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(54) ULTRASONIC ATOMIZER AND ELECTRONIC CIGARETTE

(57) An ultrasonic atomizer and an electronic cigarette. The ultrasonic atomizer comprises a liquid storage assembly (1), a liquid guiding assembly (2) and an atomization assembly (3). A liquid compartment (13) is provided inside the liquid storage assembly (1). The atomization assembly (3) comprises an ultrasonic atomization sheet (33). The liquid guiding assembly (2) is a ceramic liquid guiding member (21). The ultrasonic atomization sheet (33) is vertically placed. An upper section of the ceramic liquid guiding member (21) is in communication with the liquid compartment (13). A lower section of the ceramic liquid guiding member (21) directly contacts at least one atomization surface of the ultrasonic atomization sheet (33). An atomization region (331) of the ultrasonic atomization sheet (33) is exposed under the ceramic liquid guiding member (21). In the invention, a liquid storage member does not need to be provided in the atomization region (331) of the ultrasonic atomization sheet (33) because an e-liquid will directly flow to the atomization region (331) of the ultrasonic atomization sheet (33) by means of the ceramic liquid guiding member (21), such that ultrasonic atomization can be activated quickly, and a large amount of vapor can be generated.

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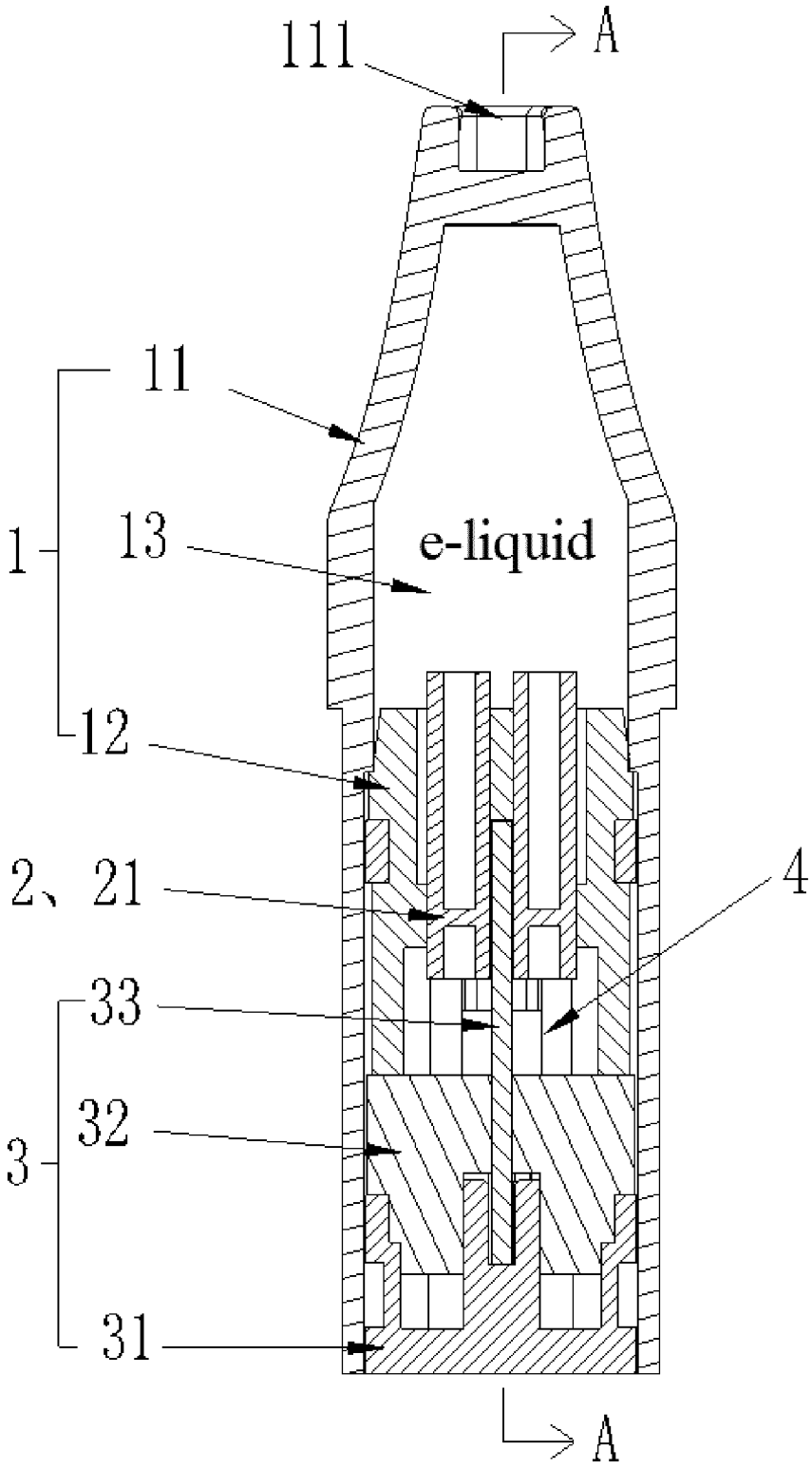

Fig. 1

Description

Field of the Invention

[0001] The present invention relates to electronic cigarettes, in particular to an ultrasonic atomizer and an electronic cigarette.

