



(11) **EP 3 892 138 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
13.10.2021 Bulletin 2021/41

(51) Int Cl.:
A24F 47/00 (2020.01)

(21) Application number: **19910406.8**

(86) International application number:
PCT/CN2019/071657

(22) Date of filing: **14.01.2019**

(87) International publication number:
WO 2020/146982 (23.07.2020 Gazette 2020/30)

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

- **ZHU, Wei**
Shenzhen, Guangdong 518118 (CN)
- **GUO, Meiling**
Shenzhen, Guangdong 518118 (CN)
- **ZHOU, Bo**
Shenzhen, Guangdong 518118 (CN)
- **ZHANG, Pengfei**
Shenzhen, Guangdong 518118 (CN)

(71) Applicant: **O-Net Automation Technology (Shenzhen) Limited**
Shenzhen, Guangdong 518118 (CN)

(74) Representative: **Westphal, Mussnug & Partner, Patentanwälte mbB**
Werinherstraße 79
81541 München (DE)

(72) Inventors:

- **HUANG, Huihua**
Shenzhen, Guangdong 518118 (CN)

(54) **POWER SUPPLY DEVICE HAVING TEMPERATURE CONTROL FUNCTION AND ELECTRONIC CIGARETTE**

(57) The disclosure provides a power supply device with temperature control and an electronic cigarette, wherein the power supply device includes a housing, a battery arranged in the housing, an electrical connection assembly disposed at a first end of the housing, a temperature control board and an airflow sensor disposed in the housing, and a lamp cap disposed at a second end of the housing; the electrical connection assembly and the airflow sensor are electrically connected with the temperature control board respectively, and the temperature control board is electrically connected with the battery. The power supply device with temperature control has temperature control function, which can avoid phenomena such as dry burning of an atomizer of the electronic cigarette; the power supply device has less structural members, low cost and easy assembly, the volume is reduced compared with the power supply device in the prior art, which is more portability.

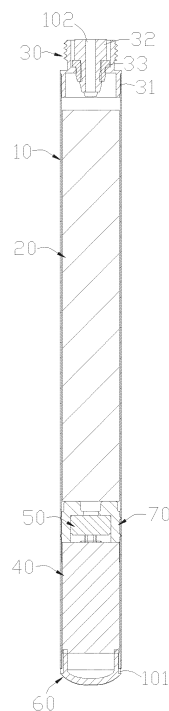


Fig. 1

Description

Technical Field

[0001] The present disclosure relates to the technical field of electronic cigarettes, in particular to a power supply device with temperature control and an electronic cigarette.

BACKGROUND

[0002] An electronic cigarette typically includes a power supply device, an atomizer and a cartridge. The atomizer is powered by the power supply device and can atomize the smoke liquid in the cartridge into smoke, so that a user has a feeling similar to smoking when inhaling.

[0003] During use of the electronic cigarette, the power of a battery will become lower and lower, which will affect the atomization temperature of the atomizer, and then affect the taste of smoke and smoking experience. The electronic cigarette without temperature control function, the atomizer is easy to dry burn when there is no smoke liquid or smoke liquid is insufficient, which will produce pernicious gas and burnt substance to be inhaled into human body, which is harmful to human health.

[0004] Conventionally, the electronic cigarette with temperature control adopts a box-shaped power supply device and a key switch control, which has a plurality of structural members, is complex in structure and not easy to assemble, and has high cost. In addition, the product has a large volume and is inconvenient to carry.

SUMMARY

[0005] The technical problem to be solved by the present disclosure is to provide a power supply device with temperature control, which is simple in structure and small in volume, and an electronic cigarette with the power supply device.

[0006] The technical solution adopted by the present disclosure to solve the technical problem is to provide a power supply device with temperature control configured for supplying power to an atomizer of an electronic cigarette, wherein the power supply device includes a housing, a battery arranged in the housing, an electrical connection assembly disposed at a first end of the housing, a temperature control board and an airflow sensor disposed in the housing, and a lamp cap disposed at a second end of the housing; the electrical connection assembly and the airflow sensor are electrically connected with the temperature control board respectively, and the temperature control board is electrically connected with the battery.

[0007] Preferably, when the airflow sensor is triggered, the temperature control board detects an initial resistance value of the atomizer at room temperature through the electrical connection assembly, obtains a target resistance value of the atomizer at a specific temperature

according to the initial resistance value, supplies power to the atomizer through the electrical connection assembly, and obtains an actual resistance value of an atomizer in a working process through the electrical connection assembly;

when the trigger of the airflow sensor is stopped, the temperature control board detects a voltage or a current of the atomizer through the electrical connection assembly, and stops detecting when the actual resistance value of the atomizer is recovered to be consistent with the initial resistance value.

[0008] Preferably, the lamp cap, the electrical connection assembly or the housing is provided with an airflow inlet, the electrical connection assembly is provided with an airflow outlet, and the airflow inlet is communicated with the airflow outlet to define an airflow channel.

[0009] Preferably, the electrical connection assembly includes a first electrical connector, a second electrical connector, and an insulator; the first electrical connector is inserted with the first end of the housing and is electrically connected with a negative terminal of the temperature control board; the second electrical connector extends into the first electrical connector and is electrically connected with an output terminal of the temperature control board; the insulator is disposed between the first electrical connector and the second electrical connector.

[0010] Preferably, one end of the first electrical connector is fitted in the first end of the housing, and another end of the first electrical connector extends out of the housing; an outer peripheral surface of the another end of the first electrical connector is provided with a screw thread, a buckle or a magnetic attractable member.

[0011] Preferably, a first insulating sheet is provided between the electrical connection assembly and the battery to insulate them from each other.

[0012] Preferably, the temperature control board is provided with a temperature coefficient detection module configured for detecting a measured resistance value and an initial resistance value of the atomizer within a preset time, obtaining a temperature coefficient of a heating element in the atomizer according to the measured resistance value and the initial resistance value, and obtaining a target resistance value of the atomizer at a specific temperature according to the temperature coefficient.

[0013] Preferably, the airflow sensor is received and positioned in the lamp cap; one end of the temperature control board is inserted with the lamp cap, and a second insulating sheet is provided between another end of the temperature control board and the battery.

