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- **TYLER, Andrew**
Liverpool L24 9HP (GB)
- **COOK, Alan**
Liverpool L24 9HP (GB)
- **SAJTOS, Tamas**
Liverpool L24 9HP (GB)

(71) Applicant: **NERUDIA LIMITED**
Liverpool Merseyside L24 9HP (GB)

(74) Representative: **Mewburn Ellis LLP**
Aurora Building
Counterslip
Bristol BS1 6BX (GB)

(72) Inventors:
• **AUSTIN, Andrew**
Liverpool L24 9HP (GB)

(54) **METHOD AND ASSEMBLY TOOL FOR AN AEROSOL DELIVERY COMPONENT**

(57) The present disclosure relates to a method for assembly of an aerosol delivery component, said method comprising: a) providing a component housing having an aperture in communication with an aerosolisation chamber and a housing interior space; b) providing an elongate liquid transfer element having an upstream portion and a downstream portion; c) inserting the elongate liquid transfer element through the aperture and aerosolisation chamber such that the upstream portion of the liquid transfer element extends into the housing interior space; d) mounting the component housing and liquid transfer element in a mounting space defined between a base portion and a head portion of an assembly tool, with the head portion in abutment with the downstream portion of the liquid transfer element; and e) moving the head portion relative to the base portion to move the liquid transfer element until the downstream portion of the liquid transfer element is positioned within the aerosolisation chamber. The present disclosure also relates to an aerosol delivery component assembly tool comprising a base portion and a head portion defining a mounting space therebetween for receiving the component housing. The base portion is configured to support a component housing and the head portion is movable relative to the base portion to push a liquid transfer element into the component housing.

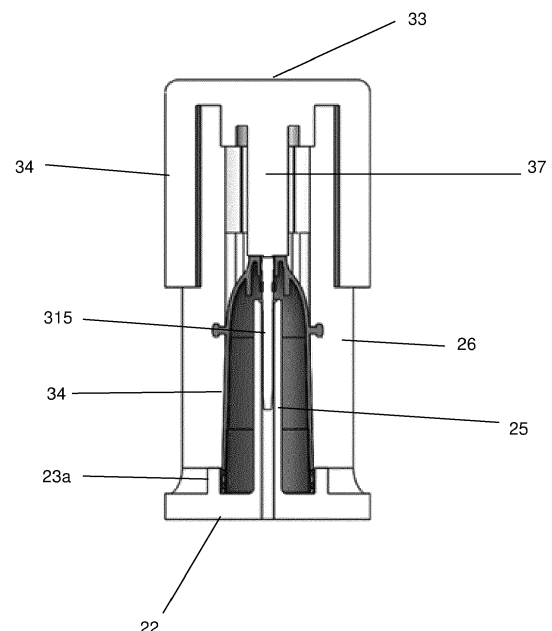


Fig. 7B

Description

Field of the Invention

[0001] The present invention relates to a method of and a tool for manufacturing an aerosol delivery component, and particularly to a method of and a tool for manufacturing an aerosol delivery component (such as a smoking substitute component) comprising an elongate liquid transfer element.

Background

[0002] One form of an aerosol delivery device is a smoking-substitute system, which is an electronic system that permits the user to simulate the act of smoking by producing an aerosol or vapour that is drawn into the lungs through the mouth and then exhaled. The inhaled aerosol or vapour typically bears nicotine and/or other flavourings without the odour and health risks associated with traditional smoking and tobacco products. In use, the user experiences a similar satisfaction and physical sensation to those experienced from a traditional smoking or tobacco product, and exhales an aerosol or vapour of similar appearance to the smoke exhaled when using such traditional smoking or tobacco products.

[0003] One approach for a smoking substitute system is the so-called "vaping" approach, in which a vaporisable liquid, typically referred to (and referred to herein) as "e-liquid", is heated by a heating element to produce an aerosol/vapour which is inhaled by a user. The e-liquid typically includes a base liquid as well as nicotine and/or flavourings. The resulting vapour therefore also typically contains nicotine and/or flavourings. The base liquid may include propylene glycol and/or vegetable glycerine.

[0004] A typical vaping smoking substitute system includes a mouthpiece, a power source (typically a battery), a tank for containing e-liquid, as well as a heating element. In use, electrical energy is supplied from the power source to the heating element, which heats the e-liquid to produce an aerosol (or "vapour") which is inhaled by a user through the mouthpiece.

[0005] Vaping smoking substitute systems can be configured in a variety of ways. For example, there are "closed system" vaping smoking substitute systems, which typically have a sealed tank and heating element. The tank is pre-filled with e-liquid and is not intended to be refilled by an end user. One subset of closed system vaping smoking substitute systems include a device which includes the power source, wherein the device is configured to be physically and electrically coupled to a consumable including the tank and the heating element. The consumable may also be referred to as a cartomizer. In this way, when the tank of a consumable has been emptied, the consumable is disposed of. The device can be reused by connecting it to a new, replacement, consumable. Another subset of closed system vaping smoking substitute systems are completely disposable, and

intended for one-use only.

[0006] There are also "open system" vaping smoking substitute systems which typically have a tank that is configured to be refilled by a user. In this way the system can be used multiple times.

[0007] An example vaping smoking substitute system is the myblu® system. The myblu® system is a closed system which includes a device and a consumable component. The device and consumable component are physically and electrically coupled together by pushing the consumable component into the device. The device includes a rechargeable battery. The consumable component includes a mouthpiece, a sealed tank which contains e-liquid, as well as a heating element, which for this system is a heating filament coiled around a portion of a wick. The wick is partially immersed in the e-liquid, and conveys e-liquid from the tank to the heating filament. The device is activated when a microprocessor on board the device detects a user inhaling through the mouthpiece. When the system is activated, electrical energy is supplied from the power source to the heating element, which heats e-liquid from the tank to produce a vapour which is inhaled by a user through the mouthpiece.

[0008] For a smoking substitute system it is desirable to deliver nicotine into the user's lungs, where it can be absorbed into the bloodstream. As explained above, in the vaping approach, e-liquid is heated by a heating element to produce an aerosol/vapour which is inhaled by a user. Many e-cigarettes also deliver flavour to the user, to enhance the experience. Flavour compounds are contained in the e-liquid that is heated. Heating of the flavour compounds may be undesirable as the flavour compounds are inhaled into the user's lungs. Toxicology restrictions are placed on the amount of flavour that can be contained in the e-liquid. This can result in some e-liquid flavours delivering a weak and underwhelming taste sensation to consumers in the pursuit of safety.

[0009] In some smoking substitute systems, liquid aerosol precursors are delivered for vaporisation/aerosolisation using a liquid transfer element which may be an elongate member. This liquid transfer element is supported within the vaping component so as to be in fluid communication with the e-liquid. Assembly of the component can be problematic as the liquid transfer element has to be positioned and secured within the component. This is typically carried out by applying a compressive force to push the liquid transfer element into position. The liquid transfer element is susceptible to distortion or damage upon the application of the compressive force, especially if it is not applied equally across the liquid transfer element.

[0010] The present invention has been devised in light of the above considerations.

Summary of the Invention

[0011] According to a first aspect there is provided a method for assembly of an aerosol delivery component,

said method comprising:

- a) providing a component housing having an aperture in communication with an aerosolisation chamber and a housing interior space;
- b) providing an elongate liquid transfer element having an upstream portion and a downstream portion;
- c) inserting the elongate liquid transfer element through the aperture and aerosolisation chamber such that the upstream portion of the liquid transfer element extends into the housing interior space;
- d) mounting the component housing and liquid transfer element in a mounting space defined between a base portion and a head portion of an assembly tool, with the head portion in abutment with the downstream portion of the liquid transfer element; and
- e) moving the head portion relative to the base portion to move the liquid transfer element until the downstream portion of the liquid transfer element is positioned within the aerosolisation chamber.

[0012] By mounting the component housing and liquid transfer element within a mounting space between a head portion and a base portion of an assembly tool and then moving the head portion relative to the base portion (such that the mounting space reduces in dimension), the magnitude and direction of the pushing force necessary to move the liquid transfer element can be better controlled thus minimising distortion and damage of the liquid transfer element.

[0013] Optional features will now be set out. These are applicable singly or in any combination with any aspect.

[0014] In some embodiments, the method comprises mounting the component housing (e.g. an upstream end of the component housing) on a base plate of the base portion. The method may comprise restricting movement e.g. restricting lateral movement of the component housing relative to the base portion and/or head portion of the tool. The method may comprise restricting lateral movement of the component housing on the base plate. For example, the base plate may comprise a restrictor e.g. an annular restrictor for abutment with the component housing e.g. for encircling the component housing.

[0015] In some embodiments, the method comprises restricting lateral movement of the head portion relative to the base portion. This ensure that the pushing force is applied in a direction aligned with the axis of the liquid transfer element to eliminate any bending forces on the liquid transfer element.

[0016] The method may comprise engaging and pushing the downstream end of the liquid transfer element with the head portion. The head portion may be moved vertically towards the base portion such that the liquid transfer element is pushed vertically within the housing

interior space. For example, the head portion may comprise a head plate which may lie parallel but (vertically) spaced from the base plate of the base portion and the method may comprise moving the head plate (vertically) towards the base plate to reduce the vertical height of the mounting space therebetween. As the mounting space between the head and base portion reduces, the liquid transfer element is forced further into the housing interior space.

[0017] The method may comprise providing a projection depending downwardly from the head plate, the method further comprising abutting/engaging the downstream portion of the liquid transfer element with the projection to push the liquid transfer element through the aperture.

[0018] In some embodiments, the method further comprises axially guiding the liquid transfer element within the housing interior space. For example, the method may comprise providing the base portion with an axial guide tube for receiving and guiding the liquid transfer element. The axial guide tube may extend from the base plate into the mounting space such that, upon mounting of the component housing within the mounting space, the guide tube extends axially within the housing interior space.

[0019] In some embodiments, the method comprises providing a support collar within the component housing for supporting the liquid transfer element. The support collar may comprise a collar aperture providing communication between the aerosolisation chamber and the housing interior space. The support collar may be integral with the component housing. The method may comprise: inserting the liquid transfer element through the collar (aperture); and pushing the downstream portion of the liquid transfer element so that the upstream portion moves within the interior space through the collar (aperture).

