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(54) ELECTRONIC CIGARETTE ATOMIZING CORE AND ELECTRONIC CIGARETTE ATOMIZER

(57) An electronic cigarette atomizing core (C) and an electronic cigarette atomizer. The electronic cigarette atomizing core comprises an ultrasonic atomizing sheet (6), an elastic insulating gasket (7), and an electrode assembly (8) which are stacked from top to bottom. The upper surface of the ultrasonic atomizing sheet (6) is provided with a first electrical connection end, and the lower surface thereof is provided with a second electrical connection end. The electrode assembly (8) comprises a first electrode (81) and a second electrode (83). The first electrode (81) is electrically conducted to the second electrical connection end, and the second electrode (83) is electrically conducted to the first electrical connection end. The upper surface of the elastic insulating gasket (7) is provided with a plurality of bosses (71), and the elastic insulating gasket (7) supports the ultrasonic atomizing sheet (6) via the bosses (71). The present invention can reduce the absorption of the amplitude and frequency of the ultrasonic atomizing sheet (6), thereby improving working efficiency of the ultrasonic atomizing sheet (6) and fully atomizing an e-liquid to enhance the taste of vapor.

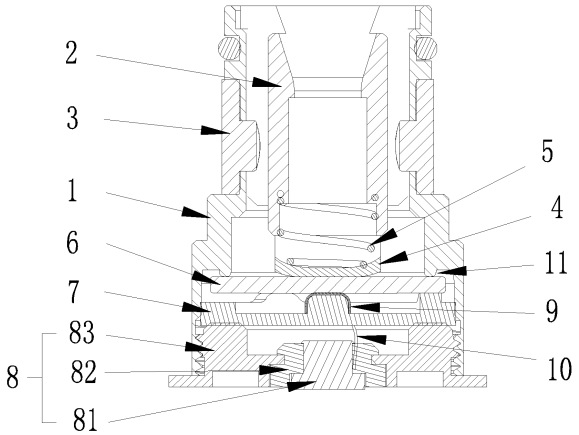

Fig. 1

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Description

Field of the Invention

[0001] The present invention relates to an electronic cigarette apparatus, and in particular, to an electronic cigarette atomizing core and an electronic cigarette atomizer.

Background of the Invention

[0002] As described in Chinese patent No. CN201721169084.7, an ultrasonic atomizing sheet of an ultrasonic atomizing core is mounted in an insulating gasket, and the insulating gasket covers the periphery of the ultrasonic atomizing sheet. Since the insulating gasket is made of silicone and has certain elasticity and softness, the insulating gasket can stably cover the ultrasonic atomizing sheet. However, the insulating gasket is prone to absorbing the amplitude and frequency (commonly known as absorbing vibration) of the ultrasonic atomizing sheet in the working process because the insulating gasket is in contact with both upper and lower surfaces of the ultrasonic atomizing sheet with a large area of contact and the insulating gasket has certain elasticity and softness. Consequently, the ultrasonic atomizing sheet is low in working efficiency and cannot fully atomize an e-liquid, resulting in poor taste of vapor.

[0003] In addition, some of ultrasonic atomizing sheets of ultrasonic atomizing cores are electrically connected by means of welded electronic lines, while some are electrically connected by direct abutting using a spring. Unfortunately, the ultrasonic atomizing sheets electrically connected in the two manners are prone to poor electrical contact in the working process, and the assembly thereof can be complicated, resulting in increased costs of atomizers. If a spring is used for abutting of an ultrasonic atomizing sheet, the elastic force of the spring is not easy to control (low elastic force accuracy), and therefore, the atomizing efficiency and the service life of the ultrasonic atomizing sheet may be affected. Moreover, the manufacturing process of such an ultrasonic atomizing sheet would be complicated with high cost.

Summary of the Invention

[0004] The technical problem to be solved in the present invention is to, with the purpose of overcoming the shortcomings of the prior art, provide an electronic cigarette atomizing core and an electronic cigarette atomizer that can reduce the absorption of the amplitude and frequency of an ultrasonic atomizing sheet, thereby improving the working efficiency of the ultrasonic atomizing sheet and fully atomizing an e-liquid to enhance the taste of vapor.

[0005] To solve the above technical problem, the present invention provides an electronic cigarette atomizing core, including an ultrasonic atomizing sheet, an elastic insulating gasket and an electrode assembly that are stacked in sequence from top to bottom. A first electrical connection end is disposed on an upper surface of the ultrasonic atomizing sheet, while a second electrical connection end is disposed on a lower surface thereof. The electrode assembly includes a first electrode and a second electrode. The first electrode is electrically conducted to the second electrical connection end, and the second electrode is electrically conducted to the first electrical connection end. A plurality of bosses are formed on an upper surface of the elastic insulating gasket, and the elastic insulating gasket supports the ultrasonic atomizing sheet via the bosses.

[0006] According to the present invention, with the bosses propping against the lower surface of the ultrasonic atomizing sheet, the lower surface of the ultrasonic atomizing sheet is in point-to-point contact, rather than surface-to-surface contact, with the elastic insulating gasket by means of the bosses. Therefore, the area of contact is small, so that the absorption of the working amplitude and frequency of the ultrasonic atomizing sheet by the elastic insulating gasket is reduced, thereby improving the e-liquid atomizing efficiency of the ultrasonic atomizing sheet and fully atomizing an e-liquid to enhance the taste of vapor.

[0007] In specific implementation, the bosses are uniformly distributed along the shape of the end of the elastic insulating gasket and integrally formed with the elastic insulating gasket. Thus, the cost can be reduced, and the uniform installation of the bosses can ensure the balance of propping forces exerted on the lower surface of the ultrasonic atomizing sheet. As a result, the ultrasonic atomizing sheet can be prevented from tilting due to uneven propping forces, thereby avoiding the influence on the working amplitude and frequency of the ultrasonic atomizing sheet and hence the influence on the e-liquid atomizing effect.

