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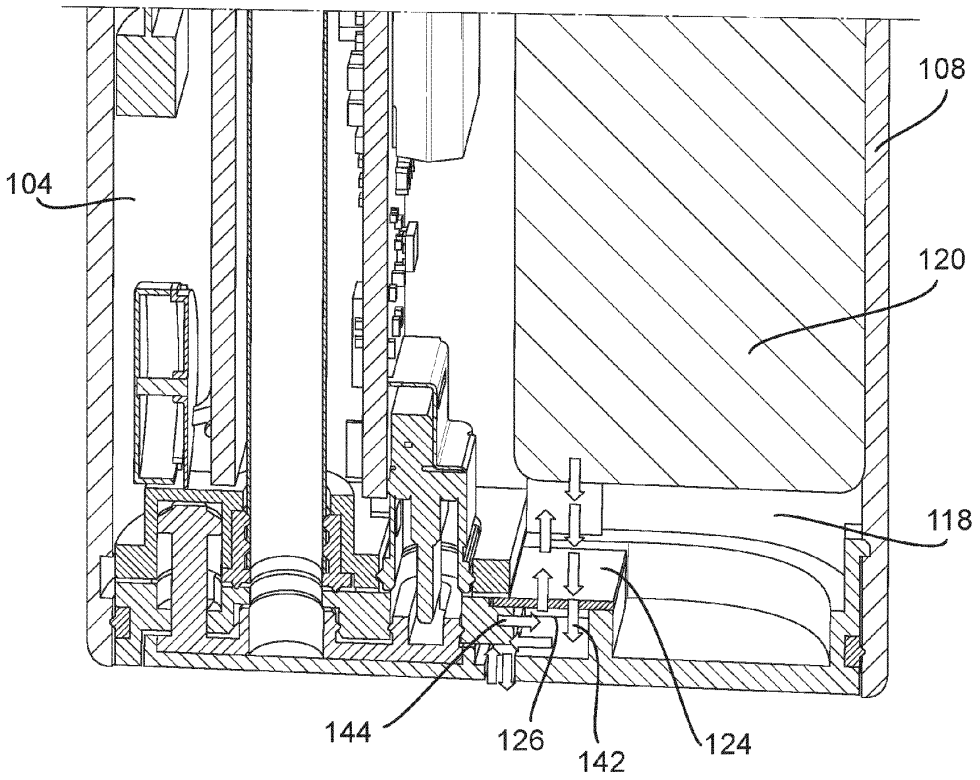
(54) **AEROSOL PROVISION DEVICE**

(57) An aerosol provision device (104) comprising a battery compartment (118) configured to receive a battery (120) for providing power to at least one electrical component of the aerosol provision device (104). The battery compartment (118) comprises an opening (126) which is closed by a gas-permeable element (124).

Fig. 5



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Description

Technical Field

[0001] The present invention relates to an aerosol provision device and an aerosol provision system.

Background

[0002] Smoking articles such as cigarettes, cigars and the like burn tobacco during use to create tobacco smoke. Attempts have been made to provide alternatives to these articles that burn tobacco by creating products that release compounds without burning. Examples of such products are heating devices which release compounds by heating, but not burning, the material. The material may be, for example, tobacco or other non-tobacco products, which may or may not contain nicotine.

Summary

[0003] According to a first aspect of the present invention there is provided an aerosol provision device comprising:

a battery compartment configured to receive a battery for providing power to at least one electrical component of the aerosol provision device;
wherein the battery compartment comprises an opening, and wherein the opening is closed by a gas-permeable element.

[0004] The gas-permeable membrane may advantageously allow hot air to flow out of the battery compartment in the event that the battery generates heat during operation. This may help to prevent a build-up of pressure within the battery compartment, which may otherwise cause damage to the aerosol provision device.

[0005] The gas-permeable element may comprise a gas permeable membrane.

[0006] The opening may be in fluid communication with an exterior of the aerosol provision device.

[0007] The opening may be arranged on a bottom end of the battery compartment.

[0008] The aerosol provision device may further comprise a protective cover spaced from, and extending at least partially over, the gas-permeable element, wherein the protective cover defines a gas flow path extending between the gas-permeable element and an exterior of the aerosol provision device.

[0009] The opening may be arranged at an end of the battery compartment so as to face an end of the battery when the battery is inserted in the battery compartment.

[0010] The gas-permeable element may be waterproof.

[0011] The gas-permeable element may be attached to the battery compartment, so as to close the opening, by at least one of: adhesive tape, a pressure sensitive adhesive, double-sided adhesive tape, welding and ultrasonic welding.

[0012] The gas permeable element may comprise expanded polytetrafluoroethylene (ePTFE).

[0013] According to a second aspect of the present invention there is provided an aerosol provision device comprising:

a battery compartment configured to receive a battery for providing power to at least one electrical component of the aerosol provision device; and
a pressure release element which is impermeable to fluid and configured to break when a pressure within the battery compartment reaches a threshold pressure such that, when broken, air within the battery compartment is able to escape the battery compartment.

[0014] Such a pressure release element may advantageously allow for a controlled release of pressure within the battery compartment, without damage occurring to other parts of the battery compartment or device as a whole, in the even of a pressure build-up within the battery compartment.

[0015] The pressure release element may integrally formed within a wall of the battery compartment.

[0016] The battery compartment may comprise a pressure release opening and the pressure release element may be attached to the battery compartment and close the pressure release opening. When the pressure release element is broken, the pressure release opening may be in fluid communication with an exterior of the device.

[0017] The pressure release element may be attached to the battery compartment, so as to close the pressure release opening, by at least one of: adhesive tape, a pressure sensitive adhesive, double-sided adhesive tape, welding and ultrasonic welding.

[0018] The pressure release element may comprise a weakened portion configured to break when the pressure within the battery compartment reaches the threshold pressure.

[0019] The pressure release element may be made from at least one of: polyethylene terephthalate, foil, or any non-woven material.

[0020] The aerosol provision device may further comprise a protective cover spaced from, and extending at least partially over, the pressure release element, wherein the protective cover defines a gas flow path extending between the pressure release element and an exterior of the aerosol provision device, and wherein the cover defines a space shaped to receive at least part of the pressure release element when it breaks.

[0021] The aerosol provision device may further comprise an article receiving portion, configured to receive an article containing an aerosol generating material, and a heating arrangement arranged to heat an article within the article receiving portion. The heating arrangement

may form part of an aerosol generator.

[0022] The aerosol provision device may comprise a battery contained within the battery compartment. A volume of the battery compartment may be larger than a volume of the battery contained therein such that there is a volume of free space within the battery compartment which is not occupied by the battery. The free space may be occupied by air.

[0023] According to a third aspect of the present invention, there is provided an aerosol provision system comprising:

an aerosol provision device according to any of the aspects or embodiments discussed above; and
an article, comprising an aerosol generating material, for insertion into the aerosol provision device.

Brief Description of the Drawings

[0024] Embodiments will now be described, by way of example only, and with reference to the accompanying drawings in which:

Fig. 1 shows a side view of an aerosol provision system in accordance with an embodiment of the present invention;

Fig. 2 shows a perspective view of the bottom of an aerosol provision device, in accordance with an embodiment of the present invention, comprising a gas-permeable membrane;

Fig. 3 shows a cut-away view through the bottom end of the aerosol provision device shown in Fig. 2;

Fig. 4 shows a bottom portion of the aerosol provision device shown in earlier Figs. with the gas-permeable element separated from the opening;

Fig. 5 shows a cut-away view through the bottom end of the aerosol provision device shown in Fig. 2 illustrating the flow of air out of and into the battery compartment;

Fig. 6 shows a partially exploded view of a bottom end of an aerosol provision device, in accordance with another embodiment of the present invention, comprising a pressure release element;

Fig. 7 shows a partially assembled view of the bottom end of the aerosol provision device shown in Fig. 6;

Fig. 8 shows a view of a cover sub-assembly of the aerosol provision device shown in Fig. 6;

Fig. 9 shows a cut-away view through the cover sub-assembly shown in Fig. 8 illustrating the outflow of air therethrough; and

Fig. 10 shows a schematic representation of an aerosol provision device, in accordance with another embodiment of the present invention, comprising a pressure release element which is integrally formed.

