



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
13.01.2016 Bulletin 2016/02

(51) Int Cl.:
A24F 47/00 (2006.01)

(21) Application number: **15173037.1**

(22) Date of filing: **20.06.2015**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA

(72) Inventors:
• **LI, Yonghai**
518104 Shenzhen Guangdong (CN)
• **XU, Zhongli**
518104 Shenzhen, Guangdong (CN)
• **HE, Youlin**
518104 Shenzhen Guangdong (CN)

(30) Priority: **07.07.2014 CN 201410319453**

(74) Representative: **ProI European Patent Attorneys**
Postfach 2123
90711 Fürth (DE)

(71) Applicant: **Shenzhen First Union Technology Co., Ltd.**
Shenzhen, Guangdong 518104 (CN)

(54) **ATOMIZING HEAD, ATOMIZER AND ELECTRONIC CIGARETTE HAVING SAME**

(57) An exemplary atomizer includes an atomizing tube and an atomizing head. The atomizing tube defines a space configured for receiving a liquid supply filled with tobacco liquid. The atomizing head includes a holder, an air inlet, an air outlet, a piercing element, a buffer chamber, an atomizing cavity, and an atomizing component. The piercing element is configured for piercing the liquid supply. The piercing element defines a liquid inlet. The

buffer chamber is configured for storing the tobacco liquid flowed from the liquid supply via the liquid inlet after the liquid supply is pierced. The liquid inlet is in communication with the buffer chamber and the liquid supply. Both of the air inlet and the air outlet communicate with the atomizing cavity. The atomizing component is configured for absorbing the tobacco liquid in the buffer chamber and heating the tobacco liquid to vaporize.

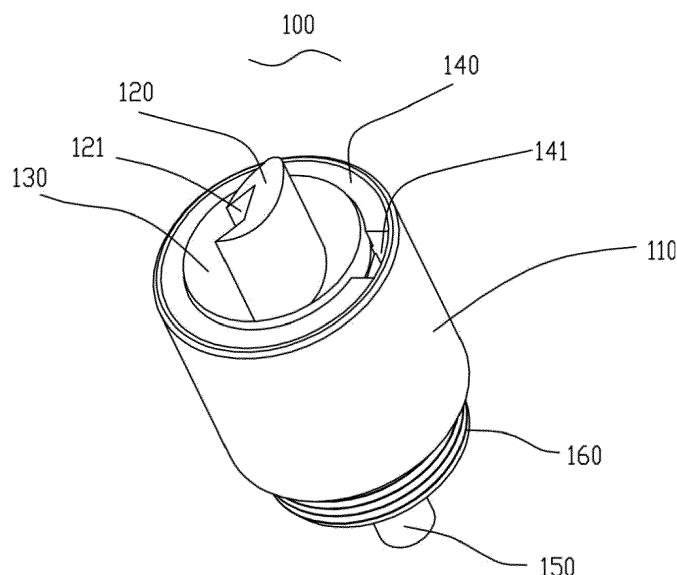


FIG. 1

Description

TECHNICAL FIELD

[0001] The present invention relates to electronic cigarettes, and particularly to an atomizing head, an atomizer and an electronic cigarette using same.

BACKGROUND ART

[0002] In a typical atomizer with a piercing structure, the piercing structure includes a hollow liquid passage. After the piercing structure pricks a liquid supply, tobacco liquid flows to an atomizing cavity through the liquid passage. To prevent liquid leakage, a liquid blocking element is provided at the bottom of the liquid passage. The liquid blocking element is configured for absorbing and storing the tobacco liquid flowed from the liquid passage. However, in the atomizer, the tobacco liquid may leak from the liquid blocking element.

[0003] What is needed, therefore, is an atomizing head, an atomizer and an electronic cigarette using same, which can overcome the above shortcomings.

SUMMARY

[0004] An exemplary atomizer includes an atomizing tube and an atomizing head. The atomizing tube defines a space configured for receiving a liquid supply filled with tobacco liquid. The atomizing head includes a holder, an air inlet, an air outlet, a piercing element, a buffer chamber, an atomizing cavity, and an atomizing component. The piercing element is configured for piercing the liquid supply. The piercing element defines a liquid inlet. The buffer chamber is configured for storing the tobacco liquid flowed from the liquid supply via the liquid inlet after the liquid supply is pierced. The liquid inlet is in communication with the buffer chamber and the liquid supply. Both of the air inlet and the air outlet communicates with the atomizing cavity. The atomizing component is configured for absorbing the tobacco liquid in the buffer chamber and heating the tobacco liquid to vaporize.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] 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.

FIG. 1 is a perspective view of an atomizing head according to a first embodiment.

FIG. 2 is a cross-sectional view of the atomizing head of FIG. 1.

FIG. 3 is an exploded perspective view of the atom-

izing head of FIG. 1.

FIG. 4 is a perspective view of a piercing element of FIG. 3.

FIG. 5 is a perspective view of a fixing cover of FIG. 3.

FIG. 6 is an alternative embodiment of the atomizing head including a liquid conducting body.

FIG. 7 is a perspective view of an atomizing head according to a second embodiment.

FIG. 8 is a cross-sectional view of the atomizing head of FIG. 7.

FIG. 9 is a perspective view of a piercing element of FIG. 8.

FIG. 10 is a cross-sectional view of the piercing element of FIG. 8.

FIG. 11 is a perspective view of a liquid blocking sleeve of FIG. 8.

FIG. 12 is a cross-sectional view of the liquid blocking sleeve of FIG. 11.

FIG. 13 is an assembled cross-sectional view of the piercing element and the liquid blocking sleeve.

FIG. 14 is a side view of an atomizer according to a third embodiment.

FIG. 15 is a cross-sectional view of the atomizer of FIG. 14.

FIG. 16 is a partially cross-sectional view of the atomizer of FIG. 14.

FIG. 17 is a cross-sectional view of a threaded electrode of FIG. 15.

FIG. 18 is a cross-sectional view of a connector of the atomizer of FIG. 15.

FIG. 19 is a cross-sectional view of a liquid cup of the atomizer of FIG. 15.

FIG. 20 is another side view of the atomizer of FIG. 14.

FIG. 21 is a cross-sectional view of an atomizer according to a fourth embodiment.

FIG. 22 is a cross-sectional view of an electronic cigarette according to a fifth embodiment.

DETAILED DESCRIPTION

[0006] 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 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 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 certain parts have been exaggerated to better illustrate details and features of the present disclosure.

[0007] 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 necessarily to the same embodiment, and such references mean at least one.

[0008] Several definitions that apply throughout this disclosure will now be presented.

[0009] The term "outside" refers to a region that is beyond the outermost confines of a physical object. 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.

First Embodiment

[0010] Referring to FIGS. 1-2, an atomizing head 100 for an electronic cigarette is shown. The atomizing head 100 includes a holder 110, an air inlet 151, an air outlet 141, a piercing element 120, a first electrode 160, a second electrode 150, a buffer chamber 111, an atomizing cavity 1232, and an atomizing component 170. The piercing element 120 is configured for pricking a liquid supply. The atomizing component 170 is configured (i.e., structured and arranged) for absorbing heating tobacco liquid in the buffer chamber 111 and heating the tobacco liquid. Both of the air outlet 141 and the air inlet 151 are in communication with the atomizing cavity 1232. The air inlet 151 is defined in the second electrode 150. The first electrode 160 and the second electrode 150 are configured for connecting to an external power supply. An insulating body 180 is sandwiched between the first electrode 160 and the second electrode 150. The piercing element 120 includes a liquid inlet 121, and the liquid inlet 121 communicates with the buffer chamber 111.

[0011] After the piercing element 120 pierces the liquid supply, the tobacco liquid in the liquid supply first flows into the buffer chamber 111 via the liquid inlet 121, and is then absorbed by the atomizing component 170. Accordingly, liquid leakage of the atomizing head is greatly improved.

