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(54) Electronic cigarette, atomizing device, power pole and charger connector

(57) An electronic cigarette includes an atomizing device (1) and a power pole (2), the atomizing device includes a first connecting assembly (110), and the power pole includes a second connecting assembly (208). The first connecting assembly includes a pair of first electrodes (110a, 110b) and at least one lapping portion (114). The second connecting assembly includes a pair of second electrodes (209a, 209b) and a cavity with at least one adapting portion formed therein and a guiding surface formed adjacent to the at least one adapting portion. The at least one lapping portion is capable of inserting into the cavity from the guiding surface and rotatable in the cavity until abuts the at least one adapting portion, whereby the first electrodes are in contact with and thus electrically connected to the respective second electrodes. An atomizing device, a power pole and a charger connector are also provided.

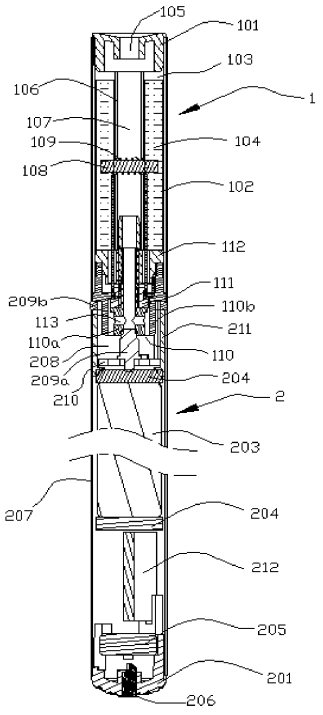

FIG.2

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Description

BACKGROUND

1. Technical Field

[0001] The present invention relates to an electronic cigarette, an atomizing device and a power pole used in the electronic cigarette, and a charger connector for charging the power pole.

2. Description of Related Art

[0002] Electronic cigarettes are similar to conventional cigarettes in appearance and taste, but less harmful to human's health, so that electronic cigarettes are widely used for helping people to quit smoke.

[0003] A typical electronic cigarette includes an atomizing device and a power pole detachably connected to the atomizing device by a screw, and the screw also finishes the electrical connection between the atomizing device and the power pole. However, such screw results the atomizing device or the power pole needs to rotate a number of circles, and the screw member can only be made of metallic materials because of the electrical connection, by which to lower the cost is difficult.

[0004] What is needed, therefore, is an electronic cigarette which can overcome the above shortcomings.

[0005] What is also needed, are corresponding atomizing device, power pole and charger connector which can overcome the above shortcomings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Many aspects of the present electronic cigarette, atomizing device, power pole and charger connector 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 electronic cigarette, atomizing device, power pole and charger connector. Moreover, in the drawings, like reference numerals designatecorresponding parts throughout the several views.

FIG. 1 is a schematic view of an electronic cigarette in accordance with a first embodiment.

FIG. 2 is a cross sectional view along A-A direction of the electronic cigarette of FIG. 1 in accordance with the first embodiment.

FIG. 3 is an exploded view of the electronic cigarette of FIG. 2.

FIG. 4 is a schematic isometric view of the atomizing device of FIG. 3.

FIG. 5 is a schematic isometric view of the power pole of FIG. 3.

FIG. 6 is a cross sectional view along B-B direction of the electronic cigarette of FIG. 2.

FIG. 7 is a cross sectional view of a power pole of an alternative embodiment.

FIG. 8 is a cross sectional view of a power pole of another alternative embodiment.

FIG. 9 is a cross sectional view of an electronic cigarette in accordance with a second embodiment.

FIG. 10 is a cross sectional view of an electronic cigarette of an alternative embodiment.

FIG. 11 is a schematic isometric view of a charger connector in accordance with a third embodiment.

DETAILED DESCRIPTION

[0007] Embodiments of the present electronic cigarette, atomizing device, power pole and charger connector will now be described in detail below and with references to the drawings.

[0008] Referring to FIG. 1, an electronic cigarette in accordance with a first embodiment is provided, which is composed of an atomizing device 1 and a power pole 2, and the atomizing device 1 is detachable from the power pole 2. The atomizing device 1 and the power pole 2 each are slim, and the atomizing device 1 and the power pole 2 are mounted along a lengthwise direction to forma body similar to a conventional cigarette and a cigar. The electronic cigarette has at least one air inlet and at least one air outlet, the atomizing device 1 has a mouthpiece 101, the air outlet can be formed in the mouthpiece 101, and the air inlet can be formed at a connection end of the power pole 2, or a distal end of the power pole 2. For example, the power pole 2 has a lamp cover 201 formed at a distal end thereof, and the lamp cover 201 has an air inlet 202. The air inlet 202 is in communication with the air outlet of the mouthpiece 101 in the electronic cigarette. The atomizing device 1 can be heating atomizing device or ultrasonic atomizing device. In the present embodiment, the atomizing device 1 is a heating atomizing device.

[0009] Referring to FIG. 2, the atomizing device 1 includes an atomizing sleeve 102, a liquid reservoir 103 and an atomizing assembly. The atomizing assembly includes a liquid transferring member 108 and a heating element. The liquid transferring member 108 is configured for absorbing a tobacco liquid 104 reserved in the liquid reservoir 103 and transferring it to the heating element. The heating element can be a heating rod, a ceramic heating element, or a heating coil, in the present embodiment, the heating element is a heating coil 109

wrapping around the liquid transferring member 108.

[0010] The atomizing device 1 further includes a first connecting assembly 110 configured at an end thereof. The first connecting assembly 110 includes an inner electrode 110a, an outer electrode 110b, and an insulated member 111 located between the inner electrode 110a and the outer electrode 110b. The inner electrode 110a and the outer electrode 110b are electrically connected to the heating coil 109 by conductive wires. The power pole 2 includes a battery sleeve 207, and a battery 203 received in the battery sleeve 207. The power pole 2 further includes a second connecting assembly 208 configured at an end thereof. The second connecting assembly 208 has a cavity receiving the first connecting assembly 110, and a positive electrode 209a and a negative electrode 209b. The first connecting assembly 110 and the second connecting assembly 208 are connected to each other by a lapping fitting (see the following detail), and when the first connectingassembly 110 and thesecond connecting assembly 208 are connected, the inner electrode 110a abuts on the positive electrode 209a, the outer electrode 110b abuts on the negative electrode 209b, thereby the atomizing device 1 can be powered on by the power pole 2.