[0020] In some embodiments, the method comprises providing a component housing having a mouthpiece portion at its downstream end and the aperture is provided in the mouthpiece portion. In this regard, the aperture may be described as a mouthpiece aperture. The aerosolisation chamber may be located upstream and proximate to (and in fluid communication with) the mouthpiece aperture of the component. The support collar may be integrally formed with the mouthpiece portion of the component housing.

[0021] The method may comprise providing a liquid transfer element comprising an upstream conveying portion and a downstream aerosol generating portion. The method may comprise pushing the downstream aerosol generating portion until it is positioned within the aerosolisation chamber.

[0022] The upstream conveying portion may be elongate and generally cylindrical.

[0023] The downstream aerosol generating portion of the liquid transfer element may define a downstream longitudinal end face of the liquid transfer element. The method may comprise pushing the downstream longitu-

dinal end face of the liquid transfer element (e.g. by abutment/engagement of the head portion projection with the downstream longitudinal end face of the liquid transfer element).

[0024] The downstream aerosol generating portion may define an enlarged (e.g. radially enlarged) portion of the liquid transfer element. For example, the method may comprise providing a liquid transfer element having a bulb-shaped or bullet-shaped downstream aerosol generating portion; and pushing the downstream portion (e.g. the downstream longitudinal end face) until the bulb-/bullet-shaped upstream portion is located in the aerosolisation chamber. The upstream aerosol generating portion may taper (inwardly) to a tip at a downstream end of the aerosol generating portion (i.e. proximate the (mouthpiece) aperture). The aerosol-generating portion may have a flattened downstream end surface.

[0025] The aerosol delivery component may be a smoking substitute component (e.g. an e-cigarette component).

[0026] The aerosol delivery component may be a consumable part of an aerosol delivery system e.g. a consumable for a smoking substitute system. In this regard, the component may be termed "a consumable component".

[0027] The component housing, aerosolisation chamber and liquid transfer element may form part of a passive aerosolisation portion configured to generate a first aerosol in such a way that does not use heat. Accordingly, the liquid transfer element may be referred to as a "passive" aerosol generator.

[0028] The method may further comprise providing a tank defining a storage chamber for containing a first aerosol precursor e.g. a liquid flavourant or an e-liquid.

[0029] The tank may at least partly surround (e.g. may fully surround) the conveying portion of the liquid transfer element. That is, the method may comprise, after pushing the liquid transfer element through the aperture such that the downstream aerosol generating portion is in the aerosolisation chamber, inserting the upstream conveying portion into the tank e.g. inserting the upstream conveying portion of the liquid transfer element into a conduit extending within the tank. Thus, the conveying portion may extend generally longitudinally (e.g. centrally) through a portion of the tank (i.e. through the conduit defined by the tank). In this way, the liquid transfer element may extend into the storage chamber so as to be in contact with (e.g. at least partially submerged in) the first aerosol precursor. Accordingly, after manufacture, the liquid transfer element may be configured to convey (e.g. via a wicking/capillary action) the first aerosol precursor from the storage chamber to the aerosolisation chamber. As will be described further below, this may allow the first aerosol precursor to form the first aerosol and be entrained in an airflow passing through the aerosolisation chamber (i.e. for subsequent receipt in a user's mouth) during use.

[0030] The method may further comprise providing a

flow passage for fluid flow through the component. The flow passage may be provided to extend generally in a longitudinal direction between (and may fluidly connect) an inlet of the passive aerosolisation portion to the aperture in the component housing (e.g. the mouthpiece aperture in the mouthpiece portion of the component housing) at a downstream end of the flow passage..

[0031] The aerosolisation chamber forms part of the flow passage within the passive aerosolisation portion. After manufacture and during use, airflow through the flow passage may pass across or through the aerosol generating portion of the liquid transfer element prior to being discharged through the mouthpiece aperture. In this respect, after manufacture, a user may draw fluid (e.g. air) into and through the flow passage of the passive aerosolisation portion by inhaling at the mouthpiece aperture

[0032] The terms "upstream" and "downstream" are used with reference to the direction of airflow (from inlet to outlet) through the component during normal use of the component (i.e. by way of inhalation at the mouthpiece aperture). Similarly, the terms "upper" and "lower" are used with reference to the component or to the assembly tool during normal use (i.e. in an upright orientation (i.e. with the mouthpiece aperture/head portion uppermost)).

[0033] The method may comprise providing the tank to at least partially define the flow passage. For example, the method may comprise providing the flow passage between an outer surface of the tank and an inner surface of the component housing.

[0034] The flow passage may be constricted (i.e. narrowed) at the aerosolisation chamber. For example, the presence of the aerosol generating portion in the flow passage may create a constricted or narrowed portion of the flow passage (because, after manufacture, the aerosol generating portion extends partway across the flow passage). In this respect, the method may comprise providing the narrowest portion of the flow passage at the aerosolisation chamber (adjacent to the aerosol generating portion of the liquid transfer element). This constriction of the flow passage increases the velocity of air/vapour passing through the aerosolisation chamber during use. In this respect, the constriction may be referred to as a Venturi aperture. The constriction may have a toroidal shape (i.e. extending about the aerosol generating portion of the liquid transfer element). The toroidal shape may, however, be interrupted by supports (e.g. projections, ribs, etc.) protruding inwardly from wall(s) of the flow passage to support the aerosol generating portion in the aerosolisation chamber.

[0035] In addition to increasing the airflow velocity, during use, the constriction reduces the air pressure of the airflow flowing through the constriction (i.e. in the vicinity of the aerosol generating portion). This low pressure and high velocity facilitate the generation of the first aerosol from the first aerosol precursor held in the aerosol generating portion (i.e. transferred from the storage chamber

by the liquid transfer element). The first aerosol is entrained in the airflow passing through the constriction and is discharged from the mouthpiece aperture of the aerosol delivery component.

[0036] The method may further comprise providing an active aerosolisation portion configured to use applied energy such as heat to vaporise a second liquid aerosol precursor to form a second aerosol.

[0037] The method may comprise providing the active aerosolisation portion upstream of the passive aerosolisation portion.

[0038] In some embodiments, the method comprises integrally forming the passive aerosolisation portion and the active aerosolisation portion.

[0039] The method may comprise providing the active aerosolisation portion with a vaporising chamber and a vapour outlet channel for fluid flow therethrough. The method may comprise fluidly connecting the vapour outlet channel to the flow passage of the passive aerosolisation portion of the component i.e. to the inlet of the flow passage through the passive aerosolisation portion. Thus, after manufacture, an airflow may be drawn into and through the active aerosolisation portion, and subsequently through the passive aerosolisation portion.

[0040] The method may comprise providing the active aerosolisation portion with a reservoir defined by a container for containing a second aerosol precursor (which may be an e-liquid). The second aerosol precursor may, for example, comprise a base liquid and a physiologically active compound e.g. nicotine. The base liquid may include an aerosol former such as propylene glycol and/or vegetable glycerine.

[0041] The method may comprise providing the vapour outlet channel extending longitudinally through the container, wherein a channel wall of the vapour outlet channel may define the inner wall of the container. In this respect, the container may surround the vapour outlet channel, such that the container may be generally annular.

[0042] The method may comprise providing the active aerosolisation portion with a vaporiser. The vaporiser may be provided in the vaporising chamber.

[0043] The vaporiser may comprise a porous wick. The vaporiser may further comprise a heating element which may be in the form of a filament wound around the wick. A portion of the wick may be exposed to fluid flow in the vaporising chamber. The wick may also comprise one or more portions in contact with the second aerosol precursor stored in the reservoir. For example, opposing ends of the wick may protrude into the reservoir and a central portion (between the ends) may extend across the vaporising chamber so as to be exposed to air flow in the vaporising chamber. Thus, after manufacture and during use, fluid may be drawn (e.g. by capillary action) along the wick, from the reservoir to the exposed portion of the wick.

[0044] The heating element may be electrically connected (or connectable) to a power source. Thus, in op-

eration, the power source may supply electricity to (i.e. apply a voltage across) the heating element so as to heat the heating element. This may cause liquid stored in the wick (i.e. drawn from the reservoir) to be heated so as to form a vapour and become entrained in fluid/air flowing through the vaporising chamber. This vapour may subsequently cool to form an aerosol in the vapour outlet channel. This aerosol is hereinafter referred to as the second aerosol. This aerosol generation may be referred to as "active" aerosol generation, because it makes use of heat to generate the aerosol.

[0045] This second aerosol may, after manufacture and during use, subsequently flow from the vapour outlet channel to (and through) the flow passage of the passive aerosolisation portion of the component. Thus, the fluid received through the mouthpiece aperture of the aerosol delivery component may be a combination of the first aerosol and the second aerosol.

[0046] The second aerosol generated is sized for pulmonary penetration (i.e. to deliver an active ingredient such as nicotine to the user's lungs). The second aerosol is formed of particles having a mass median aerodynamic diameter of less than or equal to 10 microns, preferably less than 8 microns, more preferably less than 5 microns, yet more preferably less than 1 micron. Such sized aerosols tend to penetrate into a human user's pulmonary system, with smaller aerosols generally penetrating the lungs more easily. The second aerosol may also be referred to as a vapour.

[0047] The component may be manufactured to be used in an aerosol delivery system (e.g. a smoking substitute system) comprising a device having a power source.

[0048] The component may be manufactured to be engageable/engaged with the device such that the vaporiser of the component/consumable is connected to the power source of the device.

[0049] For example, the active aerosolisation portion may be configured for engagement with the device.

[0050] The method may comprise providing the component with an electrical interface for interfacing with a corresponding electrical interface of the device. One or both of the electrical interfaces may include one or more electrical contacts. Thus, after manufacture, when the device is engaged with the component, the electrical interface may be configured to transfer electrical power from the power source to a heater of the component.

[0051] In a second aspect, there is provided an aerosol delivery component assembly tool for carrying out the method of the first aspect.

[0052] The tool may comprise: a base portion and a head portion defining a mounting space therebetween for receiving the component housing, wherein the base portion is configured to support the component housing and wherein the head portion is movable relative to the base portion to push the liquid transfer element into the component housing.

[0053] The head portion and base portion are prefer-

ably separate components that are mutually engageable to define the mounting space.

[0054] In some embodiments, the base portion of the tool comprises a base plate for mounting the component housing (e.g. for mounting an upstream end of the component housing).

