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(54) ATOMIZATION CORE, ATOMIZER AND ELECTRONIC CIGARETTE

(57) The disclosure provides an atomizing core, includes a fixing base, a side wall of the fixing seat along a first direction is penetrated with a liquid inlet in communication with the liquid storage chamber; a movable part having an atomization cavity therein, the movable part is movably connected to the fixing seat along the first direction, a liquid guiding port in communication with the atomization cavity is penetrated on the side wall along the first direction; and a heating assembly installed in the atomization cavity; the movable part reciprocates in the first direction relative to the fixing seat between the open positions of the liquid guiding port and the liquid inlet and the staggered closed positions of the liquid guiding port and the liquid inlet, the movable part at least partially protrudes from the fixed seat in the closed position. The atomizing core, atomizer and electronic cigarette of the disclosure, when not in use, the movable part moves to the closed position relative to the fixed seat, the liquid inlet and the liquid guide are staggered to prevent the e-liquid in the liquid storage cavity from entering the atomization cavity through the liquid inlet and the liquid guide, and prevent the e-liquid from contacting metal parts for a long time and affecting the taste.

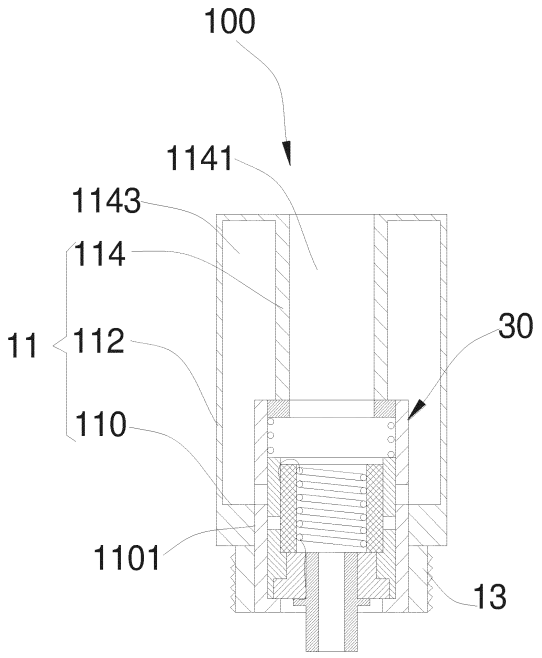

FIG.1

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Description

FIELD OF TECHNOLOGY

[0001] The invention relates to the technical field of smoke simulation, and more particularly, relates to an atomizing core, atomizer and electronic cigarette.

BACKGROUND

[0002] The atomizer is an important component of the electronic cigarette. When the e-liquid is delivered to the atomizer, the heating assembly s in the atomizer work to generate high temperature, and the e-liquid is atomized to form smoke, so that the user can inhale the smoke to achieve the feeling of simulated smoking.

[0003] At present, there is no effective isolation between the liquid storage chamber for storing e-liquid and the atomizer of electronic cigarettes on the market. When the electronic cigarette is not used for a long time, the e-liquid in the liquid storage chamber is easily in contact with the outside air and the e-liquid expires and deteriorates.

SUMMARY

[0004] Based on this, it is necessary to provide an Atomizing core and an atomizer that can prevent the e-liquid in the oil storage cavity from contacting with the outside air and causing the problem of expired deterioration in order to solve the above problems.

[0005] It is also necessary to provide an electronic cigarette with the above atomizer.

[0006] An atomizing core, includes:

a fixing base, a side wall of the fixing seat along a first direction is penetrated with a liquid inlet in communication with the liquid storage chamber;
a movable part having an atomization cavity therein, the movable part is movably connected to the fixing seat along the first direction, a liquid guiding port in communication with the atomization cavity is penetrated on the side wall along the first direction; and
a heating assembly installed in the atomization cavity;
the movable part reciprocates in the first direction relative to the fixing seat between the open positions of the liquid guiding port and the liquid inlet and the staggered closed positions of the liquid guiding port and the liquid inlet, the movable part at least partially protrudes from the fixed seat in the closed position.

[0007] In one embodiment, the movable element 3 includes a movable tube defined with an atomization cavity therein and a pole, the movable tube is slidably connected to the fixing seat along the first direction, one end of the pole is fixedly connected to the movable tube, and the other end of the pole protrudes outside of the fixing seat in the closed position.

[0008] In one embodiment, the atomizing core includes an insulating member, the insulating member is located between the movable tube and the pole.