[0011] Referring to FIGS. 2, 3 and 4, which show the detail configuration of the atomizingdevice 1. The atomizing sleeve 102 has the mouthpiece 101, the mouthpiece 101 has the air outlet 105, and an elongated glass fiber tube 106 is received in the atomizing sleeve 102. The glass fiber tube 106 forms the aerosol passage 107. An annular space between the glass fiber tube 106 and the atomizing sleeve 102 forms the liquid reservoir 103 for thetobacco liquid 104. Preferably, some porous material, such as cotton, fiber can be filled in the liquid reservoir 103 to reserve the tobacco liquid 104.

[0012] The glass fiber tube 106 has openings formed at a peripheral wall thereof, the liquid transferring member 108 extends through the openings to reach the liquid reservoir 103. The liquid transferring member 108 is made of glass fiber or porous material. The heating coil 109 wraps around the liquid transferring member 108, and the heating coil 109 is completely located in the aerosol passage 107, the tobacco liquid 104 reaches theheating coil 109 by capillary, and the heating coil 109 heats the tobacco liquid to atomize it to be aerosol. The aerosol can be sucked out at the air outlet 105 through theaerosol passage 107. A silicon base 112 is mounted at a bottom of theliquid reservoir 103, and configured for sealing the liquid reservoir 103.

[0013] The first connecting assembly 110 is located at an end of the atomizing sleeve 102. In the first connecting assembly 110, each of the inner electrode 110a and the outer electrode 110b are ring-shaped, the outer electrode 110b has a shoulder 110c formed thereon, and the inner electrode 110 has an air through hole 113 formed in a sidewall thereof. The shoulder 110c is engaged in the atomizing sleeve 102, with a bottom surface of the shoulder 110c exposed to an end of the atomizing sleeve 102. The air through hole 113 is in communication with theaerosol passage 107, and the air from the power pole 2 can flow through a gap between the inner electrode 110a and the outer electrode 110b, the air through hole 113 and the aerosol passage 107, thereby making sure the air flow from an air inlet to the air outlet.

[0014] Two ends of the heating coil 109 are connected to conductive wires, the silicon base 112 has through holes for guiding the conductive wires, and the conductive wires can be electrically connected to the inner electrode 110a and outer electrode 110b via welding, riveting, or interference fitting.

[0015] The outer electrode 110b can be made of metallic material, or instead made of plastic material, and further have a conductive layer formed thereon. When the outer electrode 110b is inserted into the cavity of second connecting assembly 208, the outer electrode 110b can be rotated, and the outer electrode 110b has at least one lapping portion formed thereon to form a connection with at least one adapting portionof the power pole 2. See FIG. 4, two ribs 114 acting as two lapping portions are formed on theouter electrode 110b, each of the ribs 114 is arc-shaped, and the two ribs 114 are concentrically arranged.

[0016] Referring to FIGS. 2, 3 and 5, the power pole 2 includes a battery sleeve 207, and a battery 203 and a control unit located in the battery sleeve 207, the control unit is located on a circuit board 212. Each end of the battery 203 has a buffer 204 to protect the battery 203. One end of the battery sleeve 207 has a lamp cover 201, an air inlet 202 is formed in the lamp cover 201, and an air actuating switch 205is positioned in the lamp cover 201. The air actuating switch 205 is electrically connected to the control unit, and configured for switching on the control unit according to an air actuating. As the air inlet 202 and the air outlet 105 are located at two sides of the sensor 202, when a user sucks the mouthpiece 101, pressure difference occurs at the two sides of theair actuating switch 205, and when pressure difference reaches a predetermined value, the air actuating switch 205 gives a signal to the control unit to control the circuit state-on, otherwise control the circuit state-off. It is understood that the air actuating switch 205 and the control unit can be mounted at a same circuit board.

[0017] The cavity of thesecond connecting assembly 208 is provided by an electrode fixing base 211 which is located at the other end of the battery sleeve 207 opposite to the lamp cover 201. A circuit board 210 is mounted in the cavity, and the positive electrode 209a is located at a central position of the circuit board 210. The positive electrode 209a is a resilient electrode which may have a spring and an electrode pin connected to the spring. The spring provides a resilient force for the electrode pin, thereby making sure to closely contact the inner electrode 110a of the atomizing device 1. The negative electrode 209b is a ring-shaped electrode inserted between battery sleeve 207 and the electrode fixing base 211, and has a flange 209c having atop surface exposed on the

end of the battery sleeve 207, when the first connecting assembly 110 is connected to the second connecting assembly 208, the top surface of the flange 209c of the negative electrode 209b contacts the bottom surface of the shoulder 110c of the outer electrode 110b to form an electrical connection.

[0018] Referring to FIGS.5 and 6, an inner surface 2081 of the cavity of the second connecting assembly 208 is circular, and two protrusions 2083 are formed at a top of the inner surface2081. Each of the protrusions 2083 is arc-shaped, and the two protrusions are concentrically arranged. The two protrusions 2083 forms two adapting portions of the power pole 2 for the lapping portions. Two gaps between the two protrusions 2083 form guiding surfaces 2082 for guiding the ribs 114 into the cavity of the second connecting assembly 208. The guiding surfaces 2082 are flat with the inner surface 2081, such that the first connecting assembly 110 can rotate in the cavity, then the ribs 114 will abuts a bottom surface of the protrusions 2083, in this way, forming a lapping fitting between the atomizing device 1 and the power pole 2. The lapping fitting is configured for preventing the first connection assembly 110 and the second connectingassembly 208 to escape from each other, and only when the first connecting assembly 110 or thesecond connecting assembly 208 is rotated again to allow the ribs 114 return to the guiding surfaces 2082, the first connection assembly 110 and the second connectingassembly 208 then can be detachedfrom each other.

[0019] Referring to FIG. 7, preferably, the protrusions 2083 further has a slanted transition section 20831. When the ribs 114 of the outer electrode 110b are rotated into the inner surface 2081, the ribs 114 slide along the transition section 20831 and finally abut on a position of the protrusions 2083 where a greatest friction force is produced therebetween. At this position, the atomizing device 1 and the power pole 2 are tightly connected, and the first connection assembly 110 and the second connectingassembly 208 are closely contact.

[0020] It is understood that thepositive electrode 209a and the negative electrode 209b can act as discharging electrodes for the atomizing device 1 when the atomizing device 1 is connected to the power pole 2, and can also act as charging electrodes for the power pole 2 when atomizing device 1 is detached from the power pole 2 and a charger is applied on the power pole 2. In alternative embodiments, the power pole 2 can have additional charging electrodes, for example, adding a positive electrode 206 at a distal end of the power pole 2, and the positive electrode 206 and the negative electrode 209b cooperatively form charging electrodes.