[0014] Preferably, the power supply device further includes a bracket which is disposed in the housing and located between the battery and the temperature control board; the airflow sensor is received and positioned in the bracket; one end of the temperature control board is inserted with the bracket, and another end of the temperature con-

trol board faces to the lamp cap.

[0015] The disclosure further provides an electronic cigarette, which includes the power supply device according to any one of the above.

[0016] The power supply device with temperature control has the function of temperature control, which can avoid phenomena such as dry burning of an atomizer of the electronic cigarette; the power supply device has less structural members, low cost and easy assembly, the volume is reduced compared with the power supply device in the prior art, which is more portability.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The disclosure will be further described with reference to the accompanying drawings and specific embodiments. In the drawings,

Fig. 1 is a sectional view of a power supply device according to a first embodiment of the present disclosure;

Fig. 2 is an exploded view of the power supply device according to the first embodiment of the present disclosure;

Fig. 3 is a sectional view of a power supply device according to a second embodiment of the present disclosure;

Fig. 4 is a sectional view of a power supply device according to a third embodiment of the present disclosure;

Fig. 5 is a sectional view of a power supply device according to a fourth embodiment of the present disclosure;

Fig. 6 is an exploded view of the power supply device according to the fourth embodiment of the present disclosure;

Fig. 7 is a sectional view of a power supply device according to a fifth embodiment of the present disclosure.

DETAILED DESCRIPTION

[0018] To clearly understand the technical features, objectives and effects of the disclosure, the specific embodiments of the disclosure will now be described in detail with reference to the accompanying drawings.

[0019] Figs. 1 and 2 show a power supply device with temperature control according to a first embodiment of the present disclosure, which is configured for supplying power to an atomizer of an electronic cigarette. The power supply device may include a housing 10, a battery 20, an electrical connection assembly 30, a temperature control board 40, an airflow sensor 50 and a lamp cap 60.

[0020] The housing 10 is a tubular structure and includes a first end and a second end opposite to the first end. The battery 20 is disposed in the housing 10. The electrical connection assembly 30 is disposed at the first end of the housing 10 and configured for electrically con-

necting with the atomizer of the electronic cigarette. The temperature control board 40 and the airflow sensor 50 are disposed in the housing 10. The lamp cap 60 is disposed at the second end of the housing 10 to seal the second end.

[0021] The electrical connection assembly 30 and the airflow sensor 50 are electrically connected to the temperature control board 40 respectively, and the temperature control board 40 is electrically connected to the battery 20. The airflow sensor 50 act as a switch element. When the airflow sensor 50 is triggered, the temperature control board 40 detects an initial resistance value of the atomizer at room temperature through the electrical connection assembly 30, obtains a target resistance value of the atomizer at a specific temperature according to the initial resistance value, supplies power to the atomizer through the electrical connection assembly 30, and obtains (detects/feeds back) an actual resistance value of the atomizer in a working process through the electrical connection assembly 30. When the trigger of the airflow sensor 50 is stopped, the power supply to the atomizer is stopped, the temperature control board 40 detects the voltage or current of the atomizer through the electrical connection assembly 30, and stops detecting when the actual resistance value of the atomizer is restored to be consistent with the initial resistance value, and the power supply device enters dormancy (no output, no detection).

[0022] Battery 20 is preferably a high rate, small volume battery.

[0023] The lamp cap 60 or the housing 10 is provided with an airflow inlet 101 communicated with the inside of the housing 10, the electrical connection assembly 30 is provided with an airflow outlet communicated with the inside of the housing 10. The airflow inlet 101 and the airflow outlet 102 are communicated to form an airflow channel. Specifically, in the housing 10, gaps are defined respectively between the battery 20 and an inner wall of the housing 10, and between the temperature control board 40 and an inner wall of the housing 10. The airflow inlet 101 and the airflow outlet 102 are communicated with each other through the gaps.

[0024] The electrical connection assembly 30 is located on one side of the battery 20 and is mounted at the first end of the housing 10. The electrical connection assembly 30 may include a first electrical connector 31, a second electrical connector 32, and an insulator 33. The first electrical connector 31 is inserted into the first end of the housing 10 and electrically connected to a negative terminal of the temperature control board 40. The second electrical connector 32 extends into the first electrical connector 31 and is electrically connected to an output terminal of the temperature control board 40. The insulator 33 is disposed between the first electrical connector 31 and the second electrical connector 32 to insulate the first electrical connector 31 and the second electrical connector 32 from each other.

[0025] The first electrical connector 31 has a generally cylindrical structure with a central passage extending ax-

ially therethrough. One end of the first electrical connector 31 can be fitted in the first end of the housing 10 in an interference manner, and a certain distance is defined between the first electrical connector 31 and the battery 20, so as to avoid a short circuit phenomenon caused by contact between the two. Another end of the first electrical connector 31 extends out of the housing 10. An outer peripheral surface of the another end of the first electrical connector 31 is provided with a screw thread, a buckle or a magnetic attractable member, so that the first electrical connector 31 can be connected with the atomizer through a threaded connection, a buckle connection or a magnetic attraction connection. The second electrical connector 32 also has a cylindrical structure and extends into the central passage of the first electrical connector 31. The insulator 33 is in a tube sleeve structure and sleeved on an outer periphery of the second electrical connector 32 and is located in the central passage of the first electrical connector 31 to insulate the second electrical connector 32 and the first electrical connector 31.

[0026] In this embodiment, the airflow outlet 102 is disposed in the second electrical connector 32 and axially extends through the second electrical connector 32.

[0027] The temperature control board 40 (temperature control PCBA board) is located on another side of the battery 20 opposite to the electrical connection assembly 30. The temperature control board 40 is provided with a temperature coefficient detection module which is configured for detecting a measured resistance value and an initial resistance value of the atomizer within a preset time, obtaining a temperature coefficient of a heating element in the atomizer according to the measured resistance value and the initial resistance value, and acquiring a target resistance value of the atomizer at a specific temperature according to the temperature coefficient.

[0028] Corresponding to the temperature control board 40, the heating element in the atomizer is made of material with positive temperature coefficient or negative temperature coefficient, such as pure titanium, pure nickel, or stainless steel, etc. When the temperature control board 40 detects that the resistance value of the heating element in the atomizer does not change from the initial value within the preset time, it is judged that the material of the heating element does not belong to the temperature control material, and the power supply device stops supplying power to the atomizer.