Background of the Invention

[0002] The existing electronic cigarette generally realizes ultrasonic atomization of e-liquid by means of contact between an ultrasonic atomization sheet andliquid guiding cotton. However, unstable liquid guiding rate of the liquid guiding cotton can easily lead toover-loaded or insufficient e-liquid on the atomization surface of the ultrasonic atomization sheet, which will cause insufficient atomization, so that users may inhale e-liquid particles or smell the burnt taste.

[0003] In addition, the liquid guiding cotton is arranged in an atomization region on the surface of the ultrasonic atomization sheet. When the ultrasonic atomization sheet is working continuously, the liquid guiding cotton may be scorched. Meanwhile, after the liquid guiding cotton is placed for a long time, the e-liquid soaks the atomization region, so that deposits cover the surface of the atomization region. Therefore, when the ultrasonic atomization sheet is activated, atomization of the e-liquid is slow, and the generated smoke is little.

Summary of the Invention

[0004] The technical problem to be solved by the present invention is, in view of the deficiencies in the prior art that liquid guiding cotton must be arranged in an atomization region, to provide an ultrasonic atomizer which can ensure normal operation of ultrasonic atomization without placing liquid guiding cotton in an atomization region of an ultrasonic atomization sheet, and an electronic cigarette.

[0005] In order to solve the above technical problems, the present invention provides an ultrasonic atomizer, which includes a liquid storage assembly, a liquid guiding assembly and an atomization assembly, a liquid bin being provided inside the liquid storage assembly, and the atomization assembly including an ultrasonic atomization sheet, wherein the liquid guiding assembly is a ceramic liquid guiding member, the ultrasonic atomization sheet is placed vertically, an upper section of the ceramic liquid guiding member is communicated with the liquid bin, and a lower section of the ceramic liquid guiding member is in direct contact with at least one atomization surface of the ultrasonic atomization sheet; and an atomization region ofthe ultrasonic atomization sheet is exposed under the ceramic liquid guiding member, that is, the ceramic liquid guiding member does not cover the atomization region ofthe ultrasonic atomization sheet, and the surface of the atomization region of the ultrasonic atomization sheet is not in contact with the ceramic liquid guiding member.

[0006] When the ultrasonic atomization sheet oscillates at a high frequency, the ceramic liquid guiding member will also oscillate, makinge-liquid in the liquid bin to flow to the ultrasonic atomization sheet. Because the e-liquid in the atomization region of the ultrasonic atomization sheet has the best atomization effect,thus making the heat generated in the atomization region is the most, so that the temperature of the atomization region of the ultrasonic atomization sheet is relatively high, which accelerates the atomization process of e-liquid. In addition, due to the high viscosity of e-liquid, when the ultrasonic atomization sheet is working, the e-liquid in the atomization region will produce a traction force on the e-liquid on the ceramic liquid guiding member, so that the e-liquid on the ceramic liquid guiding member is continuously and automatically drawn to the atomization region ofthe ultrasonic atomization sheet. Therefore, normal ultrasonic atomization of the e-liquid can be ensured without covering the atomization region by a liquid storage member that stores e-liquid (a flexible medium such as atomization cotton), which can reduce the phenomenon that the liquid storage member is scorched to affect the taste of vapor. Meanwhile, the ultrasonic atomization sheet of the present invention is placed vertically, so that the e-liquid will not be deposited on the atomization surface of the ultrasonic atomization sheet, the ultrasonic atomization of the ultrasonic atomization sheet is activated faster, and vapor can flow out of the atomization cavity faster, thereby improving user experience.

[0007] Further, the liquid guiding assembly includes at least two ceramic liquid guiding members, the ultrasonic atomization sheet has two atomization surfaces, and the two atomization surfaces at the upper partof the ultrasonic atomization sheet are respectively in contact with two ceramic liquid guiding members; the atomization region is provided on each of the two atomization surfaces of the ultrasonic atomization sheet, so that e-liquid can be transferred to the atomization regions on the two atomization surfaces of the ultrasonic atomization sheet by the ceramic liquid guiding members, and e-liquid in the atomization regions can be simultaneously atomized, and the atomization efficiency of the ultrasonic atomization sheet is higher.

[0008] In order to stably install the ceramic liquid guiding member, a slot is provided at the bottom of the liquid storage assembly in a vertical penetrating manner, a protrusion is provided in the slot, and the ceramic liquid guiding member is clamped and fixed in the slot by the protrusion.

[0009] Specifically, two slots are provided at the bottom of the liquid storage assembly in a vertical penetrating manner, a rib is provided between upper partsof the two slots, the lower parts of the two slots are communicated, and a protrusion is provided in each of the two slots; each of the two ceramic liquid guiding members is clamped and fixed in the corresponding slot by the corresponding

protrusion and the rib, and a contact portion for clamping the ultrasonic atomization sheet is provided between the lower sections of the two ceramic liquid guiding members.