[0021] Referring to FIG. 8, in an alternative embodiment, the negative electrode 209b' is made of a coil spring and arranged on the circuit board 21, the negative electrode 209b' is spaced from the positive electrode 209a, and configured for providing a resilient force in contacting the outer electrode 110b.

[0022] Referring to FIG. 9, an electronic cigarette in accordance with a second embodiment is provided, which is composed of an atomizing device 3 and a power pole 4. The atomizing device 3 includes a mouthpiece 301 and a first connecting assembly 304 at two ends thereof. The first connecting assembly304 includes an inner electrode 302 and an outer electrode 303 insulatedly spaced from the inner electrode 302. The power pole 2 includes a battery 403 and a lamp cover 401. The lamp cover 401 has an air inlet, and a controller 404 is arranged in the lamp cover 401. An air actuating switch and a control circuit are mounted in the controller 404.

[0023] The power pole 2 further includes an electrode fixing base 406 and a second connecting assembly 407 positioned at top end thereof. The electrode fixing base 406provides a cavity for the second connecting assembly 407. The outer electrode 303 has at least one rib 3031 extending outwards thereof, the electrode fixing base 406 has at least one protrusion 4061 extending inwards thereof. The at least one rib 3031 and protrusion 4061 each are arc-shaped, and at least one gap is formed adjacent to the at least one rib 3031, and also at least one gap is formed adjacent to the at least one protrusion 4061. In the present embodiment, there are two ribs 3031 and two protrusions 4061. The ribs 3031 of the outer electrode 303 enter the cavity of the electrode fixing base 406 from the gaps between the protrusions 4061, and are rotated a certain angle to abut on a bottom surface of the protrusions 4061, thereby forming a lapping fitting. The second connecting assembly 407 has a positive electrode 408 and a negative electrode 409, the positive electrode 408 is a coil spring and is arranged at a central position of the cavity, and the negative electrode 409 is a metallic shrapnel and is arranged under the protrusions 4061. In accompany with the lapping fitting, the positive electrode 408 abuts a connecting portion 3021 of the inner electrode 302, and the negative electrode 409 abuts the ribs 3031 of the outer electrode 303.

[0024] In addition, the power pole 2 further has a first charging electrode 402 and a second charging electrode 405, the first charging electrode 402 is arranged in the lamp cover 401, and the second charging electrode 405 is set around the electrode fixing base 406, and electrically connected to the negative electrode 409. In the present embodiment, the electrode fixing base 406 has a hole406a, and the negative electrode 409 is integrally formed withthe second charging electrode 405 and extends through the hole 406a to contact the ribs 3031 of the outer electrode 303. In charging the power pole 2, the first charging electrode 402 and the second charging electrode 405 are connected to a charger for charging the battery 403.

[0025] Referring to FIG. 10, in an alternative embodiment, the positive electrode 410 is a metallic shrapnel arranged at a central position of the cavity 407, and the metallic shrapnel is a circle metallic dome. When the atomizing device 3 is connected to the power pole 4, the negative electrode 409 contacts the ribs 3031 of the outer electrode 303, and the positive electrode 410 contacts a

distal end 3022 of the inner electrode 302.

[0026] It is understood thatthe above described first connecting assemblycan be mounted at the power pole 2, and the second connecting assembly can be mounted at the atomizing device 1.

[0027] Referring also to FIG. 11, a charger connector 3 in accordance with a third embodiment is provided, which includes a main body 5. The main body 5 has an interface 501 configured to be connected to outside power supply, and a third connecting assembly 504. The interface 501 can be USB interface 501. The third connecting assembly 504 includes an inner electrode 503 and an outer electrode 502 insulatedly spaced from the inner electrode 503. In the present embodiment, the outer electrode 502 has two ribs 5021. In charging the power pole 2, the third connecting assembly 504 inserts into the cavity of the electrode fixing base 406 of the power pole 2, and the third connecting assembly 504 and second connecting assembly 407 forms a lapping fitting. The charger connector 3 then can be connected to an outside power supply to charge the power pole 2.

[0028] 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 disclosure. 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 electronic cigarette comprising an atomizing device (1) and a power pole (2), wherein the atomizing device (1) or the power pole (2) comprises a first connecting assembly (110) and the power pole (2) or the atomizing device (1) comprises a second connecting assembly (208), wherein the first connecting assembly (110) comprises a pair of first electrodes (110a, 110b) and at least one lapping portion (114), and the second connecting assembly (208) comprises a pair of second electrodes (209a, 209b) and a cavity with at least one adapting portion (2083) formed therein and a guiding surface (2082) formed adjacent to the at least one adapting portion, wherein the at least one lapping portion (114) is capable of being inserted into the cavity from the guiding surface (2082) and rotatable in the cavity until it abuts the at least one adapting portion (2083), whereby the first electrodes (110a, 110b) are in contact with and thus electrically connected to the respective second electrodes (209a, 209b).

2. The electronic cigarette of claim 1, wherein the atomizing device (1) further comprises an atomizing sleeve (102), a liquid reservoir (103) defined in the atomizing sleeve (102) and configured for reserving a tobacco liquid, and an atomizing assembly including a liquid transferring member (108) and a heating coil (109) wrapping around the liquid transferring member (108) and configured for heating the tobacco liquid.

3. The electronic cigarette of claim 1 or 2, wherein the first electrodes (110a, 110b) comprise an inner electrode (110a) and an outer electrode (110b) insulatedly spaced from the inner electrode (110a), the at least one lapping portion extending outwards from the outer electrode.

4. The electronic cigarette of claim 3, wherein the second electrodes (209a, 209b) comprise a positive electrode (209a) located in the cavity, and a negative electrode (209b) set around the positive electrode (209a), the at least one adapting portion extending from an inner wall of the cavity towards a center of the cavity, the inner electrode (110a) being in contact with positive electrode (209a), and the outer electrode (110b) being in contact with the negative electrode (209b).

5. The electronic cigarette of claim 4, wherein the positive electrode (209a) and/or the negative electrode (209b) is resilient; and/or wherein the second connecting assembly further comprises an electrode fixing base (211), the cavity is provided by the electrode fixing base (211), and the positive electrode (209a) and the negative electrode (209b) are fixed by the electrode fixing base (211).

6. The electronic cigarette of claim 5, wherein the power pole (2) further comprises a battery sleeve (207) and a battery (203) received in the battery sleeve (207), the atomizing device (1) further comprises an atomizing sleeve (102), the positive electrode (209a) and the negative electrode (209b) are electrically connected to the battery(203), the negative electrode (209b) is sandwiched between the electrode fixing base (211) and the battery sleeve (207), and has a flange (209c) disposed on an end of the battery sleeve (207), the outer electrode (110b) has a shoulder (110c) exposed on an end of the atomizing sleeve (102) and configured for contacting the negative electrode (209b).