[0009] In one embodiment, the insulating member is an insulating ring located between the movable tube and the pole, the movable tube serves as a negative electrode/or the movable tube and the fixed base serve as a negative electrode, the pole serves as a positive electrode, and the heating component is electrically connected to the negative electrode and the positive electrode.

[0010] In one embodiment, the fixed seat and the movable tube are made of ceramic material printed with printed with a conductive layer.

[0011] In one embodiment, the fixing seat includes a seat and a limiting edge, the seat is a hollow tube with both ends extending therethrough along the first direction, the limiting edge is formed by extending inwardly from the edge of one end of the seat, when the movable tube is in the closed position, it is supported on the limiting edge along the first direction.

[0012] In one embodiment, the atomizing core includes a restoring member which is deformably disposed between the movable member and the fixing seat along the first direction.

[0013] An atomizer includes a housing and an atomizing core assembled in the housing, the liquid storage cavity is formed in the housing, and the atomizing core is the aforementioned atomization core.

[0014] An electronic cigarette includes an atomizer and a battery device, the cigarette holder assembly, the installation of the battery device and the atomizer of the provides the movable part in the atomizer core with a driving force to move from the closed position to the open position relative to the fixing seat.

[0015] In one embodiment, the housing includes a base provided at one end of the shell, the base is made of a metal conductive material and is threadedly connected to the battery device,

[0016] Compared with the prior art, the atomizing core, atomizer and electronic cigarette of the disclosure, when not

in use, the movable part moves to the closed position relative to the fixed seat, the liquid inlet and the liquid guide are staggered to prevent the e-liquid in the liquid storage cavity from entering the atomization cavity through the liquid inlet and the liquid guide, and prevent the e-liquid from contacting metal parts for a long time and affecting the taste. At the same time, the airflow cannot enter the liquid storage cavity through the staggered liquid guide and liquid inlets to prevent air from entering the liquid storage cavity and affect the shelf life of the e-liquid.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Exemplary embodiments of the disclosure are described more fully hereinafter with reference to the accompanying drawings.

Fig. 1 is a schematic diagram of the structure of the atomizer in a preferred embodiment of the utility model when it is in the closed position;

Fig. 2 is a schematic diagram of the structure of the atomizing core in the atomizer shown in Fig. 1;

Fig. 3 is a schematic structural diagram of the atomizer shown in Fig. 1 when it is in an open position.

Atomizer 100	housing 10
Shell 11	Base 13
Bottom wall 110	Side wall 112
Bending wall 114	Smoke outlet passage 1141
Liquid storage chamber 1143	Atomizing core 30
Fixing seat 31	Liquid inlet 310
Seat 312	Limit edge 314
movable part 33	Atomization cavity 330
Liquid guiding port 332	Activity tube 334
Pole 336	Heating assembly 35
Heating element 350	Liquid guiding member 352
Reseting member 37	Insulation cover 390
Airflow port 3901	Insulation ring 392
Assembly hole 1101	Intake passage 3341

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0018] In order to facilitate understanding of the present invention, the present invention will be described more fully below with reference to the related drawings. The drawings show the preferred embodiments of the present invention. However, the present invention can be implemented in many different forms and is not limited to the embodiments described herein. Rather, these embodiments are provided to provide a thorough understanding of the disclosure of the present invention.

[0019] It should be noted that when an element is referred to as being "fixed to" another element, it may be directly on the other element or there may be a centered element. When an element is considered to be "connected" to another element, it can be directly connected to the other element or intervening elements may also be present.

[0020] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. The terms used herein in the description of the present invention are only for the purpose of describing specific embodiments, and are not intended to limit the present invention. The term "and / or" as used herein includes any and all combinations of one or more of the associated listed items.

[0021] The electronic cigarette includes a liquid storing member, an atomizer, a battery device (not shown), and a cigarette holder assembly. The liquid storing member is used to store e-liquid. The heating assembly located in the

atomizer is electrically connected with the battery device, and is electrically driven by the battery device to heat the e-liquid absorbed form the liquid storing tube to form smoke. The smoke flows into the mouth of the smoker through the cigarette holder assembly.

[0022] In order to atomize e-liquid under electric drive, the atomizer is usually provided with a liquid inlet in communicating with the liquid storage member. During use, the heating element absorbs the e-liquid stored in the liquid storage through the liquid inlet, and the smoke formed by heating the e-liquid under electric drive flows out to the cigarette holder assembly for the user to inhale. When not in use (for example, transportation or storage), because the liquid inlet is always in communication with the liquid storing member and the atomizer, the e-liquid stored in the liquid storing tube is easily adsorbed by the heating element, and a slow chemical reaction occurs in contact with heating element (metal), which is easy to cause the e-liquid to expire and deteriorate, affecting the taste and service life of the e-liquid.