[0055] The head portion may comprise a head plate which is spaced e.g. vertically spaced from the base plate and which may be parallel to the base plate. The head portion/head plate may comprise a downwardly-dependent projection for abutting/engaging the downstream portion of the liquid transfer element to push the liquid transfer element into the component housing.

[0056] The base plate and/or the head plate may be substantially circular plates. The plates may define the upper and lower ends of the mounting space such that the spacing e.g. the vertically spacing is equal to the height dimension of the mounting space. The height of the mounting space may be variable by movement of the head portion/plate towards the base portion/base plate.

[0057] The base portion/base plate may be configured to restrict lateral movement of the component housing. In some embodiments, the base portion/base plate comprises a restrictor e.g. an annular restrictor for abutment with the component housing e.g. for encircling an upstream end of the component housing. The restrictor restricts lateral movement of the component housing relative to the base portion.

[0058] In some embodiments, the mounting space is further partly defined by a peripheral base wall extending (upwardly) from the base plate. The peripheral base wall may at least partially circumscribe the base plate e.g. it may be a circumferentially-extending wall. An upper end of the peripheral base wall may define an opening for insertion of the component housing into the mounting space.

[0059] In some embodiments, the mounting space is further partly defined by a peripheral head wall extending (downwardly) from the head plate. The peripheral head wall may at least partially circumscribe the head plate e.g. it may be a circumferentially-extending wall.

[0060] The head portion and base portion may be configured to restrict lateral movement therebetween. In this regard, the head and base portions (e.g. the peripheral base/head walls) may be provided with mutually engageable alignment features. The alignment features may allow the peripheral walls to intermesh and the intermeshed peripheral walls may encircle the mounting space.

[0061] For example, the peripheral base wall and peripheral head wall may be each castellated/crenulated with the crenulations forming engageable alignment features. The crenulations of the peripheral base wall and peripheral head wall may intermesh (e.g. to encircle the mounting space).

[0062] The crenulations on the peripheral base wall may have chamfered longitudinally-extending edges. The crenulations on the peripheral head wall may have

complimentary chamfered longitudinally-extending edges so that they align with the crenulations on the peripheral base wall.

[0063] The intermeshing of the peripheral walls restricts lateral movement of the head portion relative to the base portion. This ensure that the pushing/compressive force is applied in a direction aligned with the axis of the liquid transfer element to eliminate any bending forces on the liquid transfer element.

[0064] In some embodiments, the base portion/base plate comprises an axial guide tube for receiving and guiding the liquid transfer element. The guide tube may extend axially from the base plate and may be encircled by the restrictor.

[0065] The invention includes the combination of the preferred features described except where such a combination is clearly impermissible or expressly avoided.

Summary of the Figures

[0066] So that the invention may be understood, and so that further aspects and features thereof may be appreciated, embodiments illustrating the principles of the invention will now be discussed in further detail with reference to the accompanying figures, in which:

Figures 1A and 1B is a schematic drawing of an aerosol delivery system;

Figures 2A and 2B shows a base portion of an assembly tool;

Figure 3 shows a component housing and liquid transfer element;

Figure 4 shows the component housing of Figure 3 mounted on the base portion of Figure 2A/2B;

Figure 5 shows a head portion of the assembly tool

Figure 6 shows a perspective view of the engagement of the base portion and the head portion;

Figure 7A shows a cross section through the engaged head and base portion with the liquid transfer element extending within the space defined between the head and base portions;

Figure 7B shows a cross section through the engaged head and base portion with the space defined between the head and base portions reduced by movement of the head portion towards the base portion;

Figure 8A is a cross-sectional view of a consumable component that can be manufactured using the assembly tool, in a deactivated state; and

Figure 8B is a cross-sectional view of the consumable component of Figure 8A in an activated state.

Detailed Description of the Invention

[0067] Aspects and embodiments of the present invention will now be discussed with reference to the accompanying figures. Further aspects and embodiments will be apparent to those skilled in the art.

[0068] Referring to figures 1A and 1B, there is shown a schematic view of an aerosol delivery system in the form of a smoking substitute system 10. In this example, the smoking substitute system 10 comprises an active aerosolisation portion in the form of cartomizer 101 and a passive aerosolisation portion in the form of flavour pod 102 connected to a device 100. In this example, the device 100 includes elements of the smoking substitute system 10 such as a battery, an electronic controller, and a pressure transducer (not shown). The cartomizer 101 may engage with the device 100 via a push-fit engagement, a screw-thread engagement, or a bayonet fit, for example.

[0069] The flavour pod 102 is configured to engage with the cartomizer 101 and thus with the device 100. The flavour pod 102 may engage with the cartomizer 101 via a push-fit engagement, a screw-thread engagement, or a bayonet fit, for example. Figure 1B illustrates the cartomizer 101 engaged with the device 100, and the flavour pod 102 engaged with the cartomizer 101. As will be appreciated, in this example, the cartomizer 101 and the flavour pod 102 are distinct elements.

[0070] As will be appreciated from the following description, the cartomizer 101 and the flavour pod 102 may alternatively be combined into a single integrated component 303 that implements the combined functionality of the cartomizer 101 and flavour pod 102. In other examples, the cartomizer may be absent, with only a flavour pod 102 present.

[0071] As is set forth above, reference to a "consumable" component may mean that the component is intended to be used once until exhausted, and then disposed of as waste or returned to a manufacturer for re-processing.

[0072] Figures 2A and 2B show a base portion 21 of an assembly tool 20 for manufacturing the consumable component. The base portion 21 comprises a base plate 22 having a substantially circular perimeter. An annular ridge 23a is provided as a restrictor 23 on the base plate 22. As will be described later, the restrictor 23 provides a location to seat a component housing 24 (shown in Figure 3). The restrictor 23 further comprises upstanding alignment portions 23b, 23c for aligning the component housing 24 as it is located within the annular ridge 23a.

[0073] The base plate 22 further comprises an upstanding, elongated axial guide tube 25 which is a hollow cylindrical tube axially centred on the base plate 22 within the annular ridge 23a of the restrictor.

[0074] The base portion 21 further comprises a peripheral

base wall 26 which is a circumferentially-extending wall upstanding from the perimeter of the base plate 22. The peripheral base wall 26 is crenulated/castellated and comprises crenulations 27a, 27b, 27c, 27d spaced by notches 28a, 28b, 28c, 28b. Two diametrically opposed notches 28a, 28c extend to the base plate 22 (i.e. the peripheral base wall does not completely encircle the base plate 22 perimeter in this embodiment.) The two other diametrically opposed notches 28b, 28d are shorter in length and do not extend to the base plate 22. The upper end of the peripheral base wall defines an opening 29.

[0075] The peripheral base wall 26 and base plate 22 partly define a mounting space 30 in which the component housing 24 is mounted.

[0076] In order to manufacture the consumable component, a component housing 24 having a mouthpiece aperture 307 in communication with an aerosolisation chamber 319 and a housing interior space 31 is provided as shown in Figure 3. An elongate liquid transfer element 315 having an upstream conveying portion 317 and a downstream aerosol generating portion 322 is inserted through the aperture 307 so that the upstream conveying portion 317 is within the housing interior space 31.

[0077] The component housing 24 is then inserted into the mounting space 30 through the opening 29 as shown in Figure 4. The open upstream end 24a of the component housing 24 is seated within the annular ridge 23a of the restrictor. The alignment portions 23b, 23c ensure the component housing 24 is aligned within the annular ridge 23a.

[0078] The guide tube 25 extends within the housing interior space 31.

[0079] Figure 5 shows a head portion 32 comprising a head plate 33 which has a circular perimeter. A circumferentially-extending, downwardly depending peripheral head wall 34 encircles the head plate 33. The peripheral head wall 34 is castellated with two pairs of diametrically opposed crenulations 35a, 35b, 35c, 35d spaced by opposing pairs of notches 36a, 36b, 36c, 36d which extend to the head plate.

[0080] A projection 37 having a central nub 38 extends downwardly from the head plate 33.

[0081] After mounting of the component housing 34 on the base plate 22 (as shown in Figure 4), the head portion 32 is engaged with the base portion 20 to define the mounting space 30 between the head plate 33, base plate 22 and peripheral walls 26, 34 as shown in figures 6 and 7A.

[0082] The crenulations 35a-d of the head portion 32 slot into the notches 28a-d of the base portion 21 so that the peripheral base wall 26 and peripheral head wall 34 intermesh. The longitudinally extending walls of the crenulations 27a-d, 35a-d each have complimentary chamfers so that the head portion 32 and base portion 21 align axially as they are engaged.

[0083] The projection 37 from the head plate 33 is axially aligned with the liquid transfer element 315. The up-

stream conveying end 317 of the liquid transfer element 315 is received within the guide tube 25 (which is also axially aligned with the liquid transfer element).

[0084] In order to push the liquid transfer element into its operative position within the component housing 34, the head plate 33 is forced vertically towards the base plate 22 so that the projection 37 abuts and applies a pushing force to the aerosol-generating portion 322 of the liquid transfer element 315 as shown in Figure 7B. This reduces the vertical height of the mounting space 30 between the head plate 33 and base plate 22.

[0085] As the pushing force is applied, the annular restrictor 23a restricts lateral movement of the component housing 34 and the guide tube 25 ensures that the liquid transfer element remains axially centred within the component housing 34. Furthermore, the chamfered surfaces of the notches/crenulations of the peripheral walls 26, 34 ensure there is no lateral movement of the head portion 32 relative to the base portion. In this way, the pushing force applied to the liquid transfer element is uniaxial and thus distortion/damage of the liquid transfer element is avoided. Abutment of the lower end surfaces of the crenulations 35a, 35c of the peripheral head wall 34 with the bases of the shorter notches 28b, 28d of the peripheral base wall 26 and/or abutment of the projection 37 with the component housing 34 limits the vertical movement of the head portion 32 to ensure accurate operative positioning of the liquid transfer element 315 within the component housing. The nub 38 on the projection 37 extends within the mouthpiece aperture 307 when the height of the mounting space 30 is minimised to ensure that the aerosol generating portion 322 of the liquid transfer element 315 is correctly positioning within the aerosolisation chamber, 319.