Detailed Description

[0025] As used herein, the term "aerosol-generating material" is a material that is capable of generating aerosol, for example when heated, irradiated or energized in any other way. Aerosol-generating material may, for example, be in the form of a solid, liquid or gel which may or may not contain an active substance and/or flavourants. Aerosol-generating material may include any plant based material, such as tobacco-containing material and may, for example, include one or more of tobacco, tobacco derivatives, expanded tobacco, reconstituted tobacco or tobacco substitutes. Aerosol-generating material also may include other, non-tobacco, products, which, depending on the product, may or may not contain nicotine. Aerosol-generating material may for example be in the form of a solid, a liquid, a gel, a wax or the like. Aerosol-generating material may for example also be a combination or a blend of materials. Aerosol-generating material may also be known as "smokable material".

[0026] The aerosol-generating material may comprise a binder and an aerosol former. Optionally, an active and/or filler may also be present. Optionally, a solvent, such as water, is also present and one or more other components of the aerosol-generating material may or may not be soluble in the solvent. In some embodiments, the aerosol-generating material is substantially free from botanical material. In some embodiments, the aerosol-generating material is substantially tobacco free.

[0027] The aerosol-generating material may comprise or be an "amorphous solid". The amorphous solid may be a "monolithic solid". In some embodiments, the amorphous solid may be a dried gel. The amorphous solid is a solid material that may retain some fluid, such as liquid, within it. In some embodiments, the aerosol-generating material may, for example, comprise from about 50wt%, 60wt% or 70wt% of amorphous solid, to about 90wt%, 95wt% or 100wt% of amorphous solid.

[0028] The aerosol-generating material may comprise an aerosol-generating film. The aerosol-generating film may comprise or be a sheet, which may optionally be shredded to form a shredded sheet. The aerosol-generating sheet or shredded sheet may be substantially tobacco free.

[0029] According to the present disclosure, a "non-combustible" aerosol provision system is one where a constituent aerosol-generating material of the aerosol provision system (or component thereof) is not combusted or burned in order to facilitate delivery of at least one substance to a user. The aerosol provision system recited herein may be a non-combustible aerosol provision system.

[0030] In some embodiments, the delivery system is a

non-combustible aerosol provision system, such as a powered non-combustible aerosol provision system.

[0031] In some embodiments, the non-combustible aerosol provision system is an electronic cigarette, also known as a vaping device or electronic nicotine delivery system (END), although it is noted that the presence of nicotine in the aerosol-generating material is not a requirement.

[0032] In some embodiments, the non-combustible aerosol provision system is an aerosol-generating material heating system, also known as a heat-not-burn system. An example of such a system is a tobacco heating system.

[0033] In some embodiments, the non-combustible aerosol provision system is a hybrid system to generate aerosol using a combination of aerosol-generating materials, one or a plurality of which may be heated. Each of the aerosol-generating materials may be, for example, in the form of a solid, liquid or gel and may or may not contain nicotine. In some embodiments, the hybrid system comprises a liquid or gel aerosol-generating material and a solid aerosol-generating material. The solid aerosol-generating material may comprise, for example, tobacco or a non-tobacco product.

[0034] Typically, the non-combustible aerosol provision system may comprise a non-combustible aerosol provision device and a consumable for use with the non-combustible aerosol provision device.

[0035] In some embodiments, the disclosure relates to consumables comprising aerosol-generating material and configured to be used with non-combustible aerosol provision devices. These consumables are sometimes referred to as articles throughout the disclosure.

[0036] In some embodiments, the non-combustible aerosol provision system, such as a non-combustible aerosol provision device thereof, may comprise a power source and a controller. The power source may, for example, be an electric power source or an exothermic power source. In some embodiments, the exothermic power source comprises a carbon substrate which may be energised so as to distribute power in the form of heat to an aerosol-generating material or to a heat transfer material in proximity to the exothermic power source.

[0037] In some embodiments, the non-combustible aerosol provision system may comprise an area for receiving the consumable, an aerosol generator, an aerosol generation area, a housing, a mouthpiece, a filter and/or an aerosol-modifying agent.

[0038] In some embodiments, the consumable for use with the non-combustible aerosol provision device may comprise aerosol-generating material, an aerosol-generating material storage area, an aerosol-generating material transfer component, an aerosol generator, an aerosol generation area, a housing, a wrapper, a filter, a mouthpiece, and/or an aerosol-modifying agent.

[0039] An aerosol provision device can receive an article comprising aerosol generating material for heating. An "article" in this context is a component that includes or contains in use the aerosol generating material, which is heated to volatilise the aerosol generating material, and optionally other components in use. A user may insert the article into the aerosol provision device before it is heated to produce an aerosol, which the user subsequently inhales. The article may be, for example, of a predetermined or specific size that is configured to be placed within a heating chamber of the device which is sized to receive the article.

[0040] With reference to Fig. 1, an aerosol provision system 2, in accordance with an embodiment of the present invention, comprises an aerosol provision device 4 for generating aerosol from an aerosol generating material. The aerosol provision system 2 further comprises a replaceable article 6 comprising an aerosol generating material. In broad outline, the aerosol provision device 4 may be used to heat the article 6 to generate an aerosol or other inhalable medium, which is inhaled by a user of the device 4.

[0041] The aerosol provision device 4 comprises a body 8. The body 8 may be considered to be, and/or form, a housing arrangement which surrounds and houses various components of the device 4. An article aperture 10 is formed at one end of the body 8, through which the article 6 may be inserted for heating by an aerosol generator 12 which may be contained within the body 8.

[0042] The device 4 may also include a user-operable control element 14, such as a button or switch, which operates the device 4 when pressed. For example, a user may turn on the device 4 by operating the switch 14.

[0043] The aerosol generator 12 defines a longitudinal axis 9, which aligns with an axis of the article 6. In use, the article 6 may be fully or partially inserted into the aerosol generator 12 where it may be heated by one or more components of the aerosol generator 12.

[0044] The device 4 includes an apparatus, i.e. the aerosol generator 12, for heating aerosol-generating material. The apparatus includes an aerosol generating assembly, a controller (control circuit), and a power source. The apparatus forms part of the body 8. The aerosol generating assembly is configured to heat the aerosol-generating material of an article 6 inserted through the article aperture 10, such that an aerosol is generated from the aerosol generating material. The aerosol generating assembly may thus comprise a heating arrangement arranged to heat the article 6. The power source supplies electrical power to the aerosol generating assembly, and the aerosol generating assembly converts the supplied electrical energy into heat energy for heating the aerosol-generating material. The power source may be, for example, a battery, such as a rechargeable battery or a non-rechargeable battery. Examples of suitable batteries include, for example, a lithium battery (such as a lithium-ion battery), a nickel battery (such as a nickelcadmium battery), and an alkaline battery.

[0045] The power source may be electrically coupled to the aerosol generating assembly to supply electrical power when required and under control of the controller to heat the aerosol generating material. The control circuit may be configured to activate and deactivate the aerosol generating assembly based on a user input. The user input may be via a button press or opening a door of the device (for example, a door covering a consumable receiving receptacle, e.g. a door covering the opening 10). The control circuit may be configured to activate and deactivate automatically, for example on insertion of an article.