[0023] Please refer to FIG. 1, in one embodiment of the disclosure, the electronic cigarette includes an atomizer 100, a battery device (not shown), and a cigarette holder assembly. The atomizer 100 is electrically connected to the battery device, and is electrically driven by the battery device to heat the absorbed e-liquid to form smoke, and the smoke flows into the mouth of the smoker through the cigarette holder assembly. The cigarette holder assembly is an independent component that is detachably connected to the atomizer 100 in some embodiments. In other embodiments, the cigarette holder assembly can also be integrated with the atomizer 100, which is not limited here.

[0024] The atomizer 100 includes a housing 10 and an atomizing core 30 assembled in the housing 10. The housing 10 is used to provide an installation basis and also used to store e-liquid, the atomizing core 30 is used to absorb e-liquid and heat the adsorbed e-liquid under the drive of the battery device to form smoke.

[0025] The housing 10 is generally a hollow cylindrical structure, which includes a bottom wall 110, a side wall 112 and a bending wall 114. An assembly hole 1101 is penetrated through the bottom wall 110 for installing the atomizing core 30. The side wall 112 extends in the same direction from the outer edge of the bottom wall 110 and encloses it to form a hollow space. The bending wall 114 is connected to one end of the side wall 112 away from the bottom wall 110, the bending wall 114 is connected to an end of the side wall 112 away from the bottom wall 110, the bending wall 114 extends horizontally into the hollow space and then bends toward the bottom wall 110 to enclose a smoke outlet passage 1141. In this way, the hollow space is divided by the bending wall 114 to form a smoke outlet passage 1141 located in the inner ring and a liquid storage chamber 1143 surrounding the outer periphery of the smoke outlet passage 1141. The liquid storage chamber 1143 is used for storing e-liquid for atomization of the atomizing core 30. The smoke outlet passage 1141 is in communication with the atomizer core 30 and the cigarette holder assembly, the smoke formed by the atomizer core 30 flows out to the cigarette holder assembly via the smoke outlet passage 1141 under a suction action.

[0026] There is a certain distance between the end of the bending wall 114 and the bottom wall 110 to provide an assembly space for the atomizing core 30. That is, one end of the atomizing core 30 extends through the assembly hole 1101 into the assembly space and is sealed between the bending wall 114.

[0027] Please refer to FIG. 2, the atomizing core 30 is electrically connected to the battery device, and includes a fixing base 31, a movable part 33 and a heating element 35. The fixing seat 31 is fixedly assembled in the above-mentioned assembling space, and a side wall of the fixing seat 31 along the first direction is penetrated with a liquid inlet 310 in communication with the liquid storage chamber 1143.

[0028] An atomization cavity 330 is defined in the movable part 33, and a liquid guiding port 332 in communication with the atomization cavity 330 is penetrated on the side wall along the first direction. The movable part 33 is movably connected to the fixing seat 31 along the first direction, and reciprocates relative to the fixing seat 31 between the open positions of the liquid guiding port 332 and the liquid inlet 310 and the staggered closed positions of the liquid guiding port 332 and the liquid inlet 310. The first direction is the axial direction of the fixing seat 31.

[0029] The heating assembly 35 is installed in the atomization cavity 330, and is used for heating the absorbed e-liquid under the electric drive of the battery device to form smoke when the movable member 33 is in the open position. Specifically, the heating element 35 includes a heating element 350 and a liquid guiding element 352 matched with the heating element 350. The liquid guiding member 352 absorbs the e-liquid stored in the liquid storage chamber 1143 through the liquid inlet 310. The heating element 350 is electrically connected to the battery device, and is used for heating the e-liquid absorbed by the liquid guiding element 352 under electric drive. In this specific embodiment, the heating element 350 is a heating column formed by spirally winding heating wires, the heating column is arranged vertically in the atomization cavity 330 along the axial direction, and the two ends of the axial direction are respectively connected with the positive and negative electrodes of the battery device, to form a heating electrically circuit with the battery device.

[0030] The liquid guiding member 352 is a cylindrical liquid guiding member cotton sleeve outside of the heating column, and the liquid guiding member cotton covers the liquid guiding port 332 so as to absorb the e-liquid stored in the liquid storage chamber 1143 through the liquid guiding port 332. It can be understand, in some other embodiments, the structure of the heating element 350 and the liquid guiding element 352 can be determined as required, and only needs to realize the liquid guiding and heating atomization functions, which are not limited here.