[0012] Referring to FIGS. 3-4, the piercing element 120 includes a connecting part 123 and a piercing part 122. The piercing part 122 is configured for pricking the liquid supply. The connecting part 123 is configured for fixedly connecting with the holder 110. The liquid inlet 121 is defined in the piercing part 122. In the present embodiment, the connecting part 123 and the piercing part 122

are integrally formed. The connecting part 123 defines a liquid passage 1233, and the liquid inlet 121 is in communication with the buffer chamber 111 via the liquid passage 1233. The connecting part 123 further defines an air hole 1231 in a sidewall thereof. The air hole 1231 communicates with the atomizing cavity 1232 and the air outlet 141.

[0013] Referring to FIG. 3, the atomizing component 170 includes a heating element 172, and a liquid absorbing element 171. Two ends of the heating element 172 are respectively connected to the first and the second electrodes 150, 160. The heating element 172 is in contact with the liquid absorbing element 171.

[0014] Referring to FIG. 2, the buffer chamber 111 surrounds the atomizing cavity 1232. The buffer chamber 111 does not communicate with the atomizing cavity 1232.

[0015] Referring to FIGS. 2 and 5, the holder 110 is further provided with a fixing cover 140, and the air outlet 141 is defined in the fixing cover 140. The fixing cover 140 further defines an assembling hole 143 and a slot 142. The slot 142 is configured for giving way to the liquid passage 1233, so that the tobacco liquid can flow into the buffer chamber 111 via the liquid passage smoothly. The assembling hole 143 allows the piercing element 122 to pass through. The atomizing head 100 further includes a liquid blocking gasket 130. The liquid blocking gasket 130 is laminated on the fixing cover 140. The liquid blocking gasket 130 nests the piercing part 122, and is configured for sealing the liquid supply after the liquid supply is pierced. In the present embodiment, the liquid inlet 121 and the air outlet 141 are arranged on an identical side of the atomizing head 100.

[0016] Referring to FIG. 2, the atomizing head 100 further includes a threaded connection structure for connecting with an external structure. Therefore, the atomizing head 100 can be replaced conveniently.

[0017] Referring to FIGS. 2-3, the first electrode 160 extends to form a bracket 161, and the atomizing component 170 is supported by the bracket 161. The atomizing cavity 1232 is received in the bracket 161. The connecting part 123 nests the bracket 161. The atomizing head 100 further includes a liquid blocking element 190 in the atomizing cavity 1232. The liquid blocking element 190 prevents tobacco liquid dropped from the atomizing component 170 from flowing out of the air inlet 151. In the present embodiment, the liquid blocking element 190 may be made of glass fiber material or ceramic material.

[0018] Referring to FIG. 6, as an alternative embodiment, a liquid conducting body 12331 may be arranged in the liquid passage 1233. One end of the liquid conducting body 12331 is positioned in the liquid inlet 121, and an opposite end of the liquid conducting body 12331 is positioned in the buffer chamber 111. The liquid conducting body 12331 is configured for conveying the tobacco liquid in the liquid supply to the buffer chamber 111. The liquid conducting body 12331 may be made of glass fiber core, or cotton cloth.

Second Embodiment

[0019] Referring to FIGS. 7-8, an atomizing head 300 according to a second embodiment is shown. The atomizing head 300 includes a holder 310, an air inlet 351, an air outlet 331, a piercing element 320, a first electrode 360, a second electrode 350, a buffer chamber 311, an atomizing cavity 3232, an atomizing component 370. The air outlet 331 and the air inlet 351 are all in communication with the atomizing cavity 3232. The air inlet 351 is defined in the second electrode 350. An insulating body 380 is arranged between the first and the second electrodes 350, 360. The piercing element 320 defines a liquid inlet 321. As shown in FIG. 8 and 11, the air outlet 331 and the liquid inlet 3321 are arranged on one side of the atomizing head 300.

[0020] Referring to FIGS. 9-10, the piercing element 320 includes a connecting part 323 and a piercing part 322. The liquid inlet 321 is defined in the piercing part 322. The connecting part 323 defines an air hole 3231 in a top surface. The air hole 3231 communicates with the atomizing cavity 3232 and the air outlet 331.

[0021] Referring to FIG. 8, FIG. 12 and FIG. 13, the atomizing head 300 further includes a liquid blocking sleeve 330 wrapping around the holder 310. The liquid blocking sleeve 330 defines a liquid passage 333. The liquid inlet 321 is in communication with the buffer chamber 311 via the liquid passage 333. The liquid blocking sleeve 333 defines an assembling hole 332 allowing the piercing part 322 to pass through. The liquid passage 333 is a gap defined in the liquid blocking sleeve 330. In other embodiments, the liquid passage 333 may be a through hole defined in the liquid blocking sleeve 330. In the present embodiment, the liquid blocking sleeve 330 is made of flexible material.

[0022] Referring to FIG. 8, the first electrode 360 extends to form a bracket 361, and the atomizing component 370 is supported by the bracket 361. The piercing element 320 nests the bracket 361. The atomizing cavity 232 is received in the bracket 361. The atomizing head 300 further includes a pluggable structure for detachably connecting with an external component.

[0023] It is to be understood that the atomizing head 300 may also include a liquid conducting body 12331 similarly arranged in the liquid passage 333.

Third Embodiment

[0024] Referring to FIGS. 14-15, an atomizer 200 for an electronic cigarette is shown. The atomizer 200 includes an atomizing head 100 according to the first embodiment, an atomizing tube 210, a mouthpiece 220, a connector 230, and a threaded electrode 240. The mouthpiece 220 and the connector 230 are arranged at two opposite ends of the atomizing tube 210. The threaded electrode 240 is adapted for connecting with an external power supply. The atomizing tube 210 defines an accommodating space for receiving a liquid supply. In

the present embodiment, the liquid supply is a liquid cup 270 made of transparent material.

[0025] Referring to FIG. 16, the atomizing head 100 is detachably engaged in the connector 230.

[0026] Referring to FIGS. 16-18, the connector 230 includes a plurality of first screw threads 231, and a plurality of second screw threads 231. The threaded electrode 240 includes a plurality of third screw threads 241, a plurality of fourth screw threads 242, and a plurality of fifth screw threads 243. The third screw threads 241 are configured for coupling with the second screw threads 232, so that the connector 230 is detachably connected with the threaded electrode 240. The fourth screw threads 242 are adapted for engaging with the atomizing head 100, so that the atomizing head 100 can be detached and replaced. The fifth screw threads 243 are configured for connecting with the external power supply. In other embodiments, the threaded electrode 240 may be integrally formed with the connector 230.

[0027] Referring to FIG. 15 and FIGS. 18-19, the atomizer 200 further includes a fixing holder 250 fixedly mounted in the connector 230. The liquid cup 270 includes a bottleneck 271 defining a plurality of sixth screw threads 2711. The sixth screw threads 2711 are configured for engaging with the fixing holder 250. The liquid cup 270 defines a liquid chamber 273 for storing tobacco liquid. The liquid cup 270 includes a sealing element 272 at one end of the bottleneck 271. The sealing element 272 is configured for sealing the tobacco liquid. After the piercing part 122 pierces the sealing element 272, the piercing part 122 inserts the liquid cup 270, the liquid inlet 121 communicates with the liquid cup 270, and an end surface of the sealing element 272 abuts against the liquid blocking gasket 130.

[0028] Referring to FIG. 20, in the present embodiment, the atomizing tube 210 is made of transparent material. The atomizer 200 further includes a metallic tube 260 nesting the atomizing tube 210. The metallic tube 260 defines a window, through which the tobacco liquid in the liquid cup 270 can be seen.

Fourth Embodiment

[0029] Referring to FIG. 21, an atomizer 400 as shown is substantially similar to that of the first embodiment, except that the atomizer 400 employs the atomizing head 300 according to the second embodiment.

Fifth Embodiment

[0030] Referring to FIG. 22, an electronic cigarette includes an atomizer 200, and a power supply 500 threadly coupled with the atomizer 200. The power supply 500 is adapted for supplying the atomizer 200 power.

[0031] It is understood that the above-described embodiments are intended to illustrate rather than limit the disclosure. Variations may be made to the embodiments and methods without departing from the spirit of the dis-

closure. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the scope of the disclosure.