[0008] In specific implementation, a propping post for abutting against the second electrical connection end of the ultrasonic atomizing sheet is disposed in the middle of the elastic insulating gasket and connected to the elastic insulating gasket by means of an elastic arm. Thus, the propping post can prop against the lower surface of the ultrasonic atomizing sheet under the support of an elastic force produced by bending of the elastic arm. The propping force exerted by the propping post on the lower surface of the ultrasonic atomizing sheet can be adjusted by adjusting the elastic force of the elastic arm. The adjustment is simple with good consistence, and breakage of the ultrasonic atomizing sheet under a large propping force can be avoided.

[0009] The present invention achieves the effects of low overall atomizer manufacturing cost, simple manufacturing process, and high accuracy and good stability of the elastic force of the propping post. The elastic insulating gasket, the elastic arm and the propping post are formed integrally.

[0010] In specific implementation, an insulating ring

may be disposed between the first electrode and the second electrode. The propping post, the elastic arm and the insulating ring are formed integrally.

[0011] To achieve electrical connection of the ultrasonic atomizing sheet and the first electrode, a wire passing hole is formed between adjacent elastic arms. An electric conductor sleeves the top of the propping post and is connected to one end of a wire. The other end of the wire passes through the wire passing hole to be electrically connected to the first electrode.

[0012] The ultrasonic atomizing sheet is enclosed with an outer sleeve, and a propping ring is disposed on an inner wall of the outer sleeve. Moreover, the first electrical connection end of the ultrasonic atomizing sheet is abutted against the propping ring to achieve electrical conduction.

[0013] To reduce the absorption of the working amplitude and frequency of the ultrasonic atomizing sheet by the elastic insulating gasket as much as possible and improve the working efficiency of the ultrasonic atomizing sheet, a contact area between the bosses and the lower surface of the ultrasonic atomizing sheet is merely 1-50mm^2.

[0014] The bosses are made of an insulating material to ensure insulation between the outer sleeve and the second electrical connection end of the ultrasonic atomizing sheet and avoid short-circuiting of the first and second electrical connection ends of the ultrasonic atomizing sheet.

[0015] Thehardnessof the boss is higher than that of the elastic insulating gasket, so that the absorption of the amplitude and frequency of the ultrasonic oscillation by the bosses is reduced and the working efficiency of the ultrasonic atomizing sheet is improved.

[0016] To solve the above technical problem, the present invention further provides an electronic cigarette atomizer, including an e-liquid tank device and a suction nozzle device that are combined in such a manner of being capable of rotating relative to each other.

[0017] Compared with the prior art, the present invention has the following advantages:

1. According to the present invention, the propping post is disposed on the electronic cigarette atomizing core and the electric conductor is disposed on the propping post. One end of the electric conductor is connected to the first electrode. The elastic arm is disposed on a sidewall or an end of the propping post and supports the propping post, so that the other end of the electric conductor is elastically connected against the second electrical connection end of the ultrasonic atomizing sheet. Since the elastic arm has highly accurate and stable elastic force and is not prone to elastic failure, good electrical conduction between the first electrode and the ultrasonic atomizing sheet is achieved, and the influence of the elastic force on the working amplitude and frequency of the ultrasonic atomizing sheet is reduced.

2. According to the present invention, the elastic insulating gasket is disposed on the bottom of the ultrasonic atomizing sheet, and a plurality of bosses are formed on the upper surface of the elastic insulating gasket. Furthermore, the elastic insulating gasket is abutted against the lower surface of the ultrasonic atomizing sheet by means of the bosses, so that the upper surface of the ultrasonic atomizing sheet is in good contact with the propping ring of the outer sleeve. Moreover, the elastic insulating gasket is not directly abutted against the lower surface of the ultrasonic atomizing sheet in surface-to-surface contactbut abutted against the ultrasonic atomizing sheet by the bosses with a smaller area of contact. Thus, the absorption of the working amplitude and frequency of the ultrasonic atomizing sheet by the elastic insulating gasket is reduced, and the working efficiency of the ultrasonic atomizing sheet is improved.

3. According to the present invention, the overall structure is simple and easy to assemble, and therefore, the cost can be reduced.

Brief Description of the Drawings

[0018]

FIG. 1 is a cross-sectional view of embodiment 1 of an electronic cigarette atomizing core according to the present invention.

FIG. 2 is an exploded view of embodiment 1 of an electronic cigarette atomizing core according to the present invention.

FIG. 3 is a structural schematic diagram of an elastic insulating gasket in embodiment 1 of an electronic cigarette atomizing core according to the present invention.

FIG. 4 is a cross-sectional view of embodiment 2 of an electronic cigarette atomizing core according to the present invention.

FIG. 5 is an exploded view of embodiment 2 of an electronic cigarette atomizing core according to the present invention.

FIG. 6 is a structural schematic diagram of an insulating ring in embodiment 2 of an electronic cigarette atomizing core according to the present invention.

FIG. 7 is a cross-sectional view of embodiment 1 of an electronic cigarette atomizer according to the present invention.

FIG. 8 is a cross-sectional view of embodiment 2 of an electronic cigarette atomizer according to the present invention.

FIG. 9 is a diagram showing that a suction nozzle device of an electronic cigarette atomizer according to the present invention is turned relative to an e-liquid tank device.

List of Reference Numerals:

1-outer sleeve, 2-inner sleeve, 3-elastic insulating sleeve, 4-e-liquid guide cotton, 5-spring, 6-ultrasonic atomizing sheet, 7-elastic insulating gasket, 8-electrode assembly, 9-electric conductor, 10-wire, 11-propping ring, 71-boss, 72-propping post, 73-elastic arm, 74-wire passing hole, 81-first electrode, 82-insulating ring, 83-second electrode, 821-elastic arm, 822-propping post;

A-suction nozzle device, B-e-liquid tank device, C-atomizing core, D-atomization seat, and E-e-liquid filling port.

Detailed Description of Embodiments

[0019] The present invention will be further described in conjunction with specific preferred embodiments, but the protection scope of the present invention is not thereby limited thereto.

[0020] For ease of description, relative positional relationships (e.g., upper, lower, left, and right) of different components are all described based on what are illustrated in the drawings, which are not limiting of the structure of the present invention.