[0046] The aerosol generating assembly, may comprise various components to heat the aerosol generating material via an inductive heating process. Induction heating is a process of heating an electrically conducting heating element (such as a susceptor) by electromagnetic induction. An induction heating assembly may comprise an inductive element, for example, one or more inductor coils, and a device for passing a varying electric current, such as an alternating electric current, through the inductive element. The varying electric current in the inductive element produces a varying magnetic field. The varying magnetic field penetrates a susceptor (heating element) suitably positioned with respect to the inductive element, and generates eddy currents inside the susceptor. The susceptor has electrical resistance to the eddy currents, and hence the flow of the eddy currents against this resistance causes the susceptor to be heated by Joule heating. In cases where the susceptor comprises ferromagnetic material such as iron, nickel or cobalt, heat may also be generated by magnetic hysteresis losses in the susceptor, i.e. by the varying orientation of magnetic dipoles in the magnetic material as a result of their alignment with the varying magnetic field. In inductive heating, as compared to heating by conduction for example, heat is generated inside the susceptor, allowing for rapid heating. Further, there need not be any physical contact between the inductive element and the susceptor, allowing for enhanced freedom in construction and application. The susceptor may, for example, be arranged within the article 6. In other embodiments, the susceptor may be arranged in the device 4, specifically in the aerosol generating assembly and may contact the article 6 when it is inserted into the device 4. In some embodiments, the aerosol generating assembly may comprise a resistive heating arrangement.

[0047] The end of the device 4 closest to the opening 10 may be known as the proximal end 5 (or mouth end, or top end) of the device 4 because, in use, it is closest to the mouth of the user. In use, a user inserts the article 6 into the opening 10, operates the aerosol generator 12 to begin heating the aerosol generating material, and draws on the aerosol generated in the device 4. This causes aerosol to flow through the device 4 along a flow path towards the proximal end 5 of the device 4.

[0048] The other end of the device furthest away from the opening 10 may be known as the distal end 7 (or bottom end) of the device 4 because, in use, it is the end furthest away from the mouth of the user. As a user draws on the aerosol generated in the device 4, the aerosol flows in a direction towards the proximal end 5 of the device 4. The terms proximal and distal as applied to features of the device 4 will be described by reference to the relative positioning of such features with respect to each other in a proximal-distal direction along a longitudinal axis 9.

[0049] The aerosol provision system 2 shown in Figure 1, specifically the aerosol provision device 4, may comprise any of the features of the various embodiments of the aerosol provision devices discussed below.

[0050] Figure 2 shows the distal end 116, of the body 108, of an aerosol provision device 104 in accordance with an embodiment of the present invention. The distal end 116 is shown in partially transparent view to reveal how the body 108 comprises a battery compartment 118. The battery compartment 118 houses a battery 120 therein. The battery 120 may provide power to at least one electrical component of the aerosol provision device 104, e.g. an aerosol generator, a controller, a light source, a speaker, a haptic device or any other electrical component within the aerosol provision device 104 which may be electrically powered.

[0051] In some embodiments, the battery compartment 118 comprises an opening (not visible in Figure 2), which is closed by a gas permeable element 124. Such an opening and gas-permeable element 124 may allow the exchange of air between the battery compartment 118 and the environment in which the device 104 is present. This may ensure that the temperature of any air within the battery compartment 118 does not become too high, which may thus reduce the chance of damage occurring due to a build-up of pressure within the device 104.

[0052] Figure 3 shows a cross-sectional view through the aerosol provision device 102 shown in Figure 2. This Figure more clearly shows the arrangement of the battery 120 within the battery compartment 118. The battery compartment 118 comprises an opening 126 which is closed by the gas permeable element 124. The gas permeable element 124 may have any suitable form that permits the flow of gas therethrough. The gas permeable element 124 may, for example, be in the form of a gas permeable membrane. The gas permeable element 124 may be waterproof. Such a gas permeable element 124 may prevent the ingress of water into the body 108 of the aerosol provision device 104. This may serve to prevent damage to the internal, e.g. electrical, components of the aerosol provision device 104. The gas permeable element 124 may be made from any material that permits the flow of gas therethrough. In a set of embodiments, the gas permeable element 124 may be made from expanded polytetrafluoroethylene (ePTFE).

[0053] In the view shown in Figure 3, the aerosol provision device 104 is shown in an upright orientation. In some embodiments, as shown in Figure 3, the opening

126 may be arranged on a bottom end 118A, e.g. a distal end, of the battery compartment 118. The bottom end 118A, e.g. the distal end, may correspond to the end of the battery compartment 118 which is opposite the end (the proximal end) of the aerosol provision device 104 into which the aerosol generating article is inserted and around which a user places their mouth during use. Arranging the pressure release opening 126 at this bottom end 118A may ensure that any hot gases which are permitted to escape from the battery compartment 118 during use of the device 104 do not escape near a user's face, thereby potentially avoiding injury of a user of the device 104.

[0054] In some embodiments, the aerosol provision device 104 comprises a protective cover 128 spaced from, and extending at least partially over, the gas-permeable element 124. This can be seen in Figure 3. The protective cover 128 may serve to protect the gas permeable element 124 which may otherwise be prone to damage. The protective cover 128 may take any suitable form that suitably protects the gas permeable element.

[0055] The protective cover 128 may form part of a lowermost cover 130 which may close the distal end 116 of the body 108 of the aerosol provision device 104 and thereby also close the bottom end of the battery compartment 118. As the lowermost cover 130 closes the bottom end of the battery compartment, the lowermost cover 130 may be considered to at least partially define the battery compartment 118 and may thus be considered to be part of the battery compartment 118. The opening 126 may be formed in the lowermost cover 130. The rest of the battery compartment 118 may be defined by the walls of the body 108, and indeed any other suitable walls/structure within the body 108.

[0056] The protective cover 128 may form/define a flow path 132 which extends between the gas permeable element 124 and an exterior of the aerosol provision device 104. In the embodiment depicted, this flow path 132 terminates in an opening 134 which allows gases to flow out through the flow path 132 to an exterior of the aerosol provision device 104.

[0057] In some embodiments, the pressure release opening 126 is arranged at the end 118A of the battery compartment 118 so as to face an end 120A of the battery 120 when the battery 120 is inserted into the battery compartment 118, as shown in Figure 3. The battery compartment 118 may be elongate so as to accommodate an elongate battery 120. However, it will be appreciated that the battery compartment may have any suitable shape and may accommodate any suitable battery.

[0058] As shown in Figure 3, in some embodiments, the aerosol provision device 104 may comprise an article receiving portion 136 arranged within the body 108. The article receiving portion 136 may be dimensioned and arranged to receive an aerosol generating article when inserted into the aerosol provision device 104. An aerosol generator comprising a heating arrangement 138 may also be arranged to heat the aerosol generating article when inserted into the article receiving portion 136.

[0059] In some embodiments, the lowermost cover 130 is attached to the body 108 of the aerosol provision device 104 by a sealing element 140. This may function to seal the bottom end of the body 108.

[0060] The battery compartment 118 may be configured to be larger than the battery 120 in which it houses. As such, when a battery 120 is inserted into the battery compartment, there may be a volume of free space which may contain air.

[0061] Figure 4 shows a perspective view of the aerosol provision device 104 shown in earlier Figures with the body 108 thereof removed to more clearly show the internal components thereof. In the view shown in this Figure, the gas permeable element 124 is separated from the opening 126. In some embodiments, as depicted, an adhesive 140, e.g. in the form of a double-sided adhesive tape, may be arranged around the opening 126. During assembly of the device 104, when the gas-permeable element 124 is brought against the pressure release opening 126, the gas permeable element 124 may be attached thereto by the adhesive 140. Whilst an adhesive 140 is shown and described, it will be appreciated that other form of attachment may be utilised. For example, a pressure sensitive adhesive, welding or ultrasonic welding may be used to attach the gas permeable element 124 to the battery compartment 118.

