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(54) Title: ELECTRONIC CIGARETTE AND MOUTHPIECE PART THEREOF

(57) Abstract: An electronic cigarette and a mouthpiece part (90) thereof are disclosed in the present invention. The mouthpiece part includes an inhaling shell (1); an aerosol passage (12), a reservoir (11), an atomizing device (2), and a guiding device (3) for sealing the reservoir and guiding tobacco substance from the reservoir to the atomizing device for vaporization without fluid leakage. The guiding device includes a guiding plate (31) and an absorption piece (32) laminated each other. Tobacco substance penetrates the guiding plate and is absorbed and stored in the absorption piece for vaporization. The electronic cigarette includes the mouthpiece part (90) and a power source part (91) connected each other. This invention has advantages of assembling conveniently, good effect of guiding tobacco substance, and good leak tightness.

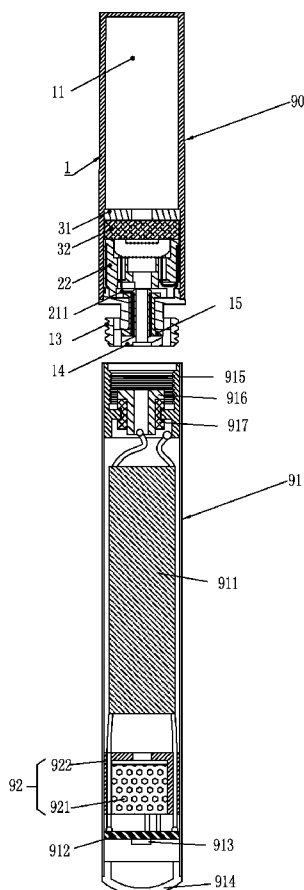


FIG. 12



MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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SPECIFICATION

ELECTRONIC CIGARETTE AND MOUTHPIECE PART THEREOF

BACKGROUND OF THE INVENTION

5 1. FIELD OF THE INVENTION

[0001] The present invention relates to a kind of electronic cigarette and a mouthpiece part thereof.

2. Description of Related Art

10 [0002] A mouthpiece part of the existing electronic cigarette comprises in an opaque inhaling shell: a reservoir, an atomizing device with an electric heat wire and an atomizing cup, a long guiding tube for guiding tobacco substance from the reservoir to the atomizing device, and a mouthpiece cap at an end of the inhaling shell. Both ends of the electric heat wire are respectively
15 associated with positive electrode and negative electrode by conductive wires.

[0003] However, such mouthpiece part of the existing electronic cigarette with the guiding tube extending into the reservoir, has problems such as complicated and inconvenient assembly, fluid leaking, and uncontrollability of guiding tobacco substance. Furthermore, the electric heat wire is pre-soldered
20 or pre-fixed with conductive wires, and then is soldered to two electrodes of atomizing device, which results a miscellaneous and uneasy assembly process. Moreover, the atomizing cup is consisted of many parts, which adds to the difficulties of assembling electric heat wire. Finally, the inhaling shell is opaque, remaining tobacco substance in the reservoir is unobservable, which
25 results unpleasant-flavor gas usually generated from burning electric heat wire after tobacco substance is exhausted.

[0004] Therefore, an improved electronic cigarette and a mouthpiece part thereof are desired which overcome the disadvantages of the prior art.

SUMMARY OF THE INVENTION

[0005] A main object of the present invention is to provide a mouthpiece part and an electronic cigarette, which facilitates assembly and manufacturing, and improves guiding tobacco substance, and prevents fluid-leakage.

5 [0006] A further object of the present invention is to provide a mouthpiece part and an electronic cigarette, in which tobacco substance remaining is observable.

[0007] To obtain the above object, a mouthpiece part of an electronic cigarette comprises an inhaling shell; within the inhaling shell, an aerosol
10 passage, a reservoir for storing tobacco substance, an atomizing device which comprising an atomizing cup and an atomizer mounted in the atomizing cup, a guiding device set between the reservoir and atomizing device for sealing the reservoir and guiding tobacco substance from the reservoir to the atomizing cup for vaporization without fluid leakage. The guiding device comprises a
15 guiding plate and an absorption piece laminating each other in such way that the guiding plate covers an open end of the reservoir and the absorption piece facing the atomizer in the atomizing cup. Thereby tobacco substance penetrates the guiding plate and is absorbed and stored in the absorption piece for vaporization.

20 [0008] In a preferable embodiment, the guiding plate defines at least one guiding hole for tobacco substance penetrating therethrough. Both the guiding plate and the absorption piece substantially has a circle shape with a cutout edge, the guiding hole in the guiding plate comprises a first main guiding hole in center of the circle and a plurality of secondary guiding holes at radial
25 directions. The materials for the absorption piece are refractory wool, glass fiber, or heavy canvas.

[0009] In a preferable embodiment, the mouthpiece part further comprises an electrode assembly. The electrode assembly comprises a first electrode, a second electrode, and an insulating ring inserting therebetween. The first

electrode comprises a cylindrical section inserting an open end of the inhaling shell for holding the atomizing device therein, and an engaging section for receiving the second electrode and insulating ring therein. The atomizer comprise an electric heat wire mounted in the atomizing cup with each end of the electric heat wire respectively passes through a corresponding wire-inserting hole in the atomizing cup. One end finally extends and is gripped between the first electrode and outer surface of the atomizing cup by interference fit therebetween, and the other end finally extends and is gripped between the second electrode and the insulating ring by interference fit therebetween. Thereby both ends of the electric heat wire respectively and electrically connected with the first electrode and the second electrode.

[0010] In a preferable embodiment, the whole or part of the mouthpiece part is transparent for observation. More preferably, the inhaling shell where the reservoir is located is transparent, so that remaining tobacco substance in the reservoir is observable.

[0011] To obtain the above object, the electronic cigarette comprises a mouthpiece part and a power source part electrically connected with each other. The mouthpiece part has the structure as described above.

[0012] In a preferable embodiment, the engaging section of the first electrode with the second electrode and insulating ring therein is electrically engaged with the power source part. Thereby the mouthpiece part is assembled with the power source part, and the first and second electrodes of the mouthpiece part are electrically connected with corresponding electrode of the power source part. The engaging section of the mouthpiece part is connected with the power source part by means of clipping, inserting, soldering, or thread engagement.

