all that need be done is to replace the liquid storage device; the atomizing assembly can be used repeatedly. At present, a relatively typical liquid storage device in an atomizer with a split structure employs tin foil to seal the e-liquid; a
15 piercing element is provided on the atomizing assembly, and when the two are connected, the tin foil can be pierced using the piercing element so that e-liquid flows into the atomizing assembly. However, the main deficiency of this solution is that: tin foil that has
20 been pierced cannot be restored to its original state, and when the liquid storage device needs to be replaced, residual e-liquid in the liquid storage device will spill out copiously when the user detaches the liquid storage device from the atomizing assembly,
25 contaminating the exterior of the atomizer while giving the consumer a poor user experience.

A technical problem sought to be solved by aspects of the present invention is to overcome one or more of
30 the deficiencies of the prior art by preferably providing a low-cost atomizer which can reduce the risk of, or prevent, spillage of e-liquid, such as tobacco liquid or a solution containing one or more ingredients found in tobacco, when the liquid storage device is
35 detached.

To seek to solve or mitigate the above technical problem, the atomizer of an aspect of the invention comprises a liquid storage device which is used for

storing e-liquid and has an open end, and an atomizing assembly which is detachably connected to the open end, the atomizing assembly comprising an atomizing chamber and an atomizing unit disposed in the atomizing chamber, the atomizing unit being used to atomize e-liquid to form an aerosol for a person to inhale; the atomizing assembly has a connection part for connecting to the liquid storage device, a liquid inlet in communication with the atomizing chamber is provided on the connection part, a seal having a liquid outlet is provided on the open end, and the connection part is suited to being inserted into the open end of the liquid storage device and then rotated by a predetermined angle so as to form an engagement connection with the liquid storage device; a rotary component capable of rotating together with the connection part is also provided on the open end, the rotary component abutting the seal; when rotating from an initial position of insertion to an engaged position, the connection part can drive the rotary component to rotate so as to link the liquid outlet to the liquid inlet; when rotating back to the initial position, the connection part can drive the rotary component to rotate so that the rotary component blocks the liquid outlet.

As a specific example of a form of rotational engagement connection, at least one projection is provided on an end face of the connection part, the liquid inlet being provided on the projection, an accommodating hole adapted in shape to the projection is provided on the rotary component, and when the connection part is inserted into the open end of the liquid storage device, the projection can extend into the accommodating hole and abut the seal.

Furthermore, a connection ring may be provided in a fixed manner on the open end of the liquid storage device, the rotary component is received in the connection ring so as to be capable of relative

rotation, at least one engaging protrusion is provided on a sidewall of the connection part, on an inner wall of the connection ring are provided a guide slot for the engaging protrusion to be inserted in and an inwardly extending step, and the step is configured to form an engagement connection with the engaging protrusion.

Preferably, a projecting locating part is provided on the outside of the rotary component, and locating slots matching the locating part are provided on the inside of the connection ring to correspond to the initial position of insertion of the connection part and the engaged position, respectively.

Further preferably, the locating slots which correspond to the initial position and the engaged position form an arc angle of 90 degrees on an inside wall of the connection ring.

Furthermore, an annular sealing cushion may be provided on an edge of the liquid outlet, on that end face of the seal which abuts the rotary component.

Furthermore, a mouthpiece which may be integrally formed with the housing of the liquid storage device may be provided on the liquid storage device, a gas guide tube in communication with the mouthpiece may be also provided inside the liquid storage device, and an aerosol generated in the atomizing chamber can pass through the gas guide tube and be sucked out through the mouthpiece.

Furthermore, a gas flow outlet in communication with the atomizing chamber may be provided in the centre of the connection part, while an axial tube part extending axially may be provided in the centre of the seal, the gas flow outlet being in communication with the gas guide tube via the axial tube part.

As a particular embodiment, the atomizing unit comprises a liquid guide body and a heating element in contact with the liquid guide body, an end of the liquid guide body being used to absorb e-liquid flowing

in through the liquid inlet, and the heating element heating the e-liquid so that the latter evaporates to form an aerosol.

Furthermore, a layer of a liquid storage body made
5 of fibrous material may be also provided between an end of the liquid guide body and the liquid inlet.

The present invention also provides an electronic cigarette, comprising an atomizer and a power supply assembly; the atomizer may be the atomizer to which the
10 various particular solutions and preferred improved solutions relate; the power supply assembly is connected to the atomizing assembly and provides a power source for the internal atomizing unit.

The present invention also provides a replaceable
15 liquid storage device that is connected to an atomizing assembly, the interior of the liquid storage device being used to store e-liquid; the liquid storage device has an open end on which are provided a seal having a liquid outlet and a rotary component which abuts the
20 seal; when the liquid storage device is not connected to the atomizing assembly, the rotary component is used to block the liquid outlet so as to seal e-liquid inside; when the liquid storage device is connected to the atomizing assembly, the rotary component can rotate
25 and open the liquid outlet.

Preferably, a housing of the liquid storage device is made of transparent material.

The beneficial effects of examples of the present invention are as follows: Since the atomizing assembly
30 and the liquid storage device in the atomizer to which the present invention relates are detachably connected, when the e-liquid has been used up, all that need be done is to discard the lower-cost liquid storage device and replace it with a new one, while the higher-cost
35 atomizing assembly can be used repeatedly, enabling a huge reduction in the cost of use. In addition, the atomizing assembly has a connection part for connecting to the liquid storage device, the connection part is

suited to being inserted into the open end of the liquid storage device and then rotated by a predetermined angle so as to form an engagement connection with the liquid storage device, and a seal and a rotary component are provided on the open end. In a normal state, when the atomizing assembly is not connected to the liquid storage device, the rotary component can block the liquid outlet on the seal, to ensure that no e-liquid leaks from the liquid storage device during warehouse storage or transportation. When forming an engagement connection with the liquid storage device, the connection part of the atomizing assembly can drive the rotary component to rotate so as to open the liquid outlet, so that e-liquid flows smoothly into the atomizing assembly. When being separated from the liquid storage device, the connection part can drive the rotary component to rotate to the initial position in which the liquid outlet is sealed, so that the e-liquid inside is sealed again, ensuring that no e-liquid will spill from the liquid storage device during detachment, to give the consumer a good user experience.

An exemplary atomizer includes a liquid supply and an atomizing assembly. The liquid supply is configured for storing tobacco liquid. The liquid supply has an open end. The atomizing assembly is detachably connected to the open end. The atomizing assembly includes an atomizing cavity and an atomizing unit. The atomizing unit is configured for heating the tobacco liquid to form aerosol. The atomizing assembly includes a connector configured for connecting with the liquid supply. The connector defines a liquid inlet. The open end is provided with a sealing component having a liquid outlet. The connector is engaged in the open end to form a snap-fit connection after the connector is rotated a predetermined angle. The liquid supply further includes a rotation component abutting against the sealing component. The connector is

capable of driving the rotation component to rotate between a first position where the rotation component blocks the liquid outlet, and a second position where the liquid outlet communicates with the liquid inlet.

5 When the connector is engaged in the open end, the rotation component is in the second position.

Description of the accompanying drawings

Many aspects of the present disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the present disclosure. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

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Fig. 1 is a schematic diagram of the structure of the liquid storage device according to an embodiment;

Fig. 2 is a schematic diagram of the structure of the atomizing assembly in an embodiment;

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Fig. 3 is a schematic exploded view of the structure of the liquid storage device in an embodiment;

Fig. 4 is a schematic diagram of the structure of the connection ring on the liquid storage device in an embodiment;

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Fig. 5 is an internal sectional view of the atomizing assembly concerned in an embodiment;

Fig. 6 is a schematic exploded view of the structure of the atomizing assembly concerned in an embodiment;

30

Fig. 7 is a schematic diagram of the state in which the rotary component is blocking the liquid outlet on the seal in an embodiment;

Fig. 8 is a schematic diagram of the state in which the atomizing assembly has driven the rotary component to rotate and opened the liquid outlet on the seal in an embodiment;

35

Fig. 9 is a schematic diagram of the structure of the electronic cigarette concerned in an embodiment.