[0062] As previously mentioned, through the presence of the gas-permeable element 124 on the battery compartment 118, gases may be able to escape the battery compartment 118. This may, at least in some instances, prevent damage to the device 104. For example, in the case of a battery 120 malfunction, the battery 120 may increase in temperature which may cause air within the battery compartment to increase in temperature. Absent the presence of the gas-permeable element 124, as the temperature of the gas within the battery compartment 118 increases, the pressure within the battery compartment 118 may increase, and in some instances, eventually cause the device 104 to explode. However, through the presence of the gas-permeable element 124, this may be avoided. This is explained in more detail below with reference to Figure 5.

[0063] Figure 5 shows the aerosol provision device 104 in use. During use, the battery 120 may generate heat as its power is consumed or indeed may generate heat in the event of a battery malfunction. Heat generated by the battery 120 may act to heat the air within the battery compartment 118. Advantageously, the presence of the gas permeable element 124 may permit the outflow of hot air, indicated by arrows 142, through the pressure release opening 126 to an exterior of the device 104. Simultaneously, cooler air from the exterior of the device 104 may flow in through the pressure release opening 126, through the gas permeable element 124 and into the battery compartment 118. This may help to regulate the temperature of the air within the battery compartment 118 and thus prevent a build-up of pressure within the battery

compartment 118 which could otherwise cause the aerosol provision device 104 to break, e.g. through breaking (e.g. exploding) of the body 108. The gas-permeable element may therefore serve to reduce the risk of potential injury to a user of the device 104.

[0064] In some instances, the battery 118 itself may break, e.g. explode, which may cause a sudden increase in air pressure within the battery compartment 118. The gas-permeable element 118 may nonetheless permit the outflow of air from the battery compartment 118 and thus reduce the likelihood of damage occurring to the rest of the device 104.

[0065] The use of a gas-permeable element as set out above is not the only means to prevent damage occurring due to pressure build-up. Another means for preventing such damage is described below. Figure 6 shows a view of a distal end 216 of an aerosol provision device 204 in accordance with another embodiment of the present invention. The distal end 216 shown in Figure 6 is shown in a partial exploded view to more clearly show the components of this embodiment. Similarly to the embodiment described above, the aerosol generative device 204 may comprise a battery compartment within the body 208 of the device 204 which extends towards the base of the device 204 shown in Figure 6. The battery compartment cannot be seen in this Figure, however it may be considered to be the same as the battery compartment 118 shown above, except for the provision of the gas-permeable element 124.

[0066] In a similar manner to the embodiment described above, the base of the battery compartment may be closed by a lower cover 230. The lower cover 230 may thus be considered to form part of the battery compartment. As shown in Figure 6, in some embodiments, a pressure release element 246 may be provided. The pressure release element 246 may be configured to break when a pressure within the battery compartment reaches a threshold pressure. As such, air within the battery compartment may be permitted to escape in a safe and controlled manner.

[0067] In some embodiments, as shown in Figure 6, the battery compartment comprises a pressure release opening 226. In such embodiments, the pressure release element 246 may be attached to the battery compartment so as to close the pressure release opening. In embodiments comprises a lower cover 230 which may comprise the pressure release opening 226, the pressure release element may be attached to the lower cover 230.

[0068] Figure 7 shows the pressure release element 246 attached to the lower cover 230 so as to close the pressure release opening 226 which is no longer visible in Figure 7. The pressure release element 246 may be attached to the battery compartment, e.g. the lower cover 230, in any suitable manner, including at least one of: adhesive tape, a pressure sensitive adhesive, double-sided adhesive tape, welding and ultrasonic welding.

[0069] With reference to both Figures 6 and 7, the pressure release element 246 may comprise a weakened portion 248. The weakened portion 248 may be configured to break when the pressure within the battery compartment reaches the threshold pressure. The weakened portion 248 may be formed in any suitable manner. For example, the weakened portion 248 may be formed by a thinning of the material in a specific area of the pressure release element 246. The weakened portion 248 may be arranged on the pressure release element 246 so as to be aligned with the pressure release opening 226. Such an arrangement may ensure that the weakened portion 248 breaks when the pressure reaches the threshold pressure. The pressure at which the pressure release element 246 breaks may be defined by the weakened portion 248, e.g. by the thickness thereof.

[0070] The pressure release element 246 may be made from at least one of: polyethylene terephthalate, foil, or any non-woven material.

[0071] In some embodiments, as shown in Figure 6, the aerosol provision device 204 may further comprise a protective cover 228. The protective cover 228 may function to protect the pressure release element 246 from damage by a user. The protective cover 228 may be provided by a separate component which may be attached to the aerosol provision device 204, e.g. to the body 208 or the lowermost cover 230 thereof. The protective cover 228 is described below in more detail with reference to Figure 9.

[0072] Figure 8 shows a view of the lower cover 230 described above, with various components attached thereto, but with the body 108 removed. It can be seen more clearly in this Figure how the pressure release opening 226 extends through the lower cover 230 and how the pressure release element 246 closes the pressure release opening 226.

[0073] Figure 9 shows a cross-sectional view through the lower cover 230. As visible in this Figure, the protective cover 228 may be spaced from the pressure release element 246. Further, the protective cover 228 may define a gas flow path extending between the pressure release element 246, specifically the portion adjacent the pressure release opening 226, and an exterior of the aerosol provision device 204. This arrangement may define a space 250 which is shaped to receive at least part of the pressure release element 246, e.g. the weakened portion 248, when it breaks. In other words, when the pressure release element 246 breaks at the threshold pressure, it may break into the space defined by the protective cover 246.

[0074] With reference to Figure 9, during use, if the pressure within the battery compartment reaches a threshold pressure, the pressure release element 246, e.g. the weakened portion 248 thereof, will break. The pressure within the battery compartment may be increased gradually, e.g. due to heating of the battery, or suddenly, due to breaking (e.g. exploding) of the battery. Once the pressure release element 246 has broken, this will allow air to escape the battery compartment through the pressure release opening 226, out through the space

250 and to the exterior of the device 204. This outflow of air is depicted in Figure 9 by arrows 252. The protective cover 228 may comprise at least one opening therein through which air can escape to the exterior of the device 204. In some embodiments, the protective cover 228 may comprise a plurality of openings and the protective cover 228 may be configured to distribute air escaping the battery compartment out through the plurality of openings. This may reduce the amount of hot air which is escaping any single opening, which may reduce the risk of injury to a user.

[0075] Whilst the pressure release element 226 breaks, it may nonetheless provide for a controlled breaking, as opposed to a more significant breaking of the device, e.g. the body 208 thereof. The pressure release element 226 may be replaceable, and thus even once broken, it may be possible to replace the pressure release element 226, together with the battery if necessary, and continue using the device 204. This may minimise waste.

[0076] The threshold pressure at which the pressure release element 246 breaks may be set depending on a number of factors including but not limited to: the size, type and/or form of the battery, the size of the battery compartment, the structure of the aerosol provision device 204. In some embodiments, the threshold pressure may be at least 1000 kPa, e.g. at least 1500 kPa, e.g. at least 2000 kPa, e.g. 2070 kPa

[0077] In the embodiment described above in relation to Figures 6-9, the pressure release element 246 is attached to the aerosol provision device 204. However, the pressure release element may instead be integrally formed with the aerosol provision device. Such an embodiment is shown in Figure 10 which illustrates a schematic view of an aerosol provision device 304 in accordance with another embodiment of the present invention. Like the embodiments discussed above, the aerosol provision device 304 comprises a body 308 and a battery compartment 318 which may house a battery 320. The aerosol provision device 304 also comprises an article receiving portion 336 heated by a heating arrangement 338. Control electronics 354, which function to control operation of the aerosol provision device 304, may also be arranged within the body 308 of the device 304.