[0013] In a preferable embodiment, the power source part comprises a media player, an alarm clock, a compass, or a voice recorder therein.

[0014] Other objects, advantages and novel features of the invention will become more apparent from the following detailed description of a preferred

embodiment thereof when taken in conjunction with the accompanying drawings, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. 1 is a front view of a mouthpiece part of an electronic cigarette in accordance with an embodiment of the present invention;

[0016] FIG. 2 is a top view of the mouthpiece part in FIG. 1;

[0017] FIG. 3 is a cross-section view of the mouthpiece part of FIG. 2 along Line A-A;

[0018] FIG. 4 is a cross-section view of the mouthpiece part of FIG. 2 along Line B-B;

[0019] FIG. 5 is an exploded, perspective view of the mouthpiece part of FIG. 1;

[0020] FIG. 6 is a front view of a guiding plate of the mouthpiece part in accordance with an embodiment of the present invention;

[0021] FIG. 7 is a cross-section view of an inhaling shell of the mouthpiece part in accordance with an embodiment of the present invention;

[0022] FIG. 8 is a perspective view of an atomizing cup of the mouthpiece part in accordance with an embodiment of the present invention;

[0023] FIG. 9 is another perspective view of the atomizing cup of FIG. 8;

[0024] FIG. 10 is a cross-sectional view of the atomizing cup of FIG. 8;

[0025] FIG. 11 is another cross-sectional view of the atomizing cup of FIG. 8; and

[0026] FIG. 12 is a cross-sectional, partly exploded view of the electronic cigarette in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0027] Referring to FIGS 1 and 12, an electronic cigarette in accordance with an embodiment of the present invention, comprises a mouthpiece part 90 and a power source part 91. The power source part 91 is electrically connected with

and supplies electric power to the mouthpiece part 90. Also referring to FIGS 3-4 together, the mouthpiece part 90 comprises an inhaling shell 1, an atomizing device 2, a guiding device 3 and electrode assembly 10 (see FIG.1). The power source part 91 supplies electric power to atomizing device 2 of the mouthpiece part 90 by electrode assembly 10.

[0028] Referring to FIGS 2-7, the inhaling shell 1 substantially is a cylinder with an open end and a closed end, and defines a reservoir 11 and an aerosol passage 12 therein. A smoke-flow hole 16 is defined in the closed end and communicates with the aerosol passage 12 so that tobacco substance is vaporized into vapor mists to be inhaled by the user by flowing along the passage 12 and puffing through the smoke-flow hole 16 at the closed end of the shell 1. This inhaling allows the user to absorb the scent-media in a vapor form together with the airflow inside the shell. In this way, the user is satisfied with a scent taste that mimics cigarette smoking. The closed end of the inhaling shell 1 and the guiding device 3 respectively seal either end of reservoir 11. In a preferable embodiment, the reservoir 11 for storing liquid tobacco substance is integrated in the shell 1. All or at least part of the inhaling shell 1 is transparent. Preferably, the section of the shell 1 where the reservoir 11 is located is transparent so that tobacco substance remaining in the reservoir 11 is observable.

[0029] The electrode assembly 10 comprises a first electrode 13 and a second electrode 14 of the atomizing device 2, and insulating ring 15 inserting therebetween. As an embodiment, the first electrode 13 is configured as negative electrode of the atomizing device 2, accordingly, the second electrode 14 is configured as a positive electrode of the same. The first electrode 13 comprises a cylindrical section 130 and an opposite engaging section 131 with external thread thereon (not labeled). The second electrode 14 is fitted in the engaging section 131 of the first electrode 13 by inserting the insulating ring 15 therebetween. The first electrode 13 has the cylindrical section 130 tightly

fitted in the inhaling shell 1 from the open end thereof and forms a cylindrical chamber for holding the atomizing device 2 therein. The electrode assembly 10 of the mouthpiece part 90 is threadedly engaged with the power source part 91 in such manner that a bottom end of the second electrode 14 contact with the corresponding electrode of the power source part 91 and the engaging section 131 of the first electrode 13 threadedly and electrically engaged in the corresponding electrode of the power source part 91, so that the electronic cigarette is detachably assembled and an electric circuit thereof is set up.

[0030] The atomizing device 2 comprises an atomizer 21 and atomizing cup

22. The atomizer 21 comprises an electric heat wire 211 and an electric heat bar 212. The electric heat wire 211 winds around the electric heat bar 212 and the atomizer 21 is mounted in the atomizing cup 22 via the electric heat bar 212. Referring to FIGS 8-11, the atomizing cup 22 is manufactured by an integrated molding process, which has an open end and a closed end. A bottom wall (not labeled) of the closed end and an annular side wall (not labeled) of the atomizing cup 22 enclose an atomizing chamber 221. A pair of seats 222 longitudinally extends upwards from the annular side wall of the atomizing cup 22 to a height, and each longitudinally defines a fix groove 2220 along inner wall of the seat 222 for fixing the electric heat bar 212 therein. A pair of wire-inserting holes 223 respectively aligned to the fix grooves 2220 are defined through the bottom wall of the atomizing cup 22. A center through hole 224 are defined in the bottom wall for heat dissipation, and a wire-cross groove 225 is defined in the bottom wall of the atomizing cup 22 opposite to the atomizing chamber 221 and communicated with one wire-inserting hole 223. The electric heat wire 211 winds round the electric heat bar 212 with both ends of the electric heat wire 211 respectively through the wire-inserting holes 223 while the heat bar 212 is mounted in the fixing groove 2220 of the seats 222. One end of the electric heat wire 211 passes through the corresponding wire-inserting hole 223 and wire-cross groove 225, extends back between the

