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(54) **HEATER ASSEMBLY FOR AN AEROSOL GENERATING DEVICE**

(57) The disclosure provides a heater assembly for an aerosol generating apparatus, the heater assembly comprising: an upper housing including an aperture; a lower housing; an elongate heater positioned through the aperture; and a gasket retained by the upper housing and the lower housing to create a hermetic seal between the upper housing and the lower housing.

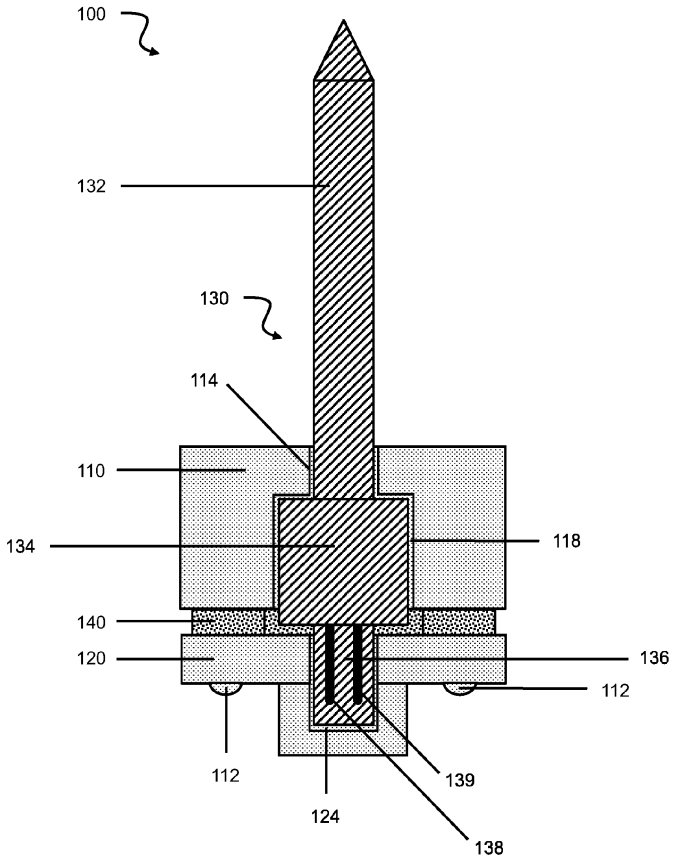

Fig. 4

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Description

FIELD

[0001] The present disclosure relates to a heater assembly for an aerosol generating device.

BACKGROUND

[0002] A typical aerosol generating apparatus may comprise a power supply, an aerosol generating unit that is driven by the power supply, an aerosol precursor, which in use is aerosolised by the aerosol generating unit to generate an aerosol, and a delivery system for delivery of the aerosol to a user.

[0003] A drawback with known aerosol generating devices is that residue and/or condensation produced by the heating of a consumable can enter the inner workings of the aerosol generating device which may cause the aerosol generating device to malfunction.

[0004] Hence, despite the effort already invested in the development of aerosol generating apparatuses/systems further improvements are desirable.

SUMMARY OF THE INVENTION

[0005] According to a first aspect, the present disclosure provides a heater assembly for an aerosol generating device, the heater assembly comprising an upper housing including an aperture, a lower housing, an elongate heater positioned through the aperture and a gasket retained by the upper housing and the lower housing to create a hermetic seal between the upper housing and the lower housing.

[0006] In this way, residue and/or condensate generated by the heating of a consumable by the elongate heater may be restricted from passing between the upper housing and the lower housing. The ingress of residue and/or condensate may lead to undesirable effects hence containing residue and/or condensate that may be produced from the heating of a consumable may be desirable. By providing a hermetic seal between the upper housing and the lower housing, any residue and/or condensate produced by, for example the heating of a consumable, may pass through the aperture and be retained between the upper housing and the lower housing due to the hermetic seal formed by the gasket retained between the upper housing and the lower housing.

[0007] Optionally, the elongate heater is positioned through the aperture such that a first part of the elongate heater is positioned on one side of the aperture and a second part of the elongate heater is positioned on the opposite side of the aperture. Optionally, part of the elongate heater has a cylindrical shape. Optionally, the elongate heater is pointed at a first end. Optionally, the elongate heater has flat, blade, shape.

[0008] Optionally, the gasket is retained by the upper housing and the lower housing such that the upper housing and the lower housing restrict the movement of the gasket. The gasket may be retained by the upper housing and the lower housing by means of a friction fit between the upper housing and the lower housing such that, in one example, the lower housing is retained by the upper housing via friction and the gasket is held between the upper housing and the lower housing.

[0009] In some examples, the heater assembly further comprises a coupling means to couple the upper housing to the lower housing. In this way, the hermetic seal between the upper housing and the lower housing may be improved because the coupling means may provide a greater pressure across the gasket. The coupling means could take a variety of forms, for example, one or more bolts and respective nuts, one or more screws, one or more pins, one or more heat stakes, one or more magnets, adhesive and/or one or more clips. One or more bolts and respective nuts may be understood to mean that each bolt has a corresponding nut, for example, if the coupling means comprises four bolts then each of the four bolts would have a nut meaning the coupling means would also comprise four nuts. Optionally, the coupling means may be passed through a component and then deformed such that the component is secured to the coupling means.

[0010] In some examples, the gasket is shaped to accommodate the coupling means. In this way, the hermetic seal between the upper housing and the lower housing may be improved because the pressure distribution across the gasket may be more uniform and/or consistent. The gasket may be shaped by forming its perimeter to conform to the coupling means. The gasket may be shaped by forming one or more apertures within the gasket such that the coupling means can pass through the gasket. In some examples, the coupling means is positioned through the gasket. In this way, the hermetic seal between the upper housing and the lower housing may be improved because the pressure distribution across the gasket may be more uniform and/or consistent. Having the coupling means positioned within the gasket may also help to correctly position the gasket relative to the upper housing and/or lower housing during manufacture.

[0011] In some examples, the coupling means includes one or more stakes. A stake may be an elongate extension of material used for securing two components together. The one or more stakes may include one or more heat stakes. A heat stake may be made from a thermoplastic such that it can be deformed when heat is applied. For example, a heat stake may be passed through a component and then deformed such that the component is secured to the heat stake.

[0012] In some examples, the upper housing includes the one or more stakes. In this way, the one or more stakes may be integrally formed with the upper housing such that complexity of heater assembly may be reduced as fewer components may need to be assembled together. The one or more stakes may project from a surface of the upper housing perpendicular to a sealing surface

of the gasket.

[0013] In some examples, the lower housing includes the one or more stakes. In this way, the one or more stakes may be integrally formed with the lower housing such that complexity of heater assembly may be reduced as fewer components may need to be assembled together. The one or more stakes may project from a surface of the lower housing perpendicular to a sealing surface of the gasket.

[0014] In some examples, the elongate heater includes a heater mount, wherein the heater mount is shaped to be received within a heater mount engagement cavity. The heater mount engagement cavity may be between the upper housing and the lower housing. In some examples, the shape of the heater mount engagement cavity is chosen such that the elongate heater is aligned with the upper housing in a pre-determined orientation. In this way, complexity of heater assembly may be reduced because the elongate heater may be positioned in a single, pre-determined orientation.

[0015] The pre-determined orientation may be a rotation orientation of the elongate heater about a longitudinal axis of the elongate heater. The elongate heater may include a rod-shaped heating portion. The longitudinal axis may be an axis aligned with a central, longitudinal, axis of the rod-shaped heating portion. The rod-shaped heating portion of the elongate heater may be located on the opposite side of the upper housing to the lower housing. During assembly, the elongate heater may be passed through the aperture in a variety of rotational orientation. The pre-determined orientation may be considered to be a specific rotation orientation of the elongate heater relative to the upper housing. For example, the pre-determined orientation may be an angle at which the elongate heater engages with the upper housing.

[0016] The heater mount engagement cavity may be defined and/or formed by the upper housing. The heater mount engagement cavity may be defined and/or formed by the lower housing. The heater mount engagement cavity may be partially defined and/or formed by the upper housing and partially defined and/or formed by the lower housing. For example, the upper housing may define a first portion of the heater mount engagement cavity and the lower housing may define a second portion of the heater mount engagement cavity. A first portion of the heater mount may be located in the first portion of the heater mount engagement cavity and a second portion of the heater mount may be located in the second portion of the heater mount engagement cavity.

[0017] In some examples, a wall of the heater mount engagement cavity includes at least one mount-engaging protrusion to engage the heater mount. In this way, the heater mount may be positioned within the heater mount engagement cavity by the at least one mount engaging protrusion. The elongate heater may be held within the heater mount engagement cavity by friction fit (e.g. snug engagement) between the heater mount and the at least one mount-engaging protrusion. This may prevent and/or limit the elongate heater moving within the cavity. Such movement, could lead to rattle when the heater assembly is moved and may, for example, be perceived as annoying by a user. Such movement may also result in misalignment between the elongate heater and a consumable, leading to, for example, lowered aerosol generating performance.

[0018] In some examples, the wall of the heater mount engagement cavity is integrally formed to include the at least one mount-engaging protrusion. This may simplify assembly and/or manufacture because fewer components may be required in order to assemble the heater assembly.

[0019] In some examples, the gasket includes a heater mount receiving aperture. In this way, the heater mount may be laterally surrounded by the gasket on all sides. The likelihood of residue and/or condensate ingress between the upper housing and the lower housing may thus be reduced.

[0020] In some examples, the heater mount receiving aperture conforms to the heater mount such that the gasket is aligned with the elongate heater in a pre-determined orientation. In this way, the complexity of assembling the heater assembly may be reduced because the gasket may only be positioned in a single, pre-determined, orientation during assembly. As above, the heater mount engagement cavity may align the elongate heater with the upper housing in a pre-determined orientation. This subsequently may allow the gasket to be aligned with the upper housing through orientation via the heater mount. In this way, for example, the gasket may thereby be aligned with the mounting means. As above, the mounting means may require alignment with the gasket. For example, the mounting means may include one or more stakes that may each respectively pass through one or more apertures in the gasket.