[0078] However, unlike the embodiment shown in Figures 6 to 9 which comprises a pressure release element which is attached to the battery compartment, in the embodiment shown in Figure 10 the pressure release element 346 is integrally formed with the battery compartment 318. The pressure release element 346 is configured to break when the pressure within the battery compartment reaches a threshold pressure, so as to allow air to escape the battery compartment 318 into the exterior of the device 304.

[0079] In some embodiments, the pressure release element 346 may be integrally formed within a wall of the body 308 of the device 304. Integrally forming the pressure release element 346 in this manner may advantageously minimise the number of separate components which have to be assembled together. As shown in Figure 10 the pressure release element 346 may be arranged on a side wall of the body 308, however it will be appreciated that it may be arranged at any suitable position. The pressure release element 346 may employ any of the features of the embodiment discussed above, for example it may comprise a weakened portion which is configured to break when the pressure within the battery compartment 318 reaches a threshold pressure.

[0080] Whilst the embodiments set out have been described in the context of a battery compartment, it will be appreciated that this invention may instead be applied to any compartment of an aerosol provision device which increases in pressure, e.g. during use of the device. As such, in any of the embodiments described herein, the battery compartment may be interchanged for another compartment of the aerosol provision device, i.e. any compartment in which the pressure therein changes.

[0081] It should also be appreciated that whilst generally shown and described as being on the distal end of the device and on the distal end of the battery compartment, e.g. on a cover thereof, the gas-permeable element or the pressure release element may be arranged at any suitable position on the aerosol provision device. In some embodiments, the aerosol provision device may comprise both a gas-permeable element and a pressure release element according to any of the embodiments described above.

[0082] It should be appreciated that any of the features of the various embodiments described above ma be combined in any suitable manner.

[0083] The various embodiments described herein are presented only to assist in understanding and teaching the claimed features. These embodiments are provided as a representative sample of embodiments only, and are not exhaustive and/or exclusive. It is to be understood that advantages, embodiments, examples, functions, features, structures, and/or other aspects described herein are not to be considered limitations on the scope of the invention as defined by the claims or limitations on equivalents to the claims, and that other embodiments may be utilised and modifications may be made without departing from the scope of the claimed invention. Various embodiments of the invention may suitably comprise, consist of, or consist essentially of, appropriate combinations of the disclosed elements, components, features, parts, steps, means, etc, other than those specifically described herein. In addition, this disclosure may include other inventions not presently claimed, but which may be claimed in future.

Claims

1. An aerosol provision device comprising:

a battery compartment configured to receive a

battery for providing power to at least one electrical component of the aerosol provision device; wherein the battery compartment comprises an opening, and wherein the opening is closed by a gas-permeable element.

2. An aerosol provision device according to any preceding claim, wherein the gas-permeable element comprises a gas permeable membrane.

3. An aerosol provision device according to any preceding claim, wherein the opening is arranged on a bottom end of the battery compartment.

4. An aerosol provision device according to any preceding claim, further comprising a protective cover spaced from, and extending at least partially over, the gas-permeable element, wherein the protective cover defines a gas flow path extending between the gas-permeable element and an exterior of the aerosol provision device.

5. An aerosol provision device according to any preceding claim, wherein the opening is arranged at an end of the battery compartment so as to face an end of the battery when the battery is inserted in the battery compartment.

6. An aerosol provision device according to any preceding claim, wherein the gas-permeable element is waterproof.

7. An aerosol provision device according to any preceding claim, wherein the gas-permeable element is attached to the battery compartment, so as to close the opening, by at least one of: adhesive tape, a pressure sensitive adhesive, double-sided adhesive tape, welding and ultrasonic welding.

8. An aerosol provision device according to any preceding claim, wherein the gas permeable element comprises expanded polytetrafluoroethylene (ePTFE).

9. An aerosol provision device comprising:

a battery compartment configured to receive a battery for providing power to at least one electrical component of the aerosol provision device; and

a pressure release element which is impermeable to fluid and configured to break when a pressure within the battery compartment reaches a threshold pressure such that, when broken, air within the battery compartment is able to escape the battery compartment.

10. An aerosol provision device according to claim 9, wherein the pressure release element is integrally formed within a wall of the battery compartment.

11. An aerosol provision device according to claim 9, wherein the battery compartment comprises a pressure release opening and wherein the pressure release element is attached to the battery compartment and closes the pressure release opening.

12. An aerosol provision device according to claim 11, wherein the pressure release element is attached to the battery compartment, so as to close the pressure release opening, by at least one of: adhesive tape, a pressure sensitive adhesive, double-sided adhesive tape, welding and ultrasonic welding.

13. An aerosol provision device according to any of claims 9 to 12, wherein the pressure release element comprises a weakened portion configured to break when the pressure within the battery compartment reaches the threshold pressure.

14. An aerosol provision device according to any of claims 9 to 13, further comprising a protective cover spaced from, and extending at least partially over, the pressure release element, wherein the protective cover defines a gas flow path extending between the pressure release element and an exterior of the aerosol provision device, and wherein the cover defines a space shaped to receive at least part of the pressure release element when it breaks.

15. An aerosol provision system comprising:

an aerosol provision device according to any preceding claim; and

an article, comprising an aerosol generating material, for insertion into the aerosol provision device.