outer surface of the atomizing cup 22 and the first electrode 13, and is tightly fixed in and electrically connected with the first electrode 13 by means of the atomizing cup 22 being tightly engaged in the first electrode 13 by interference fit. The other end of the electric heat wire 211 passes through the other
5 wire-inserting hole 223 and extends between the second electrode 14 and insulating ring 15 so as to electrically connect with the second electrode 14 by means of the insulating ring 15 being engaged in the second electrode 14 by interference fit. Therefore, both ends of the electric heat wire 221 are respectively electrically connected with the first electrode 13 and second
10 electrode 14 by such gripping means instead of soldering means, which facilitates manufacturing and assembling the mouthpiece part 90. Furthermore, heat generated from the atomizer 21 is transmitted from the center through hole 224 to the power source part 91 for heat dissipation. The atomizing cup 22 is fitted in the inhaling shell 1 in such way that the atomizing cup 22 is fixed in
15 the cylindrical chamber of the first electrode 13 and the first electrode 13 is inserted in the inhaling shell 1. The atomizing cup 22 has a configuration and size adapted to the cylindrical chamber of the first electrode 13, and is made from heat-stable material such as silica gel by an integrated molding process. The atomizing cup 22 is substantially shaped like a cylinder which has a little
20 bigger diameter than that of the cylindrical chamber of the first electrode 13, so that the atomizing cup 22 is tightly fitted in the cylindrical chamber of the first electrode 13 by interference fit. Such simple structure of the atomizing cup 22 facilitates manufacturing and assembling the mouthpiece 90. The heat-resisting material of the atomizing cup 22 is beneficial to retain the
25 temperature at outer surface of the inhaling shell 11 relatively low so that it will not be felt burning hand or mouth.

[0031] The guiding device 3 comprises a guiding plate 31 and an absorption piece 32 overlaying each other, which is used for guiding tobacco substance from the reservoir 11 to the atomizing cup 22 for vaporization without fluid

leakage. The guiding device 3 has a configuration and size adapted to the inner wall of the inhaling shell 1 and the cross-section of the open end of the reservoir 11, which is inserted in the inhaling shell 1 by interference fit in such way that the guiding plate 31 is positioned at the open end of the reservoir 11, and the absorption piece 32 faces the atomizer 21 in the atomizing cup 22. Therefore, the guiding device 3 tightly seals tobacco substance in the reservoir 11. In an illustrational embodiment, both the guiding plate 31 and the absorption piece 32 substantially have a circle shape. Furthermore, both the guiding plate 31 and the absorption piece 32 may have a cut-out edge according to cross-section of the open end of the reservoir 11.

[0032] The guiding plate 31 defines through guiding hole therein for guiding liquid tobacco substance from the reservoir 11 to the absorption piece 32. In one embodiment, the guiding plate defines a main guiding hole 311 in center of the circle shape thereof, and radially defines a plurality of secondary guiding holes 312. The absorption piece 32 may be made from such materials with adsorbability and heat-resistance which can absorb and store liquid like a sponge, and has relatively good temperature resistance to resist heat from the atomizer 21, such as refractory wool, glass fiber, or heavy canva. Therefore, the liquid tobacco substance from the reservoir 11 flows through the main and secondary guiding holes 311, 312 and is well absorbed, spread and stored in the absorptions piece 32. The absorption piece 32 has one face abutting against the guiding plate 31 and the other face against the open end of the atomizing cup 22, so that the liquid tobacco substance stored in the absorption piece 32 can be vaporized by the atomizer 21 in the atomizing cup 22. Such guiding device 3 facilitates manufacturing and assembling the mouthpiece part 90, well guides tobacco substance from the reservoir 11 to the atomizing device 2 for vaporization, and well prevents tobacco substance being leaked out.

[0033] Referring to FIG. 12 again, the electronic cigarette in accordance with the embodiment of the present invention, comprises the mouthpiece part 90

and the power source part 91 which are connected together by electrode assembly 10. It is understood that the mouthpiece part 90 and the power source part 91 may be connected by means of clipping, inserting or soldering connection instead of threaded engagement. The power source part 91
5 comprises a power supply 911, controlling board 912, lighting indicator 913, end cap 914, a first power electrode frame 915, a second power electrode 916, and an insulating washer 917.

[0034] The power supply 911 is rechargeable or non-rechargeable power source to supply electric power to the electronic cigarette. The controlling
10 board 912 controls the atomizing device 2 or other electronic elements working. The indicator 913 is electrically connected to the controlling board 912 and indicates a working mode. End cap 914 as a viewing window is sealed at end of the power source part 91. The first electrode 13 has the threaded section electrically and threadedly engaged in the first power electrode frame
15 915. The second power electrode 916 is fitted in the first electrode frame 915 by inserting the insulating washer 917 therebetween. Thereby, the mouthpiece part 90 is assembled to the power source part 91 with first electrode 13 of atomizer 2 electrically connected with the first power electrode frame 915, and the second electrode 14 of the atomizer 2 electrically contacts with the second
20 power electrode 916. Therefore, the power source part 91 is able to energize the atomizer 21.

[0035] The power source part 91 further comprises a voice recorder 92. The voice recorder 92 comprises a microphone 921 and a receiver 922 for holding the voice recorder 92 in the power source part 91. The microphone 921 is
25 electrically connected to the controlling circuit 912. Therefore, the e-cigarette has voice-recorded function. It understood that the e-cigarette can further comprises a media player , an alarm clock, and a compass.

[0036] In a preferable embodiment, the electronic cigarette of the present invention is one-off e-cigarette.

[0037] While the invention has been described in conjunction with specific embodiments, it is evident that numerous alternatives, modifications, and variations will be apparent to those skilled in the art in light of the forgoing descriptions. The scope of this invention is defined only by the following
5 claims.

What is claimed is:

1. A mouthpiece part of an electronic cigarette comprising:
an inhaling shell;
an aerosol passage defined in the inhaling shell;
5 a reservoir defined in the inhaling shell for storing tobacco substance;
an atomizing device positioned in the inhaling shell which comprising an
atomizing cup and an atomizer mounted in the atomizing cup; and
a guiding device set between the reservoir and atomizing device for sealing
the reservoir and guiding tobacco substance from the reservoir to the atomizing cup
10 for vaporization without fluid leakage;

wherein the guiding device comprises a guiding plate and an absorption
piece laminating each other in such way that the guiding plate covers an open end of
the reservoir and the absorption piece facing the atomizer in the atomizing cup;
whereby tobacco substance penetrates the guiding plate and is absorbed and stored
15 in the absorption piece for vaporization.