[0086] Once the assembly tool 20 has been used to position the liquid transfer element 315 in the component housing 24, the assembled component housing and liquid transfer element 315 is removed from the assembly tool and the upstream conveying portion 317 may be inserted (e.g. through a central conduit 324) into a tank 318 defining a storage chamber 316 for containing a first aerosol precursor.

[0087] Together the tank 318, component housing 24 and liquid transfer element 315 form a passive aerosolisation portion which may then be assembled with the active aerosolisation (cartomizer) portion 301.

[0088] Referring to Figure 8A, there is shown an integrated consumable component 303 engageable with a device (not shown) via a push-fit engagement. The consumable may be manufactured as described above using the assembly tool shown in in figures 2 - 7B.

[0089] The consumable component 303 is shown in a deactivated state. The consumable component 303 may be considered to have two portions - the active aerosolisation (cartomizer) portion 301 and the passive aerosolisation (flavour pod) portion 302, both of which are located within a single consumable component 303. It should, however, be appreciated that in a variation, the cartomiz-

er portion 301 and flavour pod portion 302 may be separate (but engageable) portions.

[0090] The consumable component 303 includes an upstream component inlet opening 306 and the downstream mouthpiece aperture 307 (i.e. defining an outlet of the consumable component 303). In other examples, a plurality of inlets and/or outlets are included. Between, and fluidly connecting, the component inlet opening 306 and the mouthpiece aperture 307 there is an airflow passage comprising (in a downstream flow direction) a vapourising chamber 325 of the cartomizer portion 301, a vapour outlet channel 323 (also within the cartomizer portion 301) and a downstream flow passage 321 (which will hereinafter be referred to as the vapour flow passage 321) of the flavour pod portion 302. The mouthpiece aperture 307 is located at the mouthpiece portion 309 of the component housing 24.

[0091] As above, the consumable component 303 includes a passive aerosolisation (flavour pod) portion 302. The flavour pod portion 302 is configured to generate a first (flavoured) aerosol for output from the mouthpiece aperture 307. The flavour pod portion 302 of the consumable component 303 includes the liquid transfer element 315. This liquid transfer element 315 acts as a passive aerosol generator (i.e. an aerosol generator which does not use heat to form the aerosol), and is formed of a porous material. The liquid transfer element 315 comprises the upstream conveying portion 317 and the downstream aerosol generating portion 322, which is located in the vapour flow passage 321. In this example, the aerosol generating portion 322 is a porous nib.

[0092] When activated, as discussed in more detail below, the storage chamber 316 (defined by the tank 318) for storing the first aerosol precursor (i.e. a liquid comprising a flavourant) is fluidly connected to the liquid transfer element 315. In the activated state, the liquid transfer element 315 is in contact with the flavoured aerosol precursor stored in the storage chamber 316.

[0093] The downstream aerosol generating portion 322 is located at a downstream end of the liquid transfer element 315, whilst the upstream conveying portion 317 forms the remainder of the liquid transfer element 315. The conveying portion 317 is elongate and substantially cylindrical. The aerosol generating portion 322 is bulb/bullet-shaped, and comprises a portion which is wider (has a greater radius) than the conveying portion 317. The aerosol generating portion 322 tapers to a tip at a downstream end of the liquid transfer element 315 or may be flattened as shown in Figure 5.

[0094] The liquid transfer element 315 extends into and through the storage chamber 316, such that the conveying portion 317 is in contact with the contents of the storage chamber 316. In particular, an inner wall of the tank 318 defines the conduit 324, through which the liquid transfer element 315 extends. The liquid transfer element 315 and the conduit 324 are located in a substantially central position within the storage chamber 316 and are substantially parallel to a central longitudinal axis of the

component housing 24.

[0095] The porous nature of the liquid transfer element 315 means that first (flavoured) aerosol precursor in the storage chamber 316 is drawn into the liquid transfer element 315. As the flavoured aerosol precursor in the liquid transfer element 315 is depleted in use, further flavoured aerosol precursor is drawn from the storage chamber 316 into the liquid transfer element 315 via a wicking action.

[0096] Before activation, the storage chamber 316 is fluidly isolated from the liquid transfer element 315. In this example, the isolation is achieved via a plug 320 (preferably formed from silicone) located at one end of a conduit 324 surrounding the liquid transfer element 315.

[0097] The storage chamber 316 further includes an air bleed channel 332, which in the deactivated state is sealed by a sealing element in the form of a pierceable membrane (preferably made from foil). Activation (or piercing) member 330, which projects inwardly from the mouthpiece portion 309, and may take the form of a blade, pierces the pierceable membrane and opens the air bleed channel 332 when the consumable component 303 is moved to the activated state (as is discussed in more detail below).

[0098] The aerosol generating portion 322 is located within the vapour flow passage 321 that extends through the flavour pod portion 302. The aerosol generating portion 322, by occupying a portion of the vapour flow passage 321, constricts or narrows the vapour flow passage 321. This constricted or narrowed portion of the vapour flow passage 321 defines the aerosolisation chamber 319 of the component housing 24. The aerosolisation chamber 319, which is adjacent the aerosol generating portion 322, is the narrowest portion of the vapour flow passage 321. The constriction of the vapour flow passage 321 at the aerosolisation chamber 319 results in increased air velocity and a corresponding reduction in air pressure of the air flowing therethrough and thus may be referred to as a Venturi aperture. The aerosolisation chamber 319 is generally toroidal in shape (extending circumferentially about the aerosol generating portion 322), but this toroidal shape may include one or more interruptions where supports extend inwardly to contact the aerosol generating portion 322 and to support the aerosol generating portion 322 within the aerosolisation chamber 319.

[0099] The cartomizer portion 301 of the consumable component 303 includes a reservoir 305 (defined by a container) for storing a second (e-liquid) aerosol precursor (which may contain nicotine). A wick 311 extends into the reservoir so as to be in contact with (i.e. partially submerged in) the e-liquid aerosol precursor. The wick 311 is formed from a porous wicking material (e.g. a polymer) that draws the e-liquid aerosol precursor from the reservoir 305 into a central region of the wick 311 that is located in the vaporising chamber 325.

[0100] A heater 314 is configured to heat the central region of the wick 311. The heater 314 includes a resistive

heating filament that is coiled around the central region of the wick 311. The wick 311 and the heater 314 generally define a vaporiser, and together with the reservoir 305 act as an active aerosol generator. The vaporiser (i.e. wick 311 and heater 314) and aerosol generating portion 322 are both at least partially located within the airflow passage, with the aerosol generating portion 322 being downstream of the vaporiser.

[0101] So that the consumable component 303 may be supplied with electrical power for activation of the heater 314, the consumable component 303 includes a pair of consumable electrical contacts 313. The consumable electrical contacts 313 are configured for electrical connection to a corresponding pair of electrical supply contacts in the device (not shown). The consumable electrical contacts 313 are electrically connected to the electrical supply contacts (not shown) when the consumable component 303 is engaged with the device. The device includes an electrical power source, for example a battery.

[0102] Figure 8B shows the consumable component 303 of Figure 7A in an activated state. To transition from the deactivated state to the activated state, component housing 24 is moved along a central longitudinal axis 350 in an upstream direction towards cartomizer portion 301. The mouthpiece portion 309 is fixed by the support collar 308 to the downstream conveying portion 317 of the liquid transfer element 315 and therefore liquid transfer element 315 moves with the component housing 24. The component housing and liquid transfer element 315 are moved relative to the tank 316.

[0103] When the component housing 24 is moved upstream, activation/piercing member 330 contacts and pierces a sealing element in the form of a pierceable membrane extending across the air bleed channel 332 thereby fluidly connecting the vapour flow passage 321 the storage chamber 316. This allows air from the vapour flow passage 321 to enter the storage chamber 316 as aerosol precursor is removed from the storage chamber 316 by the liquid transfer element 315.

[0104] In addition to piercing of the membrane by the piercing member 330, liquid transfer element 315 pushes on, and moves, plug 320 out of the conduit 324 which then allows liquid transfer element 315 to come into contact with the flavoured aerosol precursor stored in the storage chamber 316. The plug 320 may then be unconstrained within the storage chamber, or may be pushed by liquid transfer element 315 into a holding location.

[0105] Once activated, and in use, a user draws (or "sucks", "pulls", or "puffs") on the mouthpiece portion 309 of the component housing 24, which causes a drop in air pressure at the mouthpiece aperture 307, thereby generating airflow through the inlet opening 306, along the airflow passage, out of the mouthpiece aperture 307 and into the user's mouth.

[0106] When the heater 314 is activated by passing an electric current through the heating filament in response to the user drawing on the mouthpiece portion 309 (the

drawing of air may be detected by a pressure transducer), the e-liquid located in the wick 311 adjacent to the heating filament is heated and vaporised to form a vapour in the vaporising chamber 325. The vapour condenses to form the e-liquid aerosol within the vapour outlet channel 323. The e-liquid aerosol is entrained in an airflow along the vapour flow passage 321 to the mouthpiece aperture 307 for inhalation by the user when the user draws on the mouthpiece portion 309.

[0107] The device supplies electrical current to the consumable electrical contacts 313. This causes an electric current flow through the heating filament of the heater 314 and the heating filament heats up. As described, the heating of the heating filament causes vaporisation of the e-liquid in the wick 311 to form the e-liquid aerosol.

[0108] As the air flows through the vapour flow passage 321, it encounters the aerosol generating portion 322. The constriction of the vapour flow passage 321, at the aerosolisation chamber 319, results in an increase in air velocity and corresponding decrease in air pressure in the airflow in the vicinity of the porous aerosol generating portion 322. The corresponding low pressure and high air velocity region causes the generation of the flavoured aerosol from the porous surface of the aerosol generating portion 322 of the liquid transfer element 315. The flavoured aerosol becomes entrained in the airflow and ultimately is output from the mouthpiece aperture 307 of the consumable component 303 and into the user's mouth.

[0109] The flavoured aerosol is sized to inhibit pulmonary penetration. The flavoured aerosol is formed of particles with a mass median aerodynamic diameter that is greater than 70 microns. The flavoured aerosol is sized for transmission within at least one of a mammalian oral cavity and a mammalian nasal cavity. The flavoured aerosol is formed by particles having a maximum mass median aerodynamic diameter that is less than 100 microns. Such a range of mass median aerodynamic diameter will produce aerosols which are sufficiently small to be entrained in an airflow caused by a user drawing air through the device and to enter and extend through the oral and or nasal cavity to activate the taste and/or olfactory receptors.