Fig. 1

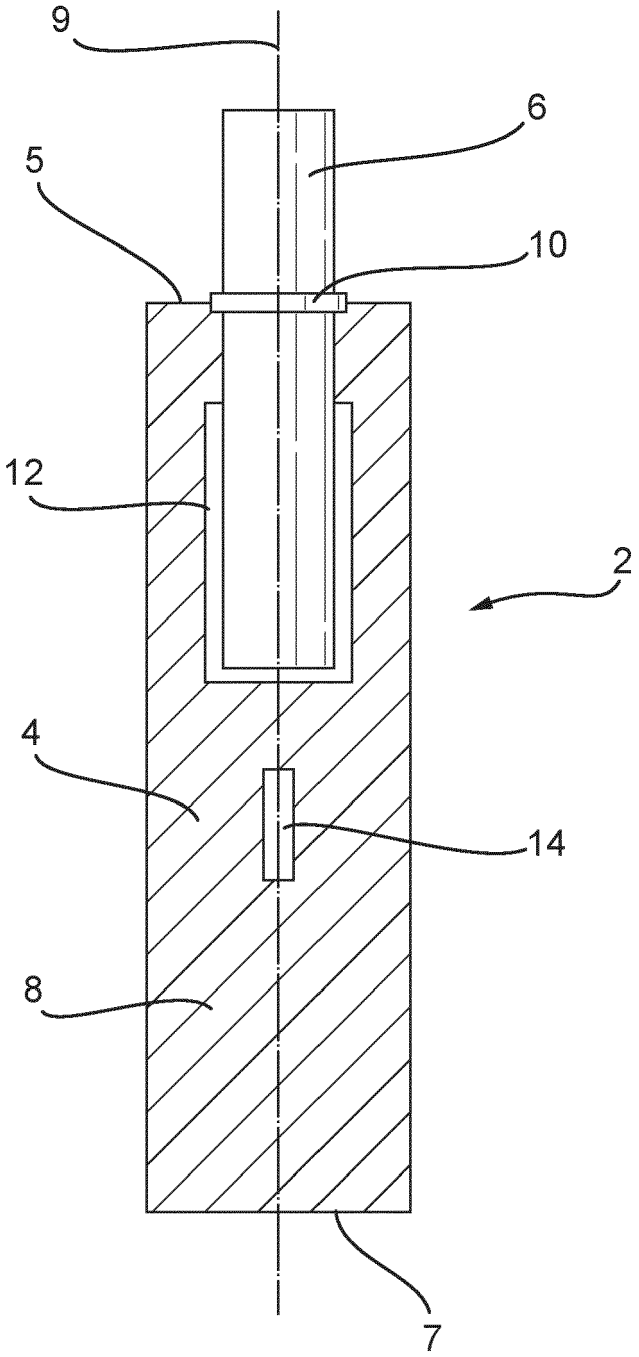

Fig. 2

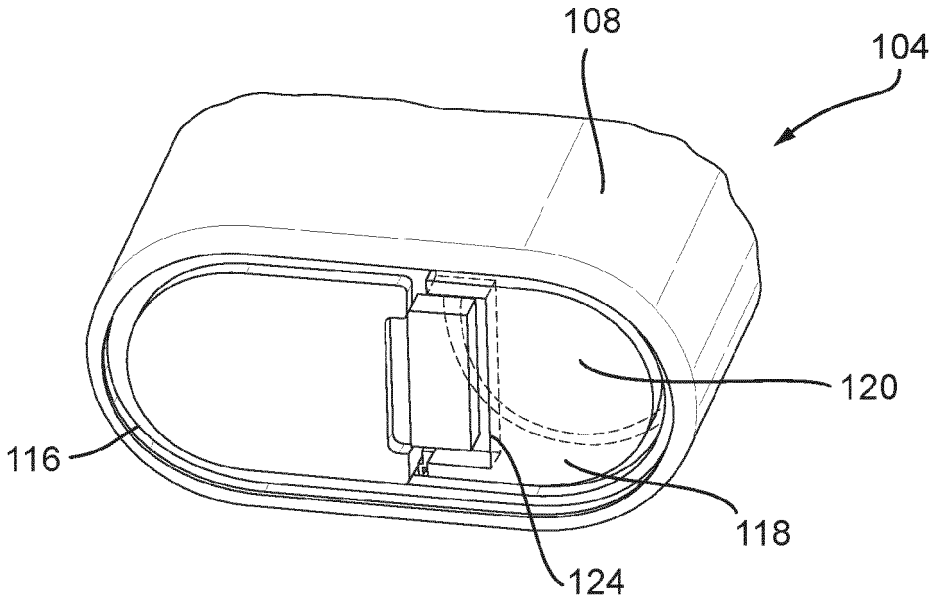
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Fig. 3

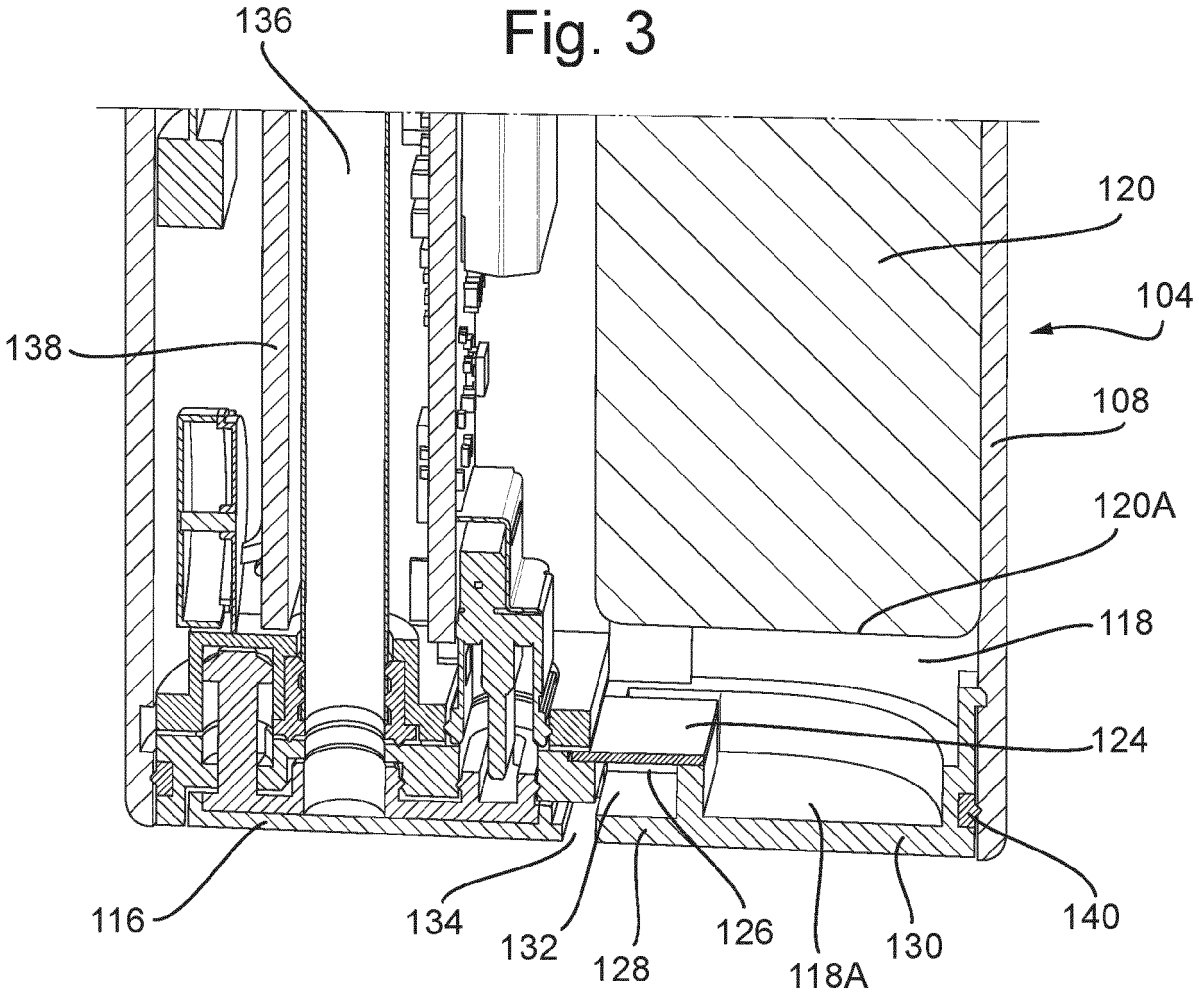
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Fig. 4