[0010] In order that e-liquid can arrive at the ultrasonic atomization sheet as soon as possible, a liquid storage cavity communicated with the liquid bin is provided inside the upper section of the ceramic liquid guiding member.

[0011] Specifically, the liquid storage assembly includes a housing and a plug, the atomization assembly includes a sealing seat and a base that are sequentially arranged under the plug, the ceramic liquid guiding member is installed in the plug, an atomization cavity is formed between the plug, the ceramic liquid guiding member and the sealing seat, the atomization surface at the upper part of the ultrasonic atomization sheet is in direct contact with the ceramic liquid guiding member, the lower part of the ultrasonic atomization sheet is placed in the sealing seat and the base, and the atomization region of the ultrasonic atomization sheet is exposed in the atomization cavity.

[0012] The upper partof the ultrasonic atomization sheet extends into the contact portion and is in direct contact with the lower sections of the two ceramic liquid guiding members, and the atomization region ofthe ultrasonic atomization sheet is located below the contact portion, so that the ceramic liquid guiding members do not cover the atomization region ofthe ultrasonic atomization sheet.

[0013] An air outlet channel connecting a suction nozzle with the atomization cavity is provided in the liquid storage assembly, an air inlet channel connecting outside air with the atomization cavity is provided in the atomization assembly, and the air inlet channel is communicated with the air outlet channel via the atomization cavity.

[0014] In order to solve the above technical problems, the present invention further provides an electronic cigarette, which includes the ultrasonic atomizer.

[0015] Compared with the prior art, the beneficial effects of the present invention are:

1. No liquid storage member is provided in the atomization region of the ultrasonic atomization sheet,and e-liquid directly flows to the atomization region of the ultrasonic atomization sheet by the ceramic liquid guiding member, so that ultrasonic atomization can be activated quickly, and a large amount of vapor can be generated;

2. Both atomization surfaces of the ultrasonic atomization sheet of the present invention are provided with atomization regions, so that both atomization surfaces of the ultrasonic atomization sheet participate in ultrasonic atomization, thereby improving the efficiency of the ultrasonic atomization;

3. E-liquid is guided by the ceramic liquid guiding members, so that the liquid guiding rate is stable; then, the e-liquid on the ceramic liquid guiding members is continuously and automatically drawn to the atomization region ofthe ultrasonic atomization sheet by means of traction force generated by the high-frequency oscillation of the ultrasonic atomization sheet; therefore, normal ultrasonic atomization of the e-liquid can be ensured without covering the atomization region by a liquid storage member that stores e-liquid (a flexible medium such as atomization cotton), which can reduce the phenomenon that the liquid storage member is scorched to affect the taste of smoke.

Brief Description of the Drawings

[0016] In order to describe the technical solutions in the embodiments of the present invention or in the prior art more clearly, the following briefly introduces the accompanying drawings required in the description of the embodiments or the prior art. Apparently, the accompanying drawings in the following description show some embodiments of the present invention, and a person of ordinary skill in the art may still derive other drawings from these drawings without any creative effort.

FIG. 1 is a front sectional view of Embodiment 1 of an ultrasonic atomizer of the present invention.

FIG. 2 is a cross-sectional view taken along line A-A of FIG. 1, in which arrows indicate the direction of air flow.

FIG. 3 is an assembly flowchart of a ceramic liquid guiding member and an ultrasonic atomization sheet of the present invention.

FIG. 4 is a three-dimensional structural diagram of the combination of the ceramic liquid guiding member and the ultrasonic atomization sheet of the present invention.

FIG. 5 is an exploded view of the atomizer of the present invention.

[0017] In the figures:

1. Liquid storage assembly; 11. Housing; 12. Plug; 13. Liquid bin; 14. Air outlet channel; 111. Suction nozzle; 121. Slot; 122. Rib; 123. Protrusion;

2. Liquid guiding assembly; 21. Ceramic liquid guiding member; 22. Contact portion; 211. Liquid storage cavity;

3. Atomization assembly; 31. Base; 32. Sealing seat; 33. Ultrasonic atomization sheet; 34. Air inlet channel; 35. Electrode; 331. Atomization region;

4. Atomization cavity.

Detailed Description of the Embodiments

[0018] The present invention will be further described below with reference to specific preferred embodiments, but the scope of protection of the present invention is not limited thereby.

[0019] For the convenience of description, the relative positional relationships of components, such as upper, lower, left, and right, are described according to the layout direction of the accompanying drawings in the specification, and do not limit the structure of this patent application.

[0020] As shown in FIGS. 1 to 5, an ultrasonic atomizer of the present invention in an embodiment includes a liquid storage assembly 1, a liquid guiding assembly 2 and an atomization assembly 3. The liquid guiding assembly 2 and the atomization assembly 3 are sequentially installed at the bottom of the liquid storage assembly 1.

