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(54) SMOKING SUBSTITUTE SYSTEM

(57) Disclosed is a smoking substitute system comprising a housing defining a cavity for receipt of a liquid aerosol precursor. The housing comprises one or more elongate viewing regions extending along respective elongate axes. The one or more viewing regions are arranged such that for both vertical and horizontal orientations of the housing the meniscus of the aerosol precursor is visible through a viewing region of the one or more viewing regions and extends transversely with respect to the elongate axis of the viewing region.

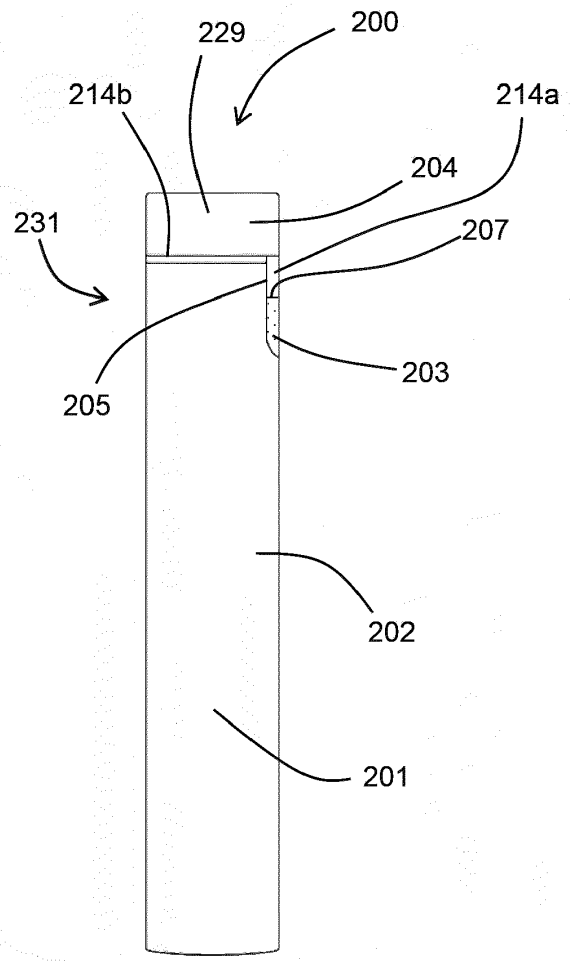

FIG 4A

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Description

Technical field

[0001] The present disclosure relates to a smoking substitute system.

Background

[0002] The smoking of tobacco is generally considered to expose a smoker to potentially harmful substances. It is generally thought that a significant amount of the potentially harmful substances are generated through the heat caused by the burning and/or combustion of the tobacco and the constituents of the burnt tobacco in the tobacco smoke itself.

[0003] Combustion of organic material such as tobacco is known to produce tar and other potentially harmful by-products. There have been proposed various smoking substitute systems in order to avoid the smoking of tobacco.

[0004] Such smoking substitute systems can form part of nicotine replacement therapies aimed at people who wish to stop smoking and overcome a dependence on nicotine.

[0005] Smoking substitute systems, which may also be known as electronic nicotine delivery systems, may comprise electronic systems that permit a user to simulate the act of smoking by producing an aerosol, also referred to as a "vapour", which is drawn into the lungs through the mouth (inhaled) and then exhaled. The inhaled aerosol typically bears nicotine and/or flavourings without, or with fewer of, the odour and health risks associated with traditional smoking.

[0006] In general, smoking substitute systems are intended to provide a substitute for the rituals of smoking, whilst providing the user with a similar experience and satisfaction to those experienced with traditional smoking and tobacco products.

[0007] The popularity and use of smoking substitute systems has grown rapidly in the past few years. Although originally marketed as an aid to assist habitual smokers wishing to quit tobacco smoking, consumers are increasingly viewing smoking substitute systems as desirable lifestyle accessories. Some smoking substitute systems are designed to resemble a traditional cigarette and are cylindrical in form with a mouthpiece at one end. Other smoking substitute systems do not generally resemble a cigarette (for example, the smoking substitute device may have a generally box-like form).

[0008] There are a number of different categories of smoking substitute systems, each utilising a different smoking substitute approach. A smoking substitute approach corresponds to the manner in which the substitute system operates for a user.