[0031] The atomizing core 30 includes a restoring member 37 which is deformably disposed between the movable

member 33 and the fixing seat 31 along the first direction, and is used to provide the movable member 33 with a restoring force that moves from the open position to the closed position.

[0032] The relative movement between the fixing seat 31 and the movable part 33 realizes the opening and closing of the liquid guiding port 332 and the liquid inlet 310 of the atomizer 100, at the same time, it can also electrically drive the heating element 35 in the atomizing core 30, so that the structure of the atomizing core 30 is simple and compact.

[0033] The fixing seat 31 includes a seat 312 and a limiting edge 314. The seat 312 is a hollow tube with both ends passing through, the limiting edge 314 is formed by extending inwardly from the edge of one end of the seat 312. In this way, the fixing seat 31 is generally U-shaped in longitudinal section along the axial direction.

[0034] When the movable element 33 is in the closed position, it is limited and supported on the limiting edge 314 along the first direction. The movable element 33 includes a movable tube 334 having an atomization cavity 330 therein and a pole 336. The movable tube 334 is slidably connected to the fixing seat 31 along the first direction, one end of the pole 336 is fixedly connected to the movable tube 334, and the other end of the pole 336 protrudes outside of the fixing seat 31 in the closed position.

[0035] In one embodiment, the pole 336 has an air inlet passage 3341 extending therethrough, the air inlet passage 3341 is in communication with the outside and the atomization cavity 332. The outside air is mixed with the smoke formed by heating in the atomization cavity 332 and flows out to the cigarette holder assembly through the smoke outlet passage 1141 for the user to inhale.

[0036] The insulating assembly includes an insulating cover 390 and an insulating member. The insulating cover 390 is disposed on the end of the seat 31 away from the limiting edge 314, an airflow port 3901 for smoke to flow out is reserved on the insulating cover 390. The resetting member 37 abuts against the insulating cover 390 and the movable tube 334, an insulating member is provided for insulation between the movable tube 334 and the pole 336. In one embodiment, the insulating member is an insulating ring 392. It can be understood that, in other embodiments, the insulating cover 390 and the fixing seat 31 are integrally provided, the resetting member 37 abuts between the movable tube 334 and the fixing seat 31.

[0037] The movable tube 334 serves as the positive electrode or the negative electrode electrically connected to the battery device, or the movable tube 334 and the fixed seat 31 together serve as the positive electrode or the negative electrode electrically connected to the battery device, and the pole 336 serves as another electrode electrically connected to the battery device. In one of the embodiments, the movable tube 334 serves as a negative electrode electrically connected to the battery device, or the movable tube 334 and the fixing seat 31 together serve as a negative electrode electrically connected to the battery device, and the pole 336 forms a positive electrode electrically connected to the battery device. In this way, when the atomizing core 30 is mated with the battery device, the positive terminal of the battery device abuts against the pole 336, and the more protruding positive pole drives the pole 336 moving upward relative to the fixing base 31 until the pole 336 is at least flush with the bottom of the fixing seat 31. At this time, the negative terminal of the battery device is in contact with the fixing base 31, and the movable member 35 moves from the closed position to the open position relative to the fixing base 31.

[0038] That is to say, the installation of the battery device and the atomizer of the disclosure provides the movable part 35 in the atomizer core 30 with a driving force to move from the closed position to the open position relative to the fixing seat 31, that is, the positive terminal of the battery device is used to push the pole 336 ingeniously to realize the electrical connection while realizing the opening or closing of the liquid guiding port 332 and the liquid inlet 310.

[0039] Please refer to FIG. 1 again, the housing 10 includes a base 13 provided at one end of the shell 11, and the outer surface of the base 13 has a connecting thread to realize the detachable connection between the atomizer 100 and the battery device. That is to say, when the atomizer 100 is screwed to the battery device by screw fitting, the movable member 33 can conduct the air flow channel.

[0040] In the embodiment, the base 13 is made of a metal conductive material and is electrically connected to the negative terminal of the battery device, so that the movable tube 334, the fixing base 31 and the metal base 13 are all used as negative electrodes. At the same time, both the fixed seat 31 and the movable tube 334 are made of ceramics printed with a conductive layer, so that while the fixed seat 31 and the movable tube 334 are electrically connected and used as a negative electrode together, the lubricity of sliding between the two is increased by ceramic. It is understandable that in some other embodiments, the base 13 and the shell 11 may be made of the same insulating material, and the two may be integrally formed, which is not limited herein.