Claims

1. An atomizer, comprising:

an atomizing tube defining a space configured for receiving a liquid supply filled with tobacco liquid; and
an atomizing head comprising:

a holder;
an air inlet;
an air outlet;

a piercing element received in the holder, the piercing element being configured for piercing the liquid supply, the piercing element defining a liquid inlet;

a buffer chamber in the holder, the buffer chamber being configured for storing the tobacco liquid flowed from the liquid supply via the liquid inlet after the liquid supply is pierced, the liquid inlet being in communication with the buffer chamber and the liquid supply;

an atomizing cavity defined in the holder, both of the air inlet and the air outlet communicating with the atomizing cavity; and
an atomizing component received in the atomizing cavity, the atomizing component being configured for absorbing the tobacco liquid in the buffer chamber and heating the tobacco liquid to vaporize.

2. The atomizer according to claim 1, wherein the piercing element comprises a connecting part and a piercing part, the connecting part is fixedly connected with the holder, the piercing part is adapted for piercing the liquid supply, and the liquid inlet is defined in the piercing part.

3. The atomizer according to claim 2, wherein the connecting part defines a liquid passage, and the liquid inlet is in communication with the buffer chamber via the liquid passage.

4. The atomizer according to claim 2, further comprising a liquid blocking sleeve wrapping around the holder, wherein the liquid blocking sleeve defines an assembling hole allowing the piercing part to pass through, and a liquid passage communicating the liquid inlet and the buffer chamber.

5. The atomizer according to any of claims 3-4, further comprising a liquid conducting body, wherein one

end of the liquid conducting body is positioned in the liquid inlet, and an opposite end of the liquid conducting body is arranged in the buffer chamber.

6. The atomizer according to claim 1, wherein the buffer chamber surrounds the atomizing cavity.

7. The atomizer according to claim 1, further comprising a fixing cover configured for fixing the piercing element to the holder, wherein the air outlet is defined in the fixing cover.

8. The atomizer according to claim 2, wherein the connecting part defines an air hole in a sidewall thereof, and the air hole communicates with the atomizing cavity and the air outlet.

9. The atomizer according to claim 1, wherein the atomizing component comprises a liquid absorbing element and a heating element, the liquid absorbing element is configured for absorbing tobacco liquid in the buffer chamber, the heating element is in contact with the liquid absorbing element, and is configured for heating the tobacco liquid absorbed in the liquid absorbing element to form aerosol.

10. The atomizer according to claim 1, further comprising a liquid blocking gasket nesting the piercing part, wherein the liquid blocking gasket is configured for sealing the liquid supply after the liquid supply is pierced.

11. The atomizer according to claim 1, wherein the atomizing tube is made of transparent material.

12. The atomizer according to claim 11, wherein the atomizer further comprises a metallic tube nesting the atomizing tube, and the metallic tube defines a window, through which the tobacco liquid in the liquid supply can be seen.

13. An electronic cigarette, comprising:

an atomizer according to any of claims 1-12; and
a power supply for providing the atomizer power.

14. An atomizing head, comprising:

a holder;
an air inlet;
an air outlet;

a piercing element received in the holder, the piercing element being configured for piercing a liquid supply filled with tobacco liquid, the piercing element defining a liquid inlet;
a buffer chamber in the holder, the buffer chamber being configured for storing the tobacco liquid flowed from the liquid supply via the liquid

inlet after the liquid supply is pierced, the liquid inlet being in communication with the buffer chamber and the liquid supply;
an atomizing cavity defined in the holder, both of the air inlet and the air outlet communicating with the atomizing cavity; and
an atomizing component received in the atomizing cavity, the atomizing component being configured for absorbing the tobacco liquid in the buffer chamber and heating the tobacco liquid to vaporize.