Particular embodiments

5 It will be appreciated that for simplicity and clarity of illustration, where appropriate, reference numerals have been repeated among the different figures to indicate corresponding or analogous elements. In addition, numerous specific details are set forth in
10 order to provide a thorough understanding of the embodiments described herein. However, it will be understood by those of ordinary skill in the art that the embodiments described herein can be practiced without these specific details. In other instances, methods, procedures and components have not been
15 described in detail so as not to obscure the related relevant feature being described. Also, the description is not to be considered as limiting the scope of the embodiments described herein. The drawings are not necessarily to scale and the proportions of
20 certain parts have been exaggerated to better illustrate details and features of the present disclosure.

The disclosure is illustrated by way of example and not by way of limitation in the figures of the accompanying drawings in which like references indicate similar elements. It should be noted that references to "an" or "one" embodiment in this disclosure are not
25 necessarily to the same embodiment, and such references mean at least one.

Several definitions that apply throughout this disclosure will now be presented.

The term "outside" refers to a region that is beyond the outermost confines of a physical object.
35 The term "inside" indicates that at least a portion of a region is partially contained within a boundary formed by the object. The term "substantially" is defined to be essentially conforming to the particular

dimension, shape or other word that substantially modifies, such that the component need not be exact. For example, substantially cylindrical means that the object resembles a cylinder, but can have one or more deviations from a true cylinder. The term "comprising," when utilized, means "including, but not necessarily limited to"; it specifically indicates open-ended inclusion or membership in the so-described combination, group, series and the like.

10 The atomizer disclosed in the present invention is mainly suitable for electronic cigarettes, liquid drug component volatilizing devices or other aromatic component releasing devices; in this embodiment, the example of an electronic cigarette will be described.

15 The atomizer consists of a liquid storage device and an atomizing assembly which are detachably connected together; a rotational engagement connection structure is used therebetween, to enable opening or closing of a liquid flow channel therebetween, achieving the

20 objective of preventing leakage of e-liquid to the outside when the liquid storage device is detached. In addition, the electronic cigarette provided by the present invention consists of three parts, namely a power supply assembly, an atomizing assembly and a

25 liquid storage device. Since the e-liquid in the liquid storage device is a consumable, the liquid storage device must be replaced frequently during use by the consumer; the service life thereof is relatively short, the service life of the atomizing assembly is second, and the power supply assembly has the longest service

30 life, is not easily damaged and does not age easily. The atomizing assembly can be used repeatedly, effectively reducing the cost of use. It can of course be appreciated that if the atomizing assembly is

35 damaged, it can also be replaced with a new atomizing assembly matching the power supply assembly. The structure and principles of use of the atomizer described above, the electronic cigarette in which the

atomizer is used, and the replaceable liquid storage device are expounded further below by way of particular embodiments.

Referring to Figs. 1 and 2, this embodiment provides an atomizer for an electronic cigarette, the atomizer mainly comprising two parts, a liquid storage device 100 and an atomizing assembly 200 which are detachably connected together; Fig. 1 and Fig. 2 show the external structures of the liquid storage device 100 and atomizing assembly 200, respectively. The liquid storage device 100 comprises a housing 101 and a mouthpiece 102 located at one end of the housing 101; the mouthpiece 102 and housing 101 are integrally formed by processing, and a chamber for storing e-liquid is provided inside the housing 101. In a preferred solution of this embodiment, the housing 101 is made of transparent material, e.g. glass or transparent plastic; the user can observe how much e-liquid remains inside through the housing 101, and a scale for showing the amount of e-liquid remaining is also provided on the housing 101. The other end of the housing 101 is an open end 103; the atomizing assembly 200 is detachably connected to the open end 103, and a rotary component 106 is provided inside the open end 103. In a normal state, the rotary component 106 is used to seal the e-liquid inside the liquid storage device 100; only when the atomizing assembly 200 is connected to the open end 103, will the rotary component 106 be driven to rotate, such that the e-liquid inside the liquid storage device 100 flows smoothly into the atomizing assembly 200.

The atomizing assembly 200 comprises an outer sleeve 201; inside the outer sleeve 201 are provided an atomizing chamber and an atomizing unit disposed in the atomizing chamber. The atomizing unit is used for atomizing e-liquid to form an aerosol for a person to inhale; the specific structure of the atomizing unit is described below. A connection part 202 for connecting

to the liquid storage device 100 is provided on the atomizing assembly 200, with a liquid inlet 203 in communication with the atomizing chamber being provided on the connection part 202; in this embodiment, there are two liquid inlets 203, arranged symmetrically with respect to each other. The connection part 202 is suited to being inserted into the open end 103 of the liquid storage device 100 and then rotated by a predetermined angle to form an engagement connection with the liquid storage device 100, and during rotation can drive the rotary component 106 to rotate, releasing the e-liquid inside the liquid storage device 200, so that e-liquid enters the liquid inlets 203. The specific structure of rotational engagement formed between the liquid storage device 100 and the connection part 202 is described below.

A threaded sleeve 207 is provided on the other end of the atomizing assembly 200 opposite the connection part 202; the atomizing assembly 200 can be connected to the power supply assembly by means of the threaded sleeve 207 so as to assemble the electronic cigarette. Since the atomizing assembly 200 and power supply assembly can both be used for a relatively long time, when the e-liquid in the liquid storage device 100 is used up, all that need be done is to replace the liquid storage device 100; there is no need to discard the entire atomizer. This greatly reduces the cost of use for the consumer, while also reducing the environmental pollution caused by discarding an entire atomizer.

Now referring to Figs. 2 and 3, a connecting ring 104 is fixed to the open end 103 of the liquid storage device 100. The cross section of the connection ring 104 is substantially circular, and the rotary component 106 is received in the connecting ring 104 so as to be capable of relative rotation. At least one engaging protrusion 205 is provided on a sidewall of the connection part 202. In this embodiment, there are specifically two engaging protrusions 205, arranged

symmetrically with respect to a centre axis of the atomizing assembly 200. On an inner wall of the connection ring 104 are provided guide slots 105 for the engaging protrusions 205 to be inserted in, and
5 inwardly extending steps 107; the steps 107 are configured to form an engagement connection with the engaging protrusions 205. The guide slots 105 are provided in an axial direction of the liquid storage device 100, are also two in number, and are provided in
10 positions corresponding to the engaging protrusions 205; the steps 107 are arc-shaped projections disposed at an inner edge of the connection ring 104.

A seal 109 having a liquid outlet 110 is provided on the open end 103; the seal 109 is used to seal the
15 e-liquid inside the liquid storage device 100, e-liquid only being able to flow out from inside the liquid outlet 110. Corresponding to the liquid inlets 203, there are also two liquid outlets 110 in this embodiment; it can of course be appreciated that there
20 may also be one or more than two liquid outlets 110. A top end face of the rotary component 106 which can rotate together with the connection part 202 abuts the seal 109, for the purpose of closing the liquid outlets 110, and will only open the liquid outlets 110 when
25 rotated to a specific position.

In an example, the arrangement is such that when the connection part 202 is inserted into the open end 103 of the liquid storage device 100, and is rotated a predetermined angle to couple with the atomizing
30 assembly 200 by snap-fit, the rotary component 106 is driven to rotate to a position where the e-liquid in the liquid storage device 100 flows to the liquid inlets 203. A detailed structure of the snap-fit connection between the liquid storage device 100 and
35 the atomizing assembly 200 will be described later. For example the steps 107 are configured for engaging with the protrusions 205 to form a snap-fit connection.

The process of assembling the various components of the liquid storage device 100 will be presented below. During assembly, first of all the rotary component 106 is positioned inside the connection ring 104; notches 118 of the same width as the guide slots 105 are provided on a sidewall of the rotary component 106, and during positioning the notches 118 must be aligned with the guide slots 105, so that the engaging protrusions 205 can pass through the guide slots 105 and extend into the notches 118, to enable joint motion of the rotary component 106 and the connection part 202. Then the seal 109 is fitted tightly against the rotary component 106 and installed in a fixed manner on the connection ring 104; specifically, a locating post 108 is provided on a sidewall on the connection ring 104, a matching locating slot 112 is provided on a sidewall of the seal 109, and connection of the connection ring 104 to the seal 109 is accomplished by inserting the locating post 108 into the locating slot 112. Finally, the connection ring 104 is inserted into the open end 103 of the housing 101 and fitted in a fixed manner, so that the sealing action of the seal 109 on the open end 103 is realized. In this embodiment, the connection ring 104 is fitted to the open end 103 of the housing 101 by an interference fit.