7. The electronic cigarette of claim 5, wherein the first connecting assembly is located at an end of the atomizing device (1), the second connecting assembly is located at an end of the power pole (2), the second connecting assembly further comprises a charging electrode set around the electrode fixing base (211), the negative electrode (209b) is located in an inner wall of the electrode fixing base(211), the electrode fixing base (211) has a hole, and the negative electrode (209b) is connected to the charging electrode through the hole.

8. The electronic cigarette of any of the preceding claims, wherein the first connecting assembly is located at an end of the atomizing device (1), the second connecting assembly is located at an end of the power pole (2), the second connecting assembly further comprises at least one charging electrode located at the other end of the power pole (2).

9. The electronic cigarette of one of claims 1 to 8, wherein the guiding surface is flat with an inner surface of the cavity and wherein the adapting portion preferably has a slanted transition section.

10. An atomizing device of an electronic cigarette, in particular of an electronic cigarette according to any of claims 1 to 9, said atomizing device comprising an atomizing sleeve (102), a liquid reservoir (103) defined in the atomizing sleeve (102), an atomizing assembly arranged in the atomizing sleeve (102), and a first connecting assembly located at an end of the atomizing sleeve (102), the first connecting assembly comprising an inner electrode (110a), an outer electrode (110b), and at least one lapping portion extending outwards from the outer electrode (110b); wherein the inner electrode (110a) preferably comprises an air through hole.

11. A power pole of an electronic cigarette, in particular of an electronic cigarette according to any of claims 1 to 9, said power pole comprising a second connecting assembly, the second connecting assembly comprising a cavity with at least one adapting portion formed therein and a guiding surface formed adjacent to the at least one adapting portion, a positive electrode (209a) arranged in the cavity, and a negative electrode (209b) set around the positive electrode (209a).

12. The power pole of an electronic cigarette of claim 11, wherein the second connecting assembly further comprises an electrode fixing base (211), the positive electrode (209a) and the negative electrode (209b) are fixed by the electrode fixing base (211), the cavity is provided by the electrode fixing base (211), and the at least one adapting portion extending from an inner wall of the cavity towards a center of the cavity.

13. The power pole of an electronic cigarette of claim 12, wherein the guiding surface is flat with an inner surface of the cavity; and/or wherein the positive electrode (209a) and/or the negative electrode (209b) is resilient.

14. The power pole of an electronic cigarette of any of claims 11 to 13, wherein the power pole further comprises a battery sleeve (207) and a battery (203) received in the battery sleeve (207), the positive electrode (210a) and the negative electrode (210b) are electrically connected to the battery (203), and the power pole further comprises at least one charging electrode electrically connected to the battery.

15. A charger connector for connecting and charging a power pole of an electronic cigarette, in particular of an electronic cigarette according to any of claims 1 to 9, the charger connector comprising a third connecting assembly, wherein the third connecting assembly comprises a pair of third electrodes (503, 502)and at least one lapping portion, the at least one lapping portion is rotatable in a cavity of the power pole until it abuts at an adapting portion of the power pole, such that the third electrodes (503, 502) are electrically connected to the power pole and thus powers the power pole; wherein the charger connector preferably further comprises a USB interface configured for connecting to an outside power.

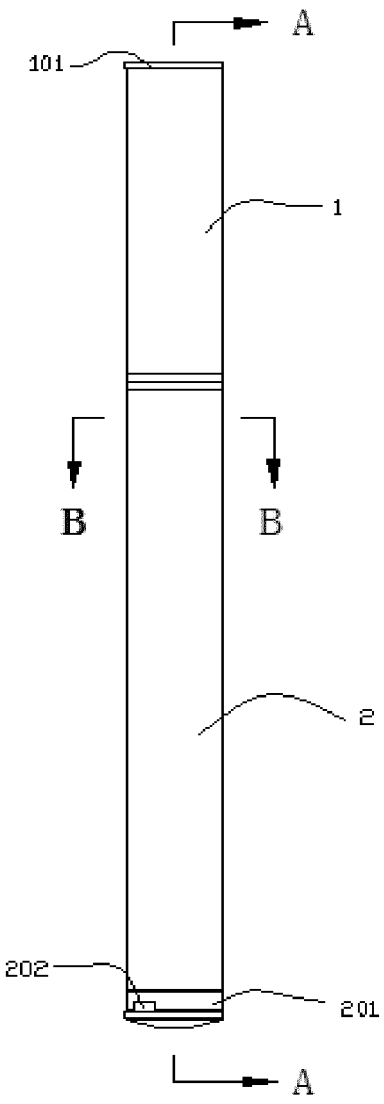
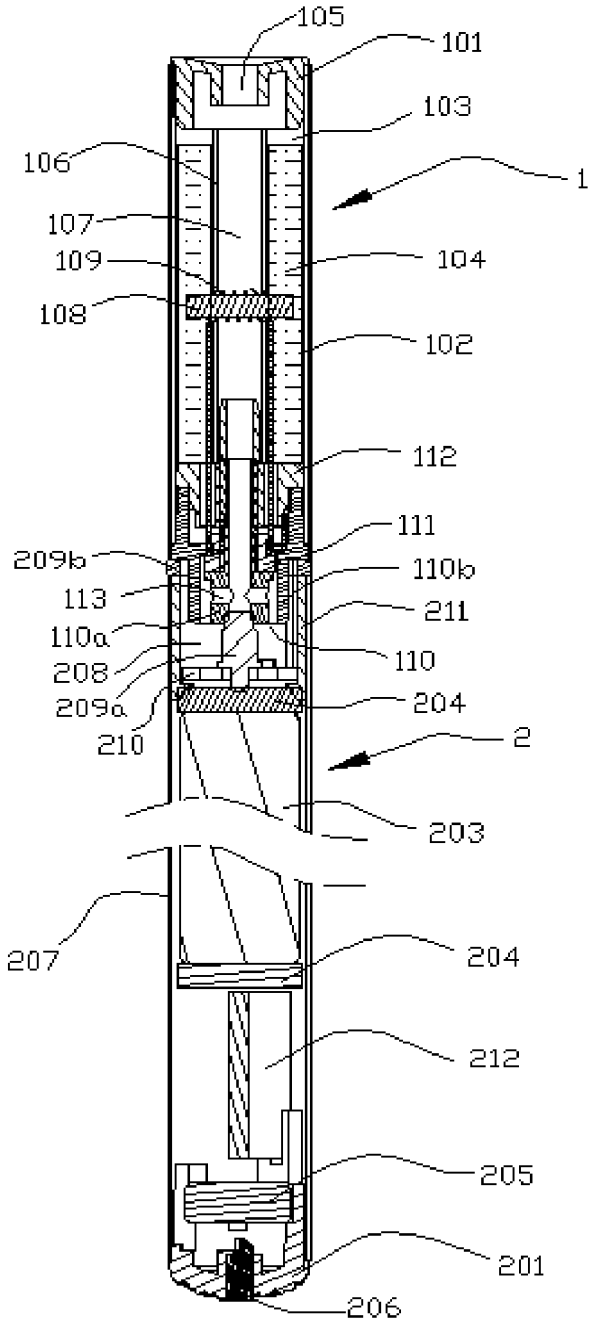