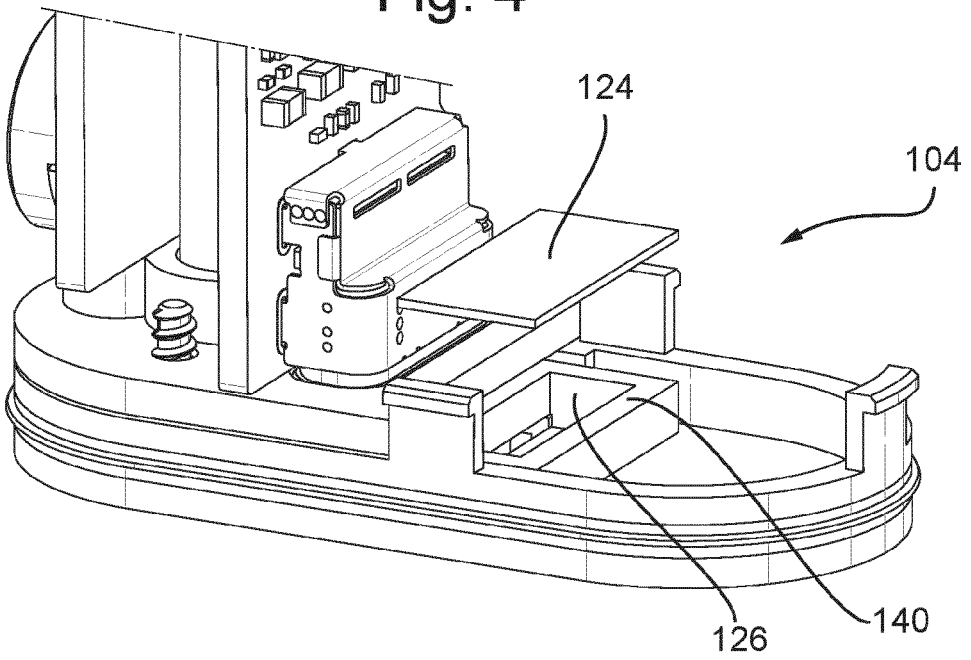


Fig. 5

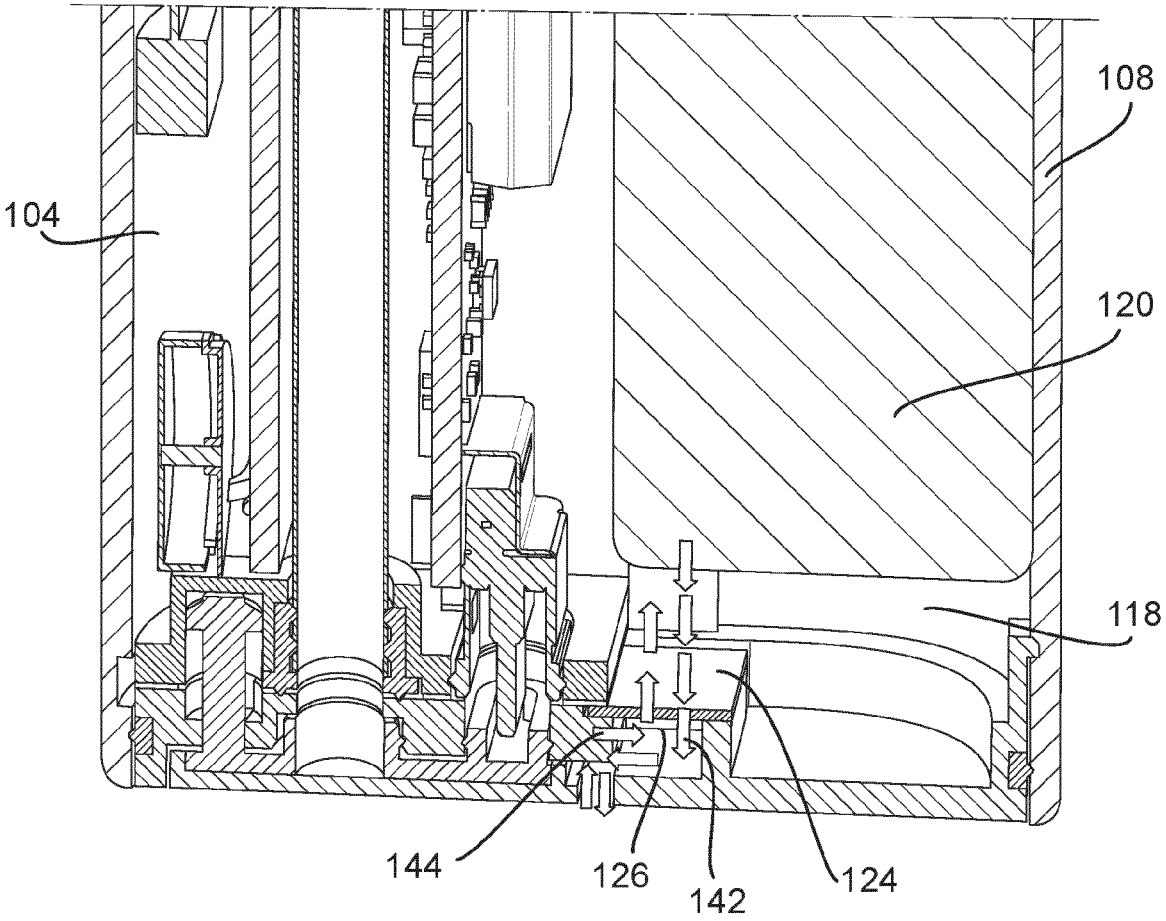


Fig. 6

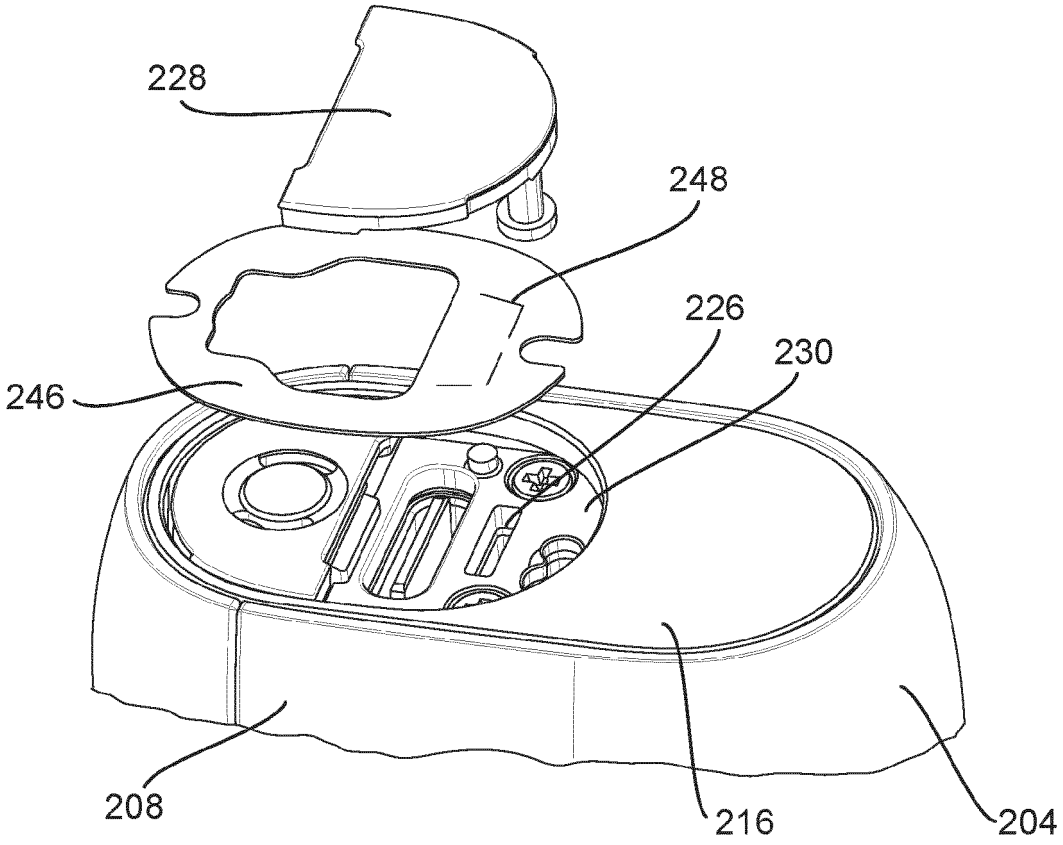


Fig. 7

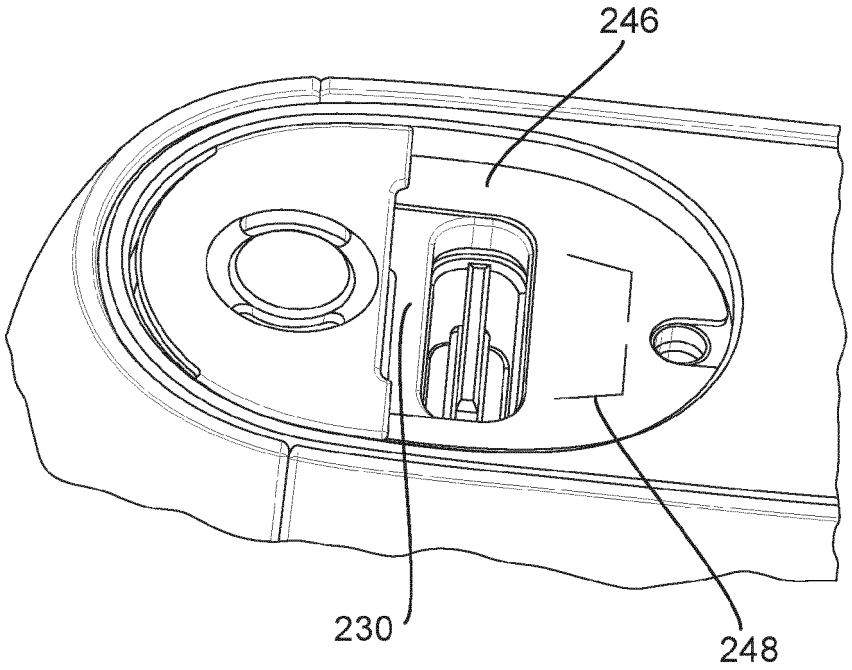


Fig. 8

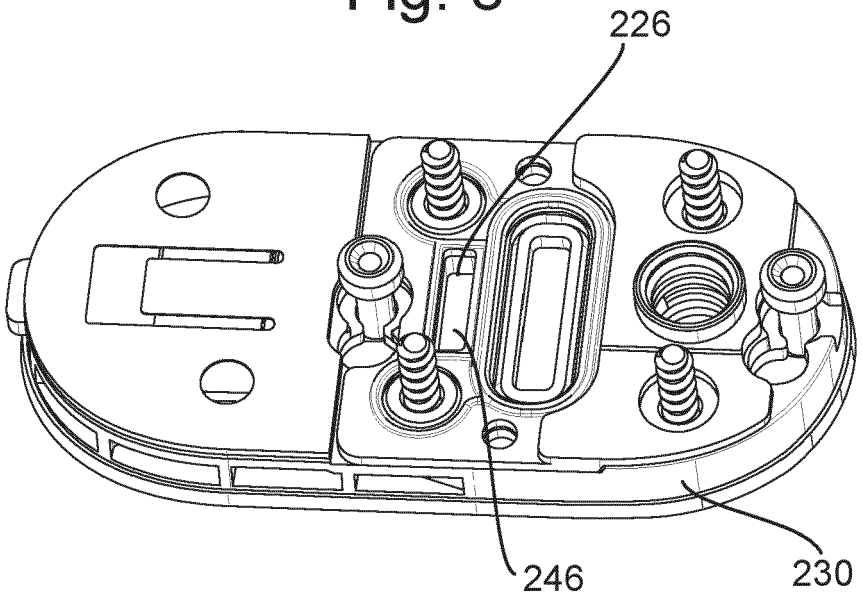


Fig. 9

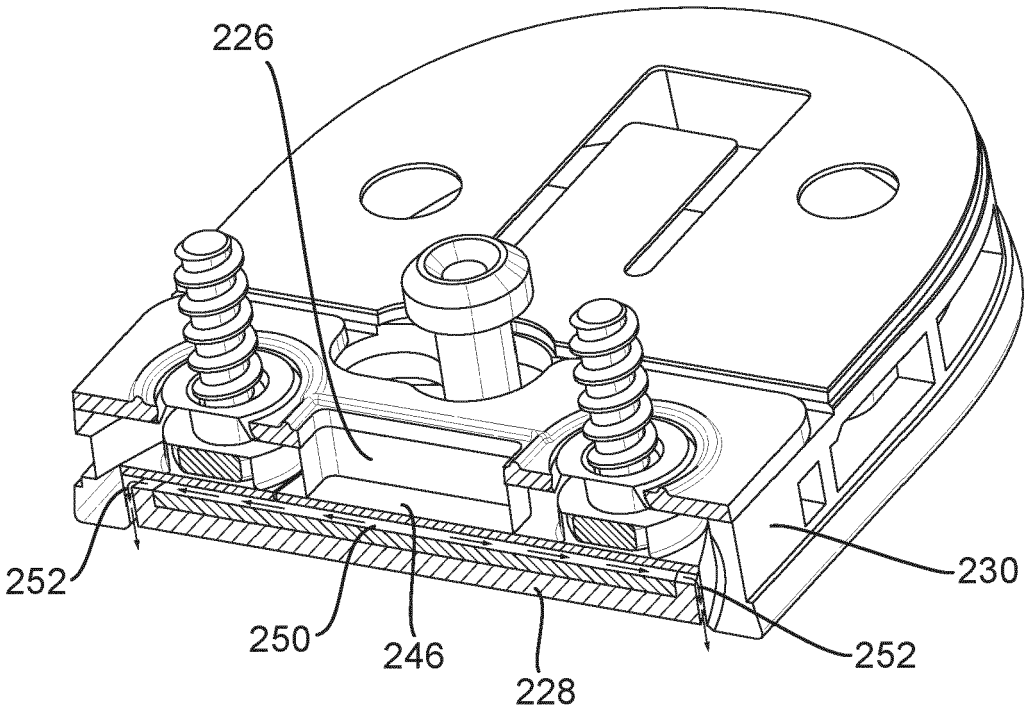
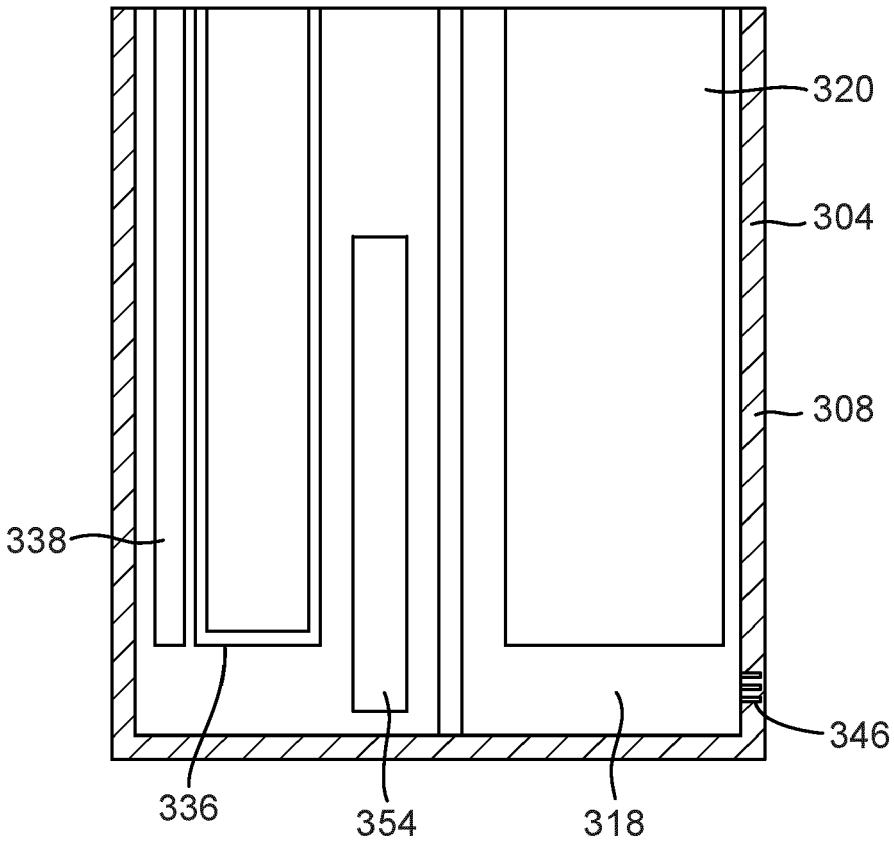


Fig. 10



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EUROPEAN SEARCH REPORT

Application Number
EP 24 15 7468

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X	WO 2022/195101 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 22 September 2022 (2022-09-22) * page 11, line 13 - page 13, line 33; figures 1-9 *	1-15	INV. A24F40/40
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X	CN 218 898 327 U (AIQIJI HONGKONG CO LTD) 25 April 2023 (2023-04-25) * paragraph [0029] - paragraph [0040]; figures 1-6 *	1-15	

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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	18 July 2024	Klintebäck, Daniel

CATEGORY OF CITED DOCUMENTS

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