In a preferred solution of this embodiment, at least one projection 204 is provided on an end face of the connection part 202. There are preferably two projections 204 in this embodiment. The liquid inlets 203 are provided on these projections 204, accommodating holes 114 adapted in shape to the projections 204 are provided on the rotary component 106, and when the connection part 202 is inserted into the open end 103 of the liquid storage device 100, the projections 204 can extend into the accommodating holes 114 and abut the seal 109; the projections 204 extending into the accommodating holes 114 can also drive the rotary component 106 to rotate. It is easy to

understand that during rotation of the rotary component 106, the accommodating holes 114 and the liquid inlets 203 on the projections 204 always correspond to each other in the same position. When the connection part 202 is located in an initial position just after insertion into the open end 103, the liquid outlets 110 on the seal 109 are staggered with respect to the liquid inlets 203 and the accommodating holes 114; at this time, other solid parts of the rotary component 106 seal the liquid outlets 110. Only when the connection part 202 drives the rotary component 106 to rotate to an engaged position, will the liquid outlets 110 be positionally aligned and linked with the liquid inlets 203.

Referring to Fig. 4 in conjunction with Fig. 3, a projecting locating part 117 is provided on the outside of the rotary component 106; the locating part 117 is a small lug or projecting post which projects from an outer wall. Locating slots 122 and 121 matching the locating part 117 are provided on the inside of the connection ring 104 to correspond to the initial position of insertion of the connection part 202 and the engaged position, respectively. During rotation, the locating part 117 will switch between locating slot 122 and locating slot 121, and when the locating part rotates to locating slot 122 or locating slot 121, there will be an obvious feeling in the fingers. Preferably, the locating part 117 is located on an elastic arm 116, with relatively small notches between the elastic arm 116 and the rotary component 106, so that when the locating part 117 disengages from locating slot 122 or locating slot 121, the elastic arm 116 can deform somewhat. In a preferred solution of this embodiment, locating slot 122 and locating slot 121 which correspond to the initial position and the engaged position form an arc angle of 90 degrees on an inside wall, i.e. rotation of the connection part 202

from the initial position to the engaged position requires 90 degrees of rotation.

There follows a description relating to the initial position and engaged position of the connection part 202 during rotation. Referring to Fig. 4, a limit position 120 which is slightly higher in an axial direction than the step 107 is provided on the step 107 of the connection ring 104; a limit position 119 is also provided correspondingly on an outer wall of the rotary component 106. When the engaging protrusion 205 on the connection part 202 is inserted into the guide slot 105 and has not yet been rotated, this is the initial position. When the connection part 202 has driven the rotary component 106 to rotate therewith by 90 degrees, limit position 119 reaches limit position 120 and there is mutual restriction, i.e. the limit position 120 can prevent over-rotation of the connection part 202. At the same time, the locating part 117 falls into the locating slot 121, at which time the connection part 202 reaches the engaged position; in this state, the liquid outlets 110 are linked with the liquid inlets 203. When the connection part 202 rotates in the opposite direction and returns to the initial position, the rotary component 106 rotates by 90 degrees again so as to block the liquid outlets 220. It must be explained that it is possible for no limit position 120 to be provided on the step 107 or for the connection part 202 to pass the limit position during rotation, i.e. when the connection part 202 needs to be unscrewed, it may not need to be rotated in reverse, rather it may be rotated by a further 90 degrees in the screw-in direction to reach the initial position so as to be detached from the liquid storage device.

Now referring to Fig. 3, in order to further enhance the sealing effect during rotation, an annular sealing cushion 111 is provided on an edge of the liquid outlet 110, on that end face of the seal 109

which abuts the rotary component 106. In this embodiment, the entire seal 109 is preferably made of silicone rubber material; the sealing cushion 111 and the seal 109 form a one-piece structure, and the
5 sealing cushion 111 projects from that end face of the seal 109 which abuts the rotary component 106. When the rotary component 106 blocks the liquid outlet 110, the sealing cushion 111 abuts an end face of the rotary component 106 elastically. When the liquid outlet 110
10 is aligned with the liquid inlet 203, the sealing cushion 111 abuts an end face of the projection 204 elastically, to ensure that no leakage of liquid occurs in any state.

There follows a description of a gas flow channel
15 for discharging the aerosol in the atomizing assembly 200. Referring to Fig. 3, a mouthpiece 102 which is integrally formed with the housing 101 of the liquid storage device 100 is provided on the liquid storage device 100. A gas guide tube 123 in communication with
20 the mouthpiece 102 is also provided inside the liquid storage device 100; the gas guide tube 123 also forms a one-piece structure with the housing 101, and an aerosol generated in the atomizing chamber 209 can pass through the gas guide tube 123 and be sucked out
25 through the mouthpiece 102. It can of course be appreciated that the gas guide channel may also be formed outside the liquid storage device 100.

Preferably, a gas flow outlet 206 in communication with the atomizing chamber 209 is provided in the
30 centre of the connection part 202, while an axial tube part 113 extending axially is provided in the centre of the seal 109, the axial tube part 113 forming a one-piece structure with the seal 109, and the gas flow outlet 206 being in communication with the gas guide
35 tube 123 via the axial tube part 113. A rotation shaft hole 115 is provided in the centre of the rotary component 106; the rotary component 106 is fitted round the axial tube part 113 by means of the rotation shaft

hole 115, and the rotation shaft hole 115 is in communication with the accommodating holes 114 on two sides. The two liquid outlets 110 on the seal 109 are arranged symmetrically with respect to a centre axis of the axial tube part 113; driven by the connection part 202, the rotary component 106 can rotate around the centre axis of the axial tube part 113.

Referring to Figs. 5 and 6, these disclose the internal structure of the atomizing assembly 200. The atomizing assembly 200 comprises the outer sleeve 201, an atomizing chamber 209 is formed inside the outer sleeve 201, and the atomizing unit is provided in the atomizing chamber 109. In this embodiment, the atomizing unit comprises a liquid guide body 210 and a heating element 211 in contact with the liquid guide body 210; the liquid guide body 210 has two ends and a microporous internal structure, and e-liquid can gradually seep through the liquid guide body 210 by the capillary action arising from the microporous structure. The heating element 211 is specifically an electrical heating wire wound helically in a middle position of the liquid guide body 210. The liquid guide body 210 is installed in a fixed manner on a seat 213, the two ends thereof being close to the liquid inlets 203 and used for absorbing e-liquid that flows in through the liquid inlets 203; the heating element 211 heats the e-liquid so that the latter evaporates to form an aerosol. The connection part 202 is located on one end of the outer sleeve 201, and the heating element 211 is aligned with the gas flow outlet 206 on the connection part 202, so the aerosol generated thereby can be smoothly discharged through the gas flow outlet 206. The threaded sleeve 207 and an electrode ring 208 are provided at the other end of the outer sleeve 201; the electrode ring 208 is sheathed inside the threaded sleeve 207 in an insulated manner, the electrode ring 208 being of a hollow structure, so air can enter the atomizing chamber 209 from the interior

of the electrode ring 208. A threaded connection can be established between the atomizing assembly 200 and a power supply assembly by means of the threaded sleeve 207, and the electrode ring 208 and threaded sleeve 207, as two contact electrodes, are correspondingly connected to positive/negative electrodes on the power supply assembly, while the heating element 211 is electrically connected to the threaded sleeve 207 and the electrode ring 208.

10 In a preferred solution in this embodiment, a layer of a liquid storage body 212 made of fibrous material is also provided between an end of the liquid guide body 210 and the liquid inlets 203. Both ends of the liquid guide body 210 are in contact with the liquid storage body 212, and the liquid storage body 212 can adsorb e-liquid flowing in through the liquid inlets 203 and temporarily store a certain volume of e-liquid; e-liquid adsorbed on the liquid storage body 212 can be gradually guided to the heating element 211 through the liquid guide body 210. The effect of additionally providing a layer of liquid storage body 212 below the liquid inlets 203 is to prevent an excessive amount of e-liquid from flowing into the atomizing chamber 209. In another, alternative solution, no liquid storage body 212 need be provided between the ends of the liquid guide body 210 and the liquid inlets 203; instead, the two ends of the liquid guide body 210 extend directly into the liquid inlets 203, and completely fill the space of the liquid inlets 203.