[0041] In addition, the assembling method between the atomizer 100 and the battery device can be determined according to needs, for example, by latching connection, when the two are assembled together, electrical connection and control of the air flow channel can be realized at the same time. In some other embodiments, the assembly between the atomizer 100 and the battery device may only be used to realize the electrical connection between the two, and the control of the airflow channel may be realized by other structures, which is not limited herein. In addition, the atomization cavity 310 and the liquid storage cavity 1143 in the atomizer 100 may be integrally arranged to avoid a gap formed between the liquid storage member and the atomization core 30 by threaded connection or docking, which may cause slow leakage of e-liquid.

[0042] Please refer to FIG. 1, when not in use, the movable member 33 located in the atomizing core 30 is in the closed position, the liquid guiding port 332 and the liquid inlet 310 are staggered. At this time, the e-liquid in the liquid storage chamber 1143 cannot enter the atomization cavity 330 through the liquid inlet 310 and the liquid guiding port 332 to be adsorbed by the liquid guiding member 352 to avoid long-term contact of the e-liquid with metal parts and affecting the taste. At the same time, the airflow entering the atomization cavity 330 from the air inlet channel 3341 cannot enter the liquid storage cavity 1143 through the staggered liquid guide port 332 and the liquid inlet 310 to prevent air from entering the liquid storage cavity 1143 and affect the shelf life of the e-liquid.

[0043] Please refer to FIG. 3, when the atomizer 100 is connected to the battery device during use, the positive end of the battery device pushes up and squeezes the pole 336 until the pole 336 is flush with the bottom of the fixing seat 31. After the movable member 33 moves for a certain stroke under the upward squeezing force, the liquid guiding port 332 moves to communicate with the liquid inlet 310. At this time, the e-liquid stored in the liquid storage chamber 1143 can enter the atomization cavity 330 through the liquid inlet 310 and the liquid guiding port 332 to be adsorbed by the liquid guiding member 352. When electrically driven, the pole 336 is electrically connected to the positive terminal of the battery device, and the fixing base 31, the movable tube 334 and the metal base 13 are all electrically connected to the negative terminal of the battery device to form an electric drive circuit.

[0044] The heating element 350 is electrically driven to heat the smoke oil and form smoke. The external cold air enters the air inlet channel 3341 under the action of the suction force, and is mixed with the smoke in the atomization cavity 310, the mixed airflow flows through the airflow port 3901 into the smoke outlet channel 1141 and enters the cigarette holder assembly for the user to inhale.

[0045] When it needs to be idle or not in use, the battery device is removed, and the movable part 33 is reset under the action of the elastic force of the reset part 37, and is reset to the closed state again, so as to avoid long-term contact of the e-liquid in the liquid storage chamber 1143 with metal parts and affect the taste. It also avoids long-term contact of the e-liquid in the liquid storage chamber 1143 with the outside air and affects the shelf life.

[0046] In the disclosure, when the atomizer 100 is assembled with the battery device, the positive terminal of the battery device squeezes the positive pole of the atomizer 100 upward, thereby realizing the conduction between the liquid guiding port 332 and the liquid inlet 310; When the battery device is not used for the first time or needs to be left unused after use, after the battery device is disassembled, the movable part 33 is reset under the action of the resetting part 37 to stagger the liquid guiding port 332 and the liquid inlet 310 to seal the e-liquid and ensure the taste of smoke liquid and extend the shelf life.

[0047] The embodiments described above are merely preferred embodiments, but not intended to limit the application. Any modifications, alternatives or improvements made within the principle and spirit of the present application should be interpreted as falling within the protection scope of the present application. The claims are not limited to the features or acts described above. Rather, the proper scope of the disclosure is defined by the appended claims.

Claims

1. An atomizing core, comprising:

   a fixing base, a side wall of the fixing seat along a first direction is penetrated with a liquid inlet in communication with the liquid storage chamber;
   a movable part having an atomization cavity therein, the movable part is movably connected to the fixing seat along the first direction, a liquid guiding port in communication with the atomization cavity is penetrated on the side wall along the first direction; and
   a heating assembly installed in the atomization cavity;
   the movable part reciprocates in the first direction relative to the fixing seat between the open positions of the liquid guiding port and the liquid inlet and the staggered closed positions of the liquid guiding port and the liquid inlet, the movable part at least partially protrudes from the fixed seat in the closed position.