[0021] The liquid storage assembly 1 includes a housing 11 and a plug 12 that are connected to each other, a suction nozzle 111 is provided on the housing 11, and a liquid bin 13 is formed after the housing 11 and the plug 12 are connected. The plug 12 is preferably an elastic silica gel plug. Two slots 121 penetrating the plug 12 are vertically provided in the plug 12, the two slots 121 are arranged in parallel, and protrusions 123 are respectively provided in the two slots 121. A rib 122 is provided between upper partsof the two slots 121, and the lower parts of the two slots 121 are communicated to form a yielding space, which facilitates the assembly of an ultrasonic atomization sheet 33.

[0022] The liquid guiding assembly 2 includes two ceramic liquid guiding members 21 arranged oppositely. When the ceramic liquid guiding members 21 are inserted into the slots 121, the lower sections of the two ceramic liquid guiding members 21 are opposite to form a contact portion 22. The contact portion 22 is used to place the ultrasonic atomization sheet 33 of the atomization assembly 3, so that the ceramic liquid guiding members 21 guide e-liquid to the ultrasonic atomization sheet 33 for ultrasonic atomization. A liquid storage cavity 211 is provided inside each ceramic liquid guiding member 21, so that the contact area between the e-liquid and the ceramic liquid guiding member 21 is larger, thereby improving the liquid guiding effect of the ceramic liquid guiding member 21.

[0023] The two ceramic liquid guiding members 21 are correspondingly inserted into the two slots 121, and each of the two ceramic liquid guiding members 21 is clamped by the protrusion 123 in the corresponding slot 121 and the rib 122, so that the ceramic liquid guiding members 21 are fixed in the slots 121.

[0024] The atomization assembly 3 includes a base 31, a sealing seat 32 arranged on the base 31, and an ultrasonic atomization sheet 33 inserted in the sealing seat 32 and the base 31. The front and back sides of the ultrasonic atomization sheet 33 are respectively set as atomization surfaces, and the middle part of the atomization surface is set as an atomization region 331.

[0025] The plug 12 is placed on the sealing seat 32, the upper part of the ultrasonic atomization sheet 33 extends into the contact portion 22 of the liquid guiding assembly 2 and is in direct contact with the lower sections of the two ceramic liquid guiding members 21, and the atomization region 331 of the ultrasonic atomization sheet 33 is located below the contact portion 22, so that the ceramic liquid guiding members 21 do not cover the atomization region 331 of the ultrasonic atomization sheet 33. In this way, when the ultrasonic atomization sheet 33 oscillates at a high frequency, the ceramic liquid guiding members 21 will also oscillate, so that the e-liquid in the liquid bin 13 flows to the ultrasonic atomization sheet 33 via the liquid storage cavities 211 of the ceramic liquid guiding members 21 and arrives at the atomization region 331. Because the ultrasonic atomization sheet 33 is in a high-frequency oscillation state, the e-liquid in the atomization region 331 draws the e-liquid on the ceramic liquid guiding members 21 to the atomization region 331 by means of the traction force of the e-liquid to participate in ultrasonic atomization. When the ultrasonic atomization sheet 33 is working, the atomization effect in the atomization region 331 is the best, and more heat is generated in the atomization region 331, so the temperature of the atomization region 331 is relatively high, which accelerates the atomization process of e-liquid.In addition, the e-liquid is automatically supplied by means of the traction force of the e-liquid when the ultrasonic atomization sheet 33 oscillates at the high frequency. Therefore, no liquid storage member isrequired to be placed in the atomization region 331, so as to reduce the phenomenon that the e-liquid storage member is scorched.

[0026] An atomization cavity 4 is provided among the plug 12, the ceramic liquid guiding members 21 and the sealing seat 32, and the atomization region 331 is exposed in the atomization cavity 4. An air outlet channel 14 connecting the suction nozzle 111 with the atomization cavity 4 is provided in the liquid storage assembly 1, an air inlet channel 34 connecting outside air with the atomization cavity 4 is provided in the atomization assembly 3, and the air inlet channel 34 is communicated with the air outlet channel 14 via the atomization cavity 4.

[0027] When this embodiment is used, a user inhales smoke from the suction nozzle 111, making outside air enters the atomization cavity 4 from the air inlet channel 34, e-liquid is transferred from the liquid bin 13 to the ultrasonic atomization sheet 33 via the liquid storage cavities 211 of the ceramic liquid guiding members 21 and arrives at the atomization region 331 of the ultrasonic atomization sheet 33, the ultrasonic atomization sheet 33 is electrically connected with an external power source to oscillate at a high frequency, then the e-liquid on the ultrasonic atomization sheet 33 is ultrasonically atom-

ized, and the ultrasonically atomized vapor is brought out to the user's mouth by air flowing there via the air outlet channel 14 and inhaled.