Referring to Figs. 7 and 8, these show schematic diagrams of the states of various components when the connection part is in the initial position and the engaged position respectively. During rotation, the positions of the housing 101 on the liquid storage device 100 and of the seal 109 and connection ring 104 do not change; the only change is in the position, in the circumferential direction, of the rotary component

106 following the connection part 202. It can be seen from Fig. 7 that when the engaging protrusions 205 on the connection part 202 can be inserted along the guide slots 105, the positions of the projections 204
5 precisely correspond to the accommodating holes 114 on the rotary component 106 and extend into the accommodating holes 114; at this time, the positions of the accommodating holes 114 are staggered with respect to the positions of the liquid outlets 110, and an end
10 face 1061 of the rotary component 106 tightly abuts the liquid outlets 110 to seal the e-liquid. It can be seen from Fig. 8 that when the connection part 202 has been rotated by 90 degrees, the engaging protrusions 205 form an engagement connection with the steps 107, and
15 at the same time the rotary element 106 has also rotated by 90 degrees, so that the accommodating holes 114 are aligned with the liquid outlets 110, the liquid outlets 110 are opened, and at the same time the projections 204 abut the liquid outlets 110, so that
20 the liquid outlets 110 are linked with the liquid inlets 203. When the connection part 202 rotates back to the initial position, the connection part 202 and the rotary component 106 return to the state shown in Fig. 7.

25 Referring to Fig. 9, this embodiment also provides an electronic cigarette, which only needs to consist of three parts, namely a liquid storage device 100, an atomizing assembly 200 and a power supply assembly 300 which are connected in sequence, to form a rod shape
30 overall. As stated above, the atomizing assembly 200 has the connection part 202 at one end and the threaded sleeve 207 at the other end; an engagement connection is formed between one end of the atomizing assembly 200 and the open end 103 of the liquid storage device 100
35 by means of the connection part 202. The first end of the atomizing assembly 200 is engaged with the open end 103 of the liquid supply 103 by snap-fit. A threaded part 301 is provided on one end of the power supply

assembly 300, a threaded connection is formed between the other end of the atomizing assembly 200 and the threaded part 301 by means of the threaded sleeve 207, and at the same time the power supply assembly 300
5 provides an operating power source for the atomizing unit inside the atomizing assembly 200.

The above embodiments are merely a portion of embodiments of this description which are given to facilitate understanding of the content of the
10 invention. They do not place any limitations on the technical solution of the present invention, and do not represent an exhaustive list of all feasible solutions. Thus, any improvements or equivalent substitutions made to the structure, flow or steps of the present
15 invention shall be understood to be included in the scope of protection thereof.

According to an aspect of the invention, there is provided an atomizer, comprising a liquid storage
20 device which is used for storing e-liquid and has an open end, and an atomizing assembly which is detachably connected to the open end, the atomizing assembly comprising an atomizing chamber and an atomizing unit disposed in the atomizing chamber, the atomizing unit
25 being used to atomize e-liquid to form an aerosol for a person to inhale, characterised in that the atomizing assembly has a connection part for connecting to the liquid storage device, a liquid inlet in communication with the atomizing chamber is provided on the
30 connection part, a seal having a liquid outlet is provided on the open end, and the connection part is suited to being inserted into the open end of the liquid storage device and then rotated by a predetermined angle so as to form an engagement
35 connection with the liquid storage device; a rotary component capable of rotating together with the connection part is also provided on the open end, the rotary component abutting the seal; when rotating from

an initial position of insertion to an engaged position, the connection part can drive the rotary component to rotate so as to link the liquid outlet to the liquid inlet; when rotating back to the initial position, the connection part can drive the rotary component to rotate so that the rotary component blocks the liquid outlet.

According to a further aspect of the invention, there is provided a replaceable liquid storage device that is connected to an atomizing assembly, the interior of the liquid storage device being used to store e-liquid, characterised in that the liquid storage device has an open end on which are provided a seal having a liquid outlet and a rotary component which abuts the seal; when the liquid storage device is not connected to the atomizing assembly, the rotary component is used to block the liquid outlet so as to seal e-liquid inside; when the liquid storage device is connected to the atomizing assembly, the rotary component can rotate and open the liquid outlet.

An aspect of the invention further provides an atomizing assembly for use in an atomizer as described herein.

Preferably the liquid storage device and the atomizing assembly are separate components, each replaceable by a user, preferably independently of each other. Preferably in an electronic cigarette the liquid storage device and the atomizing assembly are each replaceable by a user. The liquid storage device, the atomizing assembly and the power supply assembly may each have different service lives. The liquid storage device and the atomizing assembly may be each configured to be replaceable by a user independently of each other and of the power supply assembly. The service life of the liquid storage device may be

relatively short compared to the service lives of the atomizing assembly and the power supply assembly, the service life of the atomizing assembly may be longer than the service life of the liquid storage device, and
5 the service life of the power supply assembly may be longer than the service life of the atomizing assembly. The atomizing assembly is preferably detachably connected to the power supply assembly, for example by a threaded sleeve.

Claims

1. An atomizer, comprising a liquid storage device
5 which is usable for storing e-liquid and has an open
end, and an atomizing assembly which is detachably
connected to the open end, the atomizing assembly
comprising an atomizing chamber and an atomizing unit
10 disposed in the atomizing chamber, the atomizing unit
being used to atomize e-liquid to form an aerosol for a
person to inhale, wherein the atomizing assembly has a
connection part for connecting to the liquid storage
device, a liquid inlet in communication with the
15 atomizing chamber is provided on the connection part, a
seal having a liquid outlet is provided on the open
end, and the connection part is suited to being
inserted into the open end of the liquid storage device
and then rotated by a predetermined angle so as to form
20 an engagement connection with the liquid storage
device; a rotary component capable of rotating together
with the connection part is also provided on the open
end, the rotary component abutting the seal; when
rotating from an initial position of insertion to an
engaged position, the connection part can drive the
25 rotary component to rotate so as to link the liquid
outlet to the liquid inlet; when rotating back to the
initial position, the connection part can drive the
rotary component to rotate so that the rotary component
blocks the liquid outlet.

30

2. The atomizer as claimed in claim 1, wherein at least
one projection is provided on an end face of the
connection part, the liquid inlet being provided on the
projection, an accommodating hole adapted in shape to
35 the projection is provided on the rotary component, and
when the connection part is inserted into the open end
of the liquid storage device, the projection can extend
into the accommodating hole and abut the seal.

3. The atomizer as claimed in claim 1, wherein a connection ring is provided in a fixed manner on the open end of the liquid storage device, the rotary component is received in the connection ring so as to be capable of relative rotation, at least one engaging protrusion is provided on a sidewall of the connection part, on an inner wall of the connection ring are provided a guide slot for the engaging protrusion to be inserted in and an inwardly extending step, and the step is configured to form an engagement connection with the engaging protrusion.

4. The atomizer as claimed in claim 3, wherein a projecting locating part is provided on the outside of the rotary component, and locating slots matching the locating part are provided on the inside of the connection ring to correspond to the initial position of insertion of the connection part and the engaged position, respectively.

5. The atomizer as claimed in claim 4, wherein the locating slots which correspond to the initial position and the engaged position form an arc angle of 90 degrees on an inside wall of the connection ring.

6. The atomizer as claimed in claim 1, wherein an annular sealing cushion is provided on an edge of the liquid outlet, on an end face of the seal abutting the rotary component.

7. The atomizer as claimed in claim 1, wherein a mouthpiece which is integrally formed with the housing of the liquid storage device is provided on the liquid storage device, a gas guide tube in communication with the mouthpiece is also provided inside the liquid storage device, and an aerosol generated in the

atomizing chamber can pass through the gas guide tube and be sucked out through the mouthpiece.

8. The atomizer as claimed in claim 7, wherein a gas
5 flow outlet in communication with the atomizing chamber
is provided in the centre of the connection part, while
an axial tube part extending axially is provided in the
centre of the seal, the gas flow outlet being in
communication with the gas guide tube via the axial
10 tube part.

9. The atomizer as claimed in claim 8, wherein a
rotation shaft hole is provided in the centre of the
rotary component, and the rotary component is fitted
15 round the axial tube part by means of the rotation
shaft hole.