[0110] The e-liquid aerosol generated is sized for pulmonary penetration (i.e. to deliver an active ingredient such as nicotine to the user's lungs). The e-liquid aerosol is formed of particles having a mass median aerodynamic diameter of less than 1 micron. Such sized aerosols tend to penetrate into a human user's pulmonary system, with smaller aerosols generally penetrating the lungs more easily. The e-liquid aerosol may also be referred to as a vapour.

[0111] The size of aerosol formed without heating (in the passive aerosolisation portion) is typically smaller than that formed by condensation of a vapour (formed within the active aerosolisation portion).

[0112] The features disclosed in the foregoing description, or in the following claims, or in the accompanying

drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for obtaining the disclosed results, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

[0113] While the invention has been described in conjunction with the exemplary embodiments described above, many equivalent modifications and variations will be apparent to those skilled in the art when given this disclosure. Accordingly, the exemplary embodiments of the invention set forth above are considered to be illustrative and not limiting. Various changes to the described embodiments may be made without departing from the scope of the invention as defined in the claims.

[0114] For the avoidance of any doubt, any theoretical explanations provided herein are provided for the purposes of improving the understanding of a reader. The inventors do not wish to be bound by any of these theoretical explanations.

[0115] Any section headings used herein are for organizational purposes only and are not to be construed as limiting the subject matter described.

[0116] Throughout this specification, including the claims which follow, unless the context requires otherwise, the words "have", "comprise", and "include", and variations such as "having", "comprises", "comprising", and "including" will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

[0117] It must be noted that, as used in the specification and the appended claims, the singular forms "a," "an," and "the" include plural referents unless the context clearly dictates otherwise. Ranges may be expressed herein as from "about" one particular value, and/or to "about" another particular value. When such a range is expressed, another embodiment includes from the one particular value and/or to the other particular value. Similarly, when values are expressed as approximations, by the use of the antecedent "about," it will be understood that the particular value forms another embodiment. The term "about" in relation to a numerical value is optional and means, for example, +/- 10%.

[0118] The words "preferred" and "preferably" are used herein refer to embodiments of the invention that may provide certain benefits under some circumstances. It is to be appreciated, however, that other embodiments may also be preferred under the same or different circumstances. The recitation of one or more preferred embodiments therefore does not mean or imply that other embodiments are not useful, and is not intended to exclude other embodiments from the scope of the disclosure, or from the scope of the claims.

Claims

1. A method for assembly of an aerosol delivery component, said method comprising:
 - a) providing a component housing having an aperture in communication with an aerosolisation chamber and a housing interior space;
 - b) providing an elongate liquid transfer element having an upstream portion and a downstream portion;
 - c) inserting the elongate liquid transfer element through the aperture and aerosolisation chamber such that the upstream portion of the liquid transfer element extends into the housing interior space;
 - d) mounting the component housing and liquid transfer element in a mounting space defined between a base portion and a head portion of an assembly tool, with the head portion in abutment with the downstream portion of the liquid transfer element; and
 - e) moving the head portion relative to the base portion to move the liquid transfer element until the downstream portion of the liquid transfer element is positioned within the aerosolisation chamber.
2. A method according to claim 1 further comprising restricting movement of the component housing relative to the base portion and/or head portion of the assembly tool.
3. A method according to claim 1 or 2 further comprising restricting lateral movement of the head portion relative to the base portion.
4. A method according to any one of the preceding claims comprising moving the head portion vertically towards the base portion.
5. A method according to any one of the preceding claims further comprising guiding the liquid transfer element within the housing interior space.
6. A method according to any one of the preceding claims wherein the method comprises providing an integral support collar and pushing the downstream portion of the liquid transfer element so that the upstream portion moves within the interior space through the collar.
7. An aerosol delivery component assembly tool comprising a base portion and a head portion defining a mounting space therebetween for receiving the component housing, wherein the base portion is configured to support a component housing and wherein the head portion is movable relative to the base portion to push a liquid transfer element into the component housing.
8. An assembly tool according to claim 7 wherein the base portion comprises a base plate for mounting the component housing and the head portion comprises a head plate which is vertically spaced from the base plate, and wherein the height of the mounting space is variable by movement of the head plate towards the base plate.
9. An assembly tool according to claim 7 or 8 wherein the head portion comprises a downwardly-dependent projection for abutting/engaging a downstream portion of the liquid transfer element.
10. An assembly tool according to any one of claim 7 to 9 wherein the base portion comprises a restrictor for restricting lateral movement of the component housing relative to the base portion.
11. An assembly tool according to any one of claims 7 to 10 wherein the head portion and base portion are configured to restrict lateral movement therebetween.
12. An assembly tool according to claim 11 wherein the head portion and base portion each comprise mutually engagement alignment features.
13. An assembly tool according to claim 11 or 12 wherein the base portion comprises a peripheral base wall and the head portion comprises a peripheral head wall and wherein the peripheral walls can intermesh to encircle the mounting space.
14. An assembly tool according to claim 13 wherein the peripheral walls are crenulated and the crenulations have chamfered longitudinally-extending edges.
15. An assembly tool according to any one of claims 7 to 14 wherein the base portion further comprises a guide tube for axial alignment with the liquid transfer element.

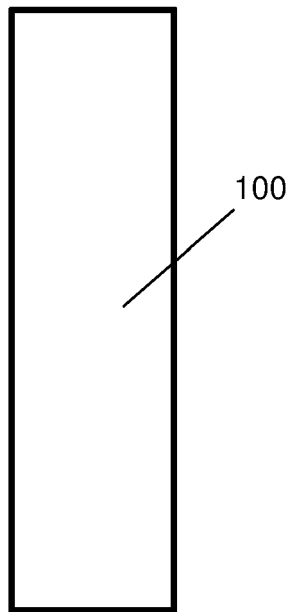
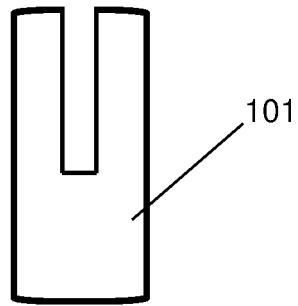
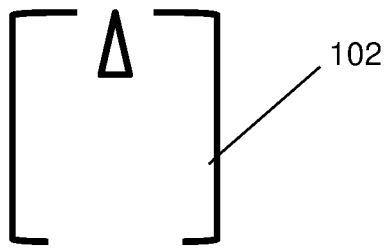


Fig. 1A

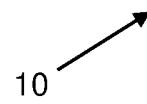
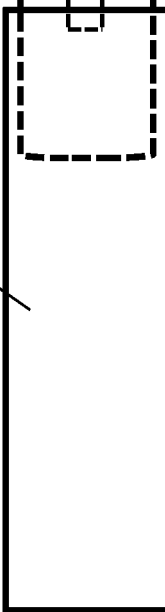
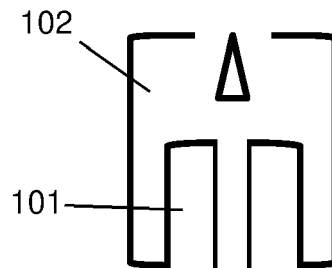
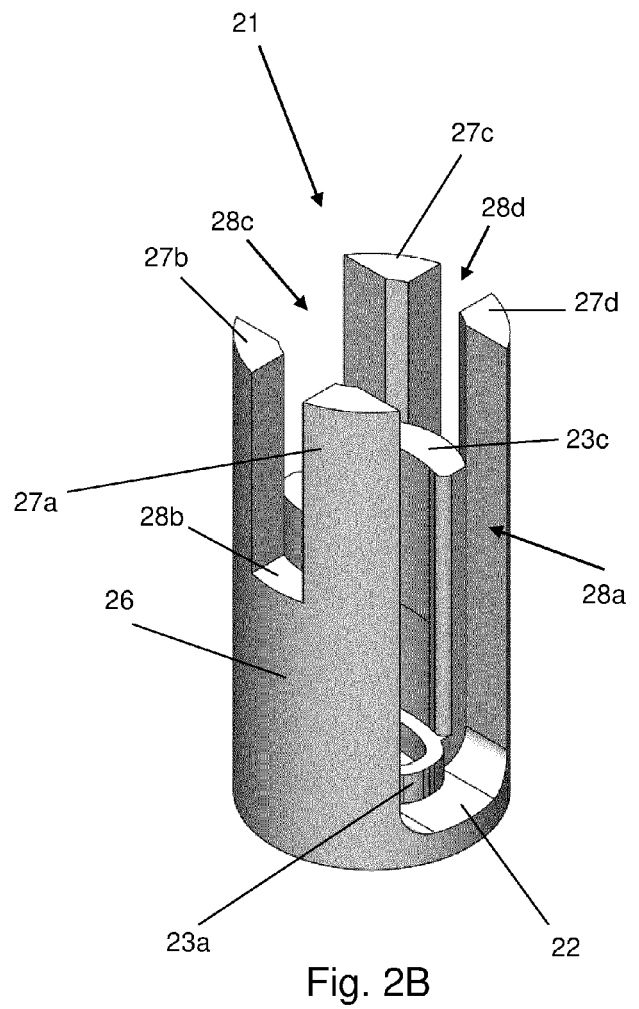
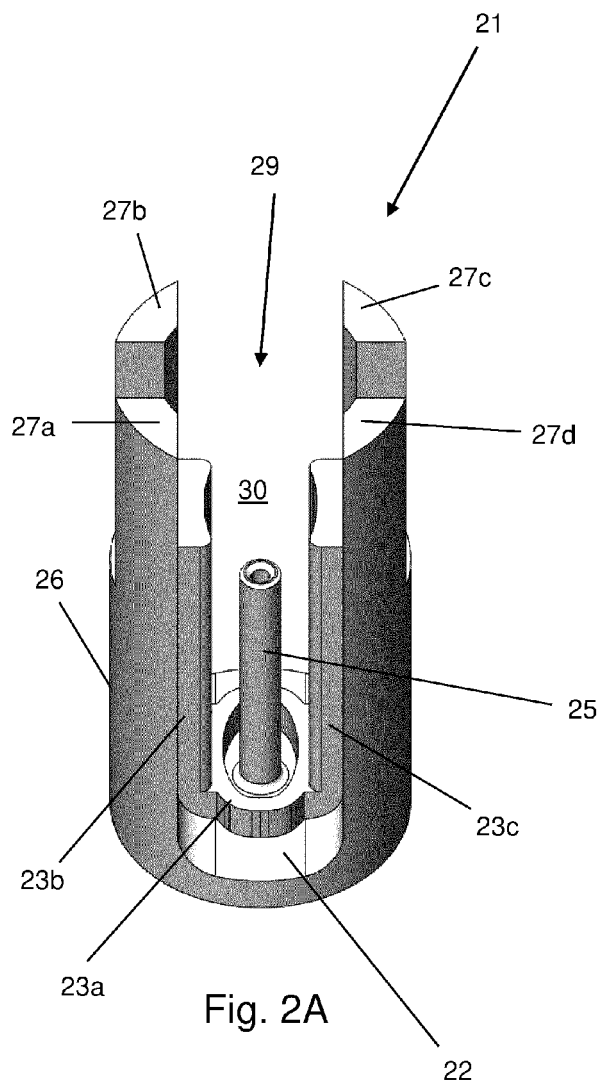