2. The mouthpiece part according to claim 1, wherein the guiding device has a
configuration and size adapted to an inner wall of the inhaling shell and the open
end of the reservoir; the guiding plate defines at least one guiding hole for tobacco
substance penetrating therethrough; and the absorption piece is made from such
20 materials with adsorbability and heat-resistance.

3. The mouthpiece part according to claim 2, wherein both the guiding plate
and the absorption piece substantially have a circle shape; the guiding hole in the
guiding plate comprises a first main guiding hole in center of the circle and a
plurality of secondary guiding holes at radial directions.

4. The mouthpiece part according to claim 3, wherein both the guiding plate
and the absorption piece substantially have a circle shape with a cutout edge;
wherein materials for the absorption piece is refractory wool, glass fiber, or heavy
canvas.

5. The mouthpiece part according to claim 1, further comprising an electrode
30 assembly; wherein the electrode assembly comprises a first electrode, a second

electrode, and an insulating ring inserting therebetween; the atomizer comprise an electric heat wire mounted in the atomizing cup with each end of the electric heat wire respectively electrically gripped by the first electrode and the second electrode.

6. The mouthpiece part according to claim 5, wherein the first electrode
5 comprises a cylindrical section inserting an open end of the inhaling shell for holding the atomizing device therein, and an engaging section for receiving the second electrode and insulating ring therein; each end of the electric heat wire respectively passes through a corresponding wire-inserting hole defined in the atomizing cup, a first end of the electric heat wire finally extends and is gripped
10 between the first electrode and outer surface of the atomizing cup by interference fit therebetween, and a second end of the electric heat wire finally extends and is gripped between the second electrode and the insulating ring by interference fit therebetween; whereby both ends of the electric heat wire respectively and electrically connected with the first and the second electrodes.

15 7. The mouthpiece part according to claim 6, wherein the atomizing cup is substantially cylindrical and is received in the cylindrical section of the first electrode, of which a bottom wall and an annular side wall enclose an atomizing chamber; the atomizing cup further defines a center through hole for heat dissipation in the bottom wall, and defines a wire-cross groove in the bottom wall
20 opposite to the atomizing chamber and communicated with one wire-inserting hole; the first end of the electronic heat wire extends through the corresponding wire-inserting hole and along the wire-cross groove for connecting with the first electrode; the atomizer further comprises an electric heat bar mounted in the atomizing cup, and the electric heat wire winds round the electric heat bar.

25 8. The mouthpiece part according to claim 1, wherein the atomizing cup is made from heat-stable material by an integrated molding process; the reservoir and the aerosol passage are integrated in the inhaling shell; the inhaling shell has one open end and the other closed end; the guiding device and atomizing device are respectively inserted in the inhaling shell from the open end thereof; the other
30 closed end seals one end of the reservoir opposite to the guiding device and defines

smoking-flow hole therethrough; and the smoking-flow hole is communicated with the aerosol passage.

9. The mouthpiece part according to claim 1, wherein whole or part of the mouthpiece part is transparent for observation.

5 10. The mouthpiece part according to claim 9, wherein the inhaling shell where the reservoir is located is transparent, whereby remaining tobacco substance in the reservoir is observable.

11. An electronic cigarette comprising a mouthpiece part and a power source part; the mouthpiece part further comprising:

10 an inhaling shell;

a reservoir defined in the inhaling shell for storing tobacco substance;

an atomizing device positioned in the inhaling shell which comprising an atomizing cup and an atomizer mounted in the atomizing cup; and

15 a guiding device set between the reservoir and atomizing device for sealing the reservoir and guiding tobacco substance from the reservoir to the atomizing cup for vaporization without fluid leakage;

wherein the mouthpiece part is electrically connected with the power source part; the guiding device comprises a guiding plate and an absorption piece laminating each other in such way that the guiding plate covers an open end of the reservoir and
20 the absorption piece facing the atomizer in the atomizing cup; whereby tobacco substance penetrates the guiding plate and is absorbed and stored in the absorption piece for vaporization.

12. The electronic cigarette according to claim 11, wherein the guiding device has a configuration and size adapted to an inner wall of the inhaling shell and the
25 open end of the reservoir; the guiding plate defines at least one guiding hole for tobacco substance penetrating therethrough; and the absorption piece is made from such materials with adsorbability and heat-resistance.

13. The electronic cigarette according to claim 12, wherein both the guiding plate and the absorption piece substantially has a circle shape with a cutout edge, the
30 guiding hole in the guiding plate comprises a first main guiding hole in center of the

circle and a plurality of secondary guiding holes at radial directions; and whole or part of the inhaling shell is transparent.

14. The electronic cigarette according to claim 11, wherein the mouthpiece part further comprises an electrode assembly; the electrode assembly comprises a first electrode, a second electrode, and an insulating ring inserting therebetween; the
5 first electrode comprises a cylindrical section inserting in the inhaling shell for holding the atomizing device therein, and an engaging section; the atomizer comprise an electric heat wire with both end respectively gripped by the first electrode and the second electrode; the power source part comprises a media player,
10 an alarm clock, a compass, or a voice recorder therein.

15. The electronic cigarette according to claim 11, wherein the engaging section designed as a column with external thread accommodates the second electrode and insulating ring therein; the power source part has a first power electrode with internal thread, and a second power electrode fitted in the first power
15 electrode by inserting an insulating washer therebetween; the mouthpiece part is electrically engaged with the power source part by means of the engaging section of the first electrode threading into the first power electrode; whereby the first electrode is electrically and threadedly engaged with the first power electrode and the second electrode electrically contacts with the second power electrode.