Embodiment 1:

[0021] As shown in FIG. 1 to FIG. 3, embodiment 1 of an electronic cigarette atomizing core C includes an outer sleeve 1 made of an electrically conductive material. The outer sleeve 1 is enclosed with an elastic insulating sleeve 3. An upper portion of an inner cavity of the outer sleeve 1 is sleeved with an inner sleeve 2. Two ends of e-liquid guide cotton 4 are clamped between the outer sleeve 1 and the inner sleeve 2. An ultrasonic atomizing sheet 6, an elastic insulating gasket 7 and an electrode assembly 8 are disposed in sequence from top to bottom in a lower portion of the inner cavity of the outer sleeve 1, and a spring 5 is disposed at the bottom of the inner sleeve 2. The middle of the e-liquid guide cotton 4 is pressed on the ultrasonic atomizing sheet 6 by the spring 5.

[0022] The ultrasonic atomizing sheet 6 includes a first electrical connection end, piezoelectric ceramic and a second electrical connection end that are stacked in sequence from top to bottom, and the second electrical connection end is disposed in the middle of the lower surface of the ultrasonic atomizing sheet 6. The electrode assembly 8 includes a first electrode 81, an insulating ring 82 and a second electrode 83 that are sleeved with one another from inside to outside. A propping ring 11 is disposed on the inner wall of the outer sleeve 1, and the propping ring 11 is abutted against the first electrical connection end of the ultrasonic atomizing sheet 6 to achieve electrical conduction between the outer sleeve 1 and the ultrasonic atomizing sheet 6. At least three bosses 71 having an equal height are formed on the upper surface of the elastic insulating gasket 7. A plurality of bosses 71 are uniformly distributed on the upper surface of the elastic insulating gasket 7, and the elastic insulating gasket 7 props against the lower surface of the ultrasonic atomizing sheet 6 via the bosses 71. Thus, the ultrasonic atomizing sheet 6 is evenly supported in one plane and prevented from tilting in the working process. Moreover, due to a small area of contact (e.g., 1-50mm^2) between the bosses 71 and the lower surface of the ultrasonic atomizing sheet 6, the absorption of the working amplitude and frequency of the ultrasonic atomizing sheet 6 by the elastic insulating gasket 7 is reduced, and the working efficiency of the ultrasonic atomizing sheet 6 is improved.

[0023] The bosses 71 are made of an insulating material, such as silicone and plastics. If silicone is used, the bosses 71 can be integrally formed with the elastic insulating gasket 7, thereby reducing the production cost. If a plastic is used, the bosses 71 can be fixedly connected to the elastic insulating gasket 7 by inlaying or fusion.

[0024] The hardness of the boss 71 is higher than that of the elastic insulating gasket 7, so that the absorption of the amplitude and frequency of the oscillation by the bosses 71 is reduced and the working efficiency of the ultrasonic atomizing sheet 6 is improved. The upper surface of the ultrasonic atomizing sheet 6 is propped against by the propping ring 11, and the lower surface of the ultrasonic atomizing sheet 6 is supported by the uniformly distributed bosses 71, and the propping force of each boss 71 applied on the support point on the lower surface of the ultrasonic atomizing sheet 6 is identical, so that the ultrasonic atomizing sheet 6 is mounted stably. The balance of stresses on the upper and lower surfaces of the ultrasonic atomizing sheet 6 ensures stable electrical connection between the first electrical connection end of the ultrasonic atomizing sheet 6 and the propping ring 11 of the outer sleeve 1. Furthermore, the lower portion of the outer sleeve 1 is electrically connected to the second electrode 83 by means of threaded connection.

[0025] A propping post 72 for abutting against the second electrical connection end of the ultrasonic atomizing sheet 6 is disposed in the middle of the upper surface of the elastic insulating gasket 7, and the periphery of the elastic insulating gasket 7 is connected to the propping post 72 by means of a plurality of uniformly arranged elastic arms 73. There is a plurality of wire passing holes 74, and each wire passing hole 74 is formed between adjacent elastic arms 73. An electric conductor 9 is sleevedon the propping post 72. One end of the electric conductor 9 extends directly or is welded to one end of a wire 10. The extension end of the electric conductor 9 or the other end of the wire 10 passes through one wire passing hole 74 to be electrically connected to the first electrode 81. The other end of the electric conductor 9 is abutted against the second electrical connection end of the ultrasonic atomizing sheet 6. The propping post 72 and the elastic arms 73 are made of silicone and have certain elasticity. The deformation of the elastic arms 73 may cause the electric conductor 9 to stably and elasti-

cally abut against the second electrical connection end of the ultrasonic atomizing sheet 6. Moreover, the elastic insulating gasket 7 is integrally formed with the propping post 72 and the elastic arms 73 by means of a mold, thus the manufacturing cost is low. The elastic arms 73 have highly accurate and stable elastic forces and are not prone to elastic failure.

Embodiment 2:

[0026] As shown in FIG. 4 to FIG. 6, embodiment 2 of electronic cigarette atomizing core C according to the present invention is substantially the same in structure as embodiment 1 except that the middle of the elastic insulating gasket 7 is hollowed out and two elastic arms 821 are symmetrically disposed on the top of the insulating ring 82 of the electrode assembly 8, with propping posts 822 being disposed on the tops of the two elastic arms 821. The propping post 822 passes through the hollowed-out portion of the elastic insulating gasket 7, and an electric conductor 9 is sleeved on the top of the propping post 822. One end of a wire 10 (which is prone to deformation) is welded to the electric conductor 9, and the other end of the wire 10 is connected to the first electrode 81. Therefore, when the electric conductor 9 is abutted against the second electrical connection end of the ultrasonic atomizing sheet 6, elastic arms 821 are deformed under stress, so that the electric conductor 9 is connected to the second electrical connection end of the ultrasonic atomizing sheet 6 more stably. The propping posts 822 and the elastic arms 821 are made of silicone and have certain elasticity. The insulating ring 82 is integrally formed with the propping posts 822 and the elastic arms 821 by means of a mold, thus the manufacturing cost is low. The elastic arms 821 have highly accurate and stable elastic forces and are not prone to elastic failure.

[0027] As shown in FIG. 7 to FIG. 9, an embodiment of an electronic cigarette atomizer according to the present invention includes a suction nozzle device A and an e-liquid tank device B. The electronic cigarette atomizing core C described above is mounted in the e-liquid tank device B by means of an atomization seat D. Moreover, the suction nozzle device A is capable of rotating relative to the e-liquid tank device B, so that an e-liquid filling port E of the e-liquid tank device B is opened. An e-liquid guide structure and an airflow passage are further disposed in the suction nozzle device A and theeliquid tank deviceB.