Fig. 1B



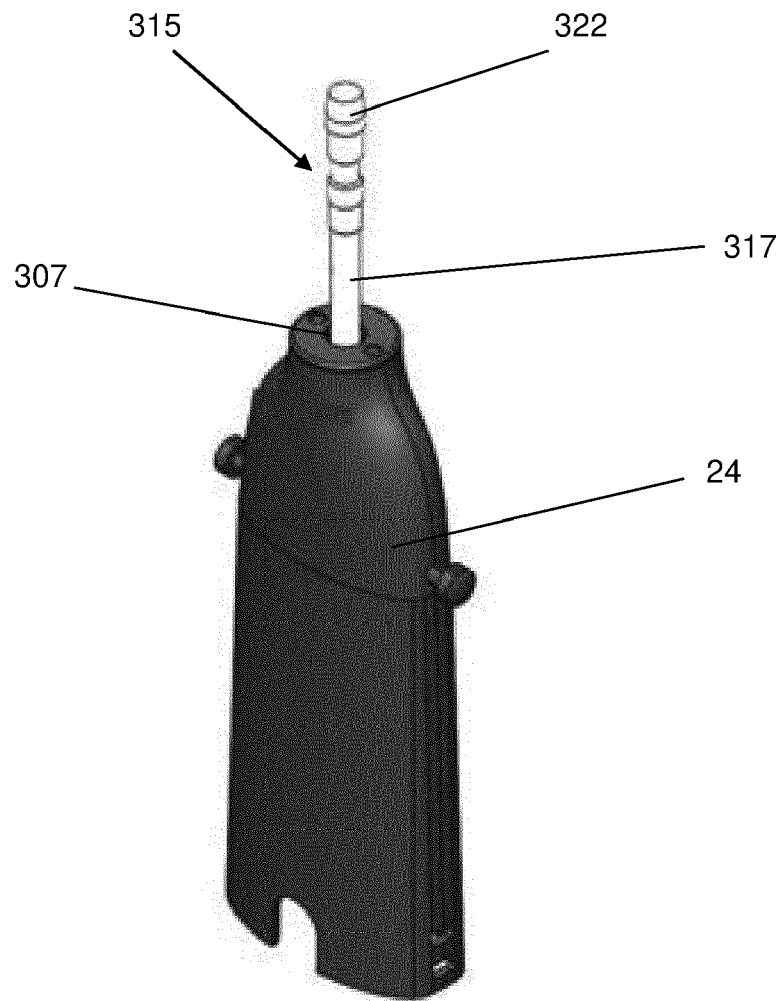
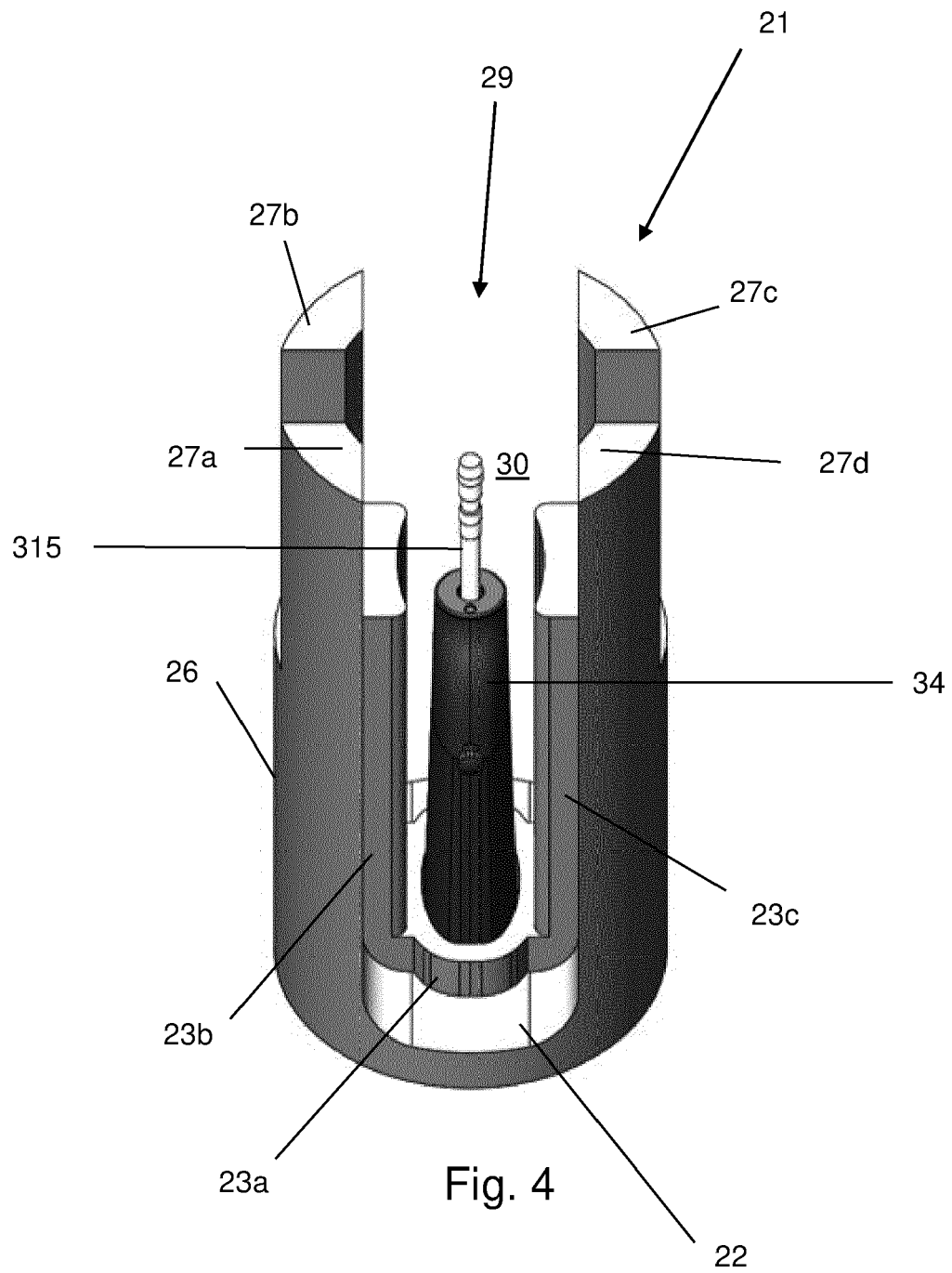
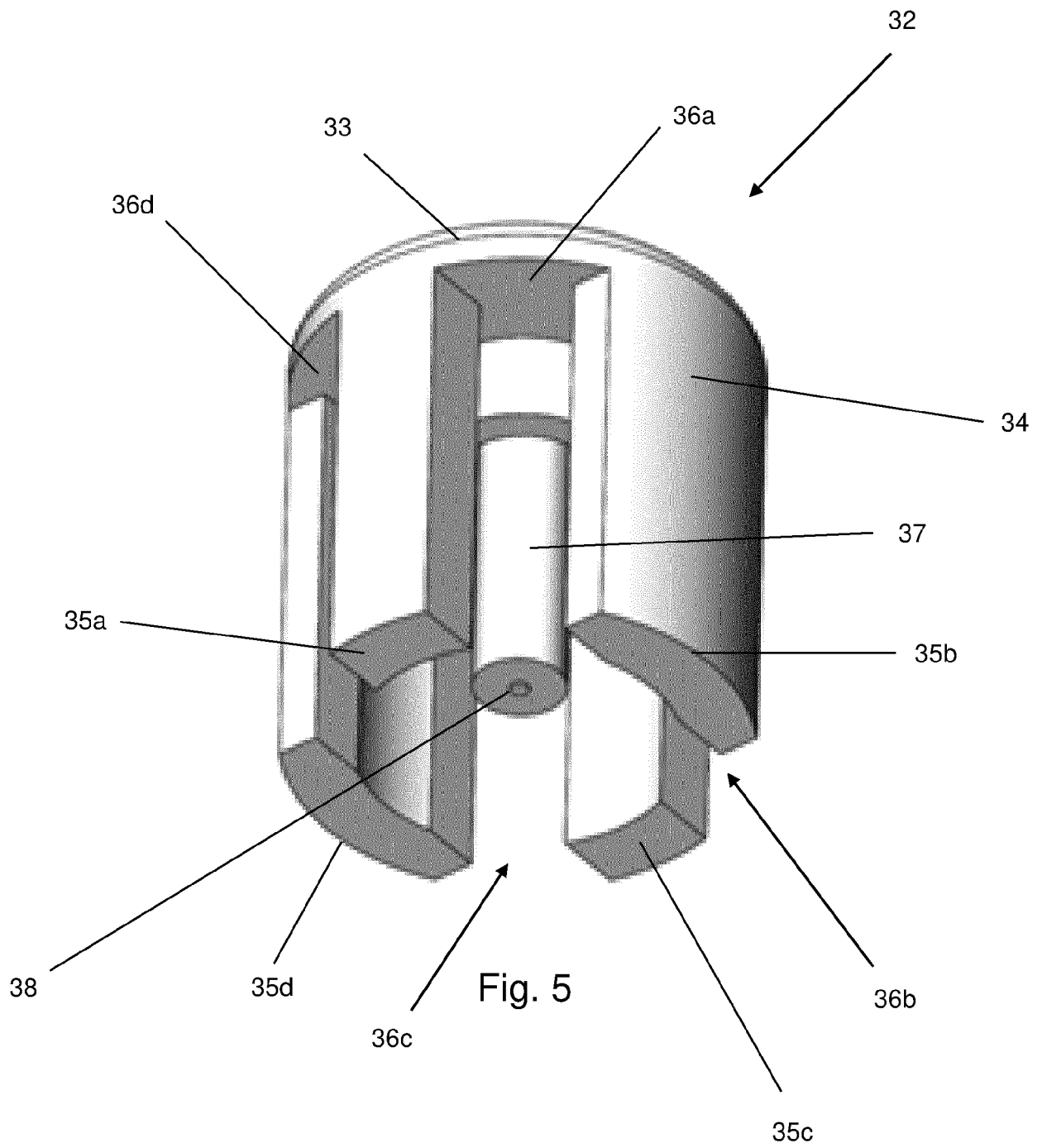