[0029] The airflow sensor 50 is electrically connected with the temperature control board 40, and can feed back a voltage signal to the temperature control board 40 according to a negative pressure value during the smoking process of the user. The temperature control board 40 can regulate the variation amplitude of the output power provided to the atomizer according to the voltage signal and the measured resistance value. When the smoking speed of the user is reduced, the negative pressure value is relatively small, and the measured resistance value tends to exceed the target value, so that the output power of the power supply device is reduced to prevent excessive

temperature or excessive smoke from choking the user. When the smoking speed of the user is increased (the air flow rate is increased), the negative pressure value is relatively large, and the measured resistance value tends to be lower than the target value, so that the output power of the power supply device is greatly increased to compensate the heat taken away by the airflow from the heating element of the atomizer, so as to ensure the temperature to be accurate, the smoke volume in unit gas volume to be consistent, and the taste to be consistent.

[0030] The power supply device of this embodiment further includes a bracket 70. The bracket 70 is disposed in the housing 10 and located between the battery 20 and the temperature control board 40. An outer peripheral surface of the bracket 70 may be provided with a concavo-convex structure or a buckle and tightly fitted with an inner wall of the housing 10. One end of the temperature control board 40 is inserted with the bracket 70, and another end of the temperature control board 40 faces the lamp cap 60 and can be inserted with the lamp cap 60 as needed, so that the temperature control board 40 is fixed in the housing 10. The airflow sensor 50 is received and positioned in the bracket 70, and in particular may be received on one side of the bracket 70 facing the temperature control board 40. The bracket 70 is made of an insulating material, which not only plays a role in fixing the temperature control board 40 and the airflow sensor 50, but also plays a role in insulating the temperature control board 40 from the battery 20, so as to effectively prevent the short circuit phenomenon caused by the top of the temperature control board 40 contacting the end of the battery 20 when the device is vibrated or dropped.

[0031] The bracket 70 can be a cylindrical structure, and one end of the bracket 70 is provided with at least one protrusion configured for abutting against the end of the battery 20, and another end of the bracket 70 is extended with a side plate. The side plate is provided with a slot configured for receiving one end of the temperature control board 40.

[0032] In addition, the temperature control board 40 and/or the airflow sensor 50 can be provided with an LED lamp for displaying the working state of the power supply device and/or the electrical quantity of the battery 20. The light of the LED lamp is transmitted through the lamp cap 60. For example, when the electrical quantity of the battery 20 is too low, the LED lamp flashes, and the power supply device stops supplying power to the atomizer. When the electrical quantity of the battery remains 20%, the color of the LED lamp is changed to prompt the user that the power supply device is about to stop working. When the measured resistance value of the atomizer does not change relative to the initial resistance value within the preset time, the power supply device judges that the material of the heating element in the atomizer does not belong to a temperature control material, the LED lamp flashes, and the power supply device stops supplying power to the atomizer.

[0033] Fig. 3 shows a power supply device with temperature control according to a second embodiment of the present disclosure, which is configured for supplying power to the atomizer of the electronic cigarette. The power supply device may include a housing 10, a battery 20, an electrical connection assembly 30, a temperature control board 40, an airflow sensor 50, a lamp cap 60 and a bracket 70.

[0034] The arrangement of the housing 10, the battery 20, the electrical connection assembly 30, the temperature control board 40, the airflow sensor 50, the lamp cap 60 and the bracket 70 can be described with reference to the first embodiment, and will not be repeated herein.

[0035] The difference from the first embodiment is that a first insulating sheet 81 is provided between the electrical connection assembly 30 and the battery 20 to insulate them from each other, so as to prevent a short circuit or an open circuit caused by shaking during transportation or the like.

[0036] Specifically, in the present embodiment, the first insulating sheet 81 is disposed between the first electrical connector 31 and an end portion of the battery 20.

[0037] In addition, the side plate for inserting with the temperature control board 40 on the bracket 70 can be extended, so as to increase the inserting area of the temperature control board 40, so that the temperature control board 40 can be more stably fixed in the housing 10.

[0038] Fig. 4 shows a power supply device with temperature control according to a third embodiment of the present disclosure, which is configured for supplying power to an atomizer of an electronic cigarette. The power supply device may include a housing 10, a battery 20, an electrical connection assembly 30, a temperature control board 40, an airflow sensor 50, a lamp cap 60 and a bracket 70.

[0039] The arrangement of the housing 10, the battery 20, the electrical connection assembly 30, the temperature control board 40, the airflow sensor 50, the lamp cap 60 and the bracket 70 can be described with reference to the first embodiment, and will not be repeated herein.

[0040] A first insulating sheet 81 may be provided between the electrical connection assembly 30 and the battery 20 as needed to prevent a short circuit or an open circuit caused by shaking during transportation.

[0041] The difference from the first embodiment is that the airflow inlet 101 is provided in the first electrical connector 31 of the electrical connection assembly 30, and extends from a side surface of the first electrical connector 31 to the central passage thereof.

[0042] Specifically, the airflow inlet 101 is disposed at one end of the first electrical connector 31 extending out of the housing 10, and a vent groove 103 is provided at one end of the second electrical connector 32 away from the housing 10. The vent groove 103 communicates the airflow outlet 102 with the airflow inlet 101.

[0043] Figs. 5 and 6 show a power supply device with temperature control according to a fourth embodiment of the present disclosure, which is configured for supplying

power to an atomizer of an electronic cigarette. The power supply device may include a housing 10, a battery 20, an electrical connection assembly 30, a temperature control board 40, an airflow sensor 50 and a lamp cap 60.

[0044] The housing 10 is a tubular structure and includes a first end and a second end opposite to each other. The battery 20 is disposed in the housing 10. The electrical connection assembly 30 is disposed at the first end of the housing 10 and configured for electrically connecting with an atomizer of the electronic cigarette. The temperature control board 40 and the airflow sensor 50 are disposed in the housing 10. The lamp cap 60 is disposed at the second end of the housing 10 to seal the second end.