FIG.1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102
112
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209b
110b
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110a
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203
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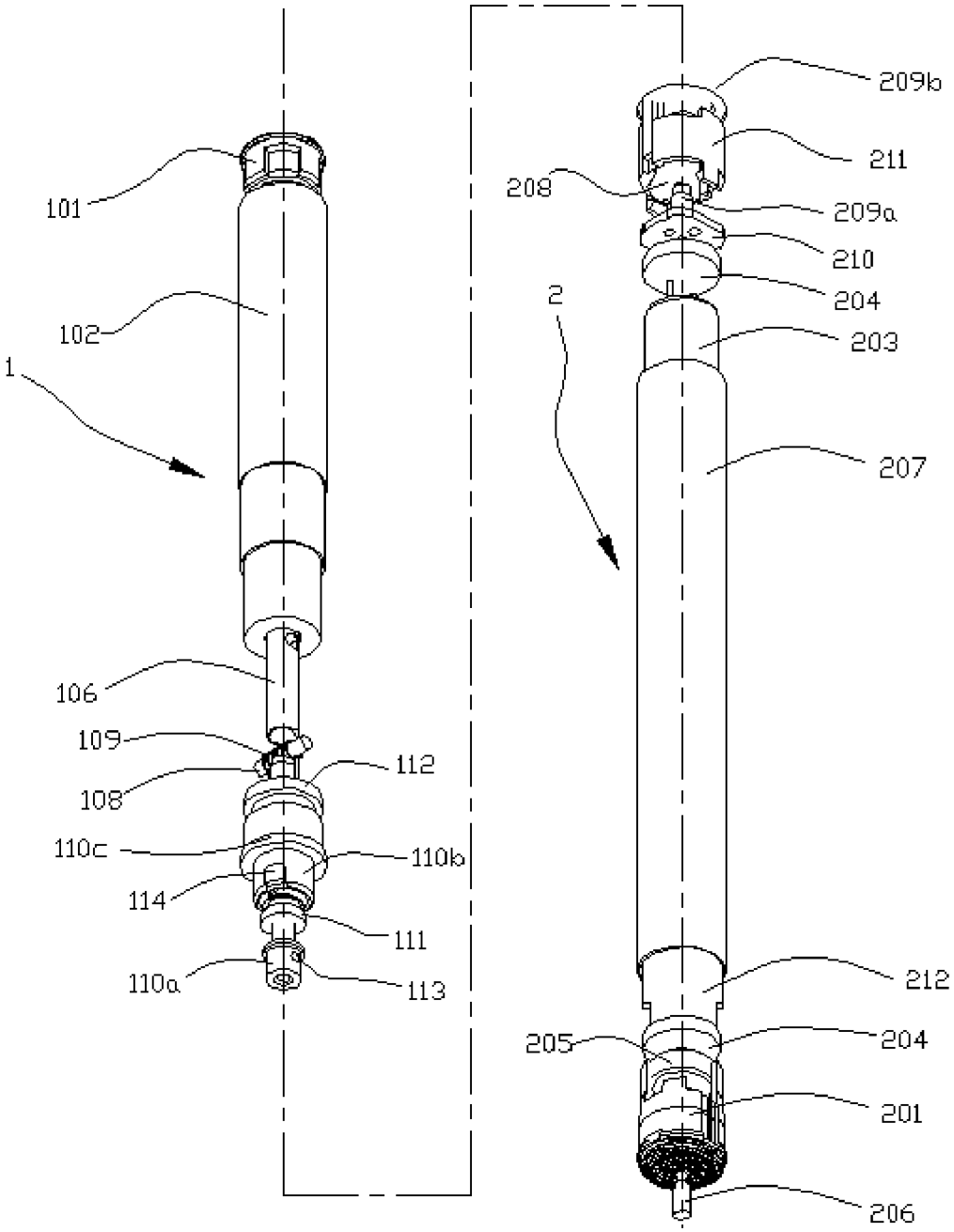
204
212
205
201
206

FIG.2


101
102
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108
110c
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110a
112
110b
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209a
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204
201
206