[0009] 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 heater to produce an aerosol vapour which is inhaled by a user. An e-liquid typically includes a base liquid as well as nicotine and/or flavourings. The resulting vapour therefore typically contains nicotine and/or flavourings. The base liquid may include propylene glycol and/or vegetable glycerine.

[0010] A typical vaping smoking substitute system includes a mouthpiece, a power source (typically a battery), a tank or liquid reservoir for containing e-liquid, as well as a heater. In use, electrical energy is supplied from the power source to the heater, which heats the e-liquid to produce an aerosol (or "vapour") which is inhaled by a user through the mouthpiece.

[0011] 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 heater and a sealed tank which 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 heater. In this way, when the tank of a consumable has been emptied, the device can be reused by connecting it to a new consumable. Another subset of closed system vaping smoking substitute systems are completely disposable, and intended for one-use only.

[0012] There are also "open system" vaping smoking substitute systems which typically have a tank that is configured to be refilled by a user, so the system can be used multiple times.

[0013] An example vaping smoking substitute system is the myblu™ e-cigarette. The myblu™ e cigarette is a closed system which includes a device and a consumable. The device and consumable are physically and electrically coupled together by pushing the consumable into the device. The device includes a rechargeable battery. The consumable includes a mouthpiece, a sealed tank which contains e-liquid, as well as a vaporiser, which for this system is a heating filament coiled around a portion of a wick which is partially immersed in the e-liquid. The system 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 vaporiser, which heats e-liquid from the tank to produce a vapour which is inhaled by a user through the mouthpiece.

[0014] Another example vaping smoking substitute system is the blu PRO™ e-cigarette. The blu PRO™ e cigarette is an open system which includes a device, a (refillable) tank, and a mouthpiece. The device and tank are physically and electrically coupled together by screwing one to the other. The mouthpiece and refillable tank are physically coupled together by screwing one into the other, and detaching the mouthpiece from the refillable tank allows the tank to be refilled with e-liquid. The system is activated by a button on the device. When the system

is activated, electrical energy is supplied from the power source to a vaporiser, which heats e-liquid from the tank to produce a vapour which is inhaled by a user through the mouthpiece.

[0015] In some systems, the tank may be connected to the device by receipt in a cavity of the device. Whilst this may protect the tank and the contents of the tank (e. g. from light) it can make it difficult for a user to determine the quantity of e-liquid remaining in the tank. Thus, there is a need to provide an improved smoking substitute system.

Summary

[0016] According to a first aspect there is provided a smoking substitute system comprising a housing defining a cavity for receipt of a liquid aerosol precursor, the housing comprising one or more elongate viewing regions extending along respective elongate axes, the one or more viewing regions arranged such that for both vertical and horizontal orientations of the housing the meniscus of the aerosol precursor is visible through a viewing region of the one or more viewing regions and extends transversely with respect to the elongate axis of the viewing region.

[0017] Such an arrangement may allow assessment of the level of aerosol precursor in the system for multiple orientations of the housing. This may allow, for example, a user to determine the level of precursor when the housing is hand held (e.g. vertical) and when the housing is resting on a surface (e.g. horizontal). The provision of elongate viewing regions may limit the amount of light that enters the cavity (which could otherwise be detrimental to the aerosol precursor).

[0018] Optional features will now be set out. These are applicable singly or in any combination with any aspect.

[0019] The housing may define a longitudinal axis. For example, the housing may be elongate so as to extend along a longitudinal axis. In the vertical orientation the housing may be oriented such that the longitudinal axis is vertical. In the horizontal orientation the housing may be oriented such that the longitudinal axis is horizontal.

[0020] The one or more viewing regions may comprise an angled viewing region having a respective elongate axis that is oriented obliquely with respect to the longitudinal axis of the housing. In such an embodiment the meniscus may extend transversely across the angled viewing region in both the vertical and horizontal orientations.

[0021] The term "obliquely" is used to describe a direction that is neither parallel nor perpendicular to the longitudinal axis. Thus, the direction in which the oblique window portion extends consists of both a longitudinal component and a component that is transverse to the longitudinal component. In this respect, in each of the horizontal and vertical orientations, the meniscus of the precursor may also be oblique with respect to the elongate axis of the angled viewing region (i.e. when viewed through the angled viewing region).

[0022] The angled viewing region may extend on an angle of between 40 and 80 degrees with respect to the longitudinal axis. The angle may be between 50 and 70 degrees. The angle may be approximately 60 degrees.