[0045] The electrical connection assembly 30 and the airflow sensor 50 are electrically connected to the temperature control board 40 respectively, and the temperature control board 40 is electrically connected to the battery 20. When the airflow sensor 50 is triggered, the temperature control board 40 detects an initial resistance value of the atomizer at room temperature through the electrical connection assembly 30, obtains a target resistance value of the atomizer at a specific temperature according to the initial resistance value, supplies power to the atomizer through the electrical connection assembly 30, and obtains (detects/feeds back) an actual resistance value of the atomizer during a working process through the electrical connections assembly 30. When the trigger of the airflow sensor 50 is stopped, the power supply to the atomizer is stopped, the temperature control board 40 detects the voltage or current of the atomizer through the electrical connection assembly 30, and stops the detection when the actual resistance value of the atomizer is restored to be consistent with the initial resistance value, and the power supply device enters dormancy (no output, no detection).

[0046] Battery 20 is preferably a high rate, small volume battery.

[0047] The lamp cap 60 or the housing 10 is provided with an airflow inlet 101 communicated with the inside of the housing 10, the electrical connection assembly 30 is provided with an airflow outlet communicated with the inside of the housing 10. The airflow inlet 101 and the airflow outlet 102 are communicated to define an airflow channel. Specifically, in the housing 10, gaps are defined respectively between the battery 20 and an inner wall of the housing 10, and between the temperature control board 40 and an inner wall of the housing 10. The airflow inlet 101 and the airflow outlet 102 are communicated with each other through the gaps.

[0048] The electrical connection assembly 30 is located on one side of the battery 20 and is mounted at the first end of the housing 10. The electrical connection assembly 30 may include a first electrical connector 31, a second electrical connector 32, and an insulator 33. The first electrical connector 31 is inserted into the first end of the housing 10 and electrically connected to the negative terminal of the temperature control board 40. The

second electrical connector 32 extends into the first electrical connector 31 and is electrically connected to the output terminal of the temperature control board 40. The insulator 33 is disposed between the first electrical connector 31 and the second electrical connector 32 to insulate the first electrical connector 31 and the second electrical connector 32 from each other.

[0049] The first electrical connector 31 has a generally cylindrical structure with a central passage extending axially therethrough. One end of the first electrical connector 31 can be fitted in the first end of the housing 10 in an interference manner, and a certain distance is defined between the first electrical connector 31 and the battery 20, so as to avoid a short circuit phenomenon caused by contact between the two. Another end of the first electrical connector 31 extends out of the housing 10. An outer peripheral surface of another end of the first electrical connector 31 is provided with a screw thread, a buckle or a magnetic attractable member, so that the first electrical connector 31 can be connected with the atomizer through a threaded connection, a buckle connection or a magnetic attraction connection. The second electrical connector 32 also has a cylindrical structure and extends into the central passage of the first electrical connector 31. The insulator 33 is in a tube sleeve structure and sleeved on an outer periphery of the second electrical connector 32 and is located in the central passage of the first electrical connector 31 to insulate the second electrical connector 32 and the first electrical connector 31.

[0050] In this embodiment, the airflow outlet 102 is disposed in the second electrical connector 32 and axially extends through the second electrical connector 32.

[0051] The temperature control board 40 (temperature control PCBA board) is located on another side of the battery 20 opposite to the electrical connection assembly 30. The temperature control board 40 is provided with a temperature coefficient detection module which is configured for detecting a measured resistance value and an initial resistance value of the atomizer within a preset time, calculating a temperature coefficient of a heating element in the atomizer according to the measured resistance value and the initial resistance value, and acquiring a target resistance value of the atomizer at a specific temperature according to the temperature coefficient.

[0052] Corresponding to the temperature control board 40, the heating element in the atomizer is made of material with positive temperature coefficient or negative temperature coefficient, such as pure titanium, pure nickel, or stainless steel, etc. When the temperature control board 40 detects that the resistance value of the heating element in the atomizer does not change from the initial value within the preset time, it is judged that the material of the heating element does not belong to the temperature control material, and the power supply device stops supplying power to the atomizer.

[0053] The airflow sensor 50 is electrically connected with the temperature control board 40, and can feed back

a voltage signal to the temperature control board 40 according to a negative pressure value during the smoking process of the user. The temperature control board 40 can regulate the variation amplitude of the output power provided to the atomizer according to the voltage signal and the measured resistance value. When the smoking speed of the user is reduced, the negative pressure value is relatively small, and the measured resistance value tends to exceed the target value, so that the output power of the power supply device is reduced to prevent excessive temperature or excessive smoke from choking the user. When the smoking speed of the user is increased (the air flow rate is increased), the negative pressure value is relatively large, and the measured resistance value tends to be lower than the target value, so that the output power of the power supply device is greatly increased to compensate the heat taken away by the airflow from the heating element of the atomizer, so as to ensure the temperature to be accurate, the smoke volume per unit gas volume to be consistent, and the taste to be consistent.

[0054] Different from the first embodiment, in this embodiment, one end of the temperature control board 40 faces the battery 20, and another end of the temperature control board 40 is inserted with the lamp cap 60 so as to be fixed in the housing 10. The airflow sensor 50 is received and positioned in the lamp cap 60, so that the lamp cap 60 functions not only as a cap, but also as a bracket to hold the temperature control board 40 and the airflow sensor 50.

[0055] One side of the lamp cap 60 facing the battery 20 is provided with a recess to receive the airflow sensor 50.

[0056] In order to avoid a short circuit between the temperature control board 40 and the battery 20, a second insulating sheet 82 may be provided between the temperature control board 40 and the battery 20. A first insulating sheet 81 may also be provided between the electrical connection assembly 30 and the battery 20 with reference to the second embodiment shown in Fig. 3.

[0057] In addition, as with reference to the first embodiment, the temperature control board 40 and/or the airflow sensor 50 may be provided with an LED lamp for displaying the working state of the power supply device and/or the electrical quantity of the battery 20. The light of the LED lamp is transmitted through the lamp cap 60.

[0058] Fig. 7 shows a power supply device with temperature control according to a fifth embodiment of the present disclosure, which is configured for supplying power to an atomizer of an electronic cigarette. The power supply device may include a housing 10, a battery 20, an electrical connection assembly 30, a temperature control board 40, an airflow sensor 50 and a lamp cap 60.