15

20

25

30

35

40

45

50

55

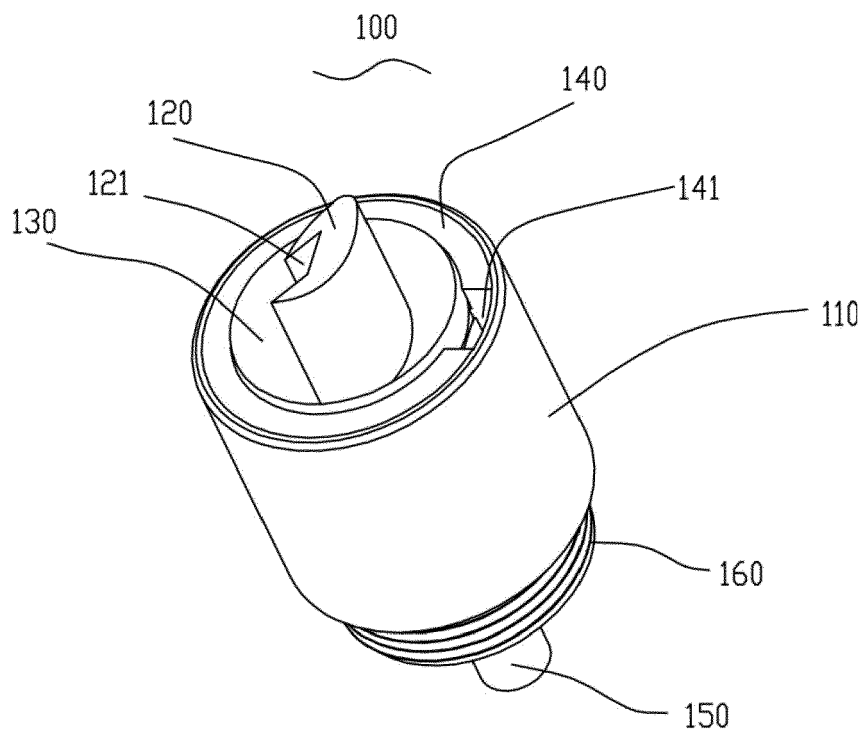


FIG. 1

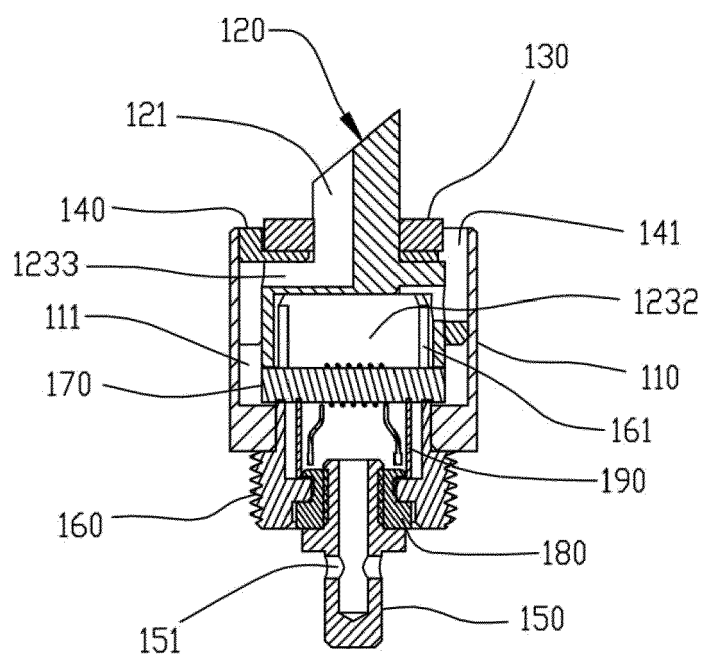


FIG. 2

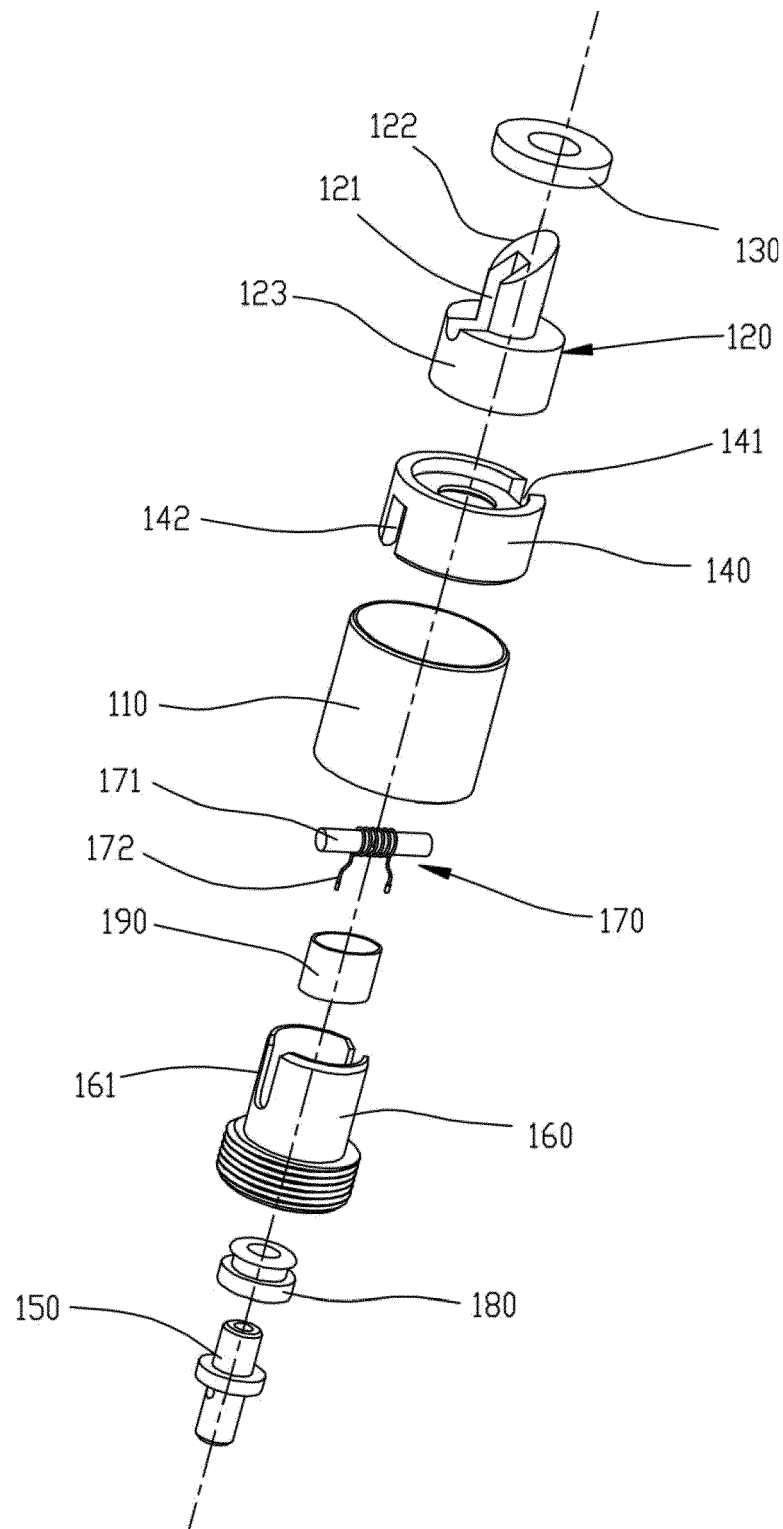


FIG. 3

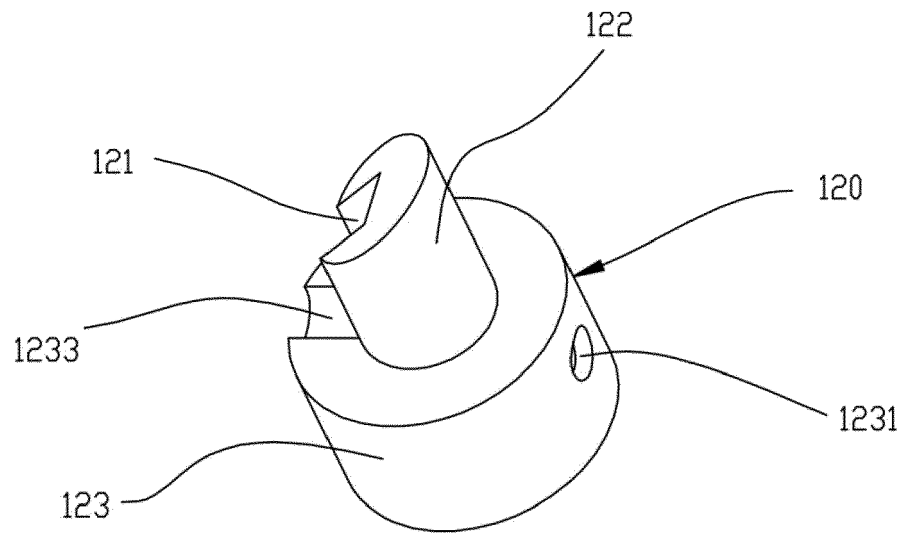


FIG. 4

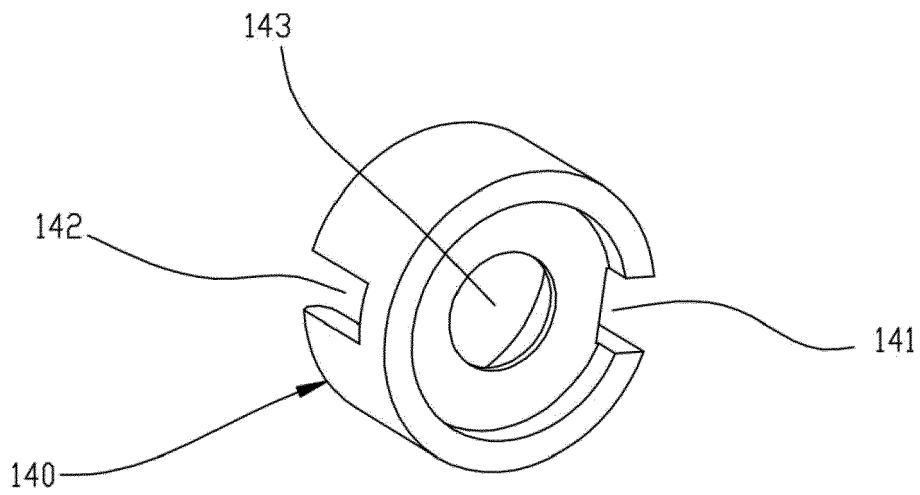


FIG. 5

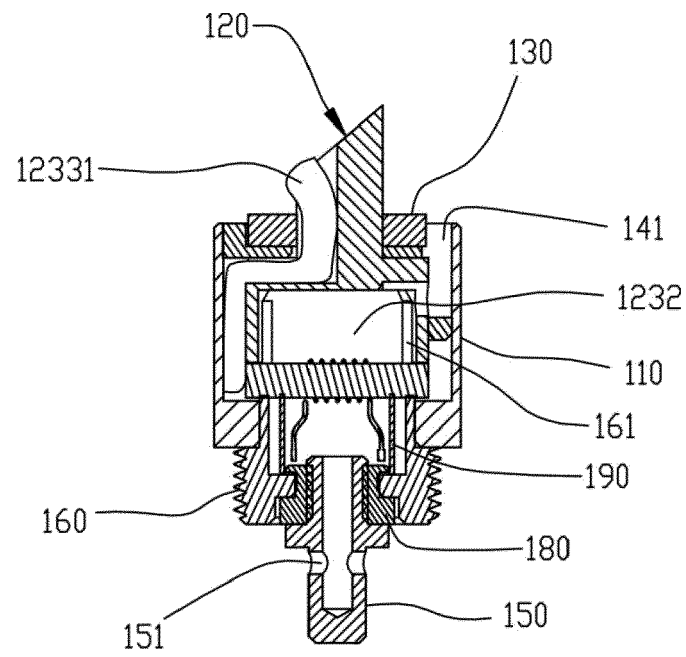


FIG. 6

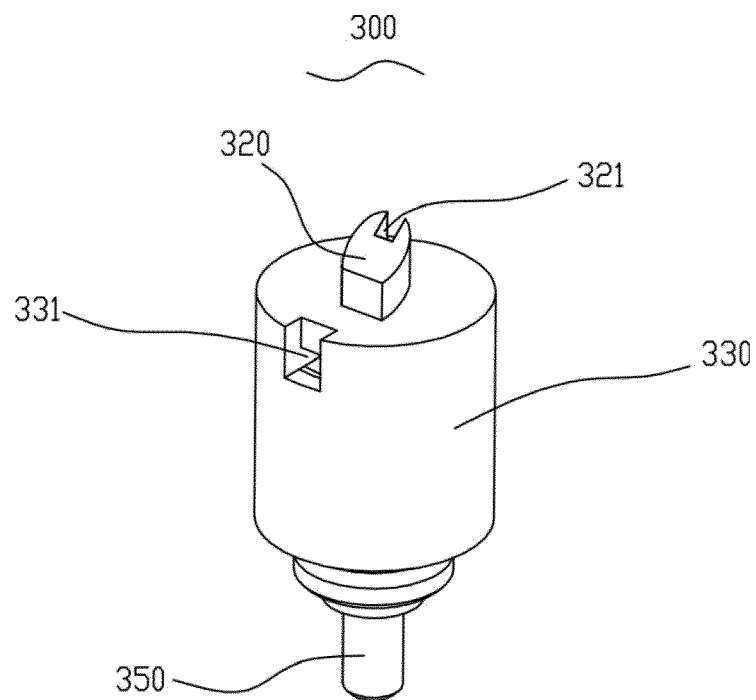


FIG. 7

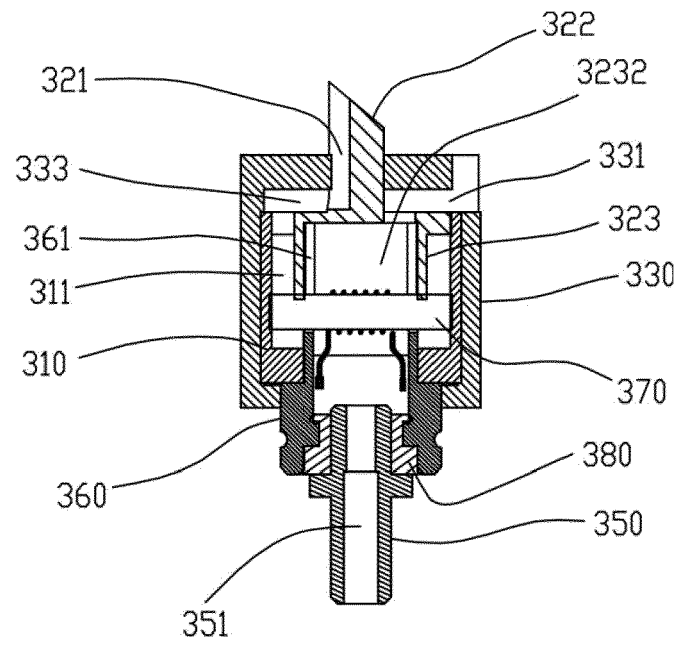


FIG. 8

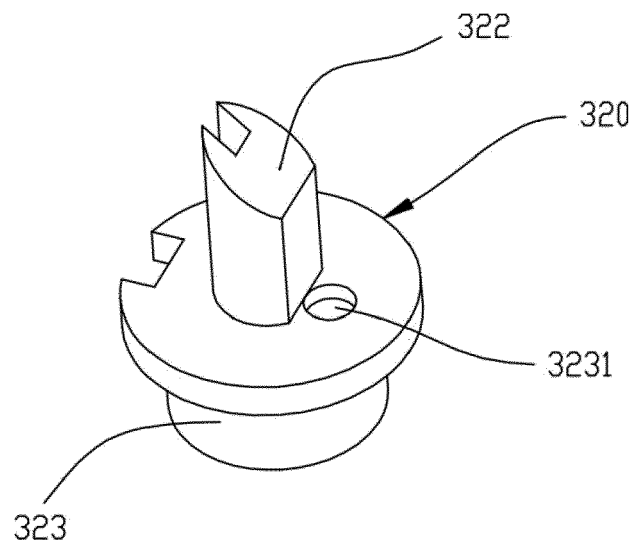


FIG. 9

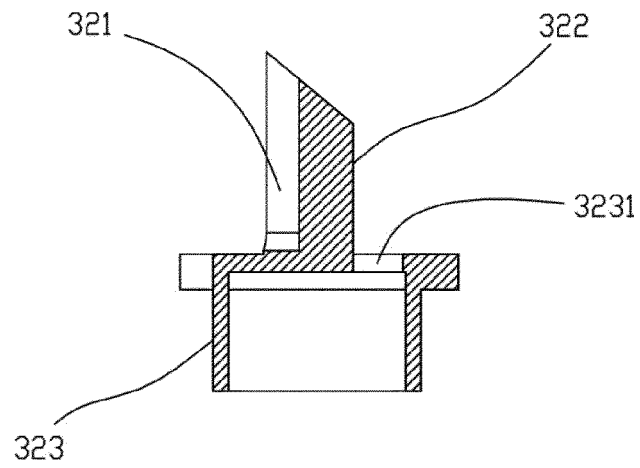


FIG. 10

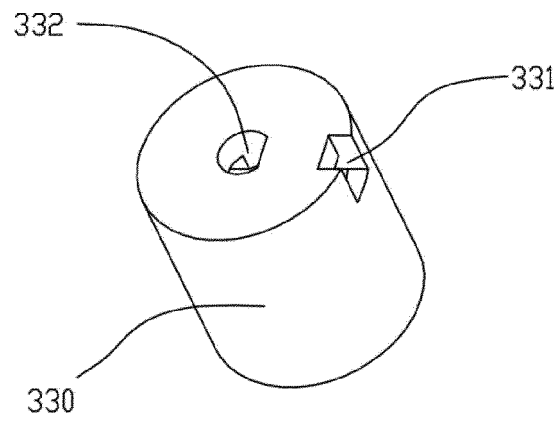


FIG. 11

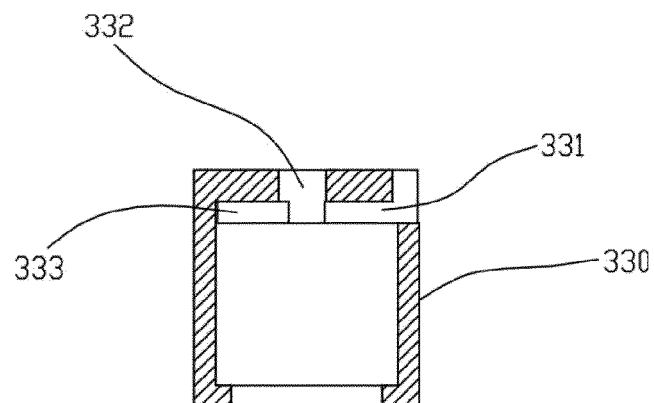