[0021] In some examples, the elongate heater includes a first electrical connector and a second electrical connector such that electrical power can be supplied to the elongate heater. In this way, the elongate heater may supply heat to a consumable to produce an aerosol. The elongate heater may include other components such as a resistive track which may be in electrical contact with the first electrical connector and the second electrical connector. When a power supply is electrically connected to the first electrical connector and the second electrical connector, a complete circuit may be formed such that current can flow in the resistive track to generate heat. The first electrical connector and the second electrical connector may each be, for example, a respective single-strand wire, a respective multiple-strand wire, a conductive tab, plug and/or socket.

[0022] In some examples, the elongate heater may be an inductive susceptor. In such examples, the susceptor may be inductively supplied with power, for example, from an induction coil surrounding the elongate heater.

[0023] In some examples, the first electrical connector and the second electrical connector are each positioned

to pass through the lower housing. In this way, electrical power may be supplied to the elongate heater. For example, a power supply could be connected to the first electrical connector and the second electrical connector such that electrical power may be supplied to the elongate heater.

[0024] Optionally, at least a portion of the first electrical connector and the second electrical connector are located within the lower housing such that the first electrical connector and the second electrical connector form a respective electrical connection from one side of the lower housing to an opposing side of the lower housing. The first electrical connector and the second electrical connector may thereby pass through the lower housing. The first electrical connector and the second electrical connector may be embedded within the lower housing such that the lower housing laterally surrounds the first electrical connector and the second electrical connector. Alternatively, the lower housing may include a first aperture for the first electrical connector and a second aperture for the second electrical connector such that each electrical connector may be located within and/or through the respective aperture within the lower housing.

[0025] In some examples, the lower housing includes a recess in which a base portion of the elongate heater is located. In this way, the base portion of the elongate heater may be protected from residue and/or condensate. The elongate heater may include a heating portion that may be rod-shaped, a heater mount portion and a base portion. The heater mount portion may be located between the heating portion and the base portion. The heater mount may be designed to partition the heating portion from the base portion. For example, to form a barrier between the heating portion and the base portion to, for example, block residue and/or condensate. The heater mount may be positioned outside the recess such that only the base portion of the elongate heater is located within the recess. At least a portion of the heater mount may be located within the lower housing and/or the recess.

[0026] In some examples, at least part of the first electrical connector and at least part of the second electrical connector are located within the recess. In this way, at least part of the first electrical connector and at least part of the second electrical connector may be protected from residue and/or condensate. The first electrical connector and the second electrical connector may each be attached to the base portion of the elongate heater. The first electrical connector may be electrically insulated from the second electrical connector. A part of the base portion of the elongate heater may be located outside of the cavity. The first electrical connector and the second electrical connector may attach to the part of the base portion of the elongate heater located outside the cavity.

[0027] In some examples, at least part of the first electrical connector and at least part of the second electrical connector are respectively located within a first channel of the lower housing and a second channel of the lower housing. In this way, the first electrical connector and the second electrical connector may be protected from damage, for example, due to unintended contact with other objects. The first channel and second channel may each respectively be an open channel or a closed channel. An open channel may partially surround the electrical connector. A closed channel may fully surround the electrical connector. The first channel and second channel may respectively be located on an internal surface of the lower housing or an external surface of the lower housing. The first channel and the second channel may respectively be embedded within the lower housing. For example, the first channel and the second channel may be integrally formed in the lower housing.

[0028] In some examples, the first channel of the lower housing and the second channel of the lower housing diverge from one another. The cross-sectional area of the first channel may respectively diverge or converge along the length of the first channel. The first channel may be funnel-shaped. The cross-sectional area of the second channel may diverge or converge along the length of the second channel. The second channel may be funnel-shaped. In this way, the first electrical connector and the second electrical connector may be spaced apart to avoid unintentional electrical contact between the first electrical connector and the second electrical connector. Such embodiments may reduce the risk of a short circuit between the first electrical connector and the second electrical connector.

[0029] In some examples, the first channel and the second channel diverge from one another in two different radial directions relative to the longitudinal axis of the elongate heater. In this way, the first electrical connector and the second electrical connector may be spaced apart to avoid unintentional electrical contact between the first electrical connector and the second electrical connector. Such embodiments may reduce the risk of a short circuit between the first electrical connector and the second electrical connector.

[0030] In some examples, an external surface of the lower housing conforms to an internal surface of the upper housing. In this way, the hermetic seal between the upper housing and the lower housing may be improved because the upper housing may retain the lower housing, for example, via friction.

[0031] In some examples, an external surface of the upper housing conforms to an internal surface of the lower housing. In this way, the hermetic seal between the upper housing and the lower housing may be improved because the upper housing may retrain the lower housing, for example, via friction.

[0032] In some examples, an external surface of the lower housing conforms to an internal surface of the upper housing such that the lower housing is aligned with the upper housing in a pre-determined orientation. In this way, ease of assembly may be improved because the lower housing can only be positioned relative to the upper housing in a single, pre-determined orientation.

[0033] In some examples, an external surface of the upper housing conforms to an internal surface of the lower housing such that the lower housing is aligned with the upper housing in a pre-determined orientation. In this way, ease of assembly may be improved because the lower housing can only be positioned relative to the upper housing in a single, pre-determined orientation.

[0034] In some examples, the upper housing and/or lower housing are at least partially formed from polyetheretherketone ("PEEK"). In this way, the upper housing and/or lower housing may not suffer from degradation when exposed to heat, for example, from the elongate heater.

[0035] In some examples, the gasket is at least partially formed from silicone. In this way, the gasket may form an improved hermetic seal between the upper housing and the lower housing. In this way, the gasket may also be more resilient to chemical and/or environmental degradation, for example, by chemicals present in residue and/or condensate.

[0036] In some examples, the elongate heater includes a rod-shaped portion such that the rod-shaped portion can be inserted into a consumable. In this way, the elongate heater may more easily be inserted into a consumable, for example, to provide heat to the consumable, for example, in order to generate an aerosol that may be inhaled by a user.

[0037] In some examples, the gasket conforms to an internal surface of the upper housing and/or lower housing. In this way, ease of assembly of the heater assembly may be improved by at least partially restricting the movement of the gasket with respect to the upper housing.

[0038] In some examples, the gasket has a substantially circular outer perimeter. In this way, ease of gasket manufacture may be improved as substantially circular gaskets may be simpler to manufacture than gaskets with irregular and/or more complex shapes.

[0039] According to a second aspect, there is provided an aerosol generating device comprising a heater assembly according to the first aspect. In this way, residue and/or condensate may be prevented from entering internal portions of the device that may result in undesirable effects. For example, if residue and/or condensate came into contact with a printed circuit board of the aerosol generating device, the printed circuit board may malfunction. For example, if residue and/or condensate came into contact with a power supply of the aerosol generating device, the printed circuit board may malfunction.

[0040] In some examples, the aerosol generating device further comprises a power supply wherein the power supply is configured to supply power to the elongate heater. In this way, when used with a consumable, the elongate heater of the heater assembly may impart heat to the consumable such that an aerosol may be generated.

[0041] The preceding summary is provided for purposes of summarizing some examples to provide a basic understanding of aspects of the subject matter described herein. Accordingly, the above-described features should not be construed to narrow the scope or spirit of the subject matter described herein in any way. Moreover, the above and/or proceeding examples may be combined in any suitable combination to provide further examples, except where such a combination is clearly impermissible or expressly avoided. Other features, aspects, and advantages of the subject matter described herein will become apparent from the following text and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0042] Aspects, features and advantages of the present disclosure will become apparent from the following description of examples in reference to the appended drawings in which like numerals denote like elements.

Fig. 1 is a block system diagram showing an example aerosol generating apparatus.

Fig. 2 is a block system diagram showing an example implementation of the apparatus of Fig. 1, where the aerosol generating apparatus is configured to generate aerosol from a solid precursor.

Fig. 3 shows an example implementation of the apparatus of Fig. 2.

Fig. 4 shows an example implementation of a heater assembly according to the present disclosure.

Fig. 5A and 5B show the upper housing of the heater assembly of Fig. 4. Fig. 5B is a view through section A-A indicated on Fig. 5A.

Fig. 6A and 6B show the gasket of the heater assembly of Fig. 4. Fig. 6B is a view through section B-B indicated on Fig. 6A.

Fig. 7A and 7B show the lower housing of the heater assembly of Fig. 4. Fig. 7B is a view through section C-C indicated on Fig. 7A.

Fig. 8A, 8B and 8C show another example implementation of a heater assembly according to the present disclosure.

Fig. 9 shows the heater assembly of Figs. 8A, 8B and 8C implemented in an example aerosol generating device.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0043] Before describing several examples implementing the present disclosure, it is to be understood that the present disclosure is not limited by specific construction details or process steps set forth in the following description and accompanying drawings. Rather, it will be

apparent to those skilled in the art having the benefit of the present disclosure that the systems, apparatuses and/or methods described herein could be embodied differently and/or be practiced or carried out in various alternative ways. Unless otherwise defined herein, scientific and technical terms used in connection with the presently disclosed inventive concept(s) shall have the meanings that are commonly understood by those of ordinary skill in the art, and known techniques and procedures may be performed according to conventional methods well known in the art and as described in various general and more specific references that may be cited and discussed in the present specification.

[0044] Any patents, published patent applications, and non-patent publications mentioned in the specification are hereby incorporated by reference in their entirety.