Fig. 3





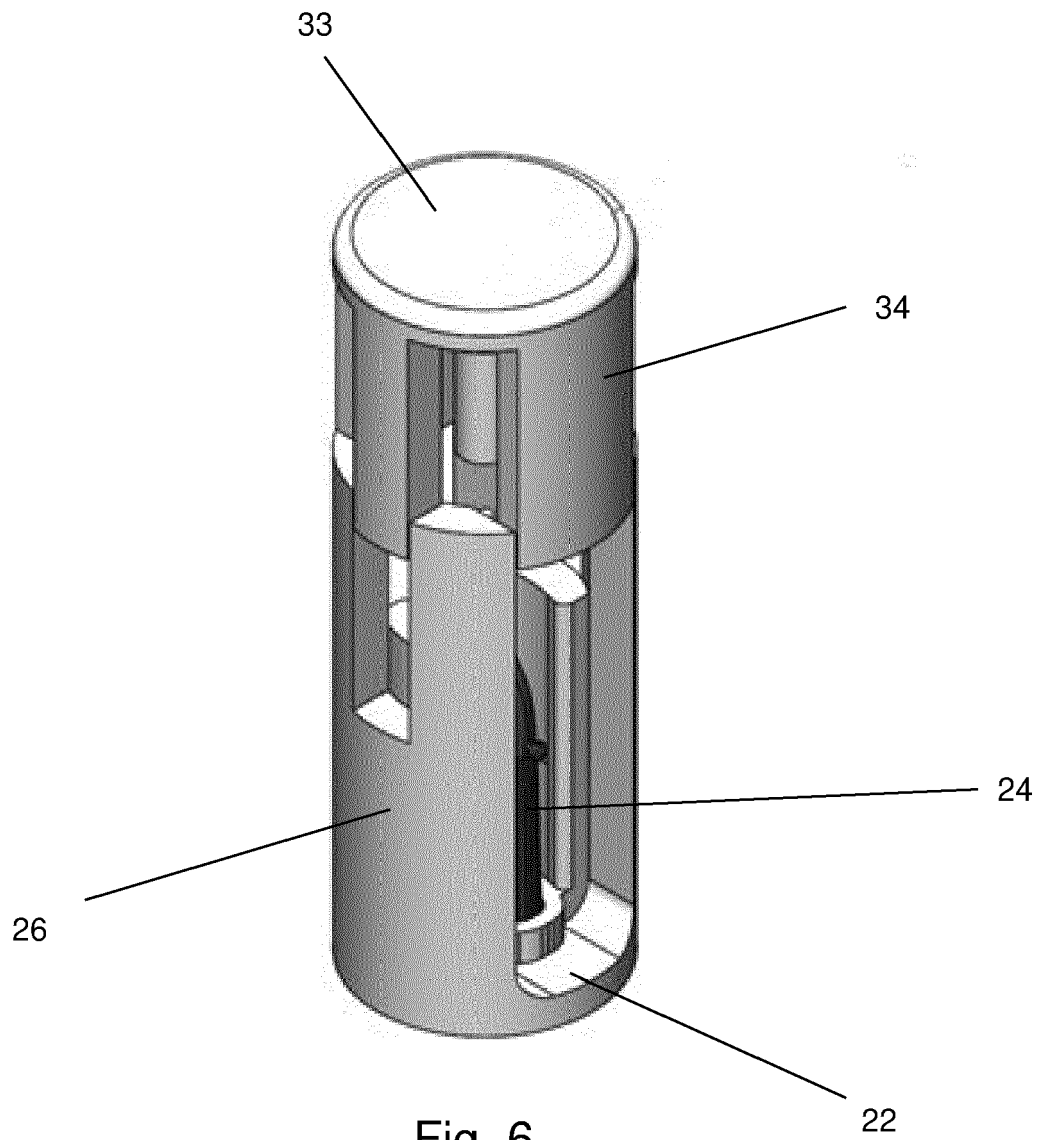


Fig. 6

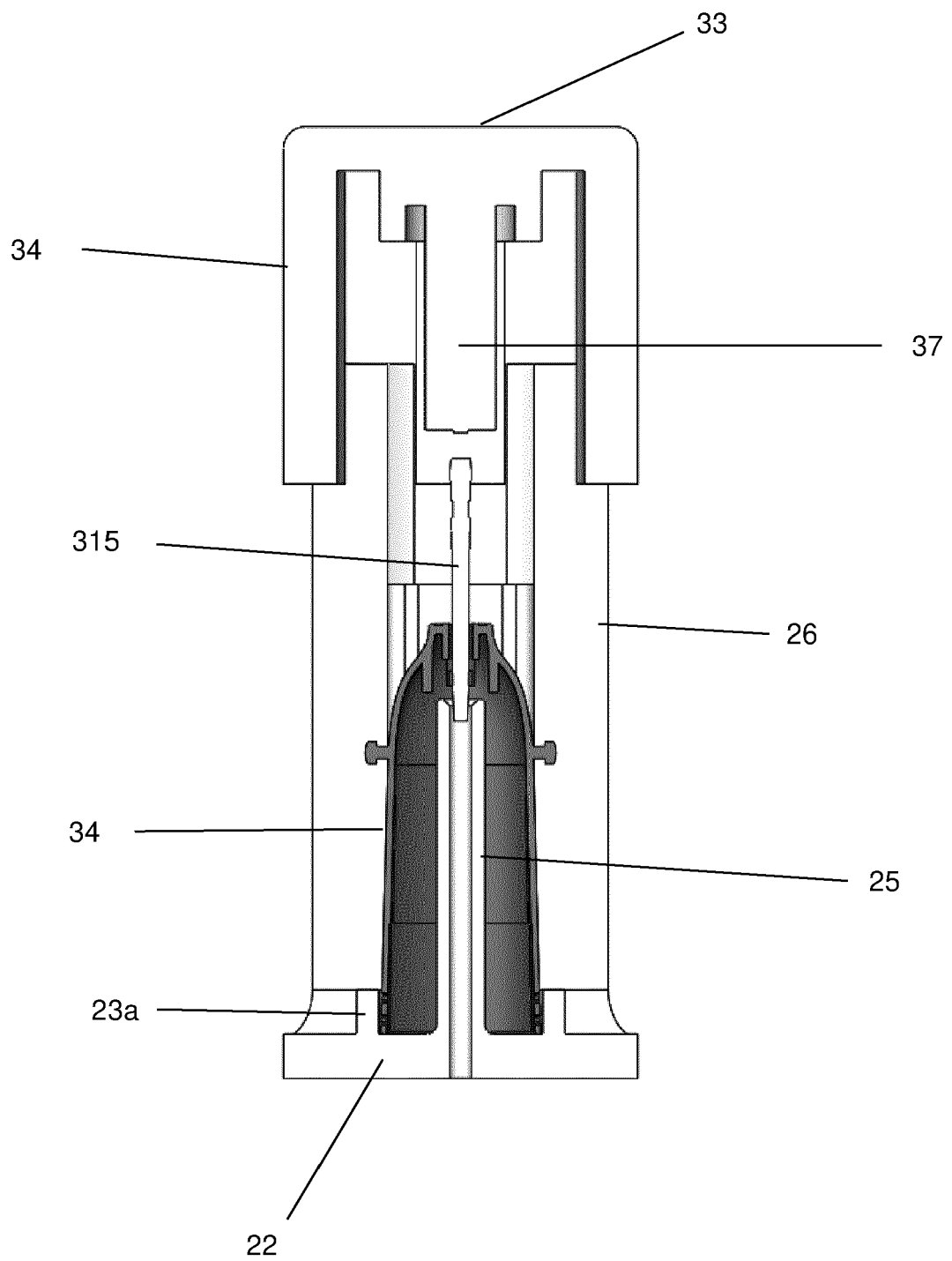


Fig. 7A

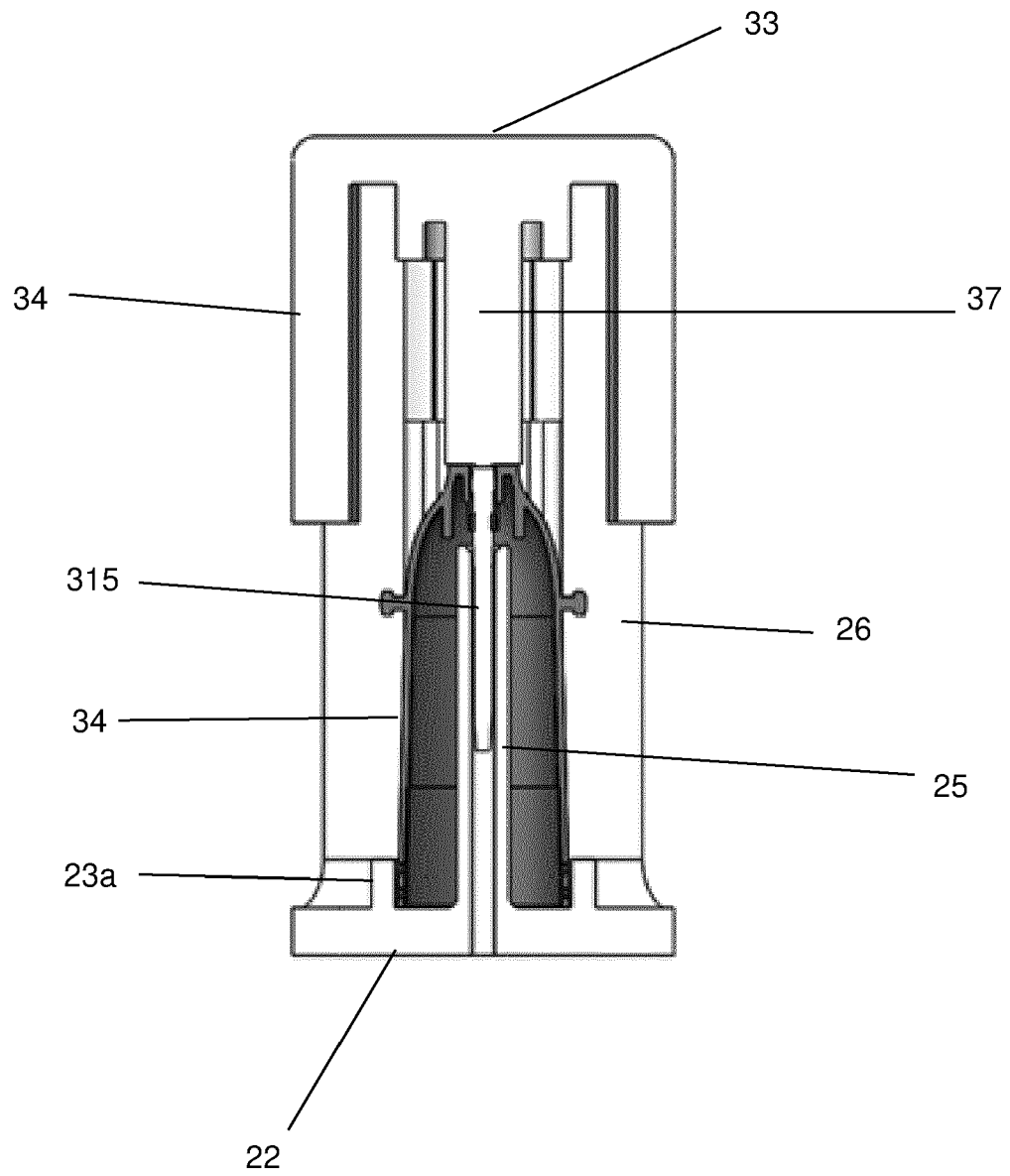


Fig. 7B

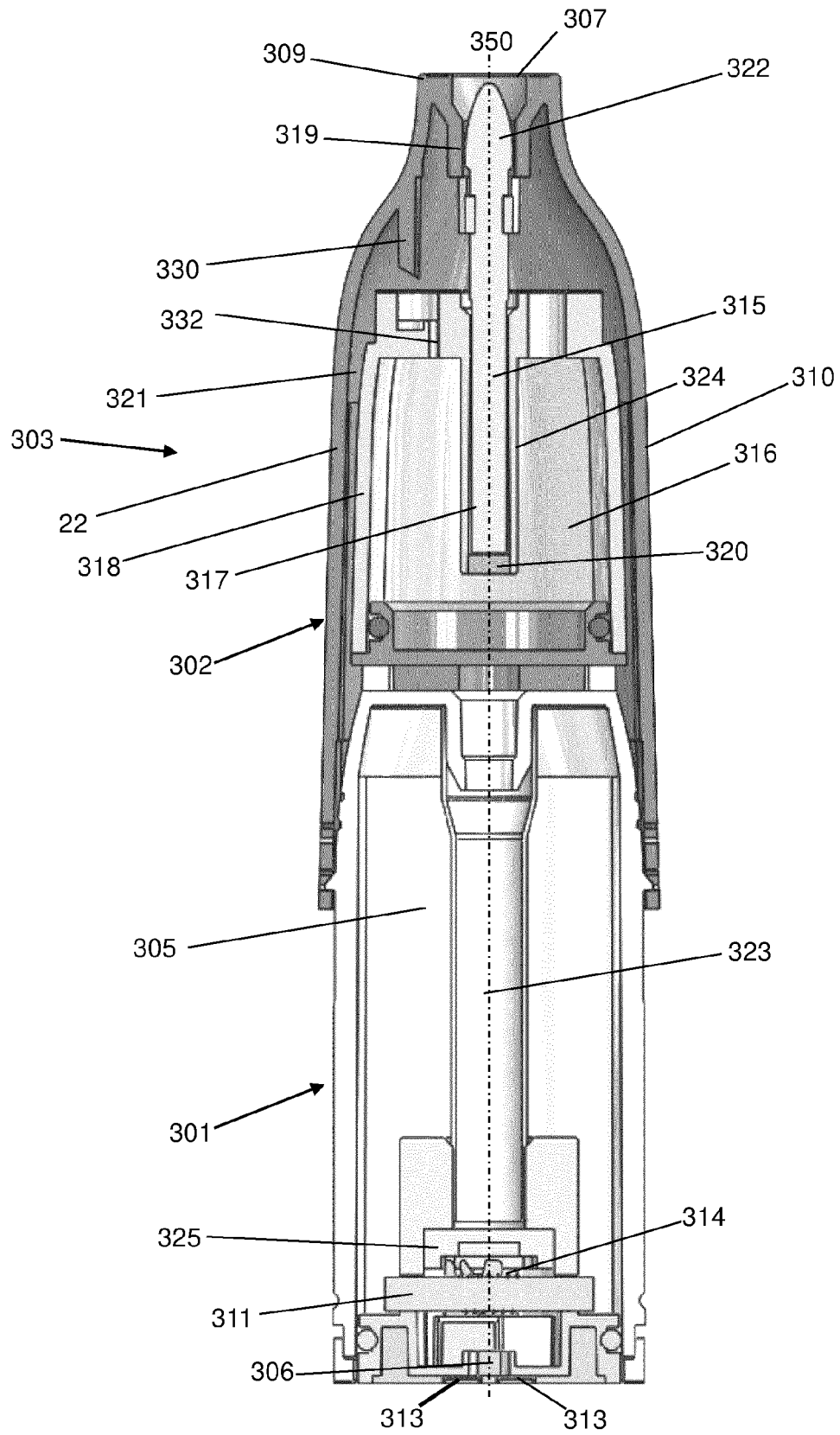


Fig.8A