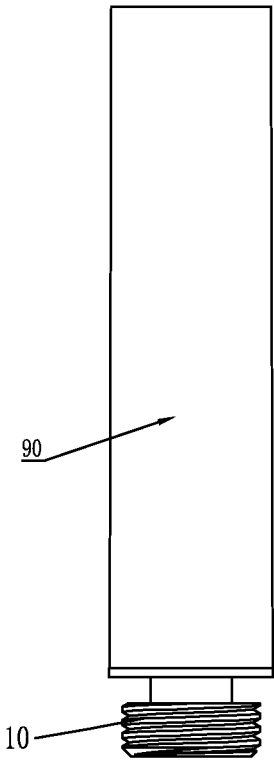


FIG. 1

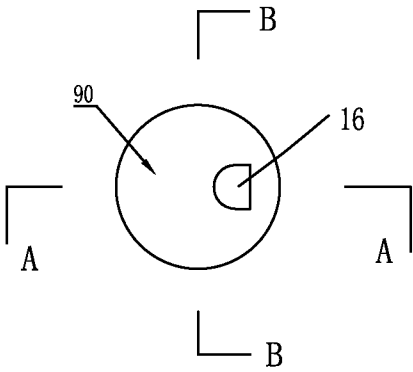


FIG. 2

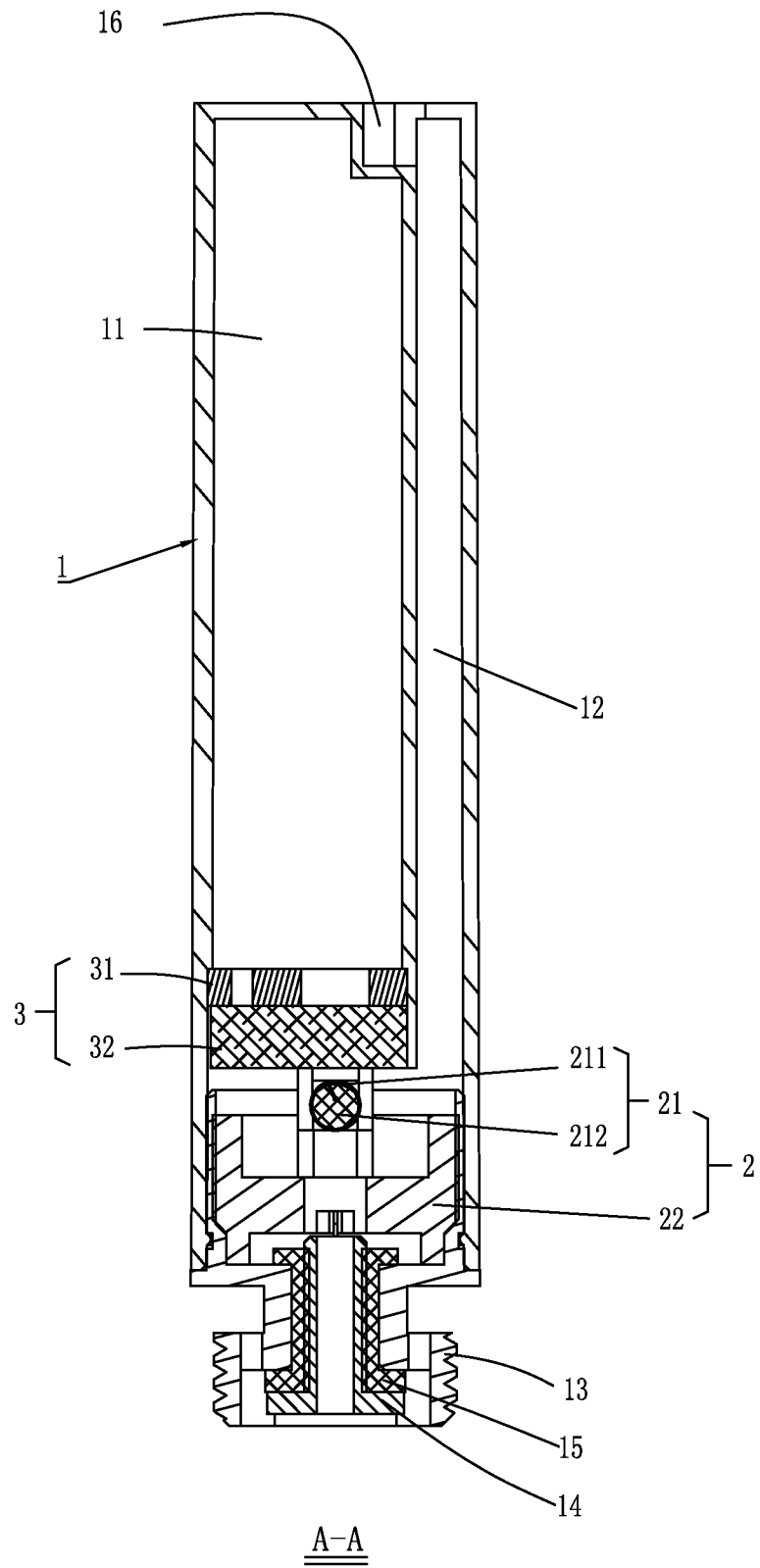


FIG. 3

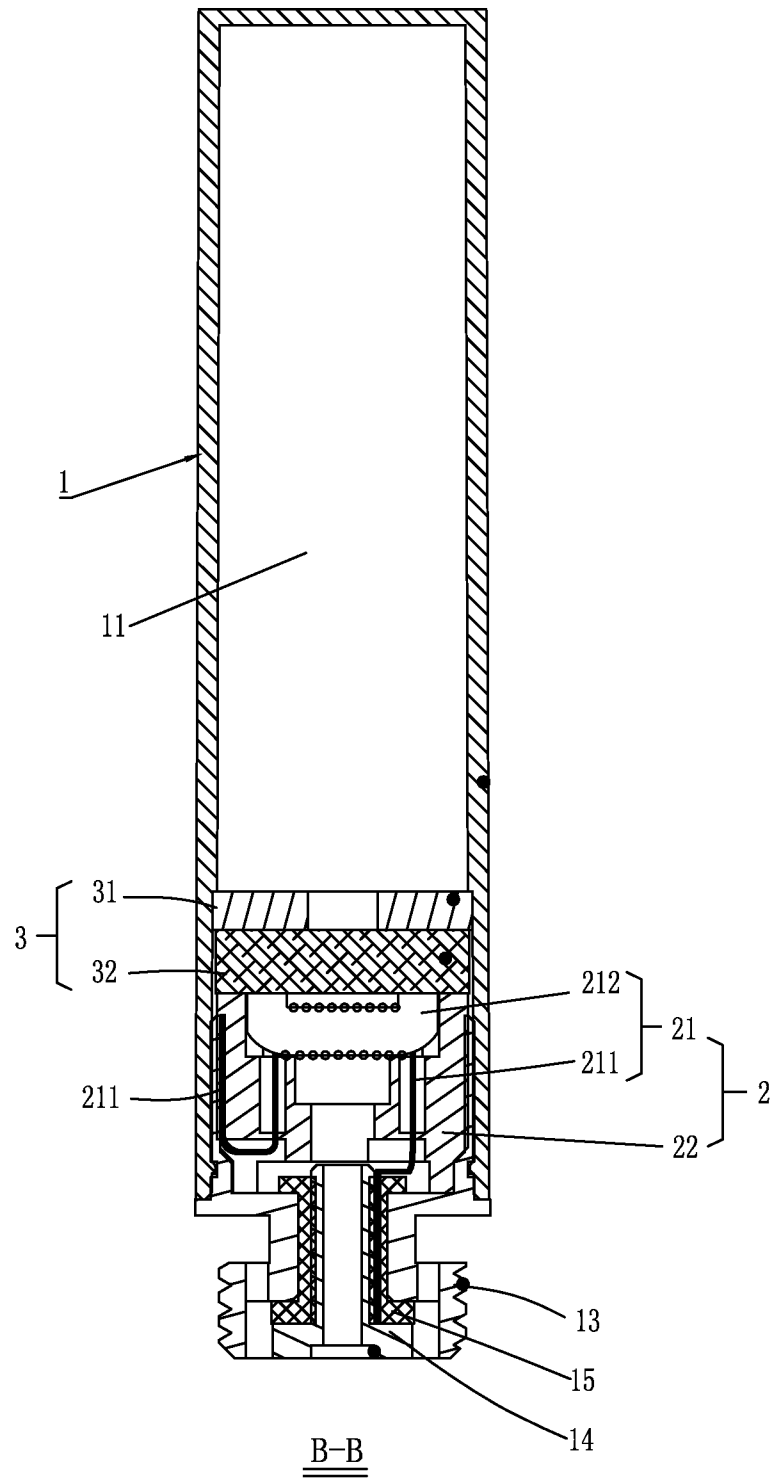


FIG. 4

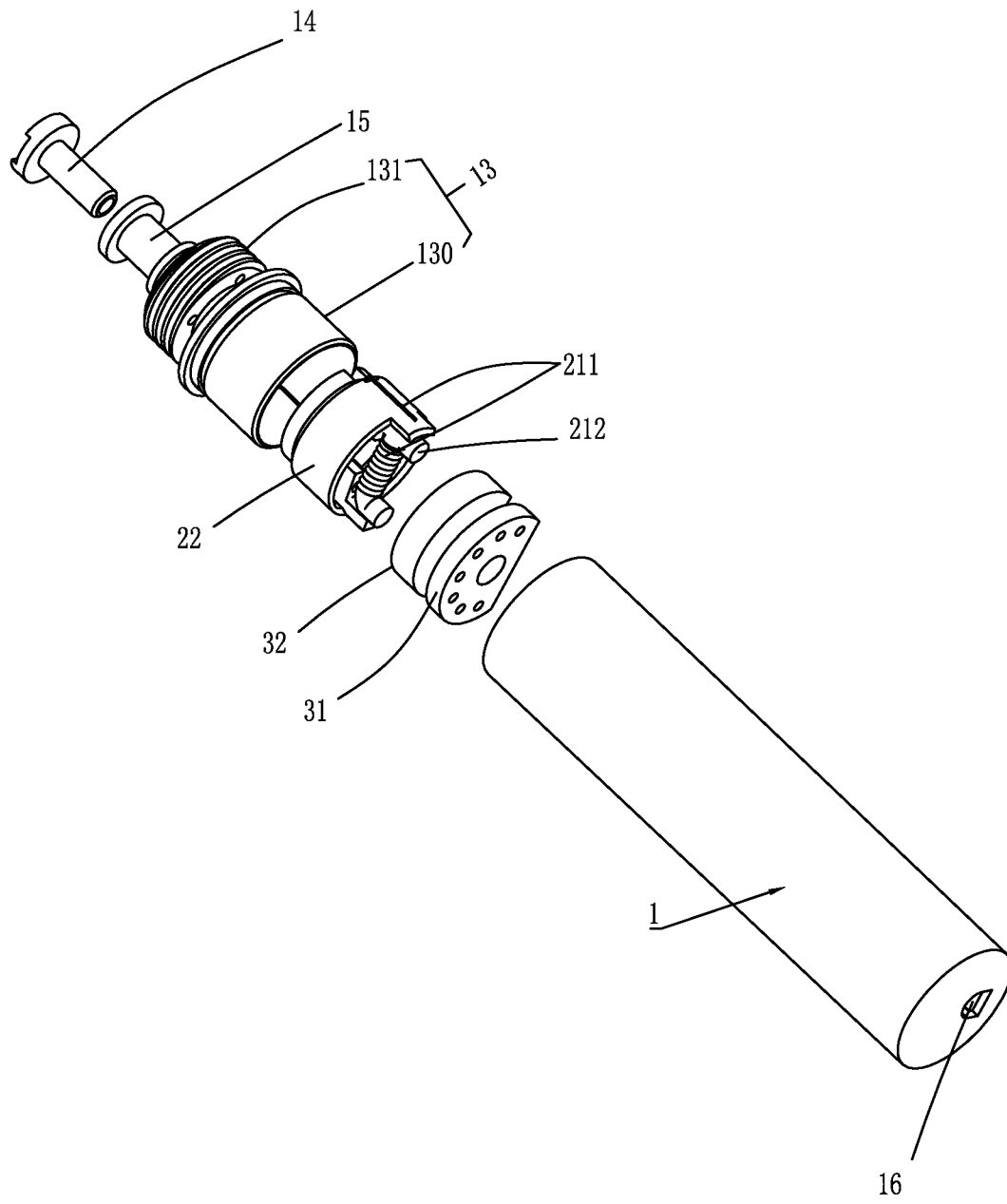


FIG. 5

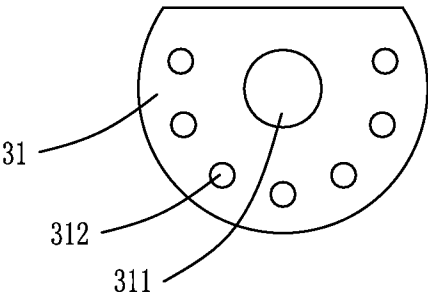


FIG. 6

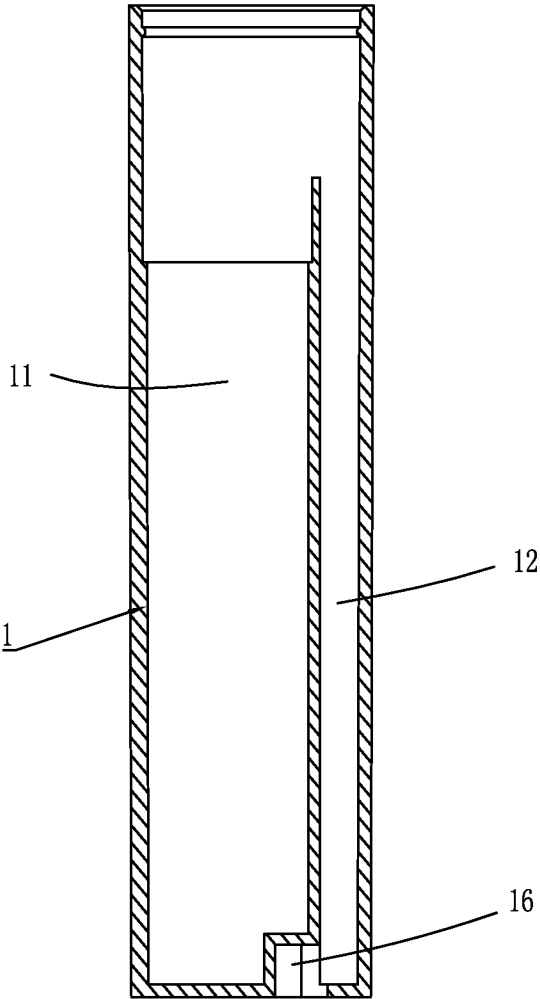