[0045] All examples implementing the present disclosure can be made and executed without undue experimentation in light of the present disclosure. While particular examples have been described, it will be apparent to those of skill in the art that variations may be applied to the systems, apparatus, and/or methods and in the steps or in the sequence of steps of the methods described herein without departing from the concept, spirit, and scope of the inventive concept(s). All such similar substitutions and modifications apparent to those skilled in the art are deemed to be within the spirit, scope, and concept of the inventive concept(s) as defined by the appended claims.

[0046] The use of the term "a" or "an" in the claims and/or the specification may mean "one," as well as "one or more," "at least one," and "one or more than one." As such, the terms "a," "an," and "the," as well as all singular terms, include plural referents unless the context clearly indicates otherwise. Likewise, plural terms shall include the singular unless otherwise required by context.

[0047] The use of the term "or" in the present disclosure (including the claims) is used to mean an inclusive "and/or" unless explicitly indicated to refer to alternatives only or unless the alternatives are mutually exclusive. For example, a condition "A or B" is satisfied by any of the following: A is true (or present) and B is false (or not present), A is false (or not present) and B is true (or present), and both A and B are true (or present).

[0048] As used in this specification and claim(s), the words

"comprising, "having," "including," or "containing" (and any forms thereof, such as "comprise" and "comprises," "have" and "has," "incl udes" and "include," or "contains" and "contain," respe ctively) are inclusive or open-ended and do not exclude additional, unrecited elements or method steps.

[0049] Unless otherwise explicitly stated as incompatible, or the physics or otherwise of the embodiments, examples, or claims prevent such a combination, the features of examples disclosed herein, and of the claims, may be integrated together in any suitable arrangement, especially ones where there is a beneficial effect in doing so. This is not limited to only any specified benefit, and instead may arise from an "ex post facto" benefit. This is to say that the combination of features is not limited by the described forms, particularly the form (e.g. numbering) of example(s), embodiment(s), or dependency of claim(s). Moreover, this also applies to the phrase "in one embodiment," "according to an embodiment," and the like, which are merely a stylistic form of wording and are not to be construed as limiting the following features to a separate embodiment to all other instances of the same or similar wording. This is to say, a reference to 'an,' 'one,' or 'some' embodiment(s) may be a reference to any one or more, and/or all embodiments, or combination(s) thereof, disclosed. Also, similarly, the reference to "the" embodiment may not be limited to the immediately preceding embodiment. Further, all references to one or more embodiments or examples are to be construed as non-limiting to the claims.

[0050] The present disclosure may be better understood in view of the following explanations, wherein the terms used that are separated by "or" may be used interchangeably:

As used herein, an **"aerosol generating apparatus"** (or **"electronic(e)-cigarette")** may be an apparatus configured to deliver an aerosol to a user for inhalation by the user. The apparatus may additionally/alternatively be referred to as a "smoking substitute apparatus", if it is intended to be used instead of a conventional combustible smoking article. As used herein a combustible "smoking article" may refer to a cigarette, cigar, pipe or other article, that produces smoke (an aerosol comprising solid particulates and gas) via heating above the thermal decomposition temperature (typically by combustion and/or pyrolysis). An aerosol generated by the apparatus may comprise an aerosol with particle sizes of 0.2 to 7 microns, or less than 10 microns, or less than 7 microns. This particle size may be achieved by control of one or more of: heater temperature; cooling rate as the vapour condenses to an aerosol; flow properties including turbulence and velocity. The generation of aerosol by the aerosol generating apparatus may be controlled by an input device. The input device may be configured to be user-activated, and may for example include or take the form of an actuator (e.g. actuation button) and/or an airflow sensor.

[0051] Each occurrence of the aerosol generating apparatus being caused to generate aerosol for a period of time (which may be variable) may be referred to as an **"activation"** of the aerosol generating apparatus. The aerosol generating apparatus may be arranged to allow an amount of aerosol delivered to a user to be varied per activation (as opposed to delivering a fixed dose of aerosol), e.g. by activating an aerosol generating unit of the apparatus for a variable amount of time, e.g. based on the strength/duration of a draw of a user through a flow path of the apparatus (to replicate an effect of smoking a conventional combustible smoking article).

[0052] The aerosol generating apparatus may be port-

able. As used herein, the term **"portable"** may refer to the apparatus being for use when held by a user.

[0053] As used herein, an **"aerosol generating system"** may be a system that includes an aerosol generating apparatus and optionally other circuitry/components associated with the function of the apparatus, e.g. one or more external devices and/or one or more external components (here "external" is intended to mean external to the aerosol generating apparatus). As used herein, an "external device" and "external component" may include one or more of a: a charging device, a mobile device (which may be connected to the aerosol generating apparatus, e.g. via a wireless or wired connection); a networked-based computer (e.g. a remote server); a cloud-based computer; any other server system.

[0054] An example aerosol generating system may be a system for managing an aerosol generating apparatus. Such a system may include, for example, a mobile device, a network server, as well as the aerosol generating apparatus.

[0055] As used herein, an **"aerosol"** may include a suspension of precursor, including as one or more of: solid particles; liquid droplets; gas. Said suspension may be in a gas including air. An aerosol herein may generally refer to/include a vapour. An aerosol may include one or more components of the precursor.

[0056] As used herein, a **"precursor"** may include one or more of a: liquid; solid; gel; loose leaf material; other substance. The precursor may be processed by an aerosol generating unit of an aerosol generating apparatus to generate an aerosol. The precursor may include one or more of: an active component; a carrier; a flavouring. The active component may include one or more of nicotine; caffeine; a cannabidiol oil; a non-pharmaceutical formulation, e.g. a formulation which is not for treatment of a disease or physiological malfunction of the human body. The active component may be carried by the carrier, which may be a liquid, including propylene glycol and/or glycerine. The term "flavouring" may refer to a component that provides a taste and/or a smell to the user. The flavouring may include one or more of: Ethylvanillin (vanilla); menthol, Isoamyl acetate (banana oil); or other. The precursor may include a substrate, e.g. reconstituted tobacco to carry one or more of the active component; a carrier; a flavouring.

[0057] As used herein, a **"storage portion"** may be a portion of the apparatus adapted to store the precursor. It may be implemented as fluid-holding reservoir or carrier for solid material depending on the implementation of the precursor as defined above.

[0058] As used herein, a **"flow path"** may refer to a path or enclosed passageway through an aerosol generating apparatus, e.g. for delivery of an aerosol to a user. The flow path may be arranged to receive aerosol from an aerosol generating unit. When referring to the flow path, upstream and downstream may be defined in respect of a direction of flow in the flow path, e.g. with an outlet being downstream of an inlet.

[0059] As used herein, a **"delivery system"** may be a system operative to deliver an aerosol to a user. The delivery system may include a mouthpiece and a flow path.

[0060] As used herein, a **"flow"** may refer to a flow in a flow path. A flow may include aerosol generated from the precursor. The flow may include air, which may be induced into the flow path via a puff by a user.

[0061] As used herein, a **"puff"** (or **"inhale"** or **"draw")** by a user may refer to expansion of lungs and/or oral cavity of a user to create a pressure reduction that induces flow through the flow path.

[0062] As used herein, an **"aerosol generating unit"** may refer to a device configured to generate an aerosol from a precursor. The aerosol generating unit may include a unit to generate a vapour directly from the precursor (e.g. a heating system or other system) or an aerosol directly from the precursor (e.g. an atomiser including an ultrasonic system, a flow expansion system operative to carry droplets of the precursor in the flow without using electrical energy or other system). A plurality of aerosol generating units to generate a plurality of aerosols (for example, from a plurality of different aerosol precursors) may be present in an aerosol generating apparatus.

[0063] As used herein, a **"heating system"** may refer to an arrangement of at least one heating element, which is operable to aerosolise a precursor once heated. The at least one heating element may be electrically resistive to produce heat from the flow of electrical current therethrough. The at least one heating element may be arranged as a susceptor to produce heat when penetrated by an alternating magnetic field. The heating system may be configured to heat a precursor to below 300 or 350 degrees C, including without combustion.

[0064] As used herein, a **"consumable"** may refer to a unit that includes a precursor. The consumable may include an aerosol generating unit, e.g. it may be arranged as a cartomizer. The consumable may include a mouthpiece. The consumable may include an information carrying medium. With liquid or gel implementations of the precursor, e.g. an e-liquid, the consumable may be referred to as a "capsule" or a "pod" or an "e-liquid consumable". The capsule/pod may include a storage portion, e.g. a reservoir or tank, for storage of the precursor. With solid material implementations of the precursor, e.g. tobacco or reconstituted tobacco formulation, the consumable may be referred to as a "stick" or "package" or "heat-not-burn consumable". In a heat-not-burn consumable, the mouthpiece may be implemented as a filter and the consumable may be arranged to carry the precursor. The consumable may be implemented as a dosage or pre-portioned amount of material, including a loose-leaf product.

[0065] As used herein, an **"information carrying medium"** may include one or more arrangements for storage of information on any suitable medium. Examples include: a computer readable medium; a Radio Frequen-

cy Identification (RFID) transponder; codes encoding information, such as optical (e.g. a bar code or QR code) or mechanically read codes (e.g. a configuration of the absence or presents of cut-outs to encode a bit, through which pins or a reader may be inserted).

[0066] As used herein **"heat-not-burn"** (or **"HNB"** or **"heated precursor")** may refer to the heating of a precursor, typically tobacco, without combustion, or without substantial combustion (i.e. localised combustion may be experienced of limited portions of the precursor, including of less than 5% of the total volume).

[0067] Referring to Fig. 1, an example aerosol generating apparatus 1 includes a power supply 2, for supply of electrical energy. The apparatus 1 includes an aerosol generating unit 4 that is driven by the power supply 2. The power supply 2 may include an electric power supply in the form of a battery and/or an electrical connection to an external power source. The apparatus 1 includes a precursor 6, which in use is aerosolised by the aerosol generating unit 4 to generate an aerosol. The apparatus 2 includes a delivery system 8 for delivery of the aerosol to a user.