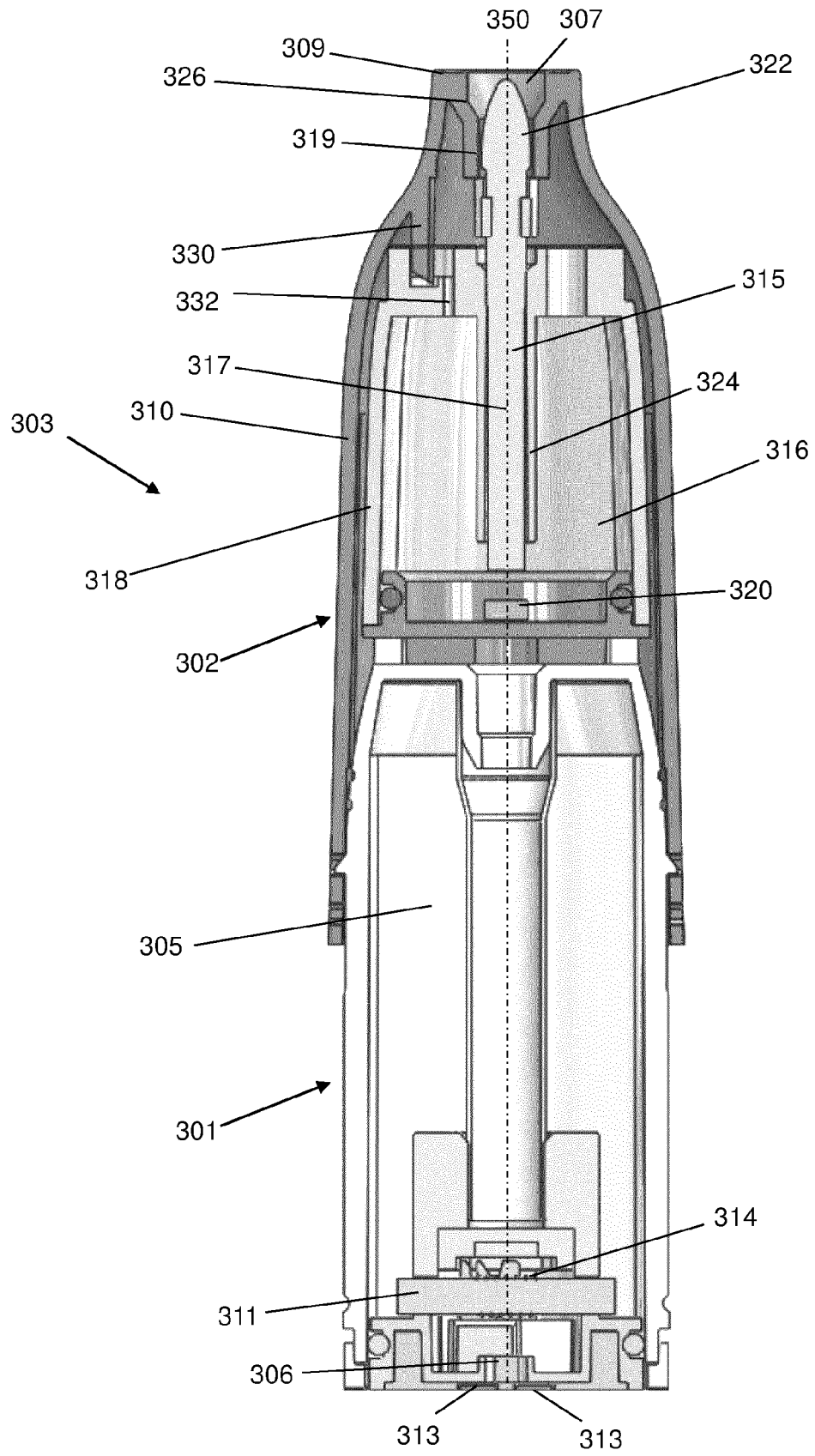


Fig. 8B



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Place of search Munich		Date of completion of the search 8 September 2020	Examiner Cabrele, Silvio
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