FIG. 12

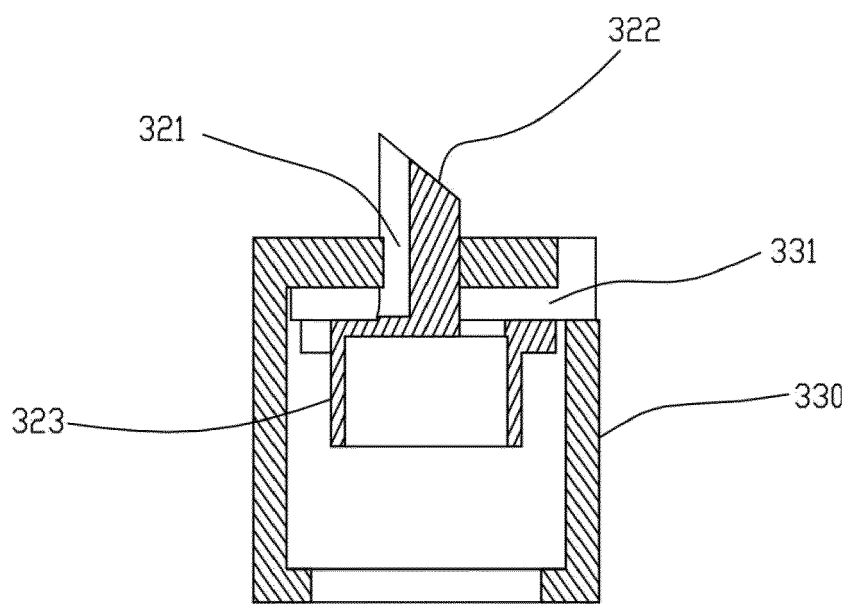


FIG. 13

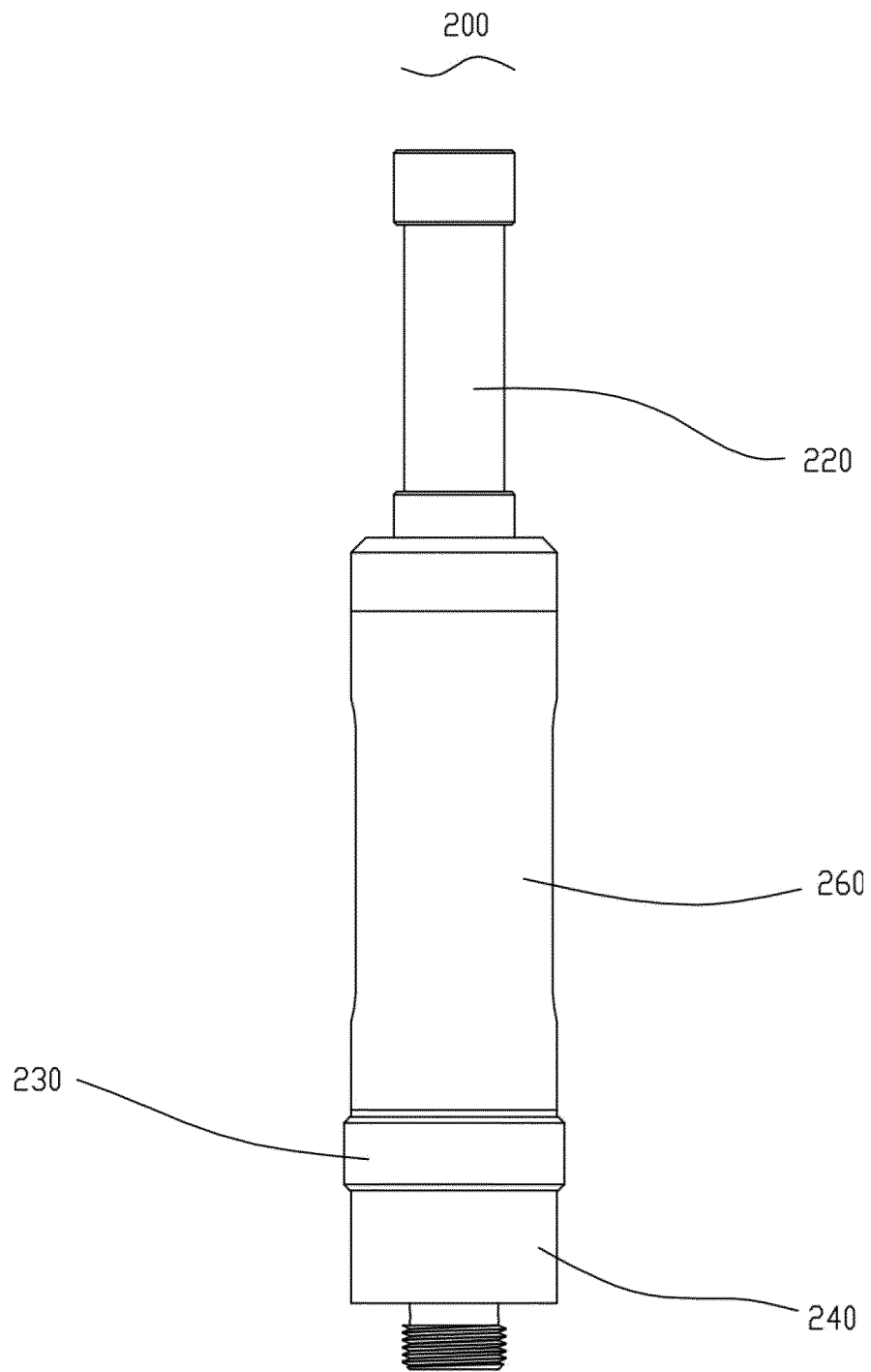


FIG. 14

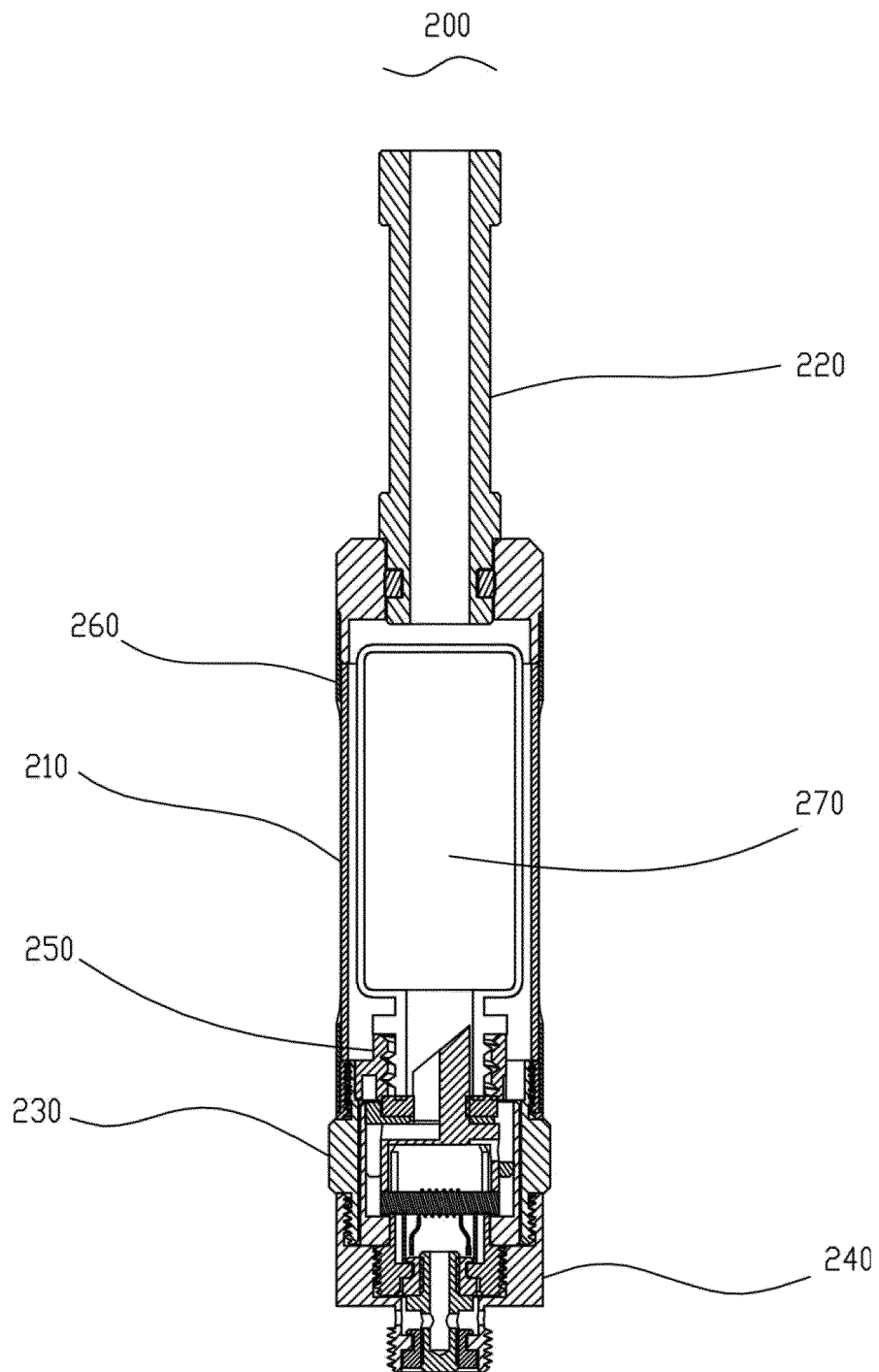


FIG. 15

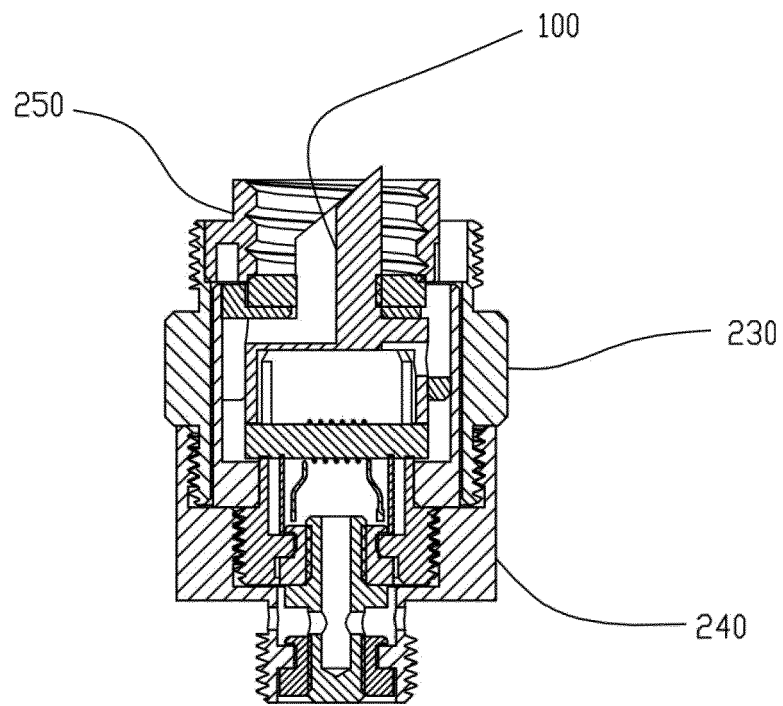


FIG. 16

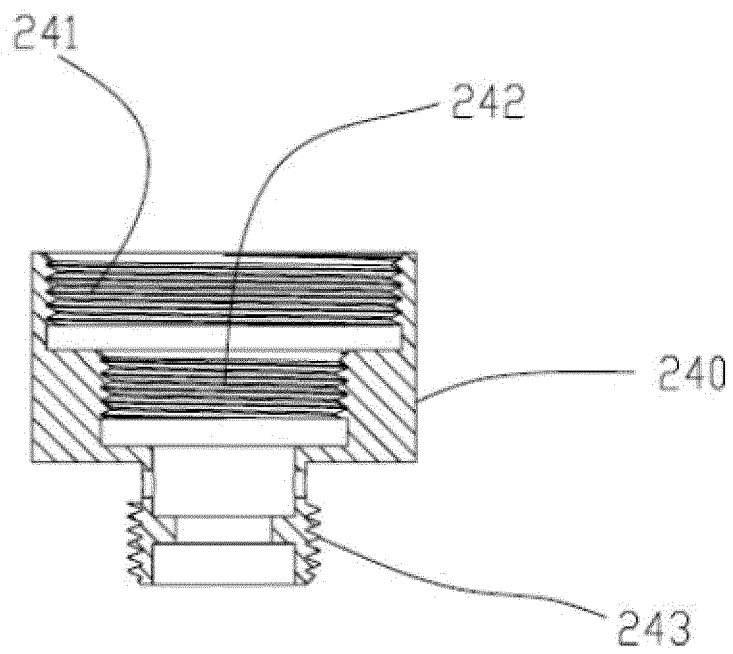


FIG. 17

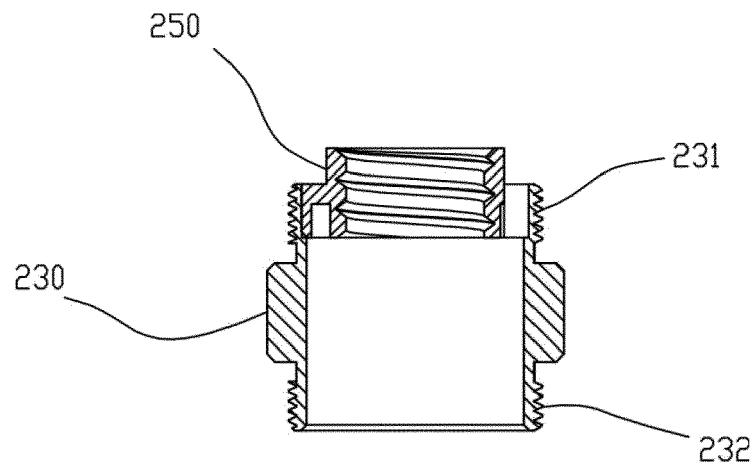


FIG. 18

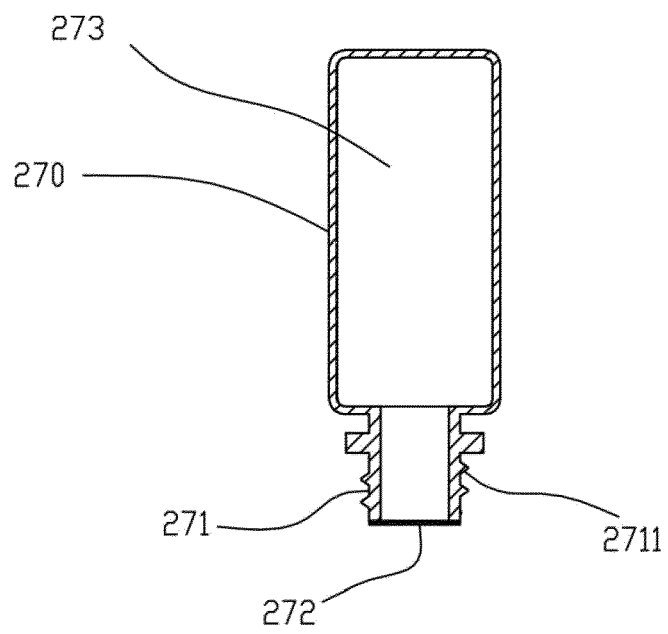


FIG. 19

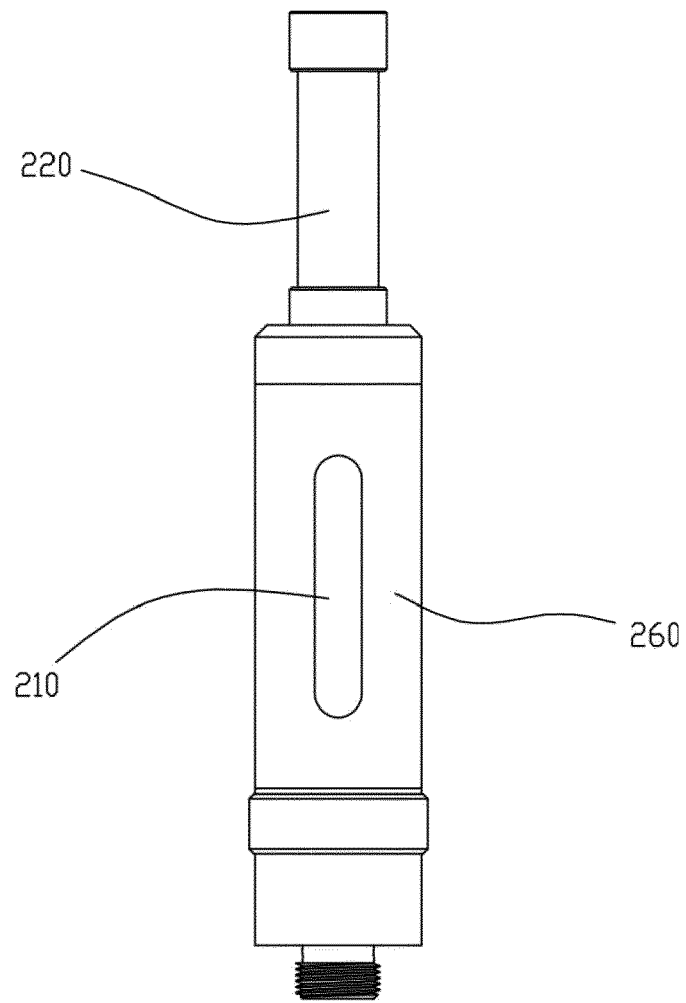


FIG. 20

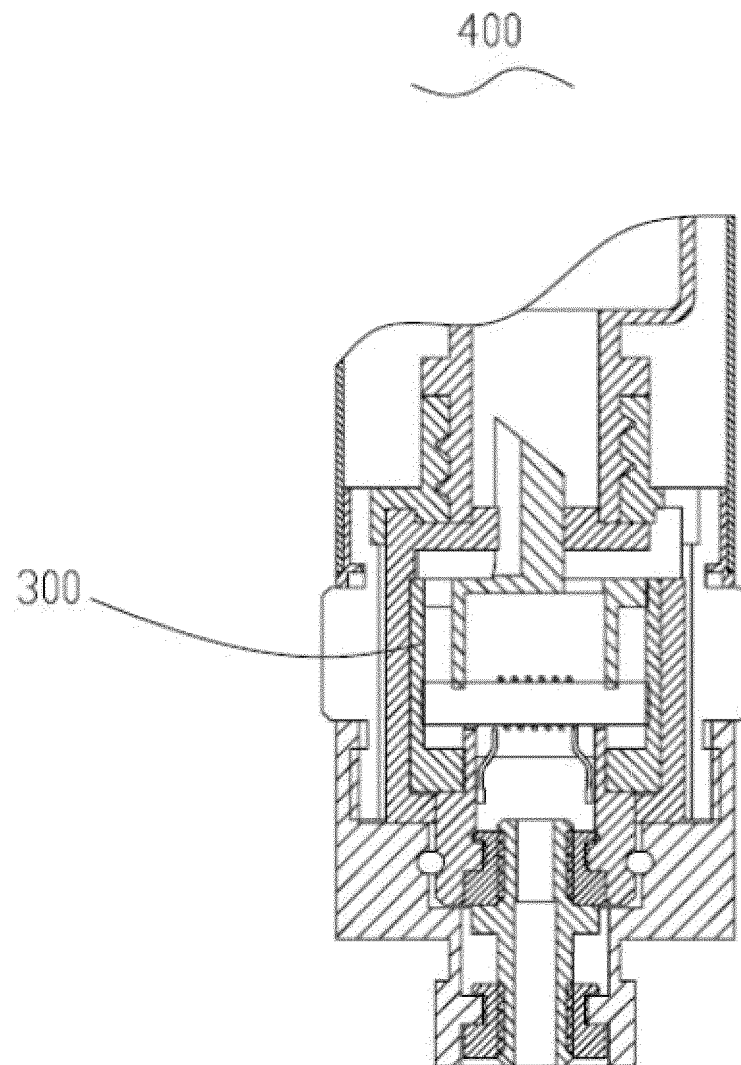


FIG. 21

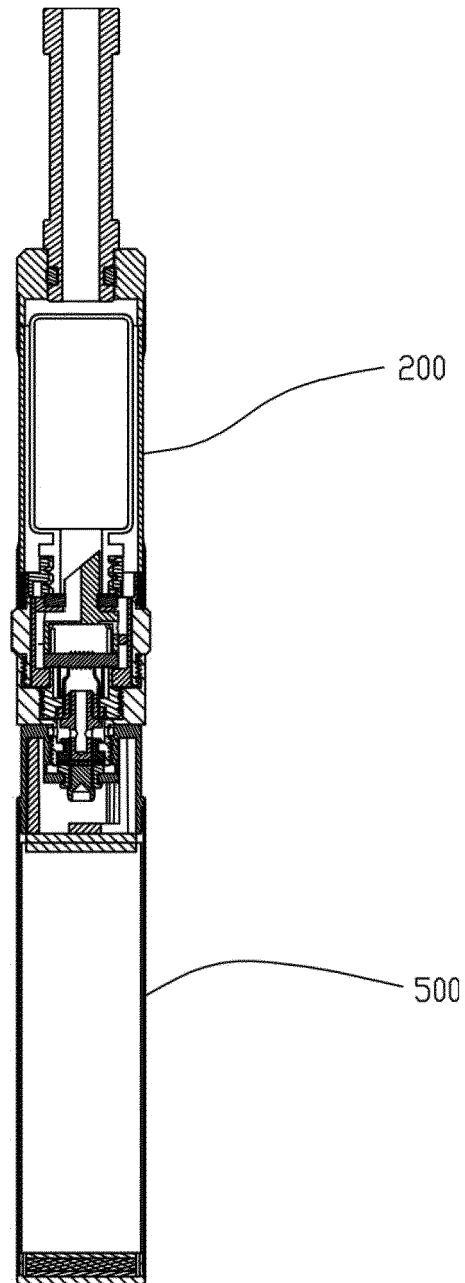


FIG. 22



EUROPEAN SEARCH REPORT

 Application Number
EP 15 17 3037