[0068] Electrical circuitry (not shown in figure 1) may be implemented to control the interoperability of the power supply 4 and aerosol generating unit 6.

[0069] In variant examples, which are not illustrated, the power supply 2 may be omitted since, e.g. an aerosol generating unit implemented as an atomiser with flow expansion may not require a power supply.

[0070] Fig. 2 shows an implementation of the apparatus 1 of Fig. 1, where the aerosol generating apparatus 1 is configured to generate aerosol by a-heat not-burn process.

[0071] In this example, the apparatus 1 includes a device body 50 and a consumable 70.

[0072] In this example, the body 50 includes the power supply 4 and a heating system 52. The heating system 54 includes at least one heating element 54. The body may additionally include any one or more of electrical circuitry 56, a memory 58, a wireless interface 60, one or more other components 62.

[0073] The electrical circuitry 56 may include a processing resource for controlling one or more operations of the body 50, e.g. based on instructions stored in the memory 58.

[0074] The wireless interface 60 may be configured to communicate wirelessly with an external (e.g. mobile) device, e.g. via Bluetooth.

[0075] The other component(s) 62 may include an actuator, one or more user interface devices configured to convey information to a user and/or a charging port.

[0076] The body 50 is configured to engage with the consumable 70 such that the at least one heating element 54 of the heating system 52 penetrates into the solid precursor 6 of the consumable. In use, a user may activate the aerosol generating apparatus 1 to cause the heating system 52 of the body 50 to cause the at least one heating element 54 to heat the solid precursor 6 of the consumable (without combusting it) by conductive heat transfer, to generate an aerosol which is inhaled by the user.

[0077] Fig. 3 shows an example implementation of the aerosol generating device 1 of Fig. 2.

[0078] As depicted in Fig. 3, the consumable 70 is implemented as a stick, which is engaged with the body 50 by inserting the stick into an aperture at a top end 53 of the body 50, which causes the at least one heating element 54 of the heating system 52 to penetrate into the solid precursor 6.

[0079] The consumable 70 includes the solid precursor 6 proximal to the body 50, and a filter distal to the body 50. The filter serves as the mouthpiece of the consumable 70 and thus the apparatus 1 as a whole. The solid precursor 6 may be a reconstituted tobacco formulation.

[0080] In this example, the at least one heating element 54 is a rod-shaped element with a circular transverse profile. Other heating element shapes are possible, e.g. the at least one heating element may be blade-shaped (with a rectangular transverse profile) or tube-shaped (e.g. with a hollow transverse profile).

[0081] In this example, the body 50 includes a cap 51. In use the cap 51 is engaged at a top end 53 of the body 50. Although not apparent from Fig. 3, the cap 51 is moveable relative to the body 50. In particular, the cap 51 is slidable and can slide along a longitudinal axis of the body 50.

[0082] The body 50 also includes an actuator 55 on an outer surface of the body 50. In this example, the actuator 55 has the form of a button.

[0083] The body 50 also includes a user interface device configured to convey information to a user. Here, the user interface device is implemented as a plurality of lights 57, which may e.g. be configured to illuminate when the apparatus 1 is activated and/or to indicate a charging state of the power supply 4. Other user interface devices are possible, e.g. to convey information haptically or audibly to a user.

[0084] The body may also include an airflow sensor which detects airflow in the aerosol generating apparatus 1 (e.g. caused by a user inhaling through the consumable 70). This may be used to count puffs, for example.

[0085] In this example, the consumable 70 includes a flow path which transmits aerosol generated by the at least one heating element 54 to the mouthpiece of the consumable.

[0086] In this example, the aerosol generating unit 4 is provided by the above-described heating system 52 and the delivery system 8 is provided by the above-described flow path and mouthpiece of the consumable 70.

[0087] Referring to Fig. 4, a heater assembly 100 according to an embodiment is shown. The heater assembly 100 comprises an upper housing 110 including an aperture 114, a lower housing 120, an elongate heater 130 positioned through the aperture 114 and a gasket 140 retained by the upper housing 110 and the lower housing 120 to create a hermetic seal between the upper housing 110 and the lower housing 120. The gasket 140

is retained by the upper housing 110 and the lower housing 120 such that the upper housing 110 and the lower housing 120 restrict the movement of the gasket 140. The upper housing 110 is coupled to the lower housing 120 by four stakes 112. Each stake 112 has a substantially circular cross-section. The gasket 140 is shaped to accommodate the stakes 112 as the gasket 140 includes four gasket outer apertures (not shown). The four stakes are each located to pass through the gasket 140 within a respective substantially circular gasket outer aperture (not shown). The four stakes 112 are each located through the lower housing 120 within a respective substantially circular lower housing outer aperture (not shown). The end of each of the stakes 112 is thermally deformed in order to couple the upper housing 110 to the lower housing 120. The stakes 112 are part of the upper housing 110. The lower housing 120 includes a recess 124. The elongate heater 130 includes three portions: a rod-shaped heating portion 132, a heater mount 134 and a base portion 136. The heater mount portion 134 is located between the rod-shaped heating portion 132 and the base portion 136. The heater mount 134 partitions the rod-shaped heating portion 132 from the base portion 136. The heater mount 134 is shaped to be received within a heater mount engagement cavity 118. The heater mount engagement cavity 118 is partially formed by the upper housing 110. The elongate heater 130 is positioned through the aperture 114 such that the rod-shaped heating portion 132 is positioned through the aperture 114. The base portion 136 has a substantially cylindrical shape. A portion of the base portion 136 is located in the recess 124. The gasket 140 includes a heater mount receiving aperture. The heater mount receiving aperture conforms to the heater mount 134. The elongate heater 130 includes a first electrical connector 138 and a second electrical connector 139. A portion of the first electrical connector 138 is located within the recess 124. A portion of the second electrical connector 139 is located within the recess 124. The first electrical connector 138 is attached to the base portion 136 of the elongate heater 130. The second electrical connector 139 is attached to the base portion 136 of the elongate heater 130.

[0088] Referring to Fig. 5A and Fig. 5B, the upper housing 110 of the heater assembly 100 of Fig. 4 is shown in more detail. Fig. 5A shows a plan view of the upper housing 110 and Fig. 5B shows a cross-section of the upper housing 110 taken through the section labelled A-A. The stakes 112 are shown in the absence of the lower housing 120. The aperture 114 is shown with the elongate heater absent. The stakes 112 are integrally formed as part of the upper housing 110. In this example, the upper housing 110 is made from polyetheretherketone ("PEEK").

[0089] Referring to Fig. 6A and Fig. 6B, the gasket 140 of the heater assembly 100 of Fig. 4 is shown in more detail. Fig. 6A shows a plan view of the gasket 140 and Fig. 6B shows a cross-section of the gasket 140 taken through the section labelled B-B. The gasket 140 includes four gasket outer apertures 142 and one heater mount receiving aperture 144. When assembled into the heater assembly 100, each stake 112 passes through a respective gasket outer aperture 142. In this example the gasket 140 is made from silicone.

[0090] Referring to Fig. 7A and Fig. 7B, the lower housing 120 of the heater assembly 100 of Fig. 4 is shown in more detail. Fig. 7A shows a plan view of the lower housing 120 and Fig. 7B shows a cross-section of the lower housing 120 taken through the section labelled C-C. The lower housing 120 includes four lower housing outer apertures 122. The recess 124 is shown without any components located within the recess 124. In this example, the lower housing 120 is made from polyetheretherketone ("PEEK").

[0091] Referring to Figs. 8A to 8C, a further embodiment of a heater assembly 200 is shown. The heater assembly 200 comprises an upper housing 210 including an aperture 214, a lower housing 220, an elongate heater 230 positioned through the aperture 214 and a gasket 240 retained by the upper housing 210 and the lower housing 220 to create a hermetic seal between the upper housing 210 and the lower housing 220. The gasket 214 is retained by the upper housing 210 and the lower housing 220 such that the upper housing 210 and the lower housing 220 restrict the movement of the gasket 114. The lower housing 220 is rotationally orientated relative to the upper housing 210 by a first protruding tab 226 and a second protruding tab 227 located on an external perimeter of the lower housing 220. The upper housing 210 is coupled to the lower housing 220 by a coupling means. In this embodiment, the coupling means is formed by four heat stakes 212. Each stake 212 has a substantially circular cross-section along the length of the respective heat stake. The gasket 240 is shaped to accommodate the stakes 212. Each stake 212 is located through the gasket 240 within a respective substantially circular gasket outer aperture 242. Each stake 212 is located through the lower housing 220 within a respective substantially circular lower housing outer aperture 222. Each stake 212 is integrally formed with the upper housing 210. In this example, the upper housing 210 is made from polyetheretherketone ("PEEK"). In this example the gasket 240 is made from silicone. In this example, the lower housing 220 is made from polyetheretherketone ("PEEK").

[0092] The elongate heater 230 includes three portions: a rod-shaped heating portion 232, a heater mount 234 and a base portion 236. The heater mount portion 234 is located between the rod-shaped heating portion 232 and the base portion 236. The heater mount 234 partitions the rod-shaped heating portion 232 from the base portion 236. The heater mount 234 is shaped to be received within a heater mount engagement cavity 218 between the upper housing 210 and the lower housing 220 such that the elongate heater 230 is aligned with the upper housing 210 in a pre-determined orientation. A wall of the heater mount engagement cavity 218 includes at least one mount-engaging protrusion 214 to engage the

heater mount wherein the heater mount 234 is positioned within the heater mount engagement cavity by the at least one mount-engaging protrusion 214. The at least one mount-engaging protrusion 214 is integrally formed as part of the upper housing 210. A portion of the base portion 236 is located in the recess 224. The gasket 240 includes a heater mount receiving aperture 244. The heater mount receiving aperture 244 conforms to the heater mount 234 such that the gasket 240 is aligned with the elongate heater 230 in a pre-determined orientation. In this example, an external surface 225 of the lower housing 220 conforms to an internal surface 216 of the upper housing 210.