10. The atomizer as claimed in claim 1, wherein the
atomizing unit comprises a liquid guide body and a
20 heating element in contact with the liquid guide body,
an end of the liquid guide body being used to transport
e-liquid flowing in through the liquid inlet, and the
heating element heating the e-liquid so that the latter
evaporates to form an aerosol.

25 11. The atomizer as claimed in claim 10, wherein a
layer of a liquid storage body made of fibrous material
is also provided between an end of the liquid guide
body and the liquid inlet.

30 12. An electronic cigarette, comprising an atomizer and
a power supply assembly, wherein the atomizer is the
atomizer as claimed in any one of claims 1 to 11; the
power supply assembly is connected to the atomizing
35 assembly and provides a power source for the internal
atomizing unit.

13. A replaceable liquid storage device for connection to an atomizing assembly, the interior of the liquid storage device being usable to store e-liquid, wherein the liquid storage device has an open end on which are
5 provided a seal having a liquid outlet and a rotary component which abuts the seal; when the liquid storage device is not connected to the atomizing assembly, the rotary component is used to block the liquid outlet so as to seal e-liquid inside; when the liquid storage
10 device is connected to the atomizing assembly, the rotary component can rotate and open the liquid outlet.

14. The liquid storage device as claimed in claim 13, wherein a housing of the liquid storage device is made
15 of transparent material.

15. A liquid storage device for use in an atomizer according to any one of claims 1 to 11.

20 16. An atomizing assembly for use in an atomizer according to any one of claims 1 to 11.

17. An atomizing assembly for detachable connection to a liquid storage device, the atomizing assembly
25 comprising an atomizing chamber and an atomizing unit disposed in the atomizing chamber, the atomizing unit being used to atomize e-liquid supplied from the liquid storage device to form an aerosol for a person to inhale, wherein the atomizing assembly has a connection
30 part for connecting to the liquid storage device, a liquid inlet in communication with the atomizing chamber is provided on the connection part, and the connection part is suited to being inserted into an open end of the liquid storage device and then rotated
35 by a predetermined angle so as to form an engagement connection so as to link a liquid outlet of the liquid storage component to the liquid inlet.

18. An atomizer, comprising:

a liquid supply configured for storing tobacco liquid,
the liquid supply having an open end; and

an atomizing assembly detachably connected to the open
5 end, the atomizing assembly comprising an atomizing
cavity and an atomizing unit, the atomizing unit being
configured for heating the tobacco liquid to form
aerosol;

wherein the atomizing assembly comprising a connector
10 configured for connecting with the liquid supply, the
connector defines a liquid inlet, the open end is
provided with a sealing component having a liquid
outlet, the connector is engaged in the open end to
form a snap-fit connection after the connector is
15 rotated a predetermined angle; the liquid supply
further comprises a rotation component abutting against
the sealing component, the connector is capable of
driving the rotation component to rotate between a
first position where the rotation component blocks the
20 liquid outlet, and a second position where the liquid
outlet communicates with the liquid inlet, when the
connector is engaged in the open end, the rotation
component is in the second position.

25 19. The atomizer of claim 18, wherein the connector
comprises a protrusion on a surface thereof, the liquid
inlet is defined in the protrusion, the rotation
component defines a receiving hole, the receiving hole
matches with the protrusion in shape, the protrusion is
30 received hole, and abuts against the sealing component.

20. The atomizer of claim 18 or claim 19, wherein the
liquid supply further comprises a connecting ring
fixedly mounted in the open end, the rotation component
35 is rotatably received in the connecting ring, the
connector has a protruding part on a sidewall thereof;
the connecting ring comprises two step portions
extending inwards and a guiding slot for insertion of

the protruding part, and the step portion is configured for engaging with the protruding part to form the snap-fit connection.

5 21. The atomizer of claim 20, wherein the rotation component comprises a protruding positioning part on a side surface thereof, and the connecting ring defines a first positioning groove and a second positioning groove in an inner surface thereof; when the rotation
10 component is in the first position, the positioning part is coupled with the first positioning groove; when the rotation component is in the first position, the positioning part is engaged the first positioning groove.

15 22. The atomizer of claim 21, wherein the first positioning groove and the second positioning groove form an arc angle of 90 degrees on an inner surface of the connecting ring.

20 23. The atomizer of any of claims 18 to 22, wherein the sealing component comprises a ring-shaped sealing gasket on a surface abutting against the rotation component, and the sealing gasket surrounds an edge of
25 the liquid outlet.

24. The atomizer of any of claims 18 to 23, wherein the liquid supply comprises a housing, a mouthpiece, and an air pipe, the mouthpiece is integrally formed with the
30 housing, and the air pipe communicates with the mouthpiece, so that the aerosol formed in the atomizing cavity can reach the mouthpiece via the air pipe.

25. The atomizer of claim 24, wherein the connector defines an air outlet in a central part thereof, the
35 air outlet communicates with the atomizing cavity, the sealing component comprises a tube extending along an

axial direction thereof, and the air outlet communicates with the air pipe via the tube.

26. The atomizer of claim 25, wherein the rotation
5 component defines a through hole in a central part thereof, and the rotation component is coupled to the sealing component in such a manner that the tube extend through the through hole.

10 27. The atomizer of any of claims 18 to 26, wherein the atomizing unit comprises a liquid conducting body and a heating element in contact with the liquid conducting body, ends of the liquid conducting body is configured for absorbing tobacco liquid flowed from the liquid
15 inlet, and the heating element is configured for heating the tobacco liquid to form aerosol.

28. The atomizer of claim 27, wherein the liquid supply further comprises a liquid absorbing body sandwiched
20 between ends of the liquid conducting body and the liquid inlet, and the liquid absorbing body is made of fibrous material.

29. An electronic cigarette, comprising:
25 an atomizer according to any of claims 18 to 28; and a power supply configured for providing the atomizer power.

30. The electronic cigarette of claim 29, wherein the
30 connector comprises a protrusion on a surface thereof, the liquid inlet is defined in the protrusion, the rotation component defines a receiving hole, the receiving hole matches with the protrusion in shape, the protrusion is received hole, and abuts against the
35 sealing component.

31. The electronic cigarette of claim 30, wherein the liquid supply further comprises a connecting ring

fixedly mounted in the open end, the rotation component is rotatably received in the connecting ring, the connector has a protruding part on a sidewall thereof; the connecting ring comprises two step portions
5 extending inwards and a guiding slot for insertion of the protruding part, and the step portion is configured for engaging with the protruding part to form the snap-fit connection.

10 32. The electronic cigarette of claim 31, wherein the rotation component comprises a protruding positioning part on a side surface thereof, and the connecting ring defines a first positioning groove and a second positioning groove in an inner surface thereof; when
15 the rotation component is in the first position, the positioning part is coupled with the first positioning groove; when the rotation component is in the first position, the positioning part is engaged the first positioning groove.

20 33. The electronic cigarette of claim 32, wherein the first positioning groove and the second positioning groove form an arc angle of 90 degrees on an inner surface of the connecting ring.

25 34. A liquid supply for storing tobacco liquid, the liquid supply having an open end, the liquid supply further comprising:

30 a sealing component in the open end, the sealing component having a liquid outlet; and

a rotation component abutting against the sealing component, wherein the rotation component is capable of rotating relative to the sealing component between a first position where the rotation component blocks the
35 liquid outlet, and a second position where the liquid outlet communicates with the liquid inlet.

35. The liquid supply according to claim 17, wherein the liquid supply comprises a housing made of transparent material.

- 5 36. The liquid supply device according to claim 34 or claim 35, wherein the liquid storage device is detachably connectable to an atomizing assembly in an electronic cigarette.