FIG.3

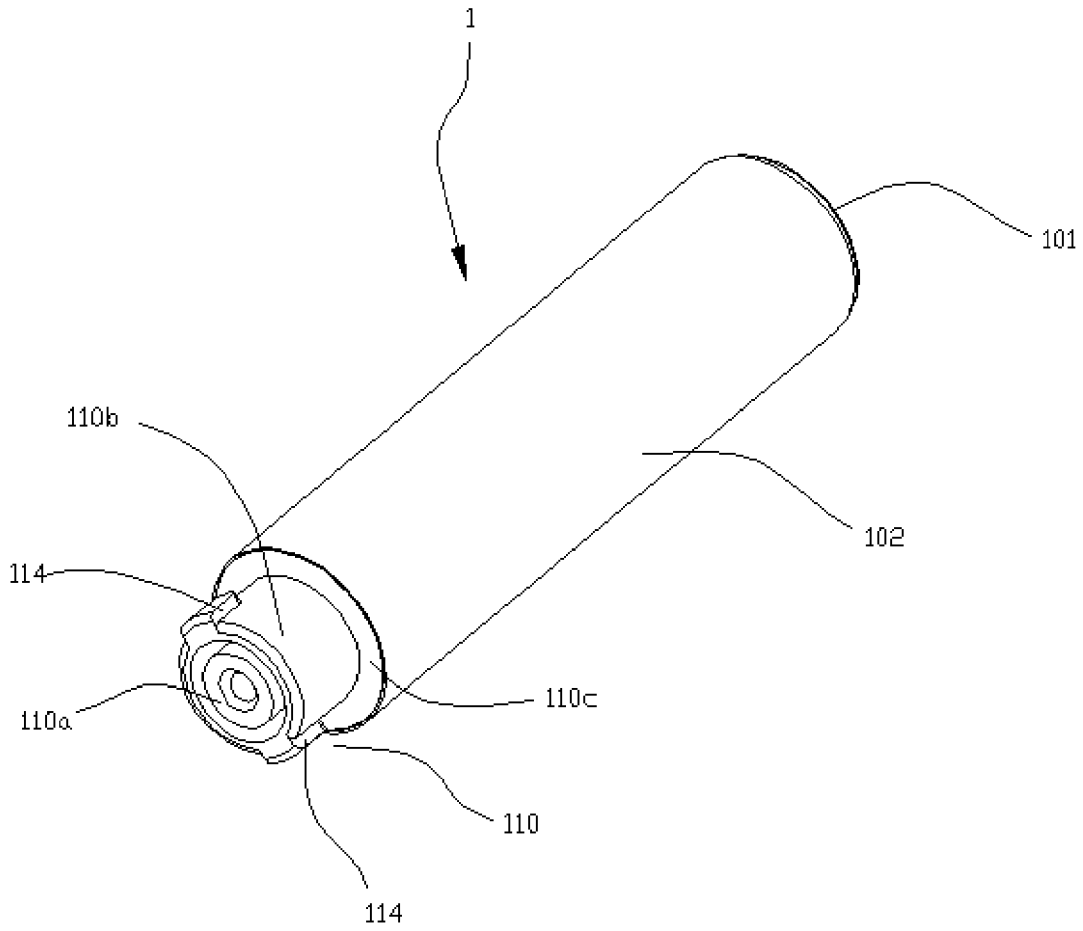

FIG.4

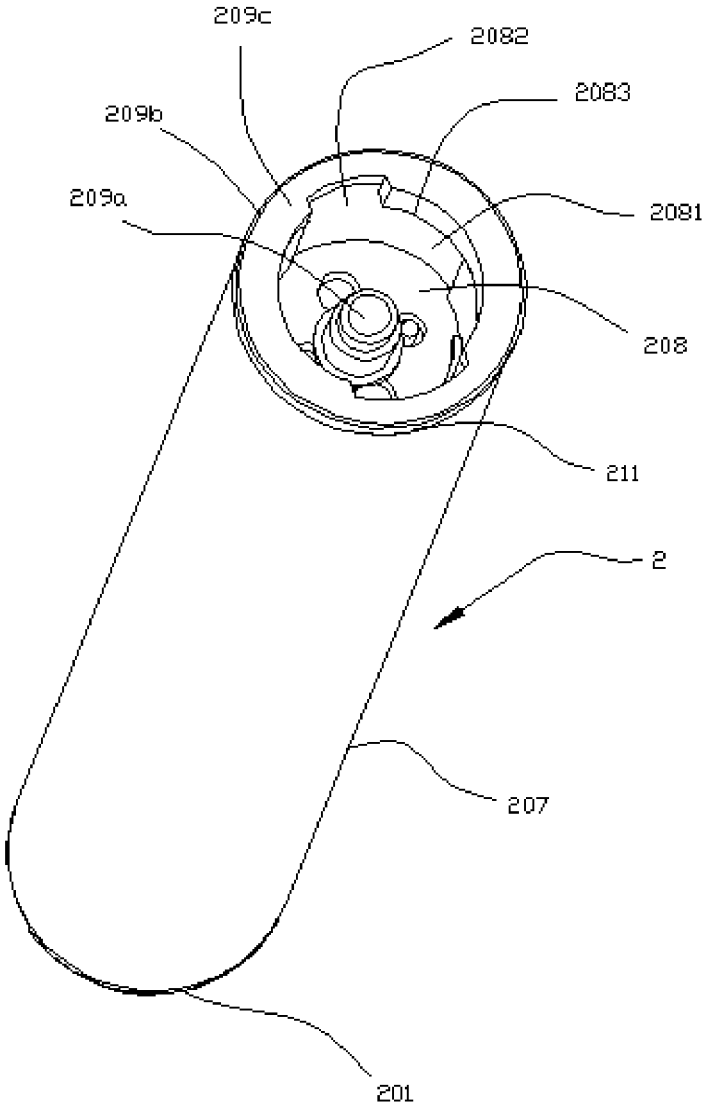

FIG.5

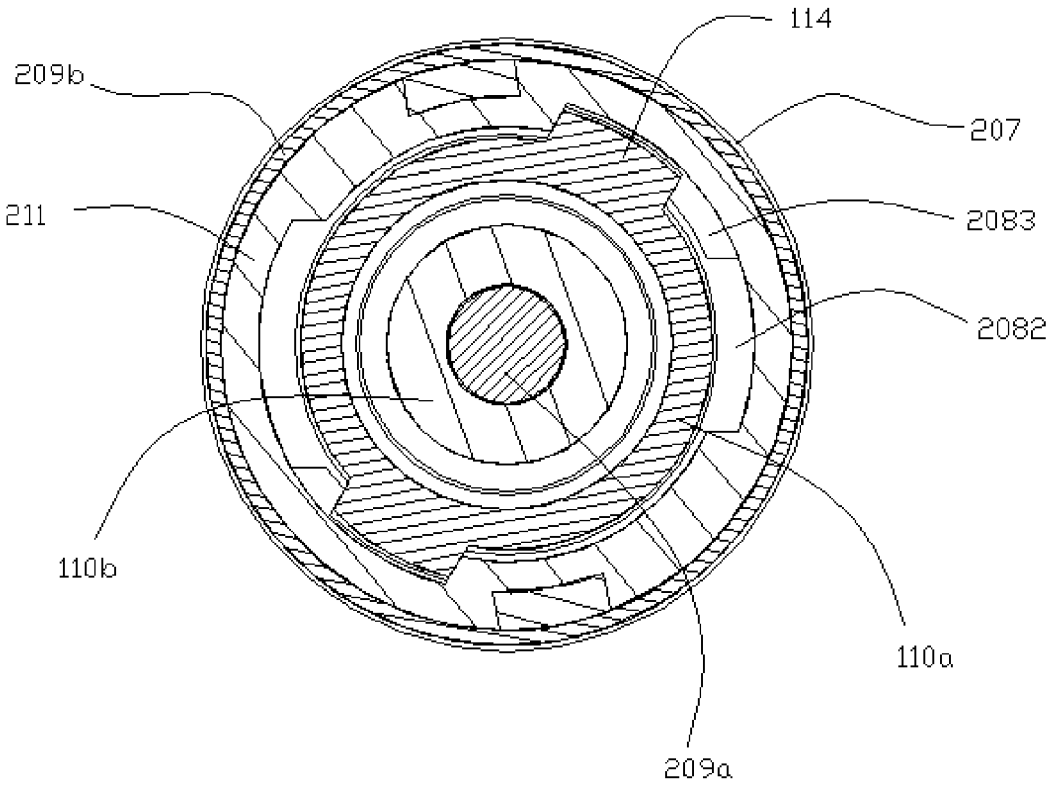

FIG.6