[0093] The elongate heater 230 includes a first electrical connector 238 and a second electrical connector 239. The lower housing 220 includes a recess 224. A portion of the first electrical connector 238 is located within the recess 224. A portion of the second electrical connector 239 is located within the recess 224. The first electrical connector 238 is positioned through the lower housing 220 and the second electrical connector 239 is positioned through the lower housing 220. Part of the first electrical connector 238 and part of the second electrical connector 239 are respectively located within a first channel 228 of the lower housing and a second channel 229 of the lower housing. The first channel 228 and the second channel 229 diverge from one another in two different radial directions relative to the longitudinal axis of the elongate heater. The first channel 228 is an open, funnel-shaped channel. The second channel 229 is an open, funnel-shaped channel. The first electrical connector 238 is a wire. The second electrical connector 239 is a wire. The first electrical connector 238 is attached to the base portion 236. The second electrical connector 239 is attached to the base portion 236.

[0094] Referring to Fig. 9, the heater assembly 200 of Figs. 8A to 8C is shown positioned within the body 50 of the example aerosol generating apparatus 1 of Fig. 3. The body 50 includes a power supply 2. The elongate heater 230 is located such that the rod-shaped heating portion 232 is located within a consumable-receiving cavity 80 of the moveable cap 51. When a consumable 70 is inserted into the consumable-receiving cavity 80 and electrical power is supplied to the elongate heater 130 from the power supply 2, the elongate heater 230 may heat the consumable such that an aerosol may be generated. The cap 51 is moveable relative to the body 50 such that, when the cap 51 is moved relative to the body 50, the rod-shaped heating portion 232 of the elongate heater 230 moves relative to the cap 51. This means the rod-shaped heating portion 232 of the elongate heater 230 can be moved in to and out of a consumable 70 located within the consumable-receiving cavity 80 by moving the cap 51 relative to the body 50.

Claims

1. A heater assembly for an aerosol generating apparatus, the heater assembly comprising:

   an upper housing including an aperture;
   a lower housing;
   an elongate heater positioned through the aperture; and
   a gasket retained by the upper housing and the lower housing to create a hermetic seal between the upper housing and the lower housing.

2. The heater assembly according to claim 1, further comprising a coupling means to couple the upper housing to the lower housing.

3. The heater assembly according to claim 2, wherein the gasket is shaped to accommodate the coupling means.

4. The heater assembly according to either claim 2 or 3, wherein the coupling means includes one or more stakes.

5. The heater assembly according to any one of claims 1 to 4, wherein the elongate heater includes a heater mount, wherein the heater mount is shaped to be received within a heater mount engagement cavity between the upper housing and the lower housing such that the elongate heater is aligned with the upper housing in a pre-determined orientation.

6. The heater assembly according to claim 5, wherein a wall of the heater mount engagement cavity includes at least one mount-engaging protrusion to engage the heater mount wherein the heater mount is positioned within the heater mount engagement cavity by the at least one mount-engaging protrusion.

7. The heater assembly according to either claim 5 or 6, wherein the gasket includes a heater mount receiving aperture.

8. The heater assembly according to claim 7, wherein the heater mount receiving aperture conforms to the heater mount such that the gasket is aligned with the elongate heater in a pre-determined orientation.

9. The heater assembly according to any one of claims 1 to 8, wherein the elongate heater includes a first electrical connector and a second electrical connector such that electrical power can be supplied to the elongate heater.

10. The heater assembly according to claim 9, wherein the first electrical connector and the second electrical connector are each positioned to pass through the

lower housing.

11. The heater assembly according to any one of claims 1 to 10, wherein the lower housing includes a recess in which a base portion of the elongate heater is located.

12. The heater assembly according to claim 11, wherein the at least part of the first electrical connector and at least part of the second electrical connector are located within the recess.

13. The heater assembly according to any one of claims 9 to 12, wherein at least part of the first electrical connector and at least part of the second electrical connector are respectively located within a first channel of the lower housing and a second channel of the lower housing.

14. The heater assembly according to any one of claims 1 to 13, wherein an external surface of the lower housing conforms to an internal surface of the upper housing.

15. An aerosol generating device comprising the heater assembly according to any one of claims 1 to 14.

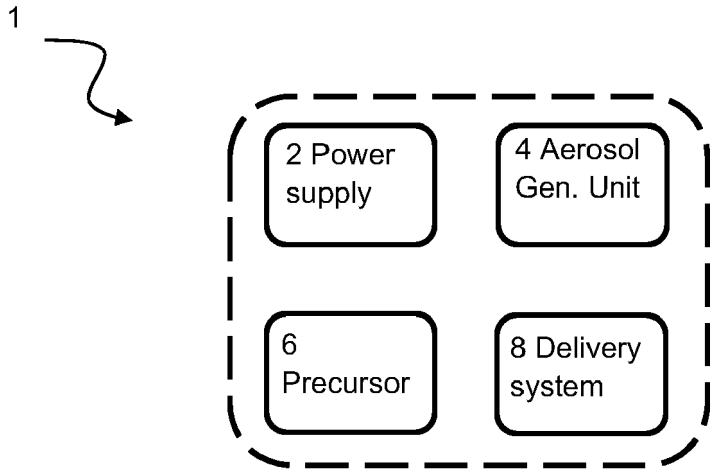

1
2 Power supply
4 Aerosol Gen. Unit
6 Precursor
8 Delivery system

Fig. 1

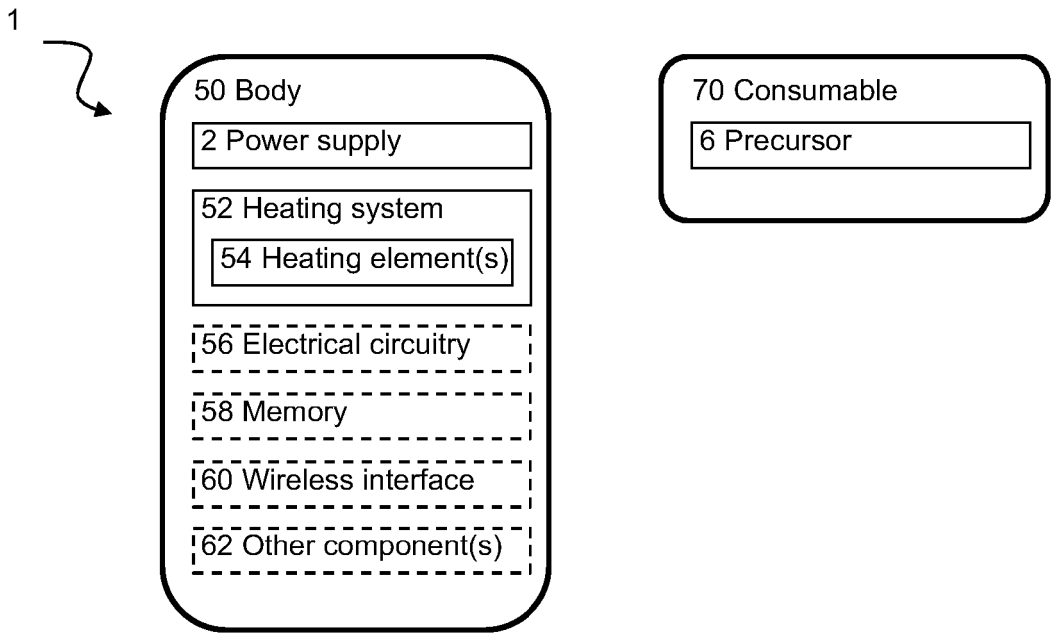
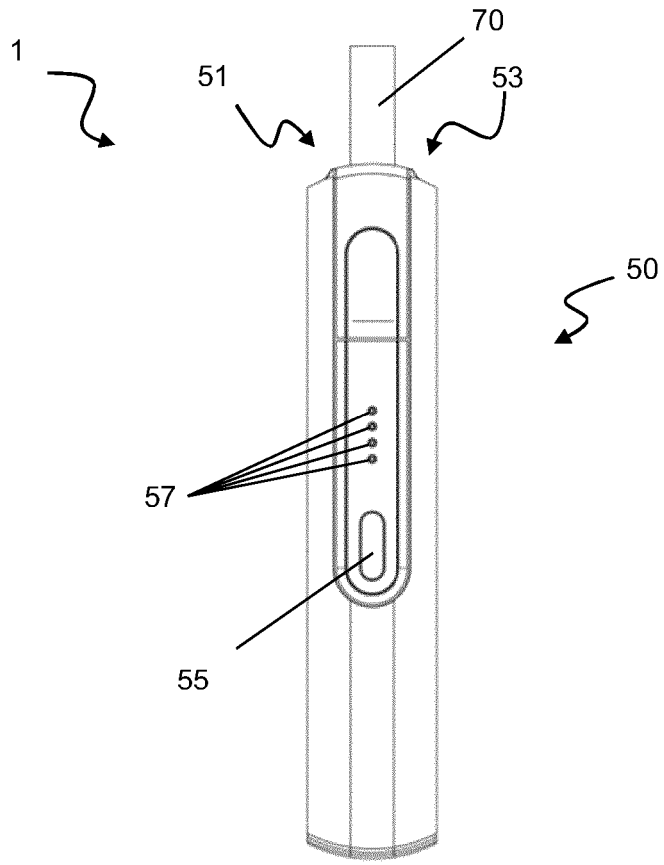

1
50 Body
2 Power supply
52 Heating system
54 Heating element(s)
56 Electrical circuitry
58 Memory
60 Wireless interface
62 Other component(s)
70 Consumable
6 Precursor

Fig. 2


1
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70
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50
57
55