[0023] The one or more viewing regions may comprise first and second viewing regions that are oriented so as to be orthogonal to one another. Thus, in a vertical orientation the meniscus may extend transversely across one of the first and second orthogonal viewing regions and in the horizontal orientation the meniscus may extend transversely across the other of the first and second orthogonal viewing regions.

[0024] One of the first and second orthogonal viewing regions may be oriented so as to be parallel to the longitudinal axis and the other of the first and second orthogonal viewing regions may be oriented so as to be perpendicular to the longitudinal axis.

[0025] The first and second orthogonal viewing regions may be joined (and/or may overlap). For example, the first and second orthogonal viewing regions may overlap so as to form a cross shape. In this respect, the first and second viewing regions may define a cross-shaped window formed in the housing.

[0026] The first and second orthogonal viewing regions may alternatively be joined at respective ends so as to form an L shape. Thus, the first and second orthogonal viewing regions may define an L-shaped window.

[0027] The first and second orthogonal viewing regions may alternatively be spaced from one another (i.e. separate viewing regions).

[0028] The width (perpendicular to the elongate axis) of each elongate viewing region may be between 1 mm and 7 mm. The width may be between 1 mm and 6 mm. The width of the each viewing region may be between 2 and 5 mm.

[0029] The housing may comprise opposing and longitudinally extending front and rear walls spaced by opposing side walls extending therebetween. The distance between the front and rear walls may define a depth of the housing and the distance between the side walls may define a width of the housing. The width of the housing may be greater than the depth of housing.

[0030] A first viewing region of the one or more viewing regions may be formed in the front and/or rear wall and a second viewing region of the one or more viewing regions may be formed in one of the side walls.

[0031] When the system comprises an angled viewing region, the angled viewing region may be formed in a side wall of the housing. The angled viewing region may be a first angled viewing region and the one or more viewing regions may comprise a second angled viewing region. The second angled viewing region may be formed in an opposing side wall to the first angled viewing region.

[0032] The one or more viewing regions may comprise a transverse viewing region connecting the first and second angled viewing regions. The transverse viewing region may be formed in the front or rear wall of the housing.

[0033] The transverse viewing region may be a first transverse viewing region and the one or more viewing regions may further comprise a second transverse viewing region. The first transverse viewing region may connect respective first ends of the angled viewing regions and the second transverse viewing region may connect respective second ends (opposing the first ends) of the angled viewing region. The first transverse viewing region may be formed in one of the front and rear walls of the housing and the second transverse viewing region may be formed in the other of the first and rear walls of the housing.

[0034] Thus, the first and second angled viewing regions and the first and second transverse viewing regions may form a loop (i.e. in the form of a window) that extends about the housing (i.e. about the longitudinal axis).

[0035] When the one or more viewing regions comprises first and second orthogonal viewing regions, one of the first and second orthogonal viewing regions may be formed in the front or rear wall of the housing and the other of the first and second viewing regions may be formed in a side wall of the housing.

[0036] For example, the orthogonal viewing region formed in the front or rear wall may be transverse to the longitudinal axis of the housing and the orthogonal viewing region formed in the side wall may be parallel to the longitudinal axis. The transverse (orthogonal) viewing region may be formed in both the front and rear walls of the housing and may form a loop about the housing.

[0037] In some embodiments, the system may comprise a smoking substitute device and the housing may be a housing of the device. The housing may comprise a tank (or a tank portion) defining the cavity. In such embodiments, the tank may be configured so as to be refillable with aerosol precursor.

[0038] In other embodiments the system may comprise a consumable for a smoking substitute device (e.g. an e-cigarette device) and the housing may be a housing of the consumable. The housing may, for example, comprise a tank of the consumable (the cavity being the interior of the tank). The one or more viewing regions may be formed in a wall of the tank.

[0039] Alternatively, the system may comprise both a device and a consumable configured for engagement, and the housing may be a system housing (e.g. defined by a consumable housing and device housing).

[0040] The one or more viewing regions may form part of the consumable. The one or more viewing regions may form part of the device. The one or more viewing regions may form part of both the device and the consumable. For example, a viewing region of the one or more viewing regions may form part of the device (e.g. formed in a wall of the device) and another viewing region may form part of (e.g. formed in a wall of the consumable).