[0059] The arrangement of the housing 10, the battery 20, the electrical connection assembly 30, the temperature control board 40, the airflow sensor 50, the lamp cap 60, and the second insulating sheet 82 is as described above with reference to the fourth embodiment, and will not be repeated herein.

[0060] The difference between this embodiment and the fourth embodiment is that the airflow sensor 50 and the temperature control board 40 are integrally connected to further reduce the assembly of structural members.

[0061] Specifically, the airflow sensor 50 may be connected to one side of the temperature control board 40 by wave soldering, pasting, or the like, which is performed when the temperature control board 40 is manufactured.

[0062] The electronic cigarette of the disclosure includes the power supply device of any one of the embodiments, and further includes an atomizer connected with the power supply device.

[0063] Referring to Fig. 1, when the electronic cigarette is used, When the airflow sensor 50 is triggered, the temperature control board 40 detects an initial resistance value of the atomizer at room temperature through the electrical connection assembly 30, obtains a target resistance value of the atomizer at a specific temperature according to the initial resistance value, supplies power to the atomizer through the electrical connection assembly 30, and obtains (detects/feeds back) an actual resistance value of the atomizer during the working process through the electrical connection assembly 30. When the trigger of the airflow sensor 50 is stopped, the power supply device stops supplying power to the atomizer, the temperature control board 40 detects the voltage or current of the atomizer through the electrical connection assembly 30, and stops detecting when the actual resistance value of the atomizer is restored to be consistent with the initial resistance value, and the power supply device enters dormancy (no output, no detection).

[0064] The heating element in the atomizer is made of material with a positive temperature coefficient or a negative temperature coefficient, such as pure titanium, pure nickel, or stainless steel, etc. When the temperature control board 40 detects that the resistance value of the heating element in the atomizer does not change from the initial value within a preset time, it is judged that the material of the heating element does not belong to the temperature control material, and the power supply device stops supplying power to the atomizer.

[0065] The airflow sensor 50 can feed back a voltage signal to the temperature control board 40 according to the negative pressure value during the smoking process of the user, and the temperature control board 40 can regulate the variation amplitude of the output power provided to the atomizer according to the voltage signal and the measured resistance value. When the smoking speed of the user is reduced, the negative pressure value is relatively small, and the measured resistance value tends to exceed the target value, so that the output power of the power supply device is reduced to prevent excessive temperature or excessive smoke from choking the user. When the smoking speed of the user is increased (the air flow rate is increased), the negative pressure value is relatively large, and the measured resistance value tends to be lower than the target value, so that the output power of the power supply device is greatly increased to

compensate the heat taken away by the airflow from the heating element of the atomizer, so as to ensure the temperature to be accurate, the smoke volume in unit gas volume to be consistent, and the taste to be consistent.

[0066] It should be understandable that the above embodiments are only preferred embodiments of the disclosure, and the description thereof is more specific and detailed, but it is not to be construed as limiting the scope of the patent of the disclosure. It should be noted that a person skilled in the art can freely combine the foregoing technical features and also can make several modifications and improvements without departing from the concept of the disclosure, and these modifications and improvements are all within the scope of protection of the present disclosure. Therefore, all equivalent transformations and modifications made according to the scope of the claims of the disclosure shall fall within the scope of the claims of the disclosure.

Claims

1. A power supply device with temperature control configured for supplying power to an atomizer of an electronic cigarette, wherein the power supply device comprises a housing, a battery disposed in the housing, an electrical connection assembly disposed at a first end of the housing, a temperature control board and an airflow sensor disposed in the housing, and a lamp cap disposed at a second end of the housing; the electrical connection assembly and the airflow sensor are electrically connected with the temperature control board respectively, and the temperature control board is electrically connected with the battery.
2. The power supply device according to claim 1, wherein when the airflow sensor is triggered, the temperature control board detects an initial resistance value of the atomizer at room temperature through the electrical connection assembly, obtains a target resistance value of the atomizer at a specific temperature according to the initial resistance value, and supplies power to the atomizer through the electrical connection assembly, and obtains an actual resistance value of the atomizer in a working process through the electrical connection assembly; when the trigger of the airflow sensor is stopped, the temperature control board detects a voltage or a current of the atomizer through the electrical connection assembly, and stops detecting when the actual resistance value of the atomizer is recovered to be consistent with the initial resistance value.
3. The power supply device according to claim 1, wherein the lamp cap, the electrical connection assembly or the housing is provided with an airflow inlet, the electrical connection assembly is provided

with an airflow outlet, and the airflow inlet is communicated with the airflow outlet to define an airflow channel.

4. The power supply device according to claim 1, wherein the electrical connection assembly comprises a first electrical connector, a second electrical connector, and an insulator; the first electrical connector is inserted with the first end of the housing and is electrically connected with a negative terminal of the temperature control board; the second electrical connector extends into the first electrical connector and is electrically connected with an output terminal of the temperature control board; the insulator is disposed between the first electrical connector and the second electrical connector. 5 10 15
5. The power supply device according to claim 4, wherein one end of the first electrical connector is fitted in the first end of the housing, and another end of the first electrical connector extends out of the housing; an outer peripheral surface of the another end of the first electrical connector is provided with a screw thread, a buckle or a magnetic attractable member. 20 25
6. The power supply device according to claim 4, wherein a first insulating sheet is provided between the electrical connection assembly and the battery to insulate them from each other. 30
7. The power supply device according to claim 1, wherein the temperature control board is provided with a temperature coefficient detection module configured for detecting a measured resistance value and an initial resistance value of the atomizer within a preset time, obtaining a temperature coefficient of a heating element in the atomizer according to the measured resistance value and the initial resistance value, and obtaining a target resistance value of the atomizer at a specific temperature according to the temperature coefficient. 35 40
8. The power supply device according to any one of claims 1-7, wherein the airflow sensor is received and positioned in the lamp cap; one end of the temperature control board is inserted with the lamp cap, and a second insulating sheet is provided between another end of the temperature control board and the battery. 45 50
9. The power supply device according to any one of claims 1-7, wherein the power supply device further comprises a bracket which is disposed in the housing and located between the battery and the temperature control board; the airflow sensor is received and positioned in the bracket; one end of the temperature control board is 55

inserted with the bracket, and another end of the temperature control board faces to the lamp cap.