2. The atomizing core according to claim 1, wherein the movable element comprises a movable tube defined with an atomization cavity therein and a pole, the movable tube is slidably connected to the fixing seat along the first direction, one end of the pole is fixedly connected to the movable tube, and the other end of the pole protrudes outside of the fixing seat in the closed position.

3. The atomizing core according to claim 2, wherein the atomizing core comprises an insulating member, the insulating member is located between the movable tube and the pole.

4. The atomizing core according to claim 3, wherein the insulating member is an insulating ring located between the

movable tube and the pole, the movable tube serves as a negative electrode/or the movable tube and the fixed base serve as a negative electrode, the pole serves as a positive electrode, and the heating component is electrically connected to the negative electrode and the positive electrode.

5. The atomizing core according to claim 4, wherein the fixed seat and the movable tube are made of ceramic material printed with printed with a conductive layer.

6. The atomizing core according to claim 1, wherein the fixing seat comprises a seat and a limiting edge, the seat is a hollow tube with both ends extending therethrough along the first direction, the limiting edge is formed by extending inwardly from the edge of one end of the seat, when the movable tube is in the closed position, it is supported on the limiting edge along the first direction.

7. The atomizing core according to claim 1, wherein the atomizing core comprises a restoring member which is deformably disposed between the movable member and the fixing seat along the first direction.

8. An atomizer, comprising:
a housing and an atomizing core assembled in the housing, the liquid storage cavity is formed in the housing, and the atomizing core is the aforementioned atomization core.

9. An electronic cigarette comprising:
an atomizer and a battery device, the cigarette holder assembly, the installation of the battery device and the atomizer of the provides the movable part in the atomizer core with a driving force to move from the closed position to the open position relative to the fixing seat.

10. The atomizing core according to claim 9, wherein the housing comprises a base provided at one end of the shell, the base is made of a metal conductive material and is threadedly connected to the battery device.