[0028] The foregoing embodiments are merely preferred embodiments of the present application, and are not intended to limit the present application in any form. While the present application is disclosed by the foregoing preferred embodiments, the embodiments are not intended to limit the present application. Any person skilled in the art can make some changes or modifications based on the technical contents disclosed above without departing from the scope of the technical solutions of the present application, and such changes or modifications should be regarded as equivalent embodiments and shall fall within the scope of the technical solutions of the present application.

Claims

1. An electronic cigarette atomizing core, comprising an ultrasonic atomizing sheet (6), an elastic insulating gasket (7) and an electrode assembly (8) that are stacked in sequence from top to bottom; a first electrical connection end is disposed on an upper surface of the ultrasonic atomizing sheet, and a second electrical connection end is disposed on a lower surface of the ultrasonic atomizing sheet; the electrode assembly comprises a first electrode (81) and a second electrode (83); the first electrode (81) is electrically conducted to the second electrical connection end, and the second electrode (83) is electrically conducted to the first electrical connection end, and **characterized in that** a plurality of bosses (71) are formed on an upper surface of the elastic insulating gasket, and the elastic insulating gasket supports the ultrasonic atomizing sheet via the bosses.

2. The electronic cigarette atomizing core according to claim 1, wherein the bosses are integrally formed with the elastic insulating gasket.

3. The electronic cigarette atomizing core according to claim 1, wherein a propping post (72) for abutting against the second electrical connection end of the ultrasonic atomizing sheet is disposed in the middle of the elastic insulating gasket, and the propping post (72) is connected to the elastic insulating gasket by an elastic arm (73).

4. The electronic cigarette atomizing core according to claim 3, wherein the elastic insulating gasket, the elastic arm and the propping post are formed integrally.

5. The electronic cigarette atomizing core according to claim 3, wherein an insulating ring (82) is disposed between the first electrode and the second electrode; and the propping post, the elastic arm and the insulating ring are formed integrally.

6. The electronic cigarette atomizing core according to claim 3, wherein a wire passing hole (74) is formed between adjacent elastic arms; an electric conductor (9) sleeves the top of the propping post and is connected to one end of a wire (10); and the other end of the wire passes through the wire passing hole to be electrically connected to the first electrode.

7. The electronic cigarette atomizing core according to claim 1, wherein the ultrasonic atomizing sheet is enclosed with an outer sleeve (1); a propping ring (11) is disposed on an inner wall of the outer sleeve; and the first electrical connection end of the ultrasonic atomizing sheet is abutted against the propping ring to achieve electrical conduction.

8. The electronic cigarette atomizing core according to claim 1, wherein a contact area between the bosses and the lower surface of the ultrasonic atomizing sheet is 1 to 50mm^2.

9. The electronic cigarette atomizing core according to claim 1, wherein the hardness of the boss is higher than that of the elastic insulating gasket.

10. An electronic cigarette atomizer, comprising an e-liquid tank device (A) and a suction nozzle device (B) that are combined in such a manner of being capable of rotating relative to each other, **characterized in that** the electronic cigarette atomizing core (C) according to any one of claims 1 to 9 is disposed in the e-liquid tank device by an atomization seat (D).