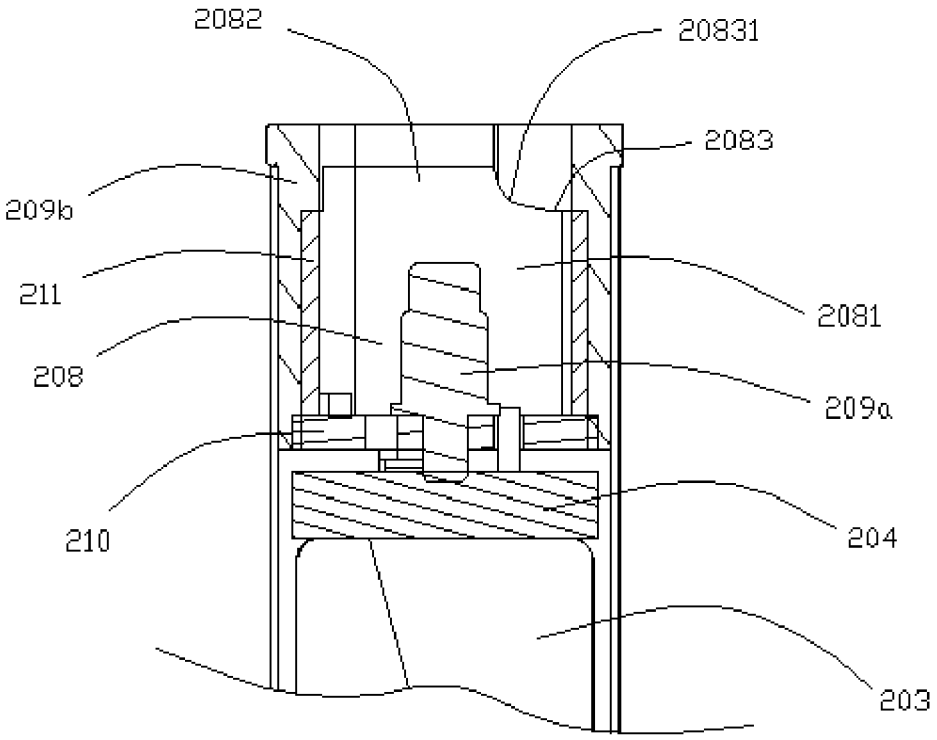

FIG.7

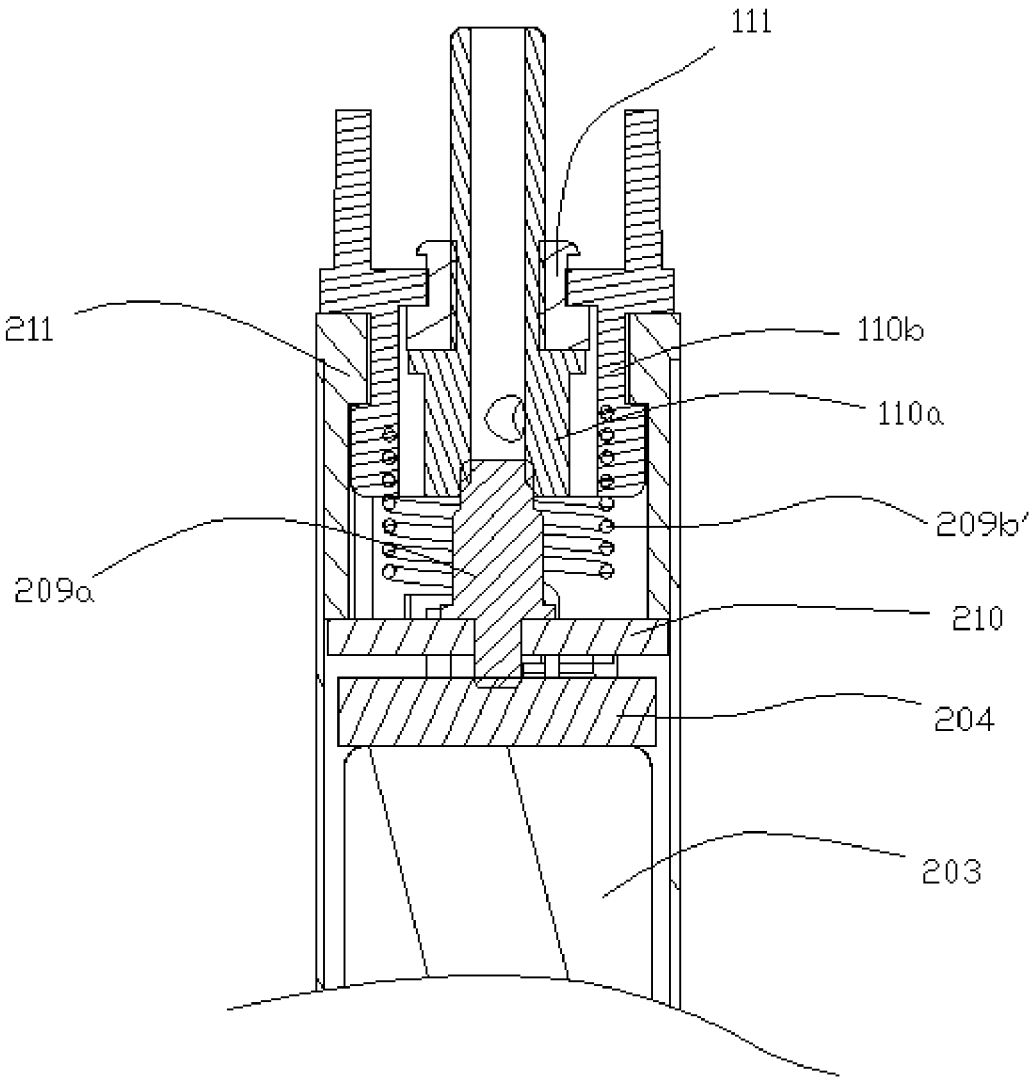

FIG.8

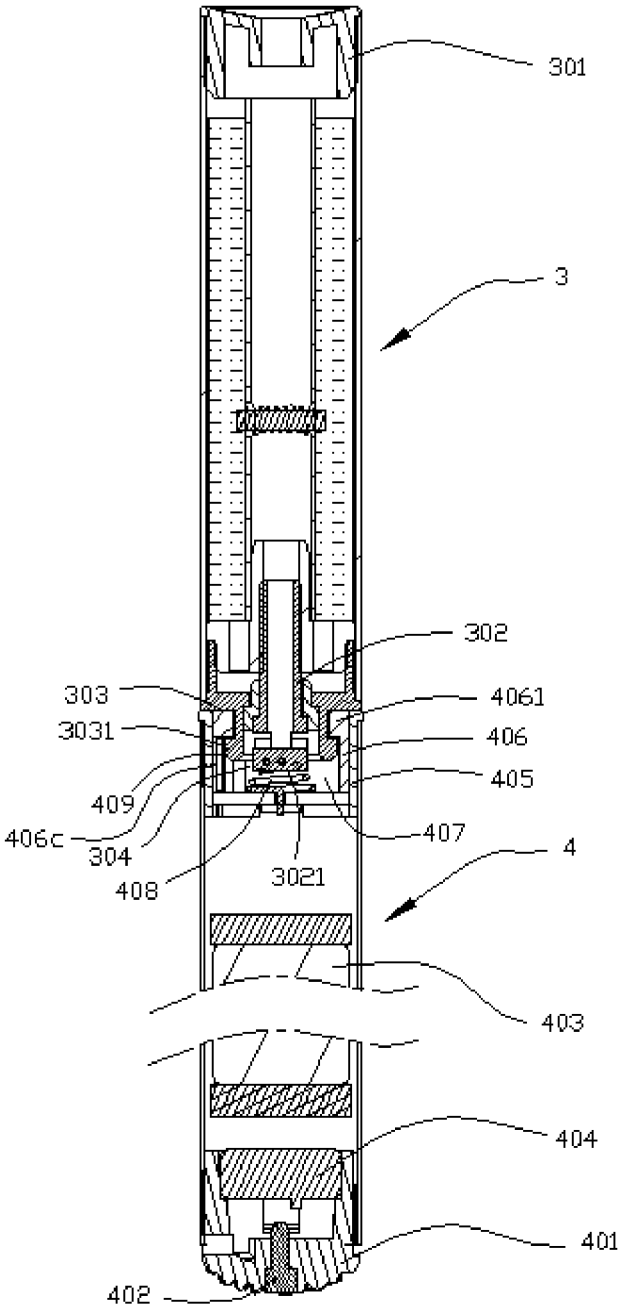
301
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FIG. 9