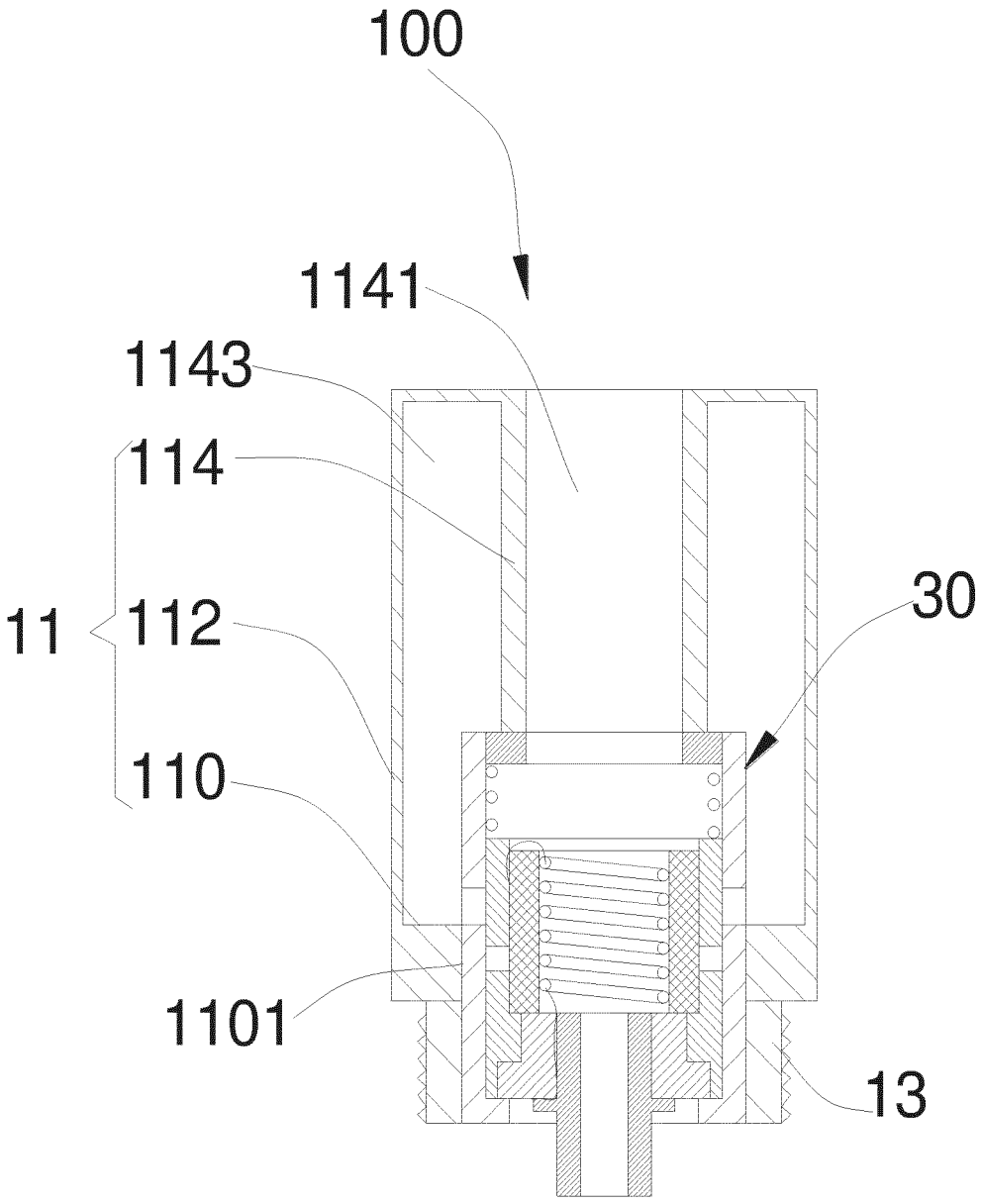

FIG.1

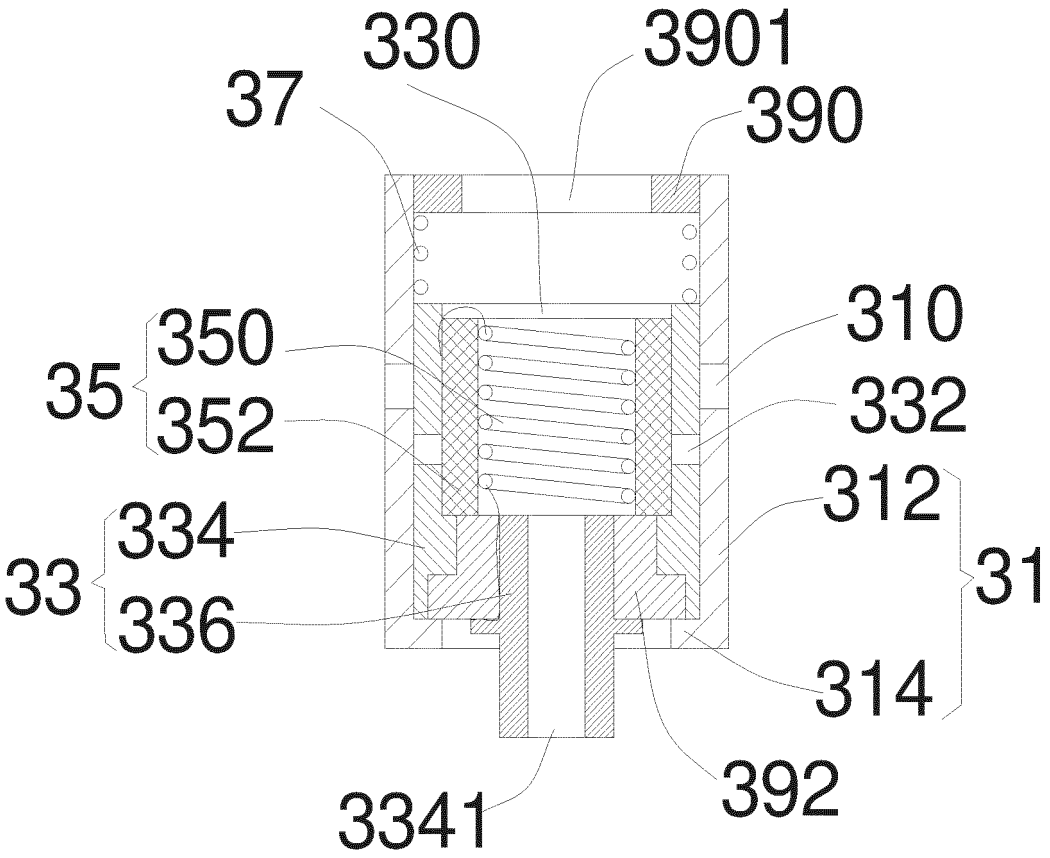

FIG.2

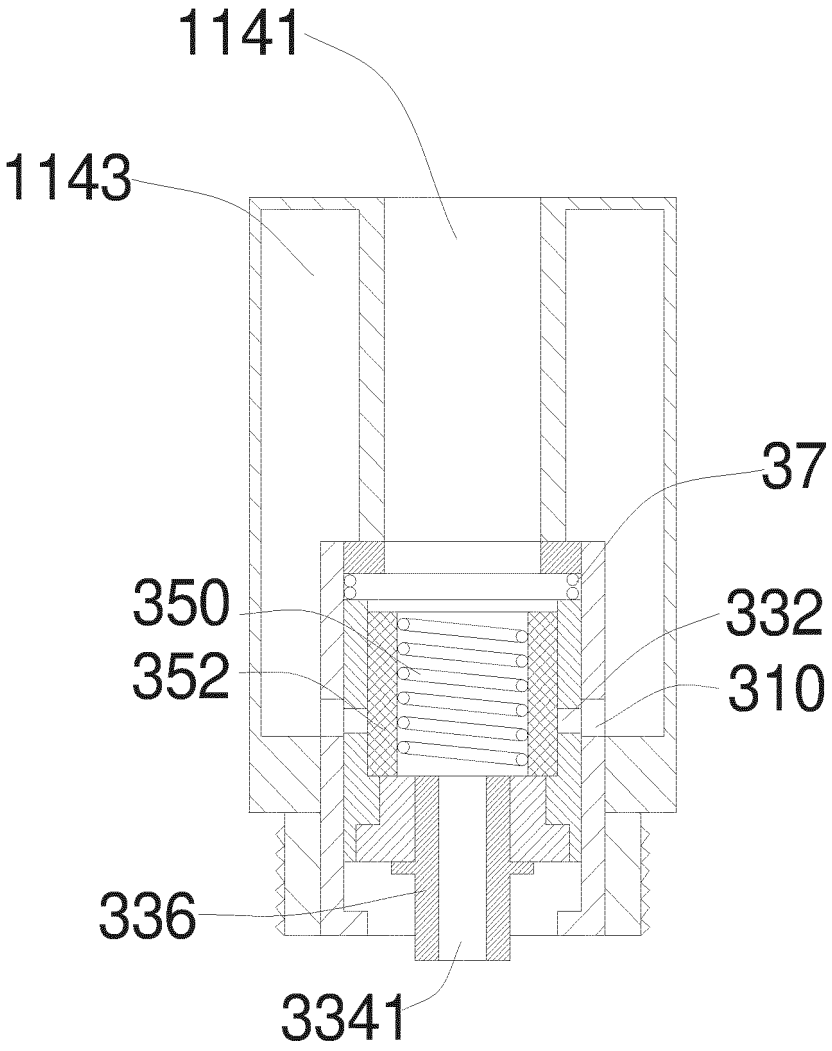

FIG.3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/099227

A. CLASSIFICATION OF SUBJECT MATTER

A24F 47/00(2006.01)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 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 VEN CNKI: 电子烟, 雾化, 移动, 位置, 连通, 关闭, electronic cigarette, atomiz+, mov+, position, connect +, clos+, shut+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 208972674 U (CHANGZHOU PAITENG ELECTRONIC TECHNOLOGY SERVICES CO., LTD.) 14 June 2019 (2019-06-14) claims 1-10, description, paragraphs 0005-0019 and 0043-0065, and figures 1-3	1-10
X	CN 205848694 U (SHENZHEN SMOORE TECHNOLOGY LIMITED) 04 January 2017 (2017-01-04) description, paragraphs 0037-0057, and figures 3-9	1-10
A	CN 206443209 U (SHENZHEN FIRSTUNION TECHNOLOGY CO., LTD.) 29 August 2017 (2017-08-29) entire document	1-10
A	CN 108323814 A (CHANGZHOU PAITENG ELECTRONIC TECHNOLOGY SERVICES CO., LTD.) 27 July 2018 (2018-07-27) entire document	1-10
A	US 2017150757 A1 (RAI STRATEGIC HOLDINGS INC.) 01 June 2017 (2017-06-01) entire document	1-10

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 October 2019	**19 November 2019**
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** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2019/099227

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 208972674 U	14 June 2019	None	
CN 205848694 U	04 January 2017	None	
CN 206443209 U	29 August 2017	EP 3289897 A1	07 March 2018
		DE 202017006945 U1	11 December 2018
		US 2018116290 A1	03 May 2018
CN 108323814 A	27 July 2018	WO 2018133267 A1	26 July 2018
US 2017150757 A1	01 June 2017	None	

Form PCT/ISA/210 (patent family annex) (January 2015)