10. An electronic cigarette, comprising the power supply device according to any one of claims 1-9.

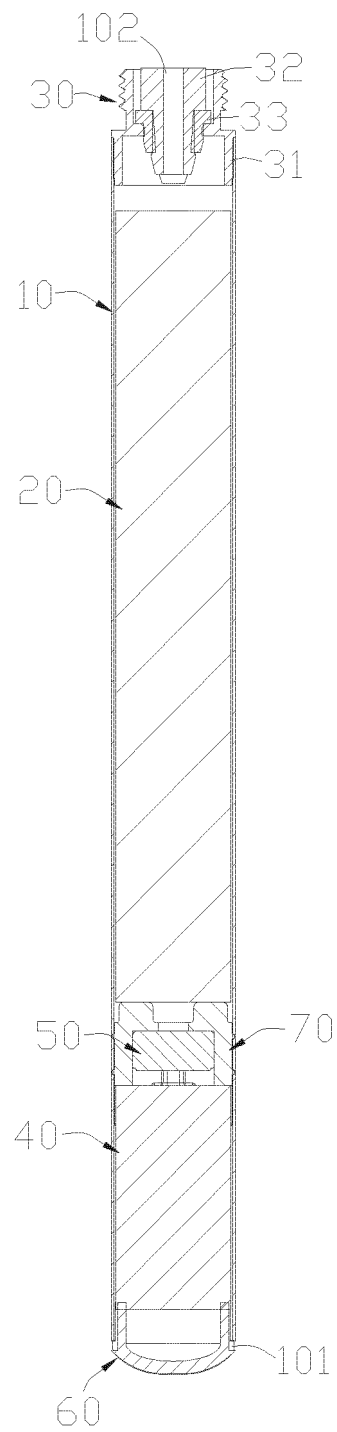


Fig. 1

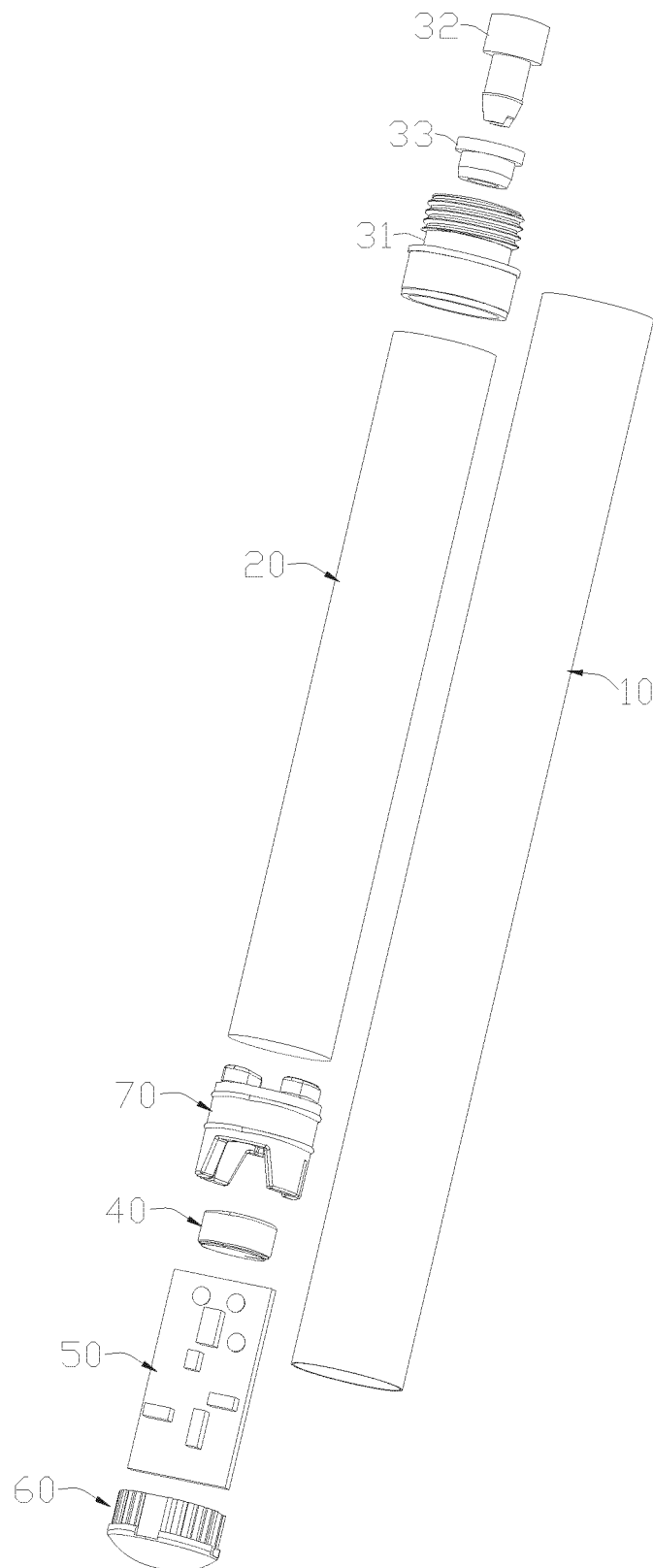


Fig. 2

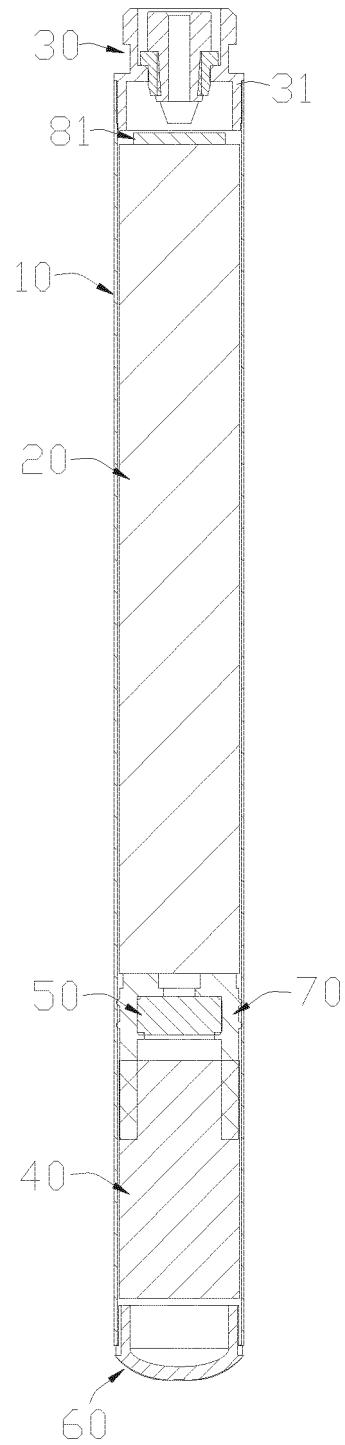


Fig. 3

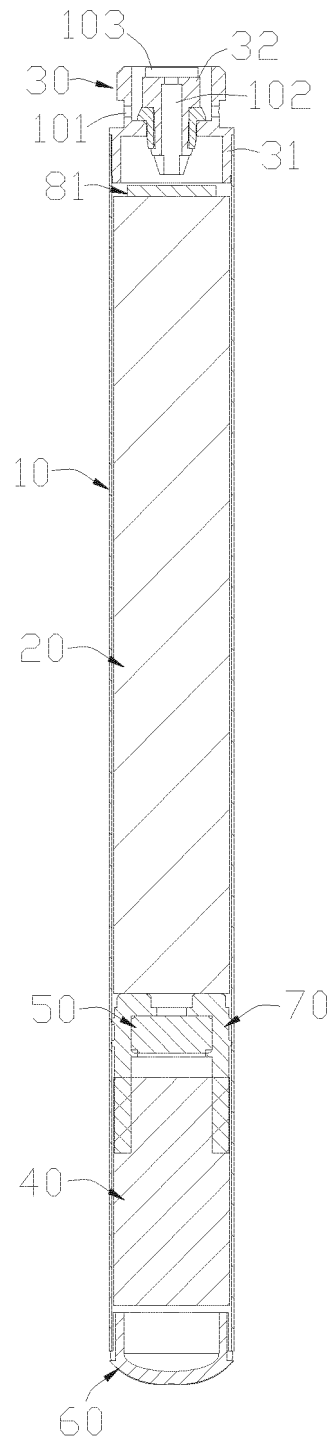


Fig. 4

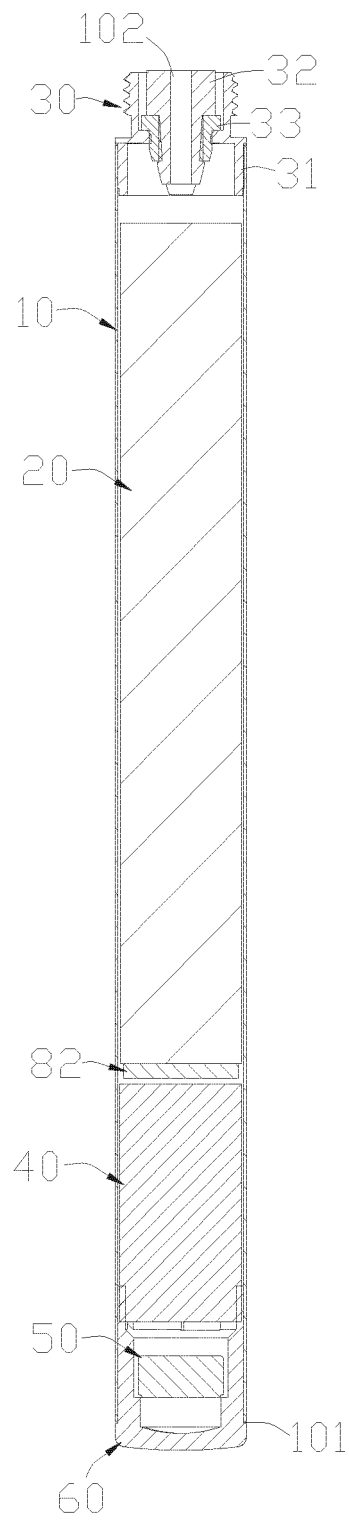


Fig. 5

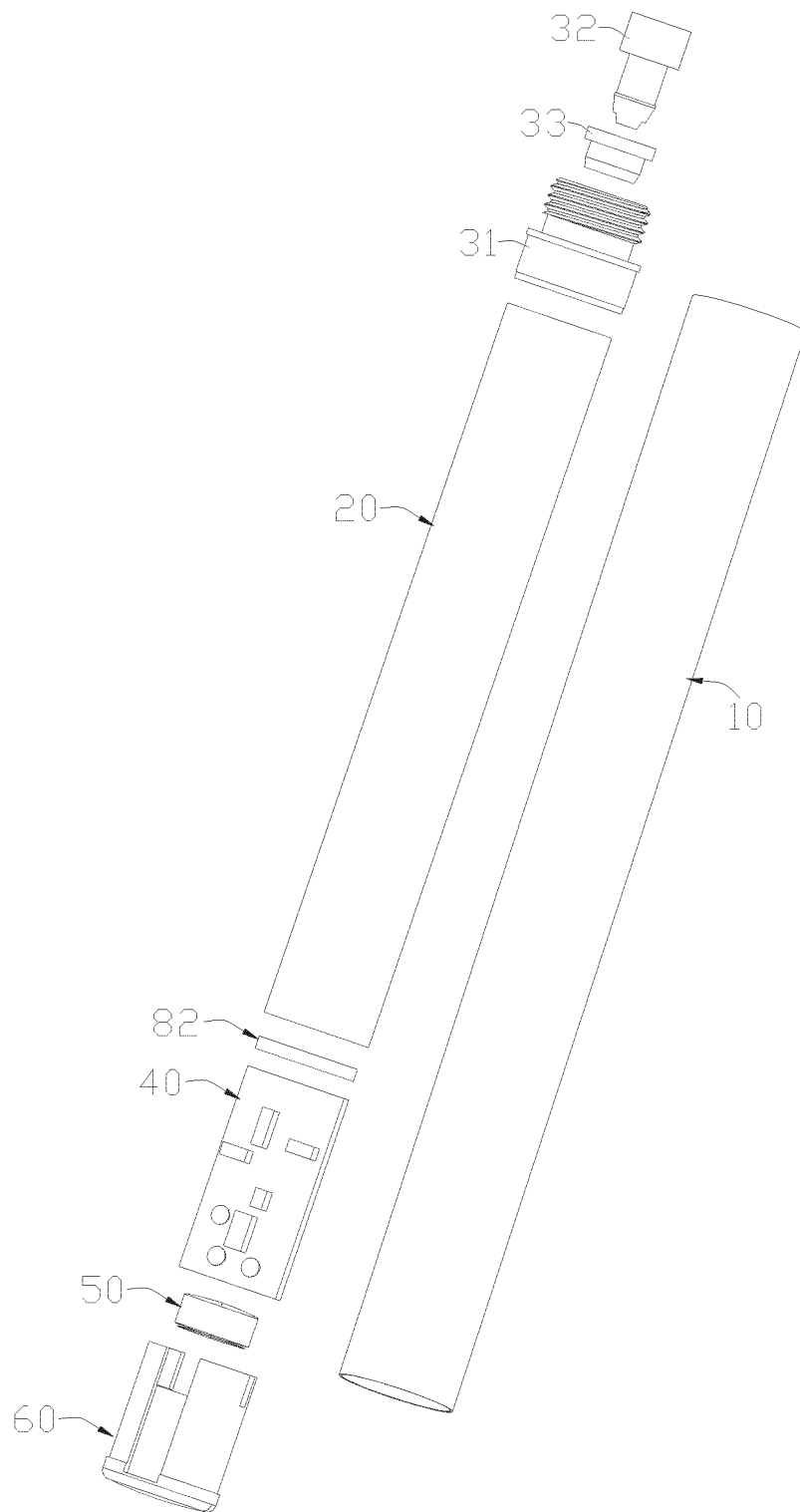


Fig. 6

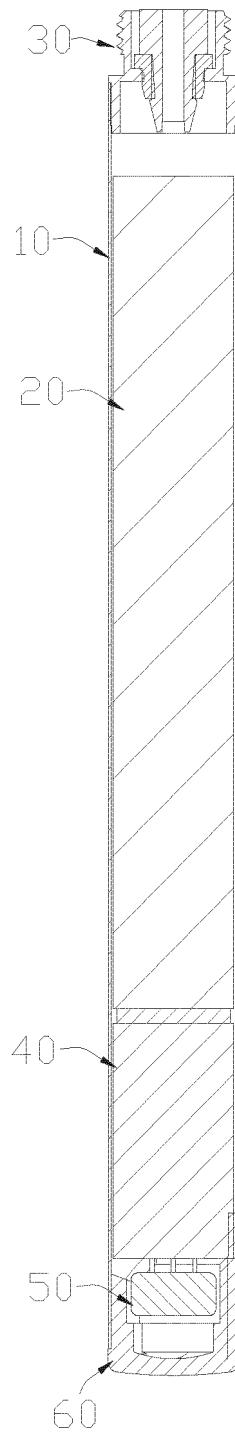


Fig. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2019/071657

A. CLASSIFICATION OF SUBJECT MATTER

A24F 47/00(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F47, A61M11, A61M15

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)

VEN & CNTXT & CPRSABS & CNKI, 电子烟, 电阻, 阻值, 温度系数, 气流传感器, electronic, cigar+, smoking, tobacco, atomiz+, vipor+, heat+, resistance, temperature coefficient, flow, air, sensor

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 106579559 A (O-NET AUTOMATION TECHNOLOGY (SHENZHEN) LIMITED) 26 April 2017 (2017-04-26) description, paragraphs 37-51 and 67-82, and figures 1-3	1-10