Fig. 3

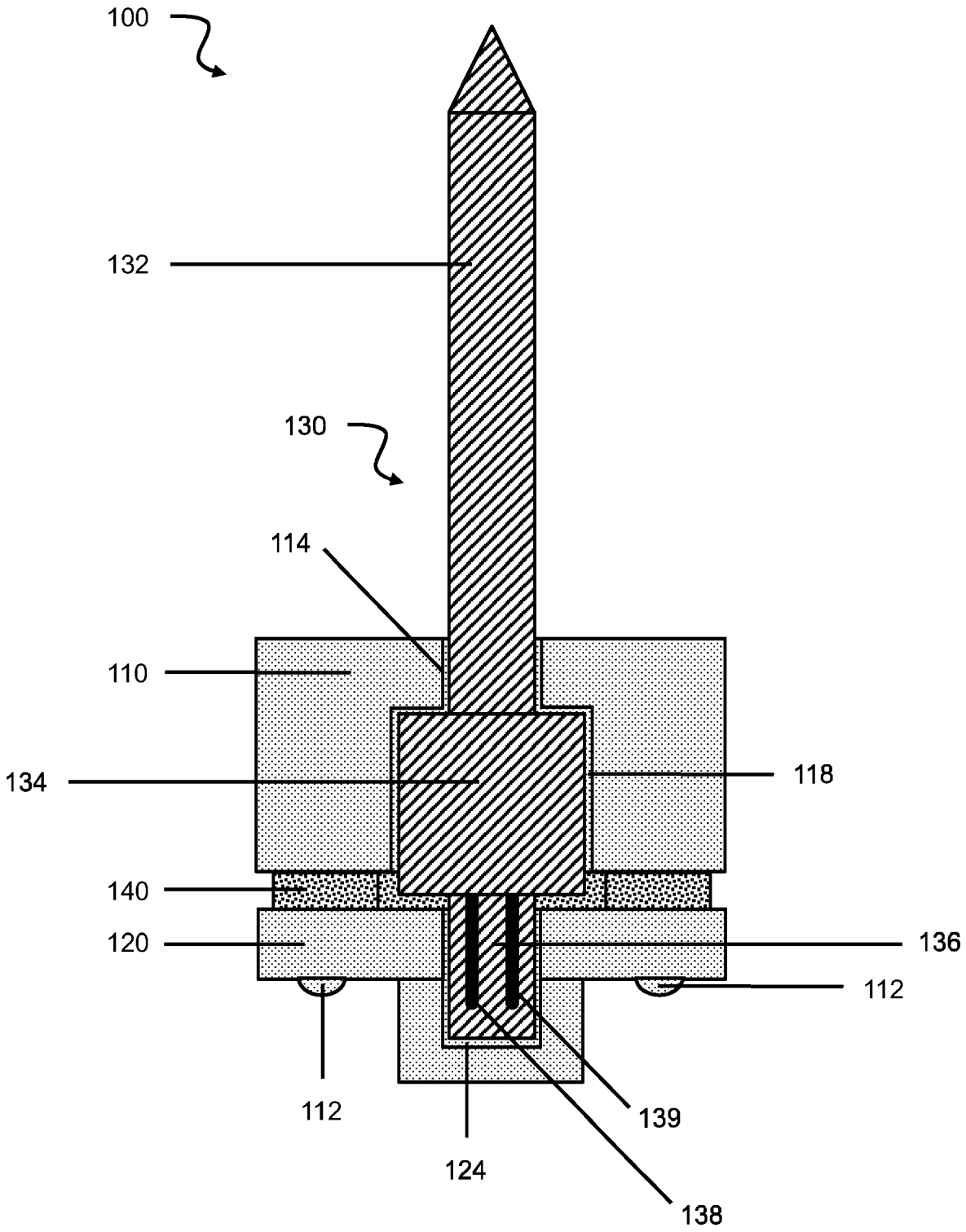


Fig. 4

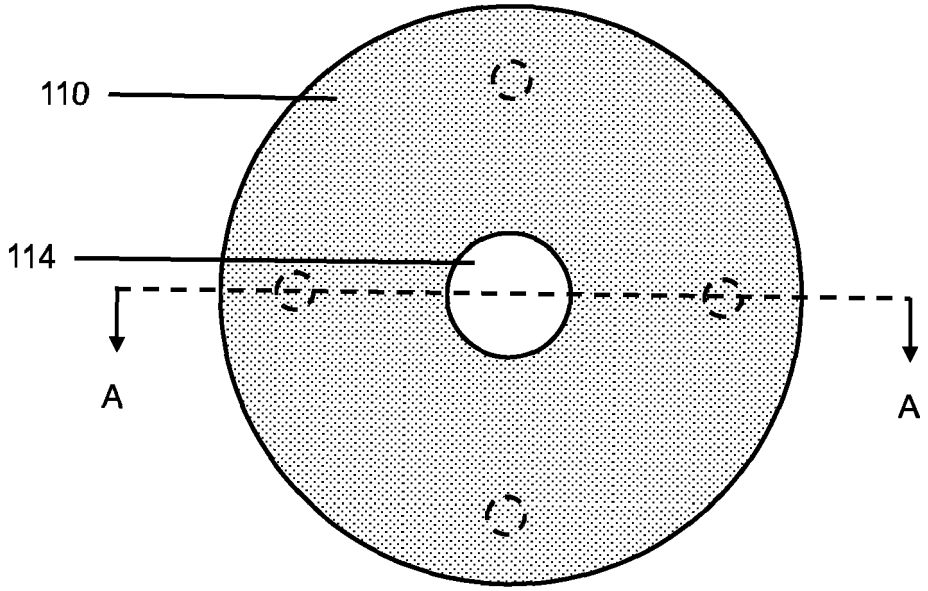


Fig. 5A

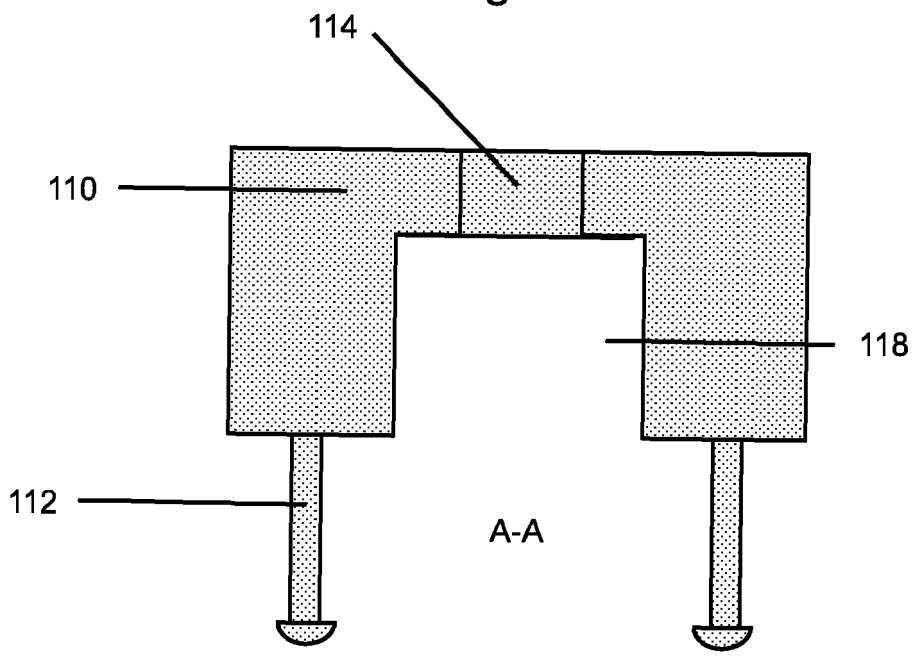


Fig. 5B

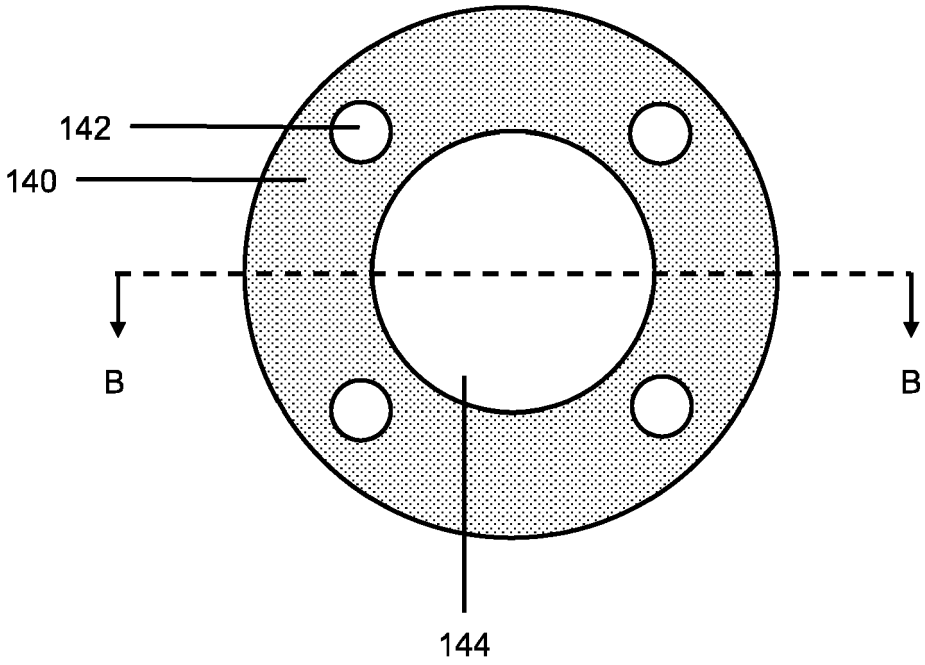
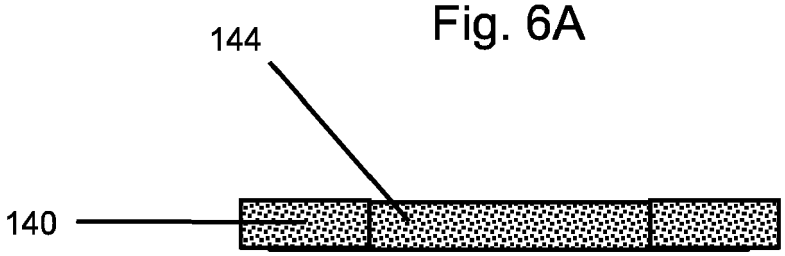