[0041] In some embodiments, at least one of the one or more viewing regions may be formed (i.e. only) when the consumable is received in the cavity of the device. In this respect, at least one of the viewing regions may be partly defined by each of the device and the consumable.

[0042] One or more walls of the tank (of the consumable) may be translucent. A portion of the tank may be received in a cavity of the device and, when received therein, a portion of the tank may remain outside of the cavity. The portion of the tank remaining outside of the cavity may define the one or more viewing regions.

[0043] The tank may comprised a raised region that defines the one or more viewing regions when the portion of the tank is received in the cavity of the device. The raised region may define a lip for engagement with an edge of the device (e.g. the device housing) defining an opening to the cavity.

[0044] The device may include a power source. The device may include a controller. A memory may be provided and may be operatively connected to the controller. The memory may include non-volatile memory. The memory may include instructions which, when implemented, cause the controller to perform certain tasks or steps of a method. The device may comprise a wireless interface, which may be configured to communicate wirelessly with another device, for example a mobile device, e.g. via Bluetooth®. To this end, the wireless interface could include a Bluetooth® antenna. Other wireless communication interfaces, e.g. WiFi®, are also possible. The wireless interface may also be configured to communicate wirelessly with a remote server.

[0045] An airflow (i.e. puff) sensor may be provided that is configured to detect a puff (i.e. inhalation from a user). The airflow sensor may be operatively connected to the controller so as to be able to provide a signal to the controller that is indicative of a puff state (i.e. puffing or not puffing). The airflow sensor may, for example, be in the form of a pressure sensor or an acoustic sensor. The controller may control power supply to a heating element in response to airflow detection by the sensor. The control may be in the form of activation of the heating element in response to a detected airflow. The airflow sensor may form part of the device.

[0046] The device may be configured to receive a consumable as described below. For example the device and the consumable may be configured to be physically coupled together. For example, the consumable may be at least partially received in a recess of the device, such that there is snap engagement between the device and the consumable. Alternatively, the device and the consumable may be physically coupled together by screwing one onto the other, or through a bayonet fitting.

[0047] Thus, the consumable may comprise one or more engagement portions for engaging with the device. In this way, one end of the consumable (i.e. the inlet end) may be coupled with the device, while an opposing end (i.e. the outlet end) of the consumable may define a mouthpiece.

[0048] The consumable may comprise an electrical interface for interfacing with a corresponding electrical interface of the device. One or both of the electrical inter-

faces may include one or more electrical contacts. Thus, when the device is engaged with the consumable, the electrical interface may be configured to transfer electrical power from the power source to a heating element of the consumable. The electrical interface may also be used to identify the consumable from a list of known types. The electrical interface may additionally or alternatively be used to identify when the consumable is connected to the device.

[0049] The device may alternatively or additionally be able to detect information about the consumable via an RFID reader, a barcode or QR code reader. This interface may be able to identify a characteristic (e.g. a type) of the consumable. In this respect, the consumable may include any one or more of an RFID chip, a barcode or QR code, or memory within which is an identifier and which can be interrogated via the interface.

[0050] The consumable may comprise a tank (reservoir) for containing the aerosol precursor. The tank may define the cavity, or may be disposed within the cavity.

[0051] The smoking substitute system may comprise a passage for fluid flow therethrough. The passage may extend through (at least a portion of) the smoking substitute system, between openings that may define an inlet and an outlet of the passage. The outlet may be at a mouthpiece of the smoking substitute system. In this respect, a user may draw fluid (e.g. air) into and through the passage by inhaling at the outlet (i.e. using the mouthpiece).

[0052] In some embodiments, the system is a vaping smoking substitute system. The aerosol precursor may comprise an e-liquid, for example, comprising a base liquid and e.g. nicotine. The base liquid may include propylene glycol and/or vegetable glycerine.

[0053] The tank may be defined by a tank housing. At least a portion of the tank housing may be translucent. For example, the tank housing may comprise a window to allow a user to visually assess the quantity of e-liquid in the tank. The tank may be referred to as a "clearomizer" if it includes a window, or a "cartomizer" if it does not. The passage may extend longitudinally within the tank and a passage wall may define the inner wall of the tank. In this respect, the tank may surround the passage e.g. the tank may be annular. The passage wall may comprise longitudinal ribs extending along it. These ribs may provide support to the passage wall. The ribs may extend for the full length of the passage wall. The ribs may project (e.g. radially outwardly) into the tank.