FIG. 7

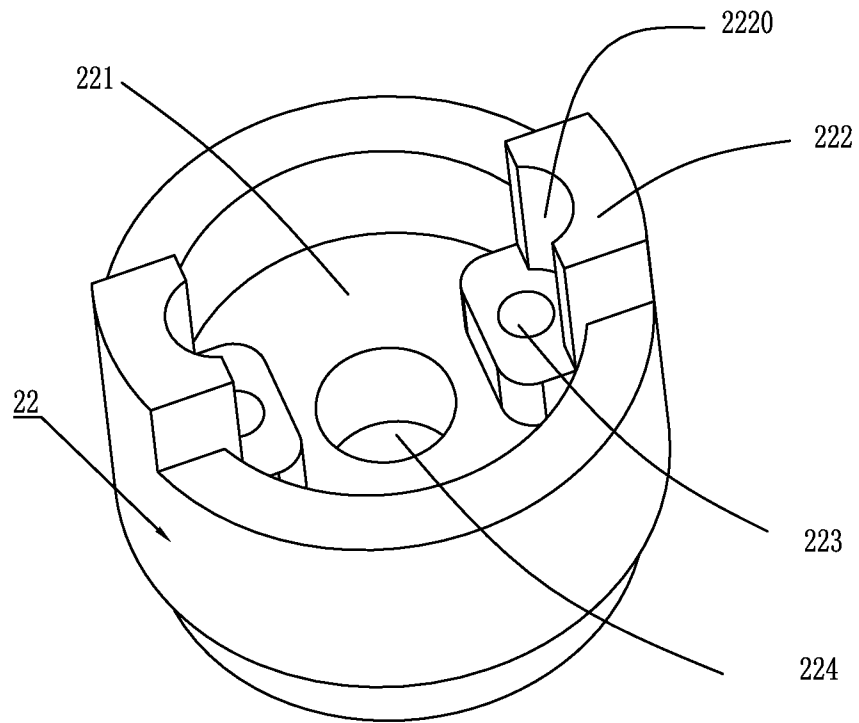


FIG. 8

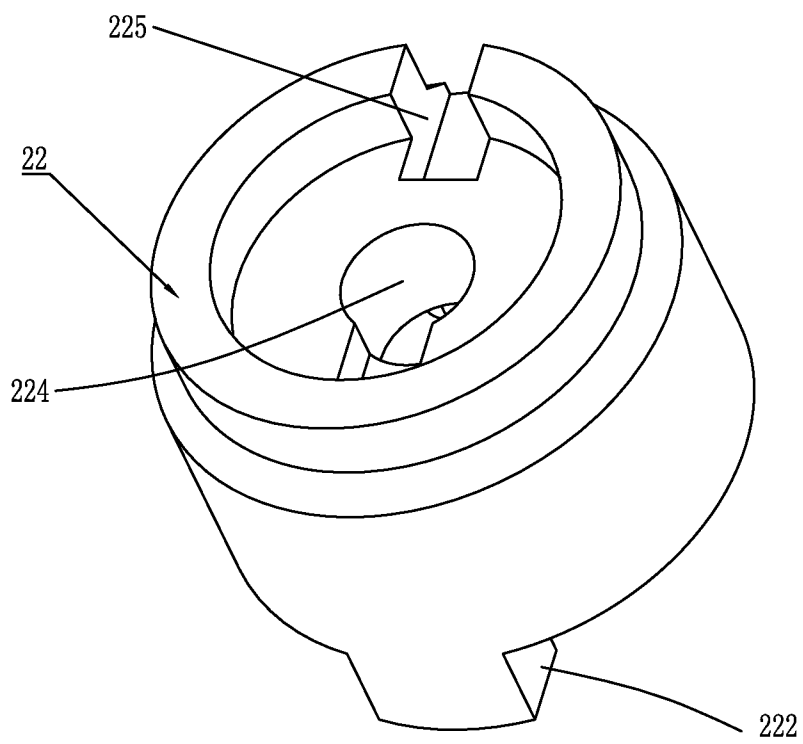


FIG. 9

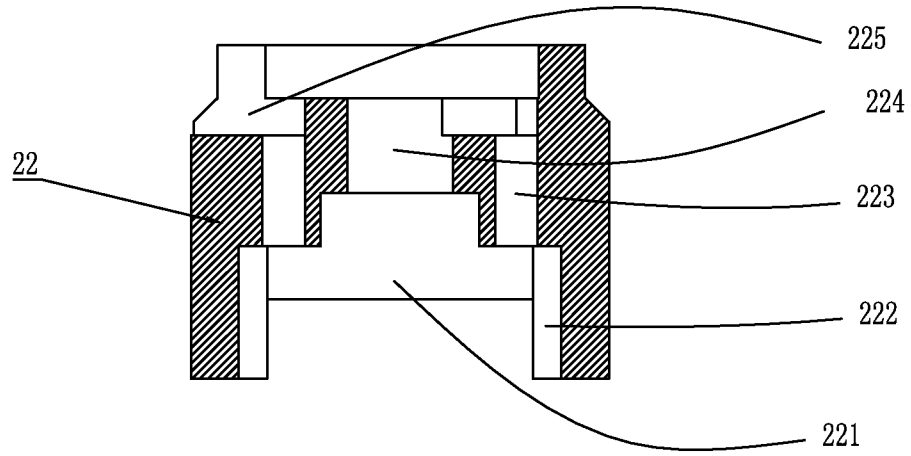


FIG. 10

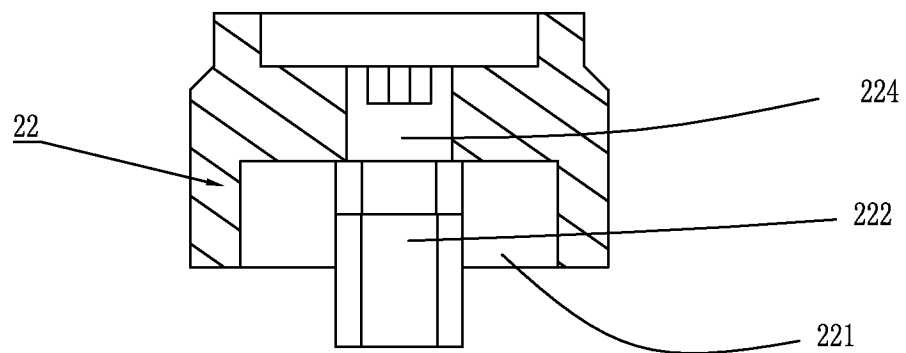


FIG. 11

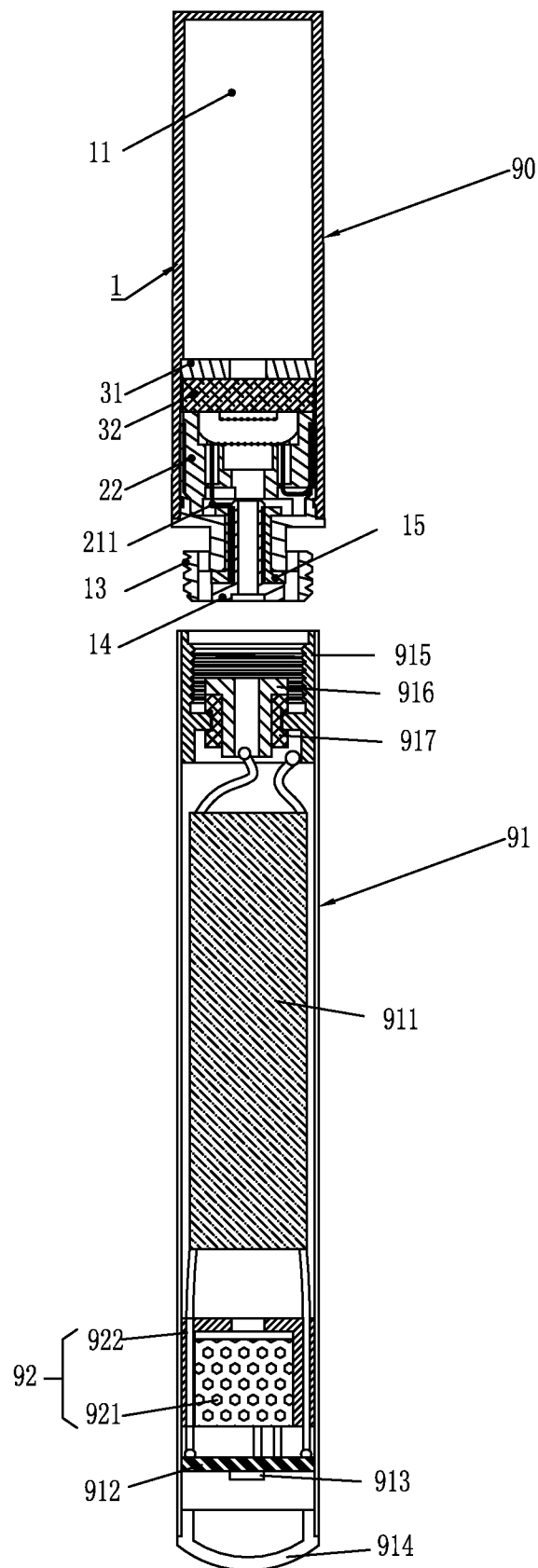


FIG. 12

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2012/073664

A. CLASSIFICATION OF SUBJECT MATTER

A24F47/00 (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)

IPC:A24D, A24F, A61M, B05B

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)

CNKI&CNPAT& WPI&EPODOC: cigar, cigarette, tobacco, smoking, inhaling, simulate, imitate, substitute, electronic, atomizer, vaporizer, aerosol, electrode, anode, cathode, cartridge, reservoir, guiding

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 102326869 A (CHEN, Zhiping) 25 Jan.2012(25.01.2012) pages7-9 of description, figs1-5	1-15
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A	JP 2010-104310 A (SAMURAING KK) 13 May 2010 (13.05.2010) the whole document	1-15

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