Y	CN 205624465 U (SHENZHEN FUMYTECH TECHNOLOGY CO., LTD.) 12 October 2016 (2016-10-12) description, paragraphs 22-30, and figures 1-4	1-10
A	CN 104571190 A (JOYTECH (CHANGZHOU) ELECTRONIC TECHNOLOGY CO., LTD.) 29 April 2015 (2015-04-29) entire document	1-10
A	CN 206260847 U (O-NET AUTOMATION TECHNOLOGY (SHENZHEN) LIMITED) 20 June 2017 (2017-06-20) entire document	1-10
A	WO 2017147560 A1 (PAX LABS, INC.) 31 August 2017 (2017-08-31) entire document	1-10
A	WO 2018134564 A1 (NICOVENTURES HOLDINGS LTD.) 26 July 2018 (2018-07-26) entire document	1-10

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

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

08 May 2019

Date of mailing of the international search report

15 May 2019

Name and mailing address of the ISA/CN

China National Intellectual Property Administration
No. 6, Xitucheng Road, Jimengqiao Haidian District, Beijing
100088
China

Authorized officer

Facsimile No. (86-10)62019451

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2019/071657

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 106579559 A	26 April 2017	None	
CN 205624465 U	12 October 2016	None	
CN 104571190 A	29 April 2015	EP 3249488 A4	06 March 2019
		CN 104571191 A	29 April 2015
		CN 104571191 B	02 January 2018
		US 2017280779 A1	05 October 2017
		WO 2016115890 A1	28 July 2016
		CN 104731127 B	30 June 2017
		JP 6483283 B2	13 March 2019
		CN 104731127 A	24 June 2015
		WO 2016115891 A1	28 July 2016
		WO 2016115892 A1	28 July 2016
		CN 104571190 B	10 May 2017
		KR 20170107518 A	25 September 2017
		CN 104571192 A	29 April 2015
		WO 2016115893 A1	28 July 2016
		EP 3249488 A1	29 November 2017
		CN 104571192 B	06 June 2017
		JP 2018505696 A	01 March 2018
CN 206260847 U	20 June 2017	None	
WO 2017147560 A1	31 August 2017	BR 112018067606 A2	08 January 2019
		US 2019069599 A1	07 March 2019
		SG 11201807028Y A	27 September 2018
		MX 2018010186 A	14 January 2019
		CL 2018002421 A1	14 December 2018
		EP 3419449 A1	02 January 2019
WO 2018134564 A1	26 July 2018	GB 201701102 D0	08 March 2017

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