[0054] The vaping smoking substitute system may comprise a vaporiser. The vaporiser may comprise a wick. The vaporiser may further comprise a heating element. The wick may comprise a porous material. A portion of the wick may be exposed to fluid flow in the passage. The wick may also comprise one or more portions in contact with e-liquid 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 passage so as to be exposed to fluid flow in the passage. Thus, fluid may be drawn (e.g. by capillary action) along the wick, from the reservoir to the exposed portion of the wick.

[0055] The heating element may be in the form of a filament wound about the wick (e.g. the filament may extend helically about the wick). The filament may be wound about the exposed portion of the wick. The heating element is electrically connected (or connectable) to a power source. Thus, in operation, 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 tank) to be heated so as to form a vapour and become entrained in fluid flowing through the passage. This vapour may subsequently cool to form an aerosol in the passage.

[0056] According to a second aspect there is provided a smoking substitute system comprising a longitudinally extending housing defining a cavity for receipt of a liquid aerosol precursor, and an elongate viewing region formed in the housing for viewing the level of aerosol precursor in the cavity, the viewing region extending obliquely with respect to the longitudinal axis defined by the housing.

[0057] The system of the second aspect may be as otherwise described above with respect to the first aspect.

[0058] According to a third aspect there is provided a smoking substitute system comprising a housing defining a cavity for receipt of liquid aerosol precursor, and first and second elongate viewing regions formed in the housing for assessing the level of aerosol precursor stored in the reservoir, the first elongate viewing region orthogonal to the second elongate viewing region.

[0059] The system of the third aspect may be as otherwise described above with respect to the first aspect.

[0060] The invention includes the combination of the aspects and preferred features described except where such a combination is clearly impermissible or expressly avoided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0061] So that further aspects and features thereof may be appreciated, embodiments will now be discussed in further detail with reference to the accompanying figures, in which:

- Fig. 1A is a front schematic view of a smoking substitute system, according to a first embodiment, in a vertical orientation;
- Fig. 1B is a front schematic view of a device of the system;
- Fig. 1C is a front schematic view of a consumable of the system;
- Fig. 1D is a front schematic view of the system in a horizontal orientation;
- Fig. 2A is a schematic of the components of the device;

- Fig. 2B is a schematic of the components of the consumable;
- Fig. 3 is a section view of the consumable;
- Fig. 4A is a front schematic view of a smoking substitute system, according to a second embodiment, in a vertical orientation;
- Fig. 4B is an exploded view of the smoking substitute system of the second embodiment;
- Fig. 4C is a front schematic view of the smoking substitute system of the second embodiment in a horizontal orientation;
- Fig. 5A is a front schematic view of a smoking substitute system according to a third embodiment; and
- Fig. 5B is a side schematic view of the smoking substitute system of the third embodiment.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0062] Aspects and embodiments will now be discussed with reference to the accompanying figures. Further aspects and embodiments will be apparent to those skilled in the art.

[0063] Fig. 1A shows a first embodiment of a smoking substitute system 100. In this example, the smoking substitute system 100 includes a device 102 and an aerosol delivery consumable 104. The consumable 104 may alternatively be referred to as a "pod", "cartridge" or "cartomizer". It should be appreciated that in other examples (i.e. open systems), the device may be integral with the consumable. In such systems, a tank of the aerosol delivery system may be accessible for refilling the device.

[0064] In this example, the smoking substitute system 100 is a closed system vaping system, wherein the consumable 104 includes a sealed tank 106 and is intended for single-use only. The consumable 104 is removably engageable with the device 102 (i.e. for removal and replacement). Fig. 1A shows the smoking substitute system 100 with the device 102 physically coupled to the consumable 104 and in a vertical orientation, Fig. 1B shows the device 102 of the smoking substitute system 100 without the consumable 104, and Fig. 1C shows the consumable 104 of the smoking substitute system 100 without the device 102. Figure 1D shows the device and consumable coupled, but in a horizontal orientation.

[0065] The device 102 comprises a device housing 101 and the consumable 104 comprises a consumable housing 129, which together define a system housing 131. The device housing 101 defines a cavity (not shown in the present figures) for receipt of a tank 106 of the consumable 104, which forms part of the consumable housing 129. The device 102 and the consumable 104 are configured to be physically coupled together by pushing the consumable 104 into