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 489 391 A1 (JOYETECH CHANGZHOU ELECTRONICS CO LTD [CN]) 22 August 2012 (2012-08-22) * figures * * paragraph [0030] - paragraph [0034] * -----	1-14	INV. A24F47/00
X	EP 2 260 733 A1 (XIU YUNQIANG [CN]) 15 December 2010 (2010-12-15) * figures * * paragraph [0019] - paragraph [0025] * -----	1-3,6, 13,14 4,5,7-12	
A	CN 202 276 831 U (JOY CHANGZHOU ELECTRONIC TECHNOLOGY CO LTD) 20 June 2012 (2012-06-20) * figures * -----	1-14	
A	WO 2013/159245 A1 (RUYAN INVEST HOLDINGS LTD [GB]; HON LIK [CN]) 31 October 2013 (2013-10-31) * figures * * paragraph [0014] - paragraph [0027] * -----	1-14	TECHNICAL FIELDS SEARCHED (IPC)
A	CN 203 105 624 U (JOYE CHANGZHOU ELECTRONIC TECHNOLOGY CO LTD) 7 August 2013 (2013-08-07) * figures * -----	1-14	A24F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 1 October 2015	Examiner Engel, Katrin
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

 1
EPO FORM 1503 03/82 (P04C01)

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

EP 15 17 3037

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

01-10-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2489391 A1	22-08-2012	CN 102160906 A	24-08-2011
		EP 2489391 A1	22-08-2012
		RU 2012124102 A	20-12-2013
		US 2012199663 A1	09-08-2012
		WO 2012058941 A1	10-05-2012

EP 2260733 A1	15-12-2010	AU 2008351672 A1	03-09-2009
		CA 2729601 A1	03-09-2009
		DE 202008018338 U1	16-04-2013
		EP 2260733 A1	15-12-2010
		GB 2466758 A	07-07-2010
		US 2011005535 A1	13-01-2011
		WO 2009105919 A1	03-09-2009

CN 202276831 U	20-06-2012	NONE	

WO 2013159245 A1	31-10-2013	AR 090841 A1	10-12-2014
		AU 2012378108 A1	13-11-2014
		CA 2870469 A1	31-10-2013
		CN 104602552 A	06-05-2015
		EP 2840913 A1	04-03-2015
		JP 2015514429 A	21-05-2015
		KR 20150020182 A	25-02-2015
		US 2015040929 A1	12-02-2015
		WO 2013159245 A1	31-10-2013

CN 203105624 U	07-08-2013	NONE	