Fig. 6A



B-B

Fig. 6B

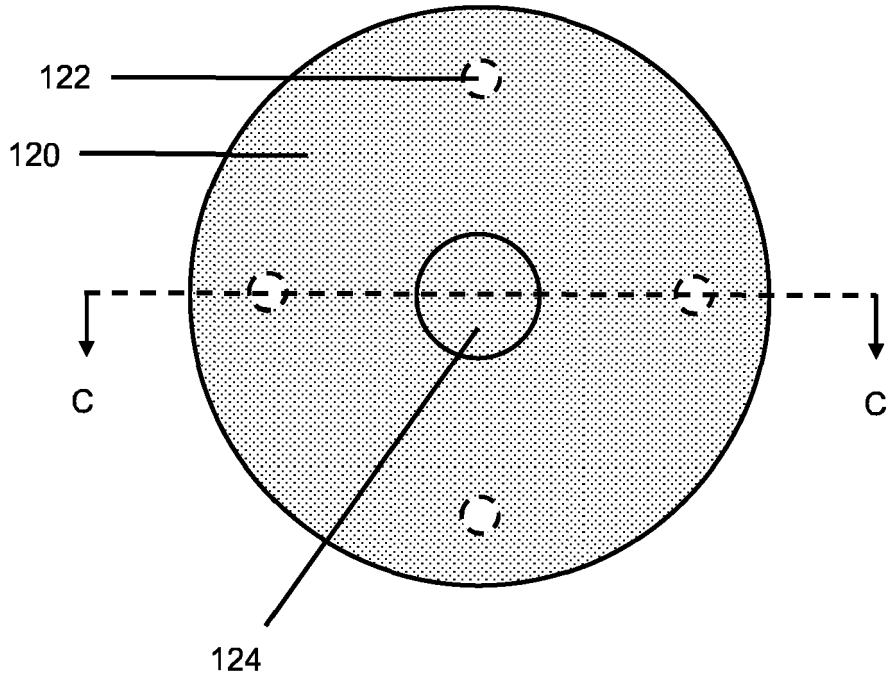
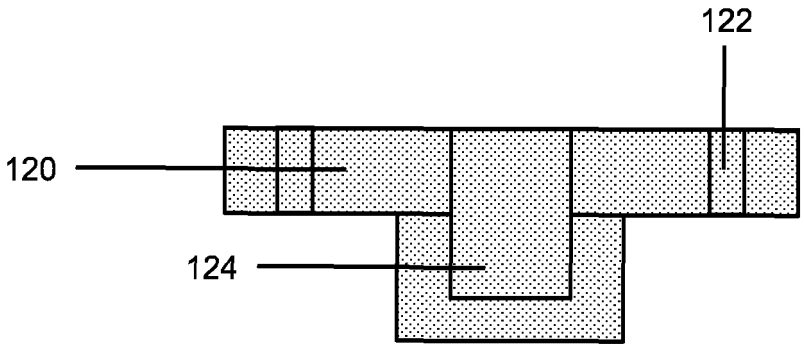