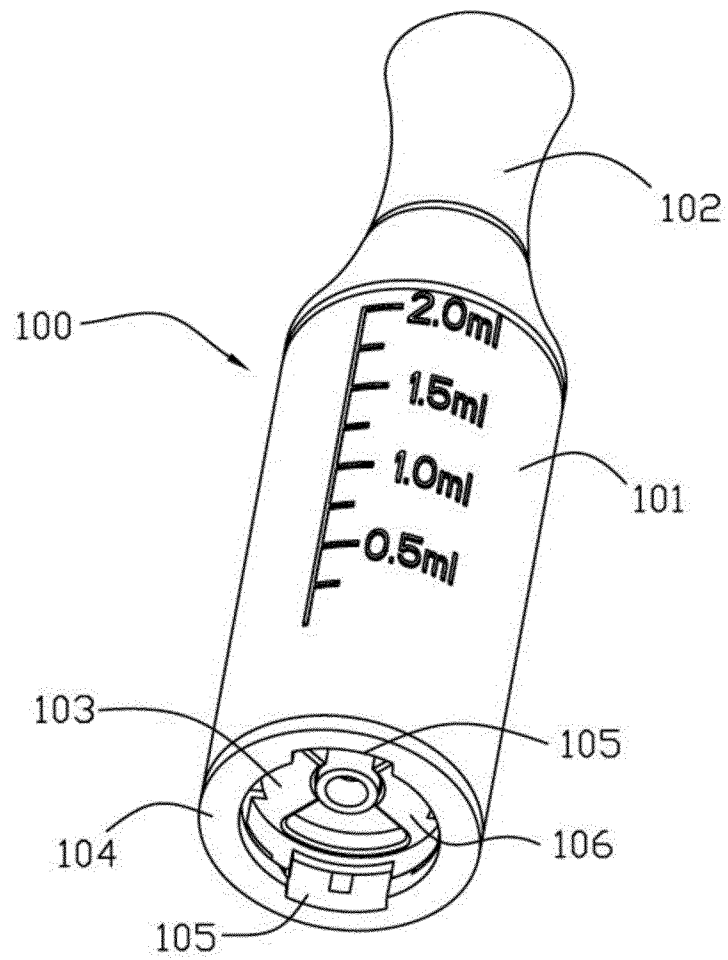


FIG. 1

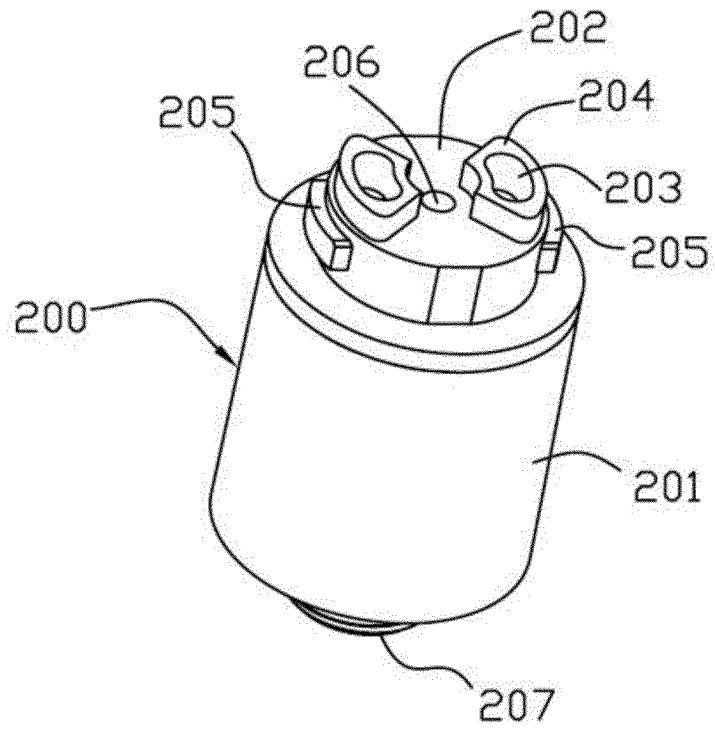


FIG. 2

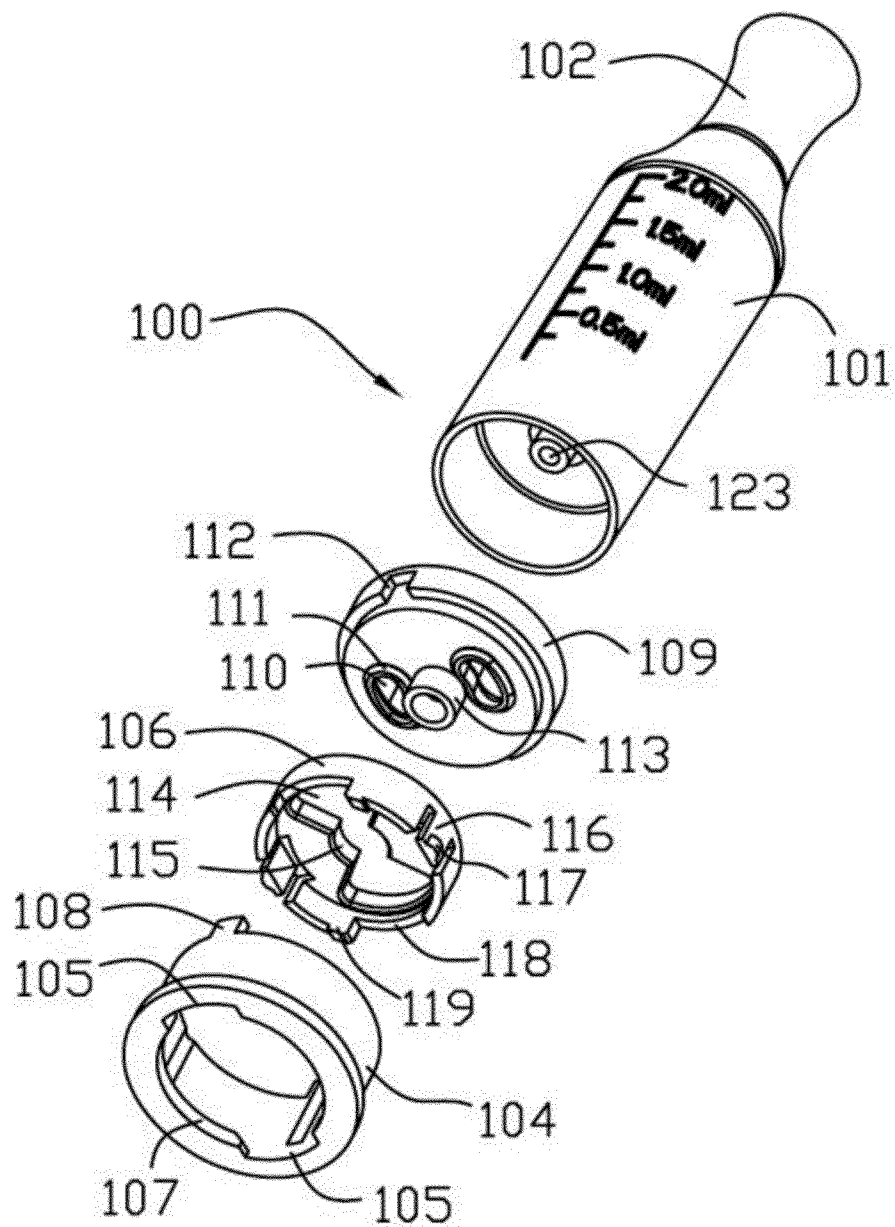


FIG. 3

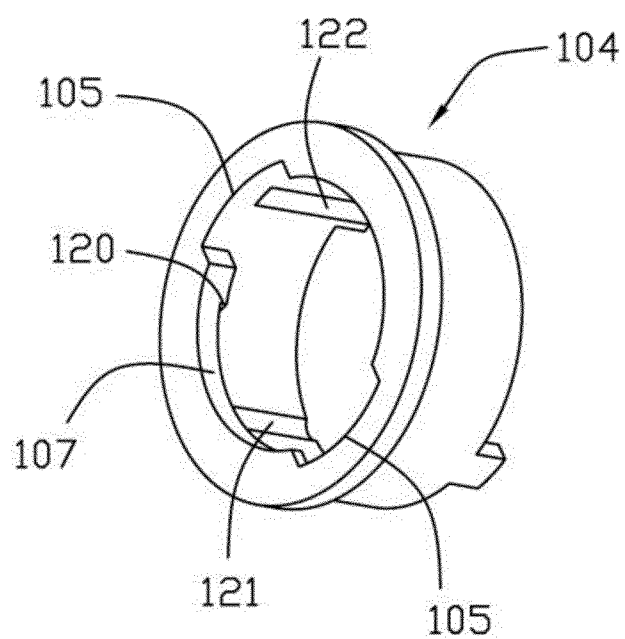


FIG. 4

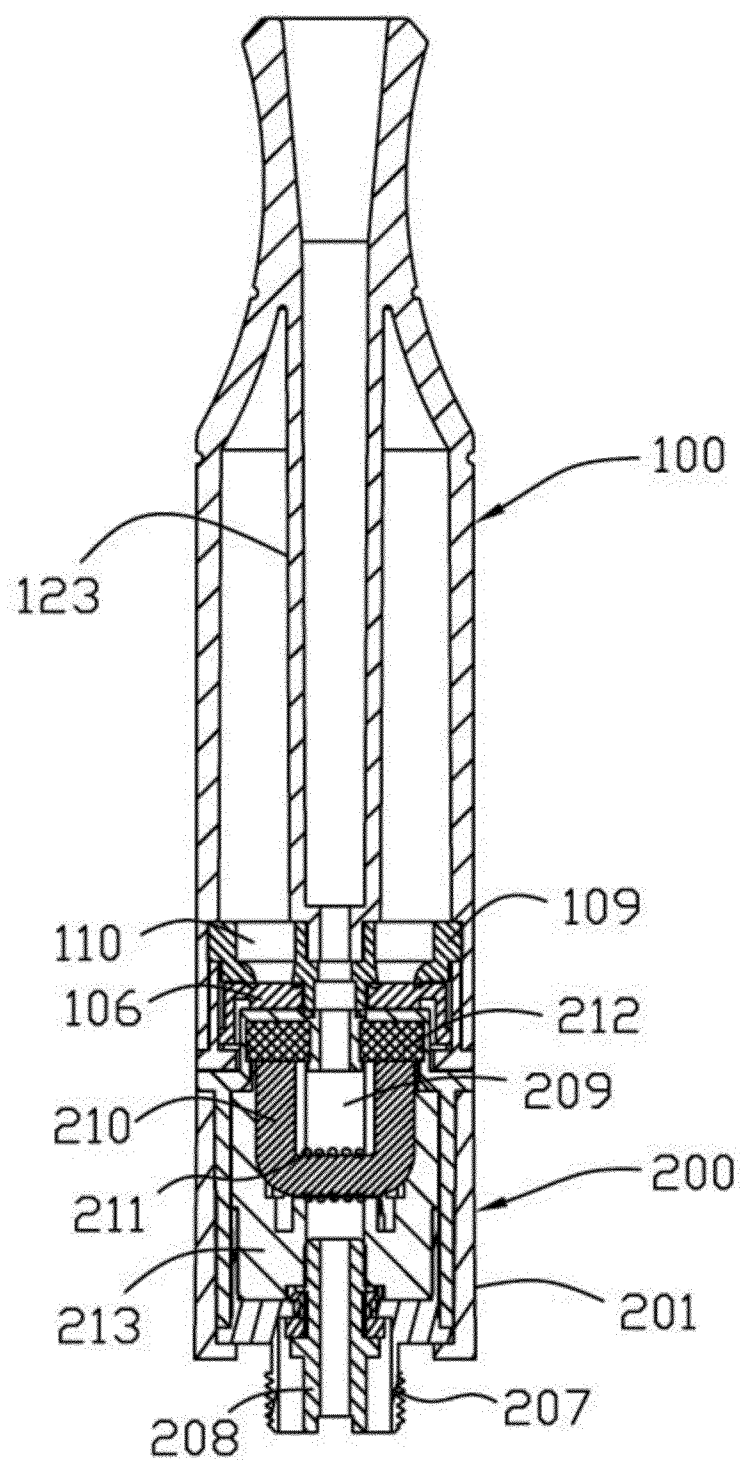


FIG. 5

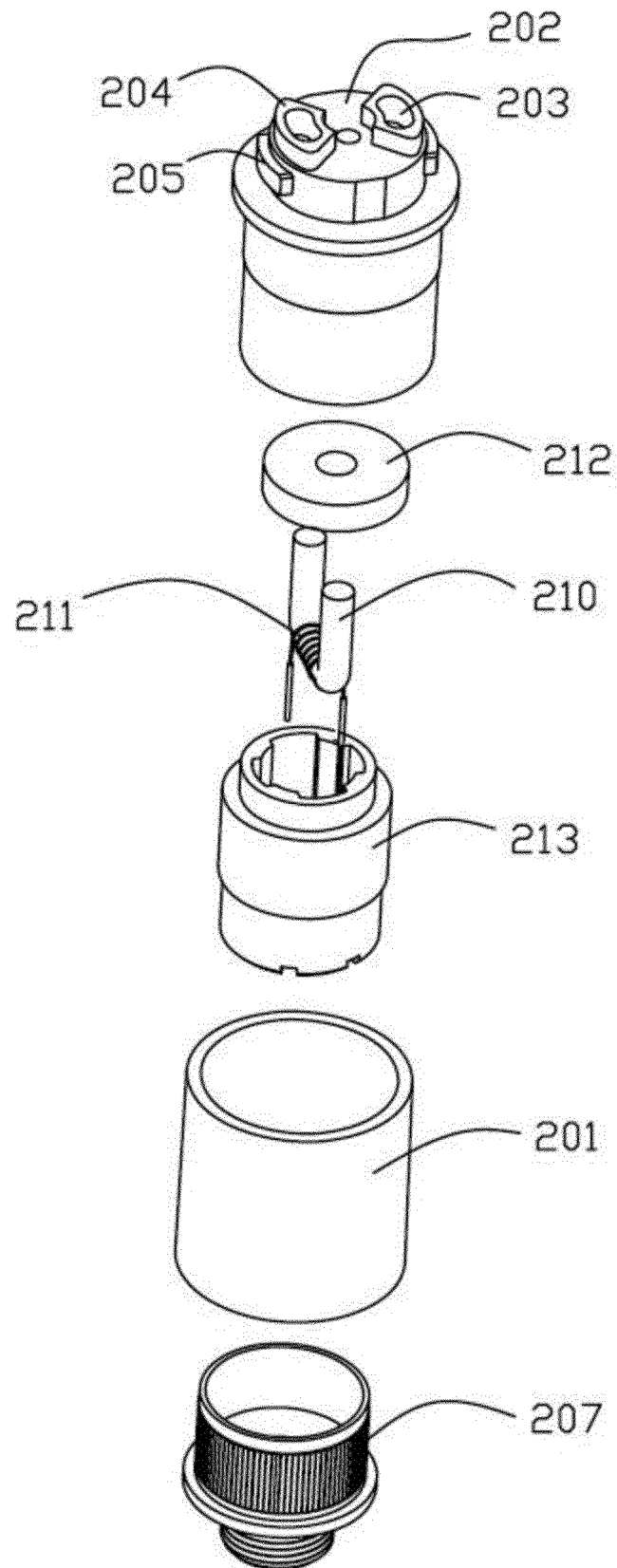


FIG. 6

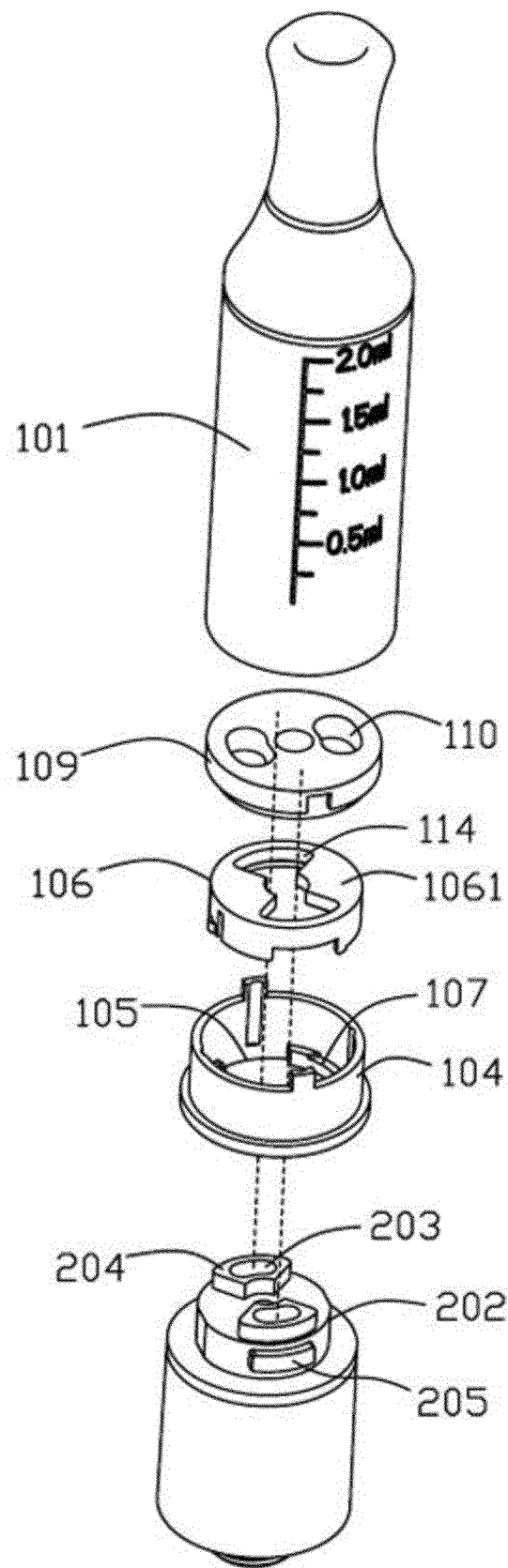


FIG. 7

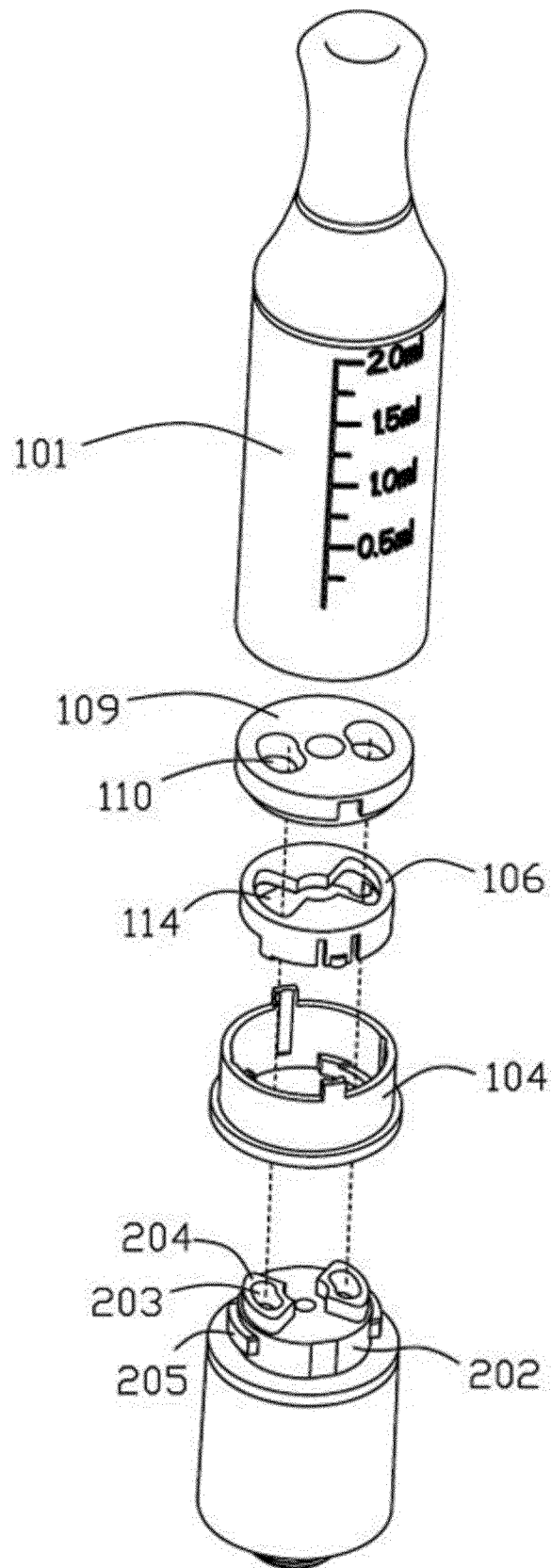


FIG. 8

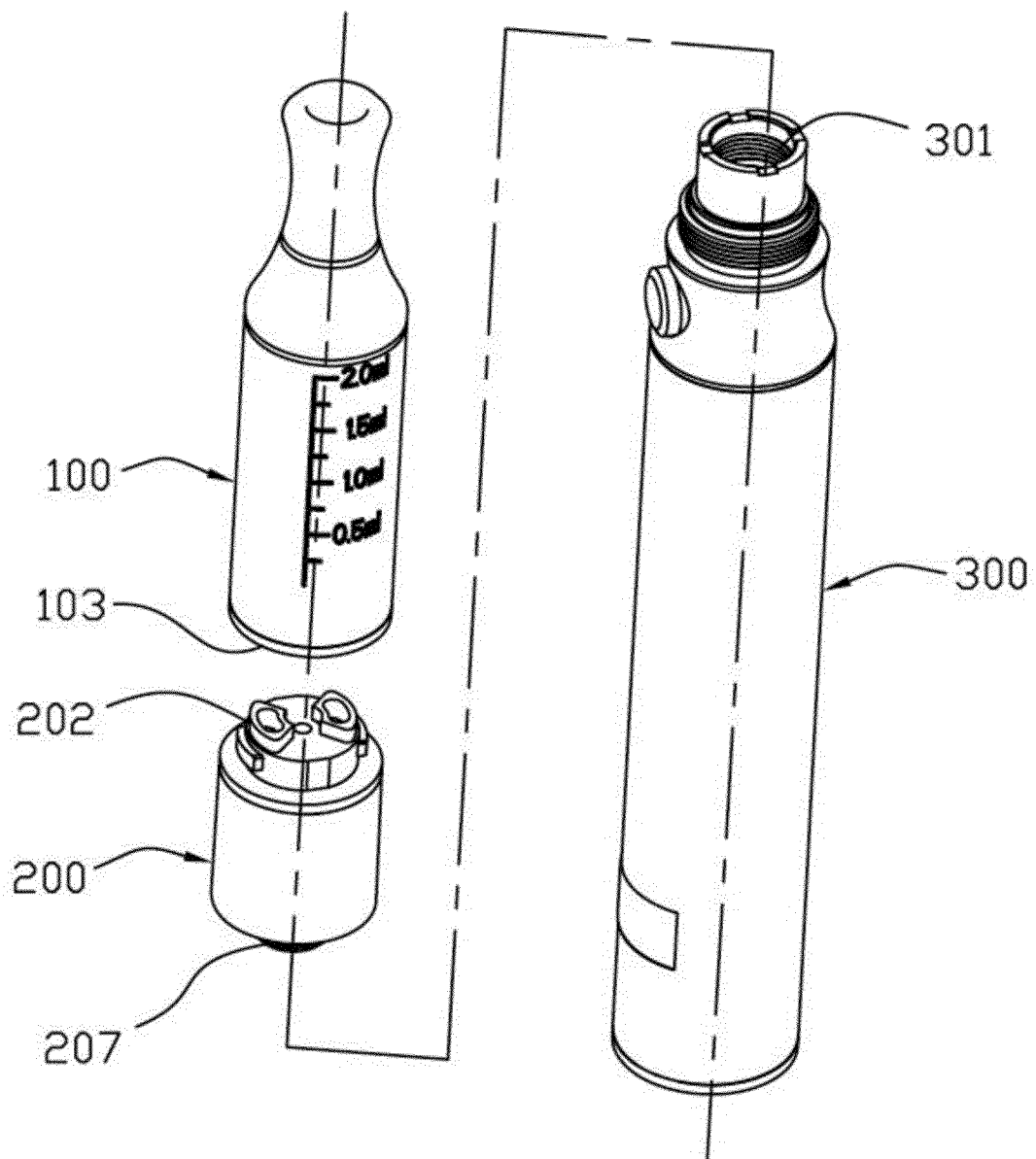


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/052439

A. CLASSIFICATION OF SUBJECT MATTER
INV. A24F47/00 B65D47/26
ADD.

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)
A24F B65D A61M

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)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	the whole document & EP 2 965 641 A1 (SHENZHEN FIRST UNION TECH CO [CN]) 13 January 2016 (2016-01-13) paragraph [0010] - paragraph [0028]	1,18
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Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

29 April 2016

Date of mailing of the international search report

31/05/2016

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Authorized officer

Koob, Michael

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/052439

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