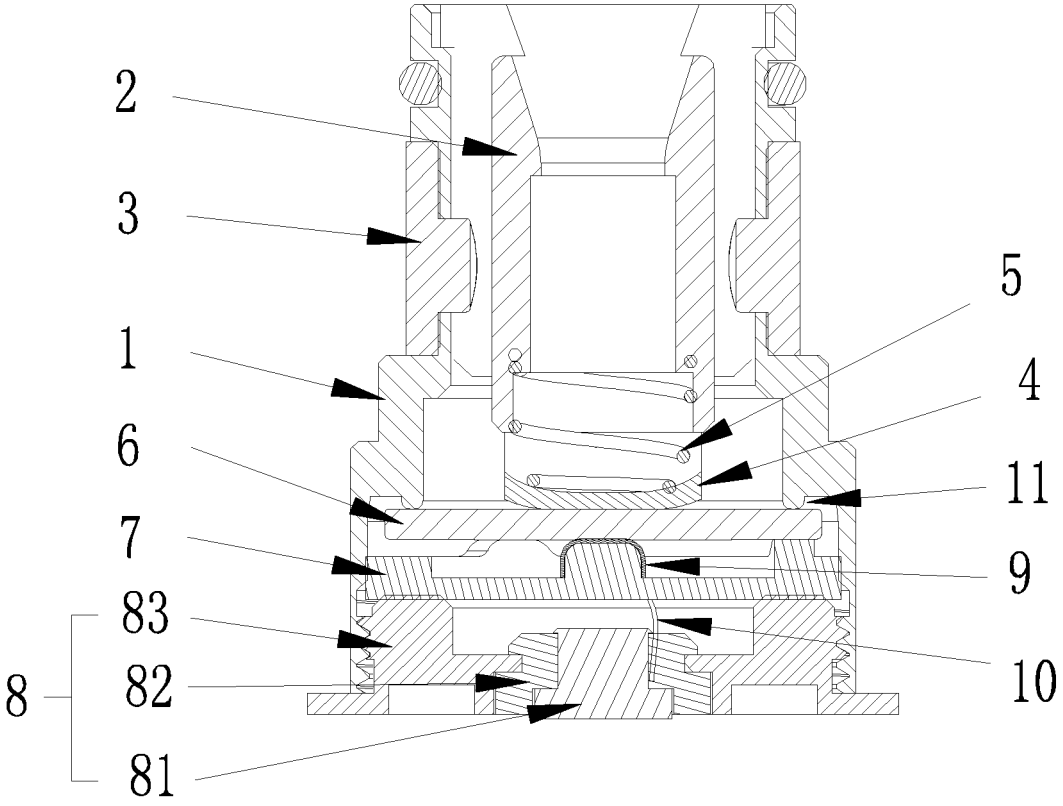

Fig. 1

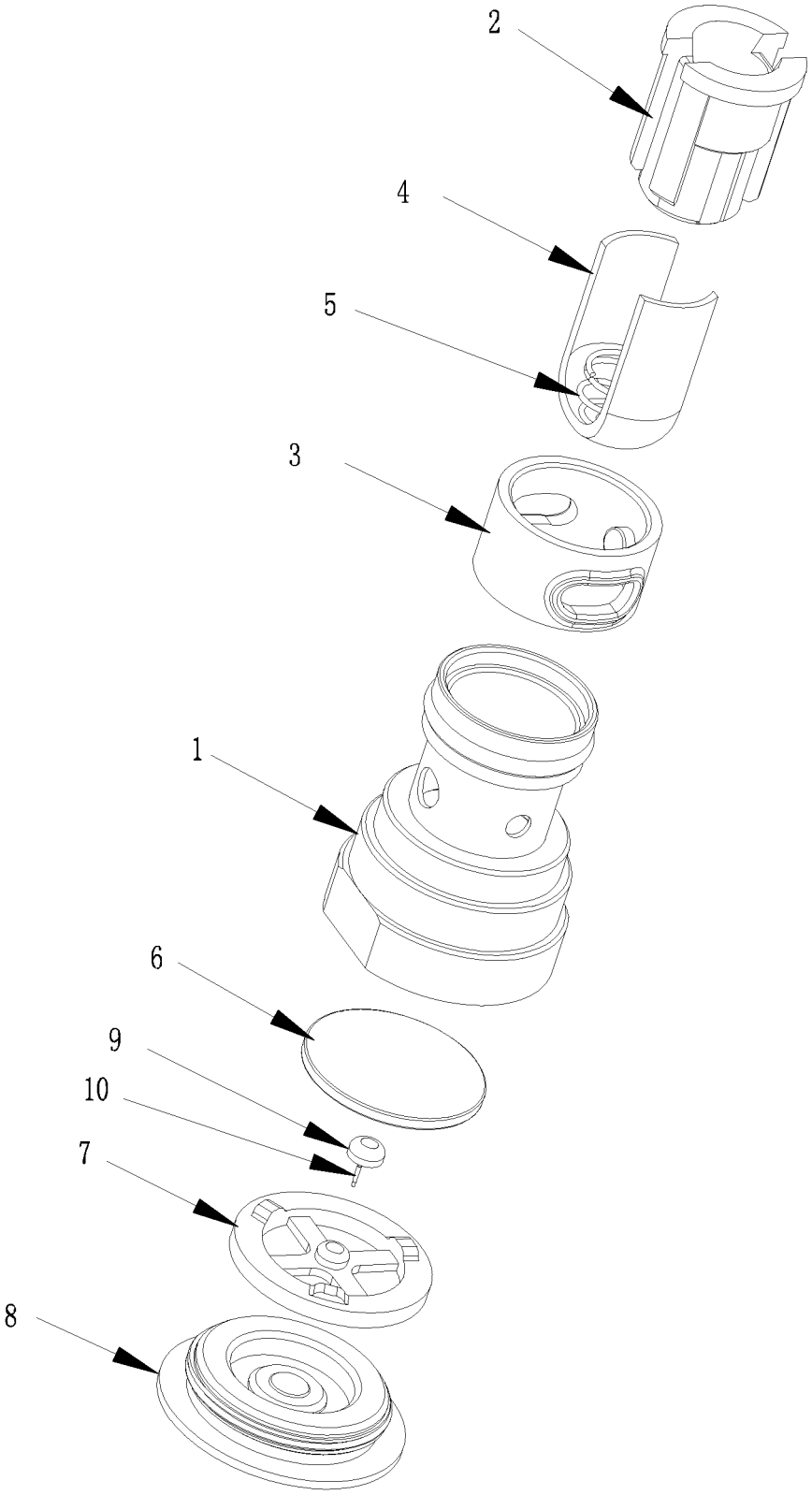

Fig. 2

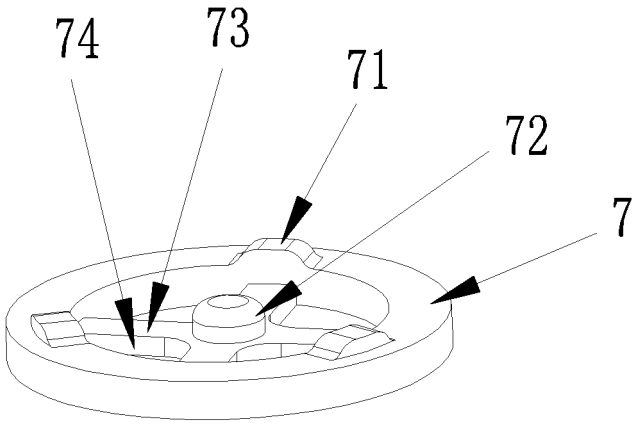

Fig. 3

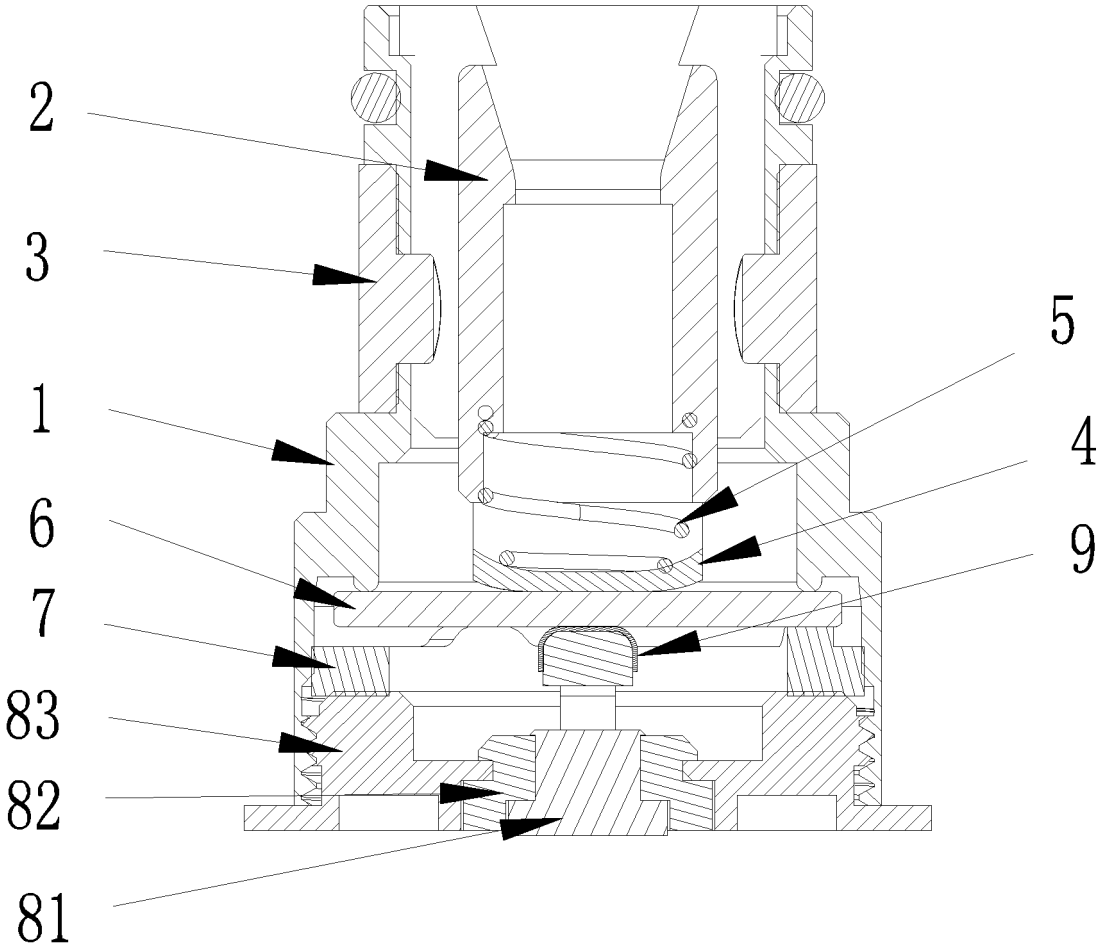

Fig. 4

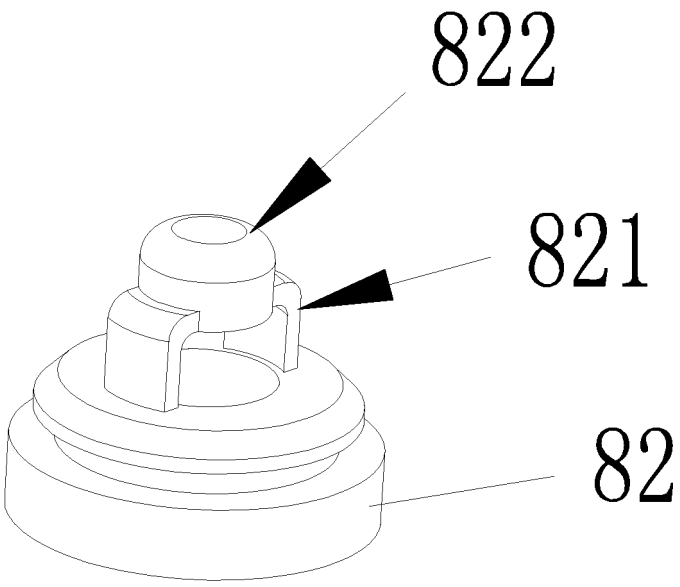

Fig. 5

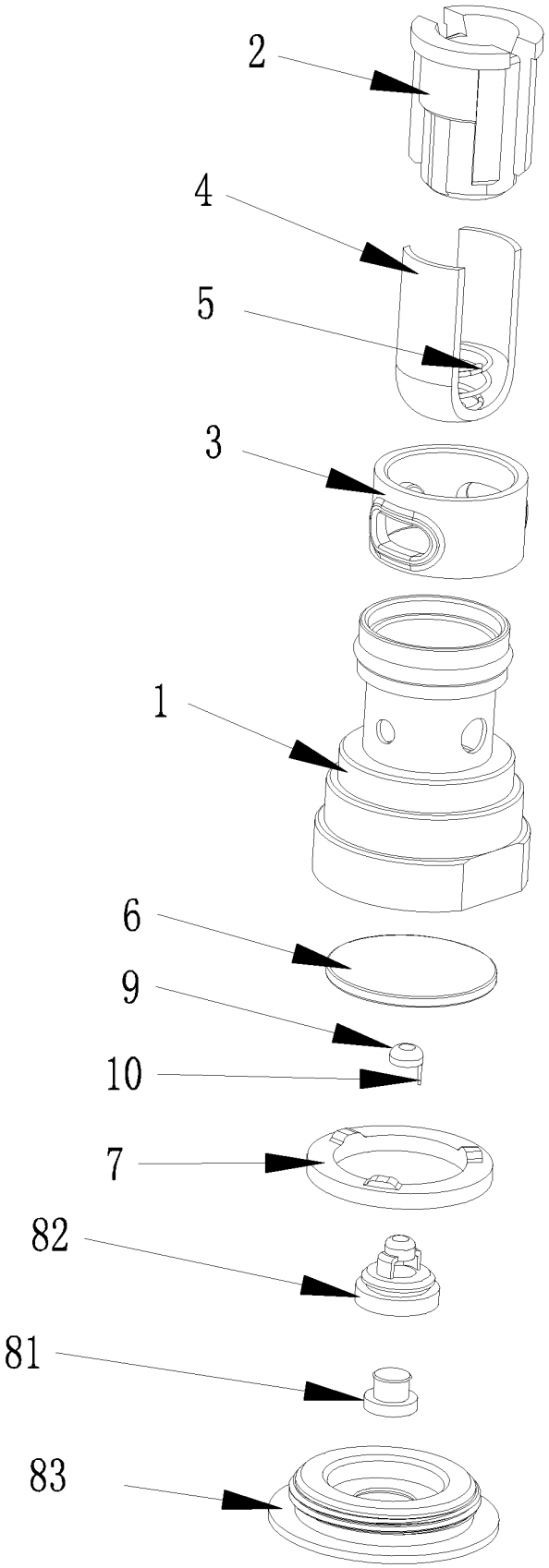

Fig. 6

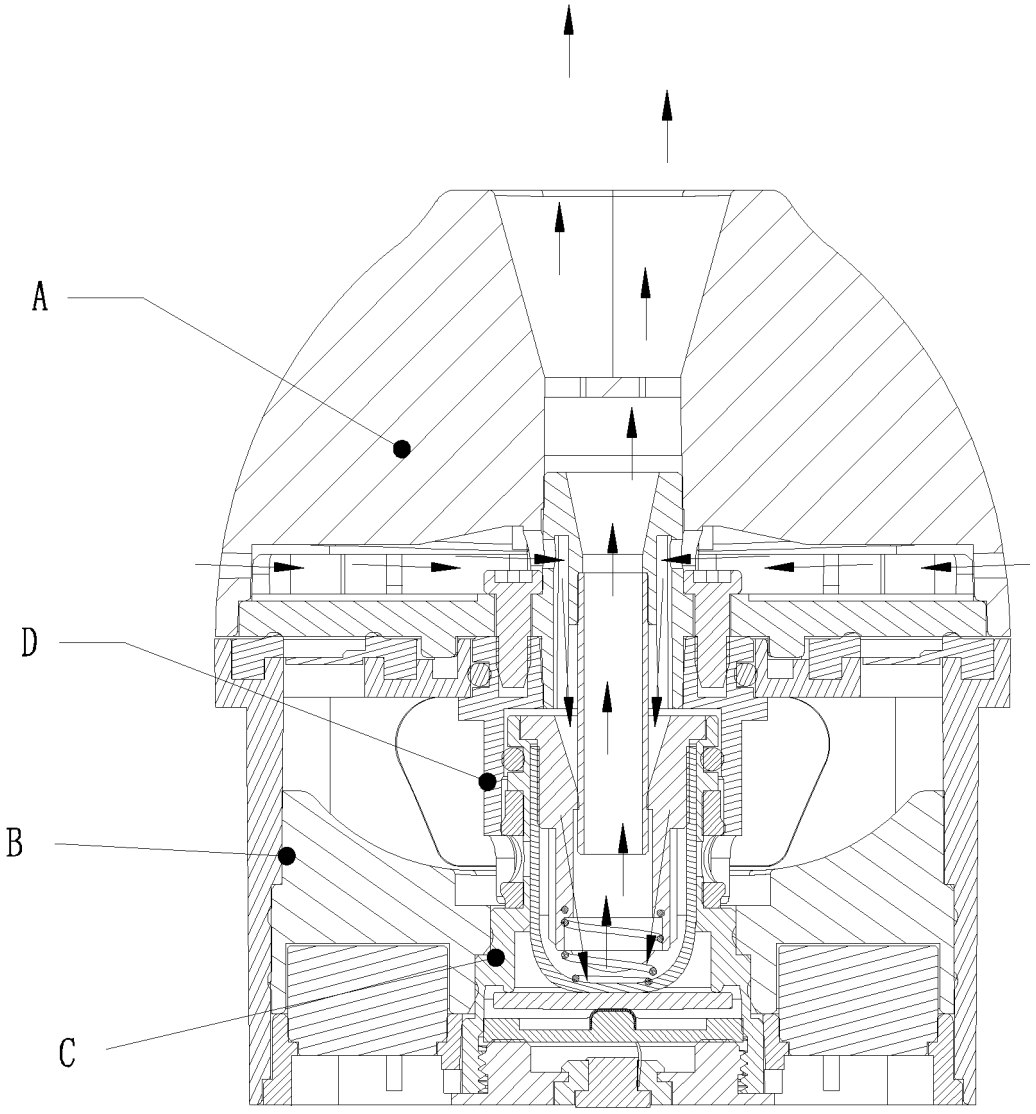

Fig. 7

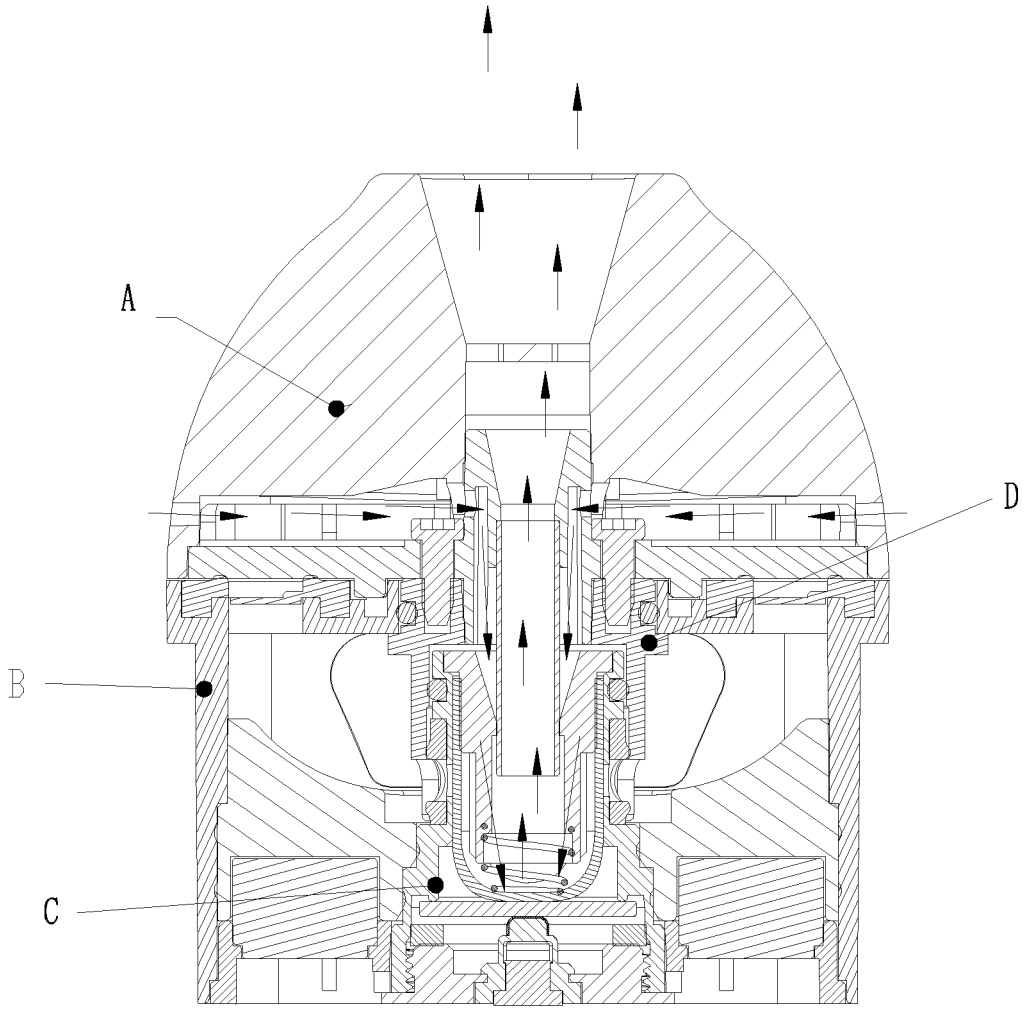

Fig. 8

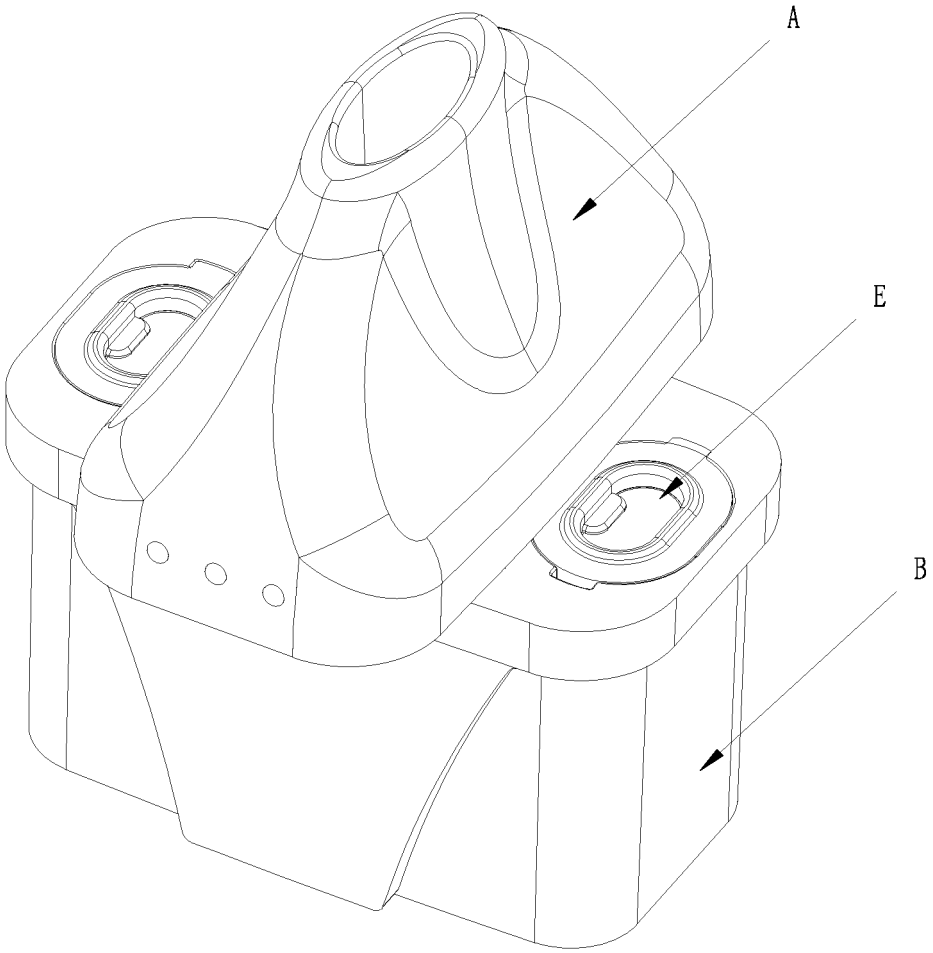

Fig. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/085129

A. CLASSIFICATION OF SUBJECT MATTER

A24F 47/00(2020.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F