Fig. 7A



C-C

Fig. 7B

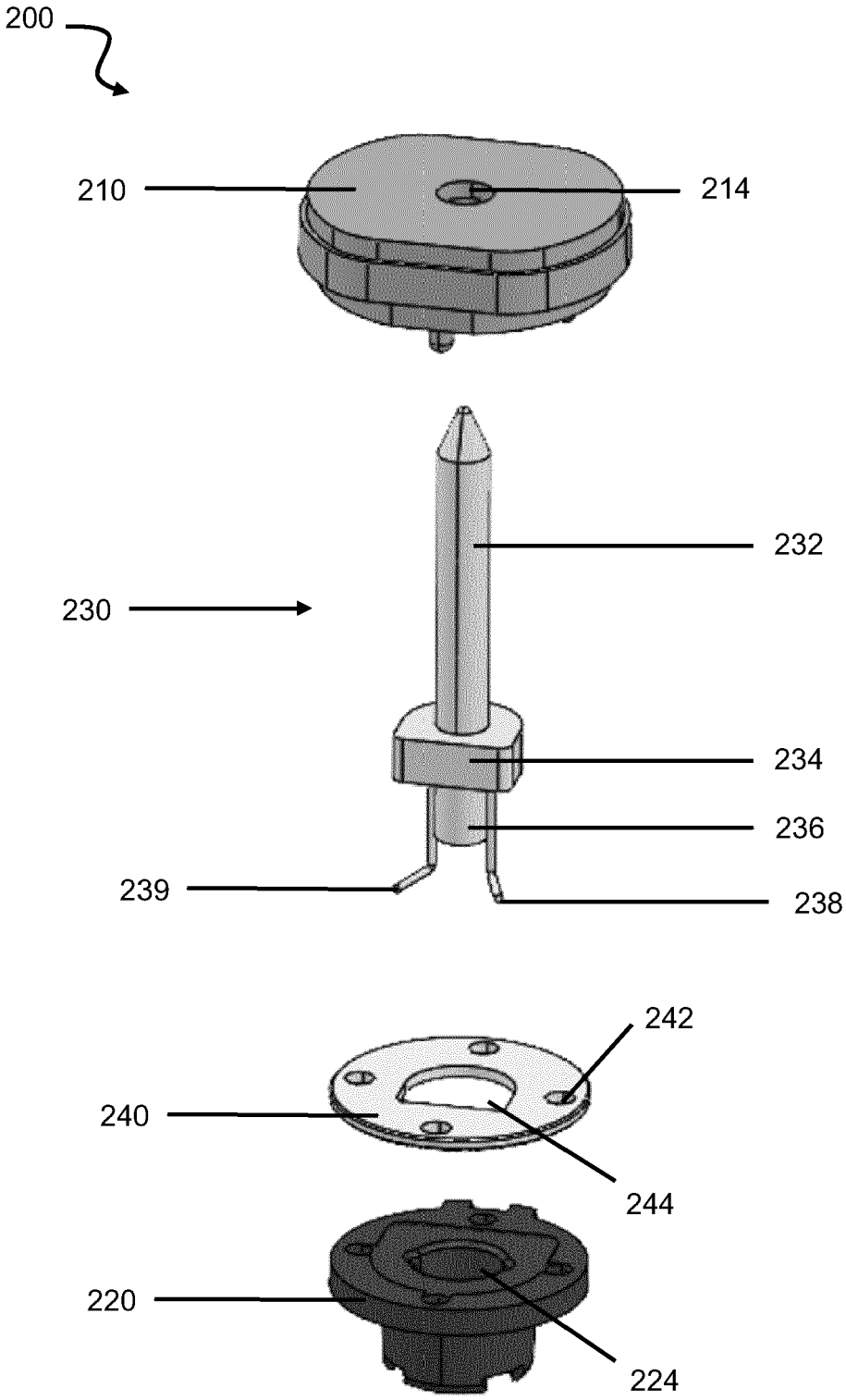


Fig. 8A

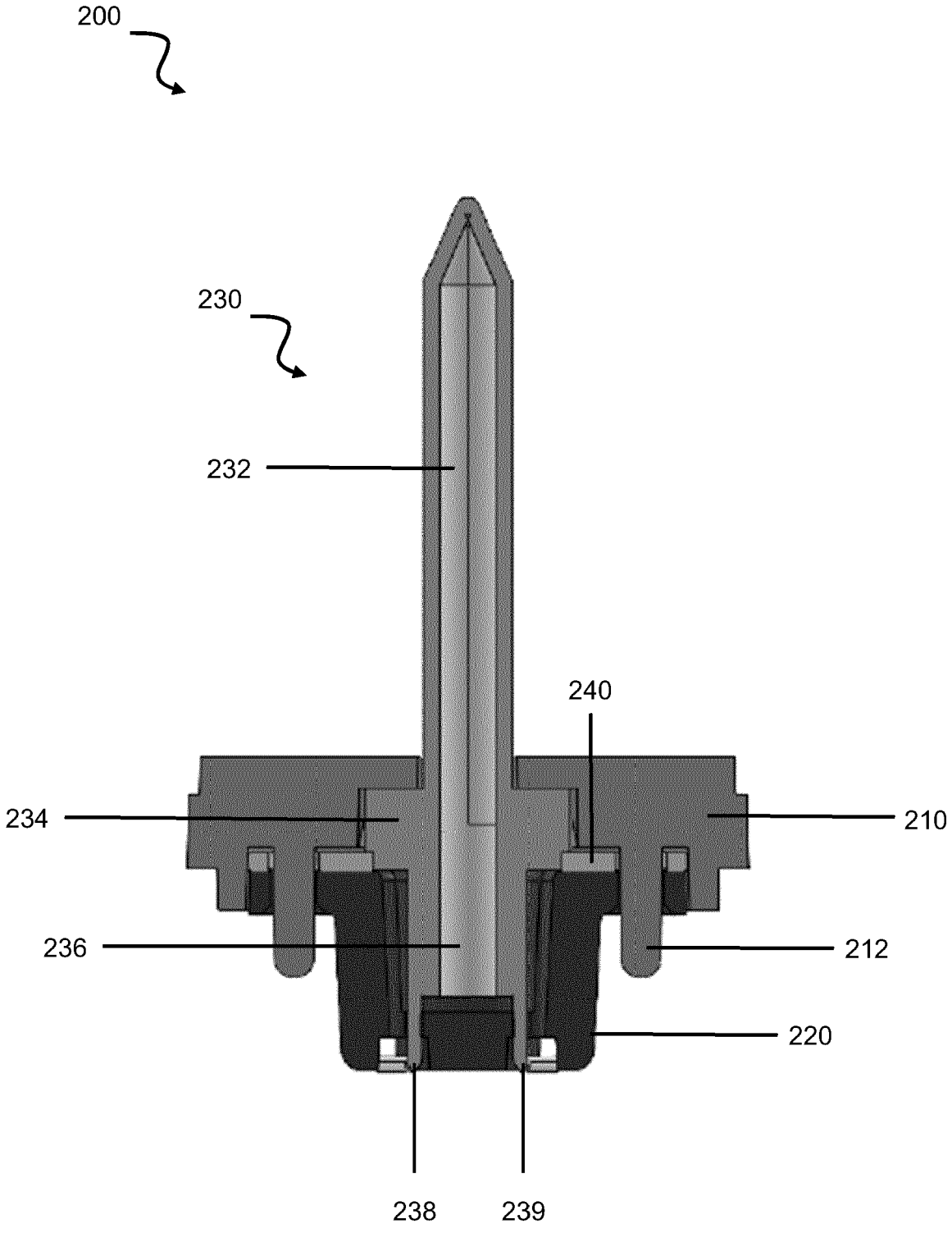


Fig. 8B

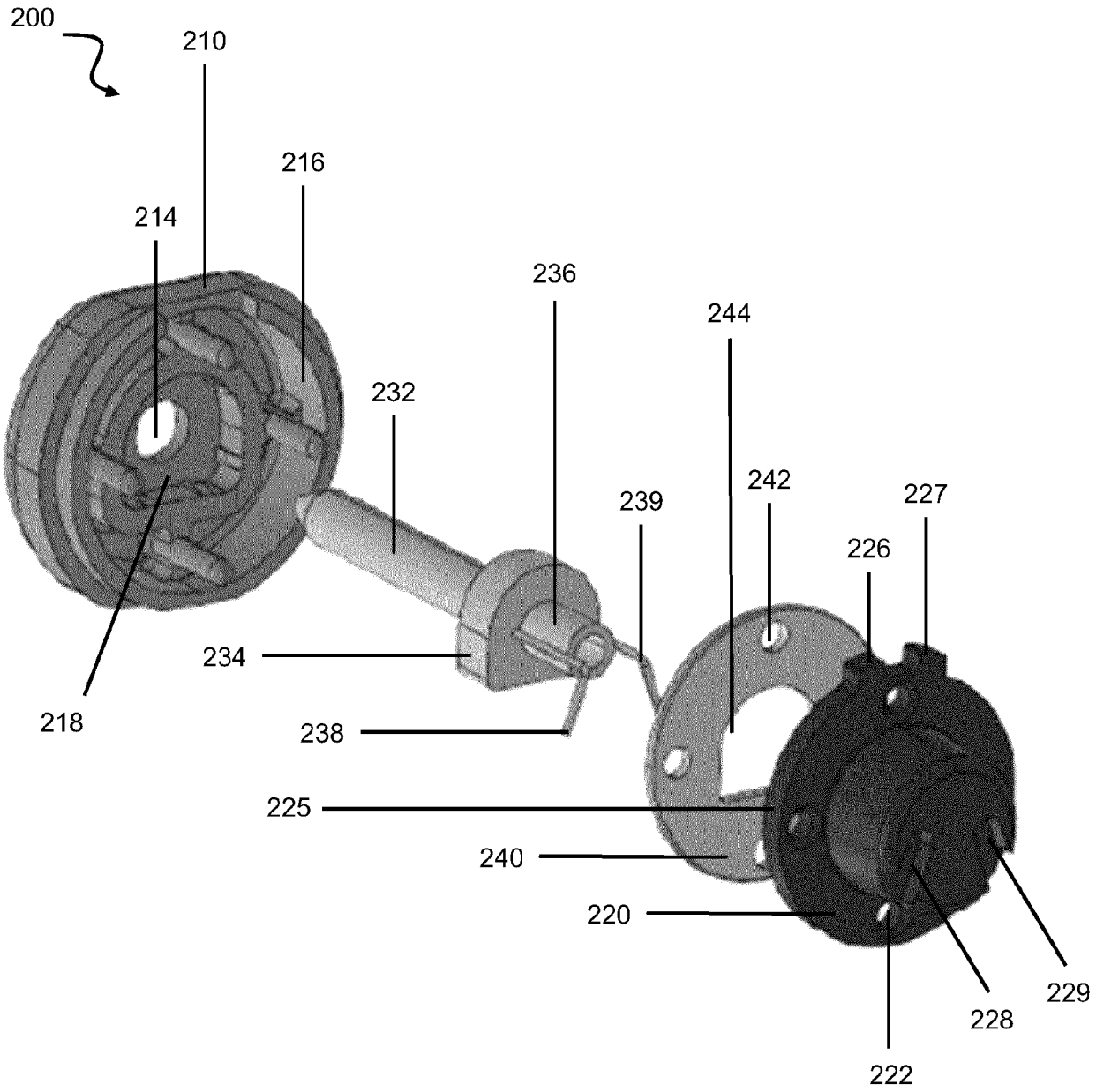

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Fig. 8C

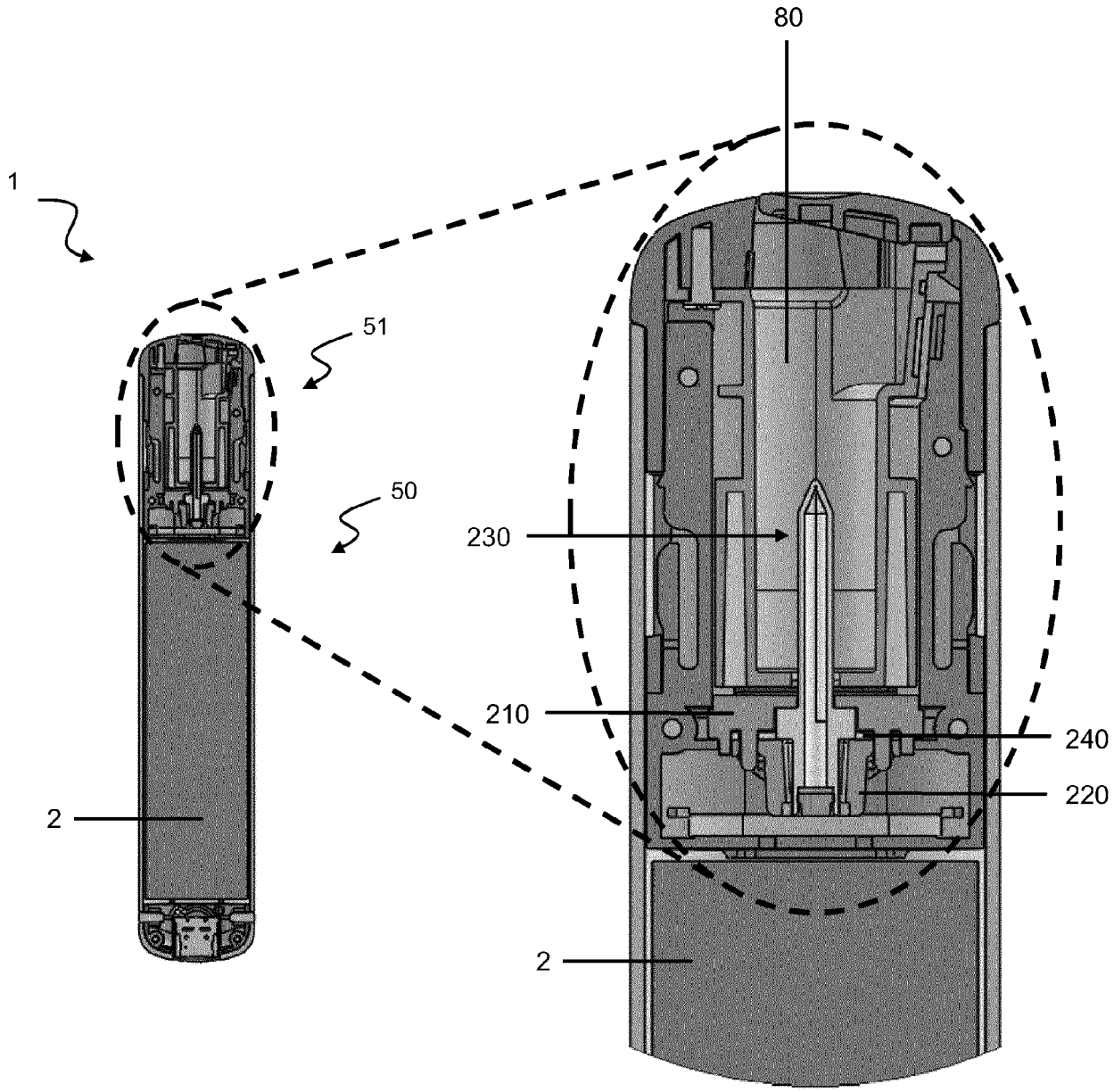

Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 22 21 4671

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X	US 2020/187555 A1 (LEE JONG SUB [KR]) 18 June 2020 (2020-06-18)	1,2,5,9, 10,14,15	INV. A24F40/40
A	* figure 6 * * paragraph [0099] - paragraph [0121] *	6,13	A24F40/46
X	KR 2019 0118303 A (EM TECH CO LTD [KR]) 18 October 2019 (2019-10-18)	1-5, 7-12,14, 15	
A	* figures 2-6 *	6,13	
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A24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 June 2023	Schwertfeger, C

CATEGORY OF CITED DOCUMENTS

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