[0028] The forgoing descriptions are only preferred embodiments of the present application, and do not limit the present application in any form. Although the present application is disclosed above with the preferred embodiments, the present application is not limited thereto. Some variations or modifications made by any skilled person familiar with the art using the disclosed technical contents without departing from the scope of the technical solution of the present application are equivalent to the embodiments, and all fall within the scope of the technical solution.

Claims

1. An ultrasonic atomizer, comprising a liquid storage assembly (1), a liquid guiding assembly (2) and an atomization assembly (3), a liquid bin (13) being provided inside the liquid storage assembly, and the atomization assembly comprising an ultrasonic atomization sheet (33), wherein the liquid guiding assembly is a ceramic liquid guiding member (21), the ultrasonic atomization sheet is placed vertically, an upper section of the ceramic liquid guiding member is communicated with the liquid bin, and a lower section of the ceramic liquid guiding member is in direct contact with at least one atomization surface of the ultrasonic atomization sheet; and an atomization region (331) of the ultrasonic atomization sheet is exposed under the ceramic liquid guiding member.

2. The ultrasonic atomizer according to claim 1, wherein the liquid guiding assembly comprises at least two ceramic liquid guiding members, the ultrasonic atomization sheet has two atomization surfaces, and the two atomization surfaces at an upper part of the ultrasonic atomization sheet are respectively in contact with two ceramic liquid guiding members; and the atomization region is provided on each of the two atomization surfaces of the ultrasonic atomization sheet.

3. The ultrasonic atomizer according to claim 1, wherein a slot (121) is provided at a bottom of the liquid storage assembly in a vertical penetrating manner, a protrusion (123) is provided in the slot, and the ceramic liquid guiding member is clamped and fixed in the slot by the protrusion.

4. The ultrasonic atomizer according to claim 1, wherein two slots (121) are provided at a bottom of the liquid storage assembly in a vertical penetrating manner, a rib (122) is provided between upper partsof the two slots, the lower parts of the two slots are communicated, and a protrusion (123) is provided in each of the two slots; each of the two ceramic liquid guiding members is clamped and fixed in the corresponding slot by the corresponding protrusion and the rib, and a contact portion (22) for inserting the ultrasonic atomization sheet is provided between the lower sections of the two ceramic liquid guiding members.

5. The ultrasonic atomizer according to claim 1, wherein a liquid storage cavity (211) communicated with the liquid bin is provided inside the upper section of the ceramic liquid guiding member.

6. The ultrasonic atomizer according to claim 1, wherein the liquid storage assembly comprises a housing (11) and a plug (12), the atomization assembly comprises a sealing seat (32) and a base (31) that are sequentially arranged under the plug, the ceramic liquid guiding members are installed in the plug, an atomization cavity (4) is formed among the plug, the ceramic liquid guiding member and the sealing seat, the atomization surface at an upper part of the ultrasonic atomization sheet is in direct contact with the ceramic liquid guiding member, a lower part of the ultrasonic atomization sheet is placed in the sealing seat (32) and the base (31), and the atomization region of the ultrasonic atomization sheet is exposed in the atomization cavity.

7. The ultrasonic atomizer according to claim 4, wherein an upper part of the ultrasonic atomization sheet extends into the contact portion and is in direct contact with the lower sections of the two ceramic liquid guiding members, and the atomization region of the ultrasonic atomization sheet is located below the contact portion.

8. The ultrasonic atomizer according to claim 6, wherein an air outlet channel (14) connecting a suction nozzle (111) with the atomization cavity is provided in the liquid storage assembly, an air inlet channel (34) connecting outside air with the atomization cavity is provided in the atomization assembly, and the air inlet channel is communicated with the air outlet channel via the atomization cavity.