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)

CNPAT, CNKI, EPODOC, WPI:

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 210017893 U (CHINA TOBACCO HUNAN INDUSTRIAL CO., LTD.) 07 February 2020 (2020-02-07) claims 1-10, description, paragraphs [0027]-[0032], and figures 1-5	1-10
PX	CN 210017892 U (CHINA TOBACCO HUNAN INDUSTRIAL CO., LTD.) 07 February 2020 (2020-02-07) description, paragraphs [0034]-[0040], and figures 1-9	1-10
Y	CN 205922902 U (CHINA TOBACCO HUNAN INDUSTRIAL CO., LTD.) 08 February 2017 (2017-02-08) description, paragraphs [0006]-[0049], and figures 1-7	1-10
Y	CN 205728076 U (CHINA TOBACCO HUNAN INDUSTRIAL CO., LTD.) 30 November 2016 (2016-11-30) description, paragraphs [0014]-[0066], and figures 1-15	1-10
A	CN 205993631 U (SHANGHAI GREEN VAPER TECHNOLOGY CO., LTD.; NIE, Yanmin) 08 March 2017 (2017-03-08) entire document	1-10
A	CN 205962834 U (CHINA TOBACCO HUNAN INDUSTRIAL CO., LTD.) 22 February 2017 (2017-02-22) entire document	1-10

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

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Date of the actual completion of the international search	Date of mailing of the international search report
19 June 2020	**15 July 2020**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/085129

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 207185931 U (CHINA TOBACCO HUNAN INDUSTRIAL CO., LTD.) 06 April 2018 (2018-04-06) entire document	1-10
A	CN 208354604 U (CHINA TOBACCO HUNAN INDUSTRIAL CO., LTD.) 11 January 2019 (2019-01-11) entire document	1-10
A	CN 205865974 U (SHENZHEN JIESHIBO TECHNOLOGY CO., LTD.) 11 January 2017 (2017-01-11) entire document	1-10
A	GB 2542013 A (BEYOND TWENTY LIMITED) 08 March 2017 (2017-03-08) entire document	1-10

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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