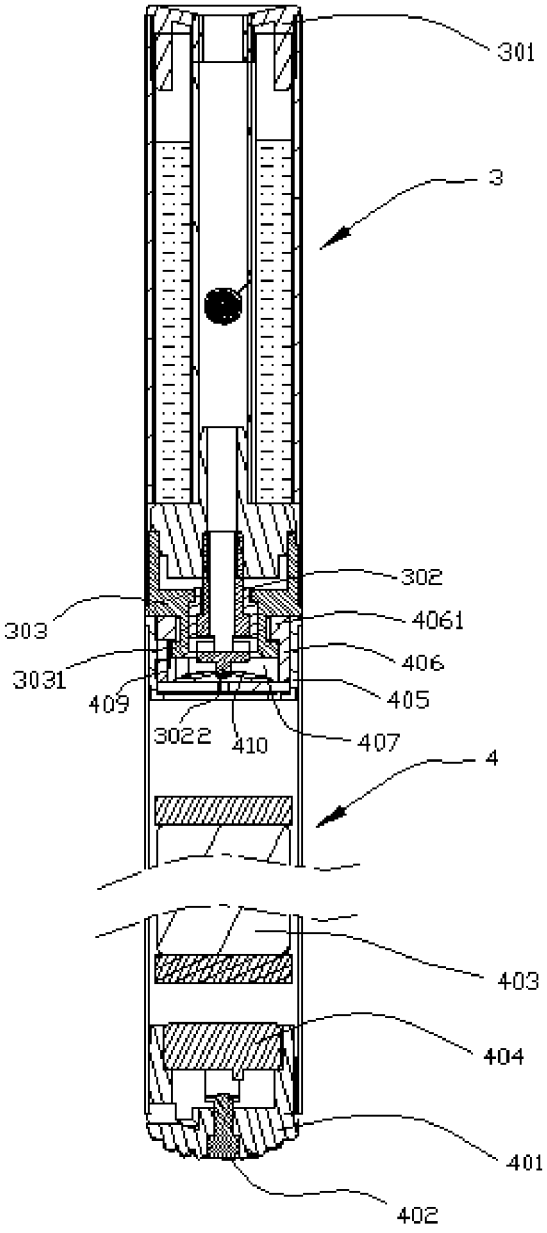
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FIG. 10

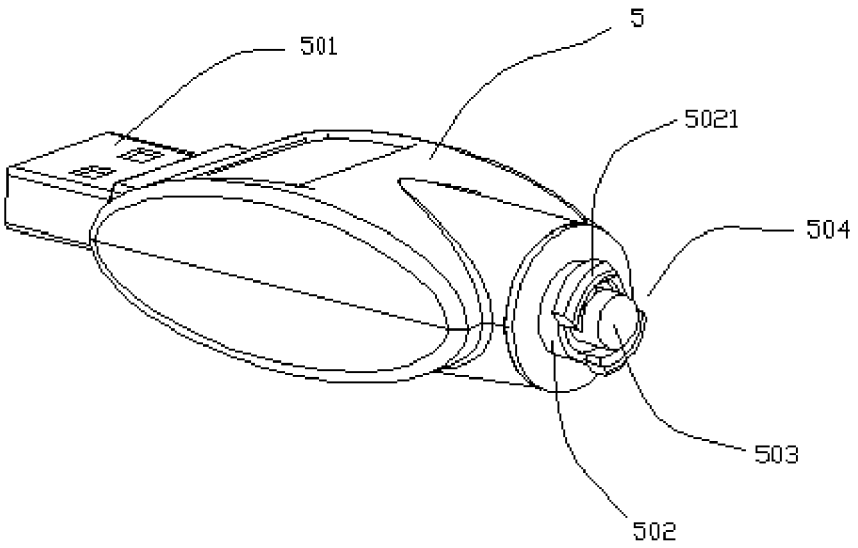

FIG. 11