9. An electronic cigarette, wherein comprising the ultrasonic atomizer according to any one of claims 1-8.

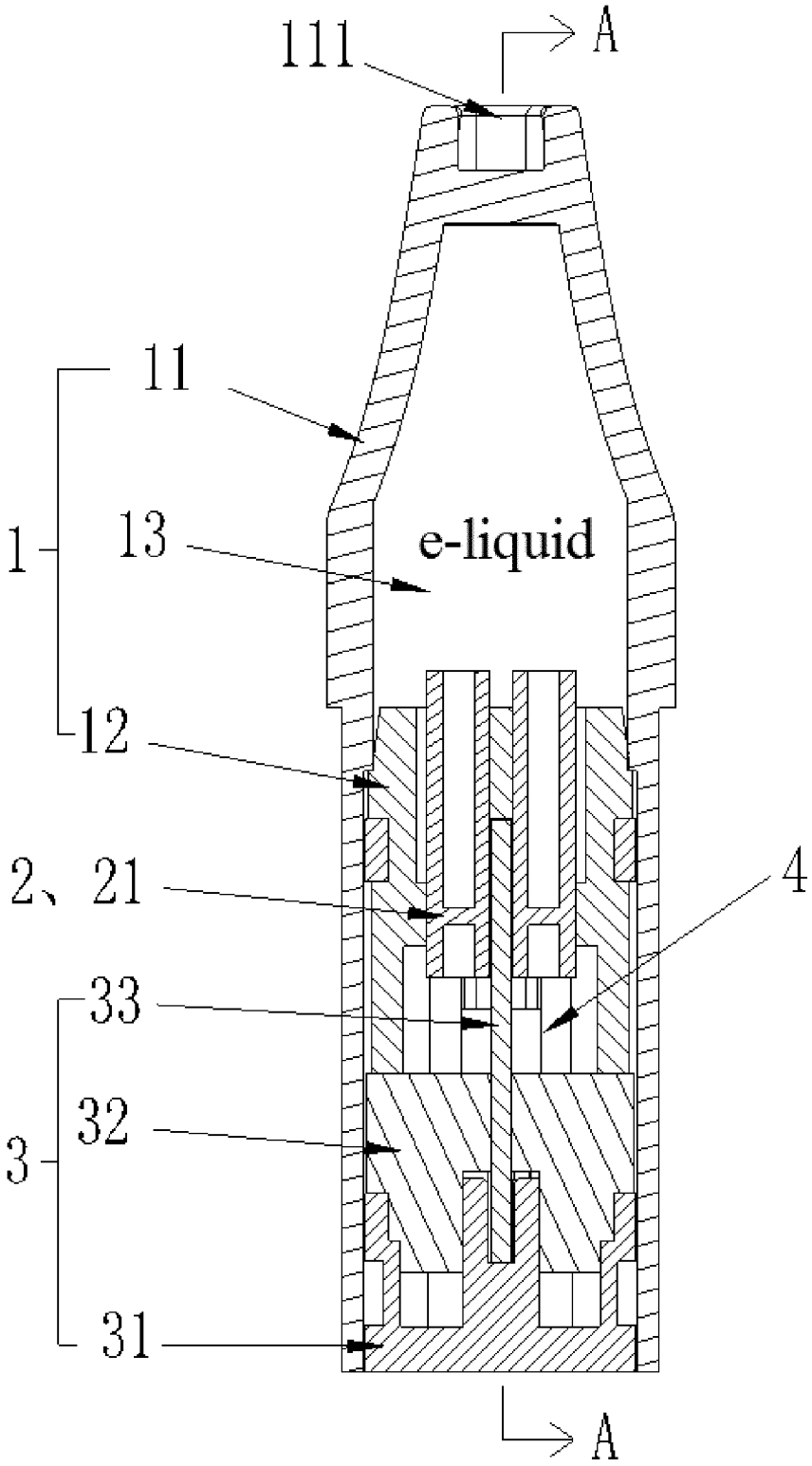

Fig. 1

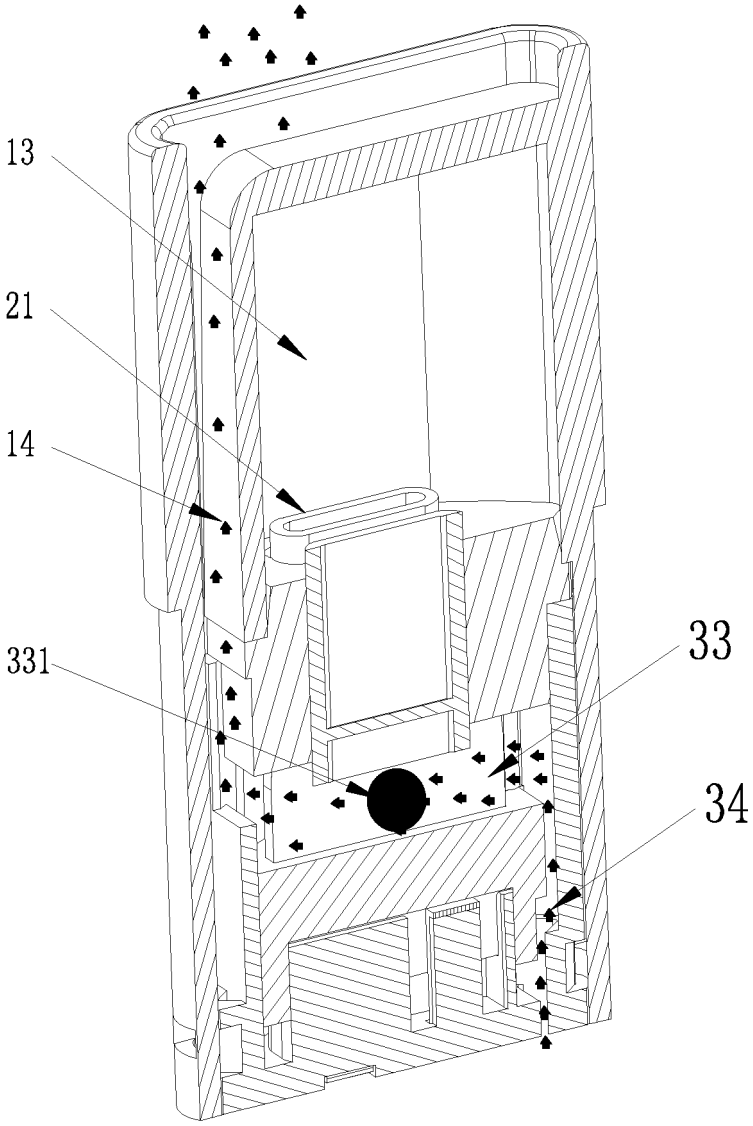

Fig. 2

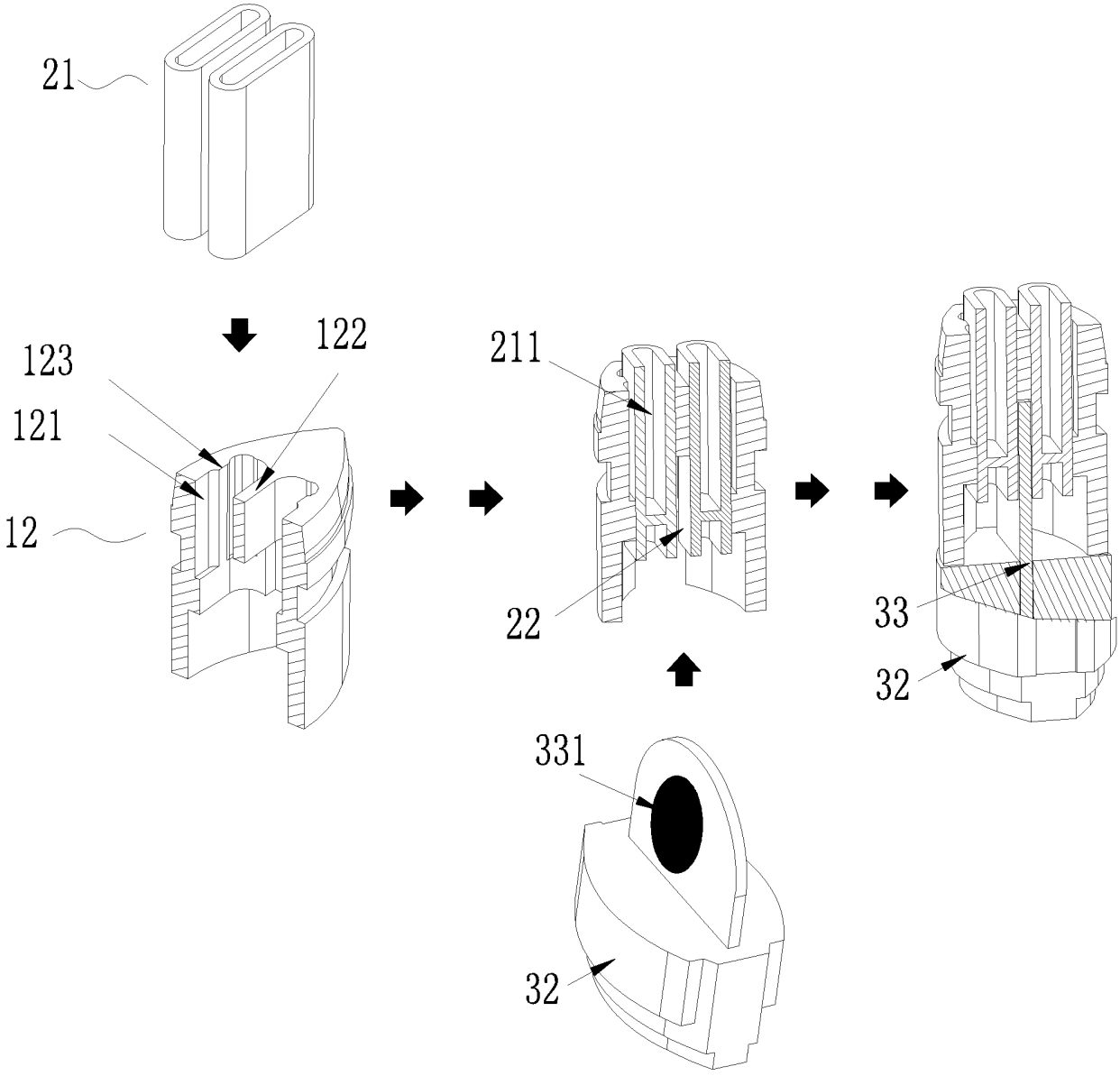

Fig. 3

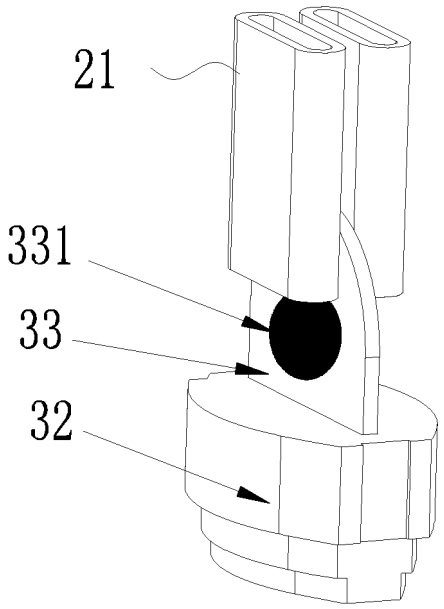

Fig. 4

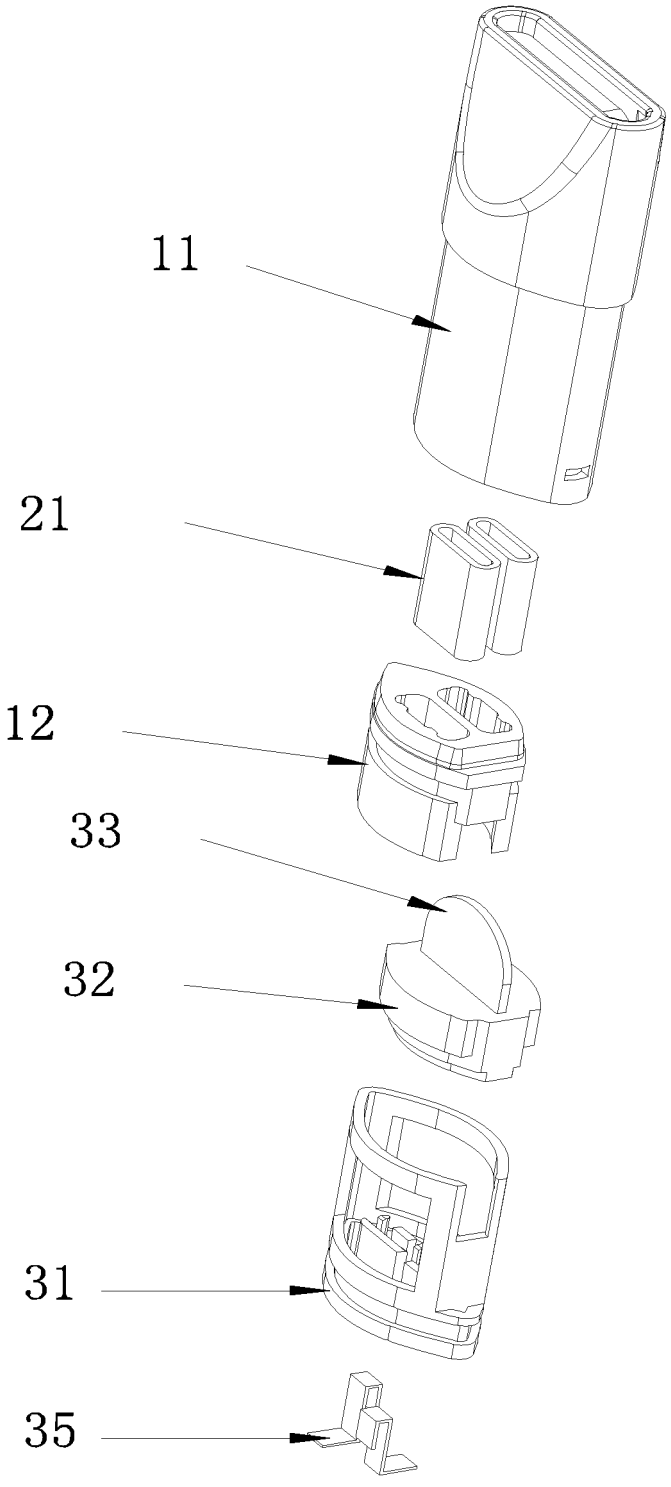

Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/136360

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/05(2020.01)i; A24F 40/48(2020.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F 40/-;A24F 47/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS, CNTXT, DWPI: 超声, 电子烟, 雾化, 陶瓷, 高温, 竖直, ultrasonic, e-cigarette, electronic cigarette, atomiz+, ceramic, high temperature, vertical

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	CN 206534132 U (CHINA TOBACCO HUNAN INDUSTRIAL CO., LTD.) 03 October 2017 (2017-10-03) description, paragraphs 0031-0037, and figures 1-8	1-9
Y	CN 205947128 U (CHINA TOBACCO HUNAN INDUSTRIAL CO., LTD.) 15 February 2017 (2017-02-15) description, paragraphs 0007-0008 and 0041-0043, and figure 2	1-9
Y	CN 206079040 U (CHINA TOBACCO HUNAN INDUSTRIAL CO., LTD.) 12 April 2017 (2017-04-12) description, paragraphs 0039-0044, and figures 1-4	1-9
Y	CN 206079039 U (CHINA TOBACCO HUNAN INDUSTRIAL CO., LTD.) 12 April 2017 (2017-04-12) description, paragraphs 0038-0042, and figures 1-3	1-9

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

* Special categories of cited documents:
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 March 2021	**18 March 2021**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** **China**	Authorized officer
Facsimile No. **(86-10)62019451**	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/136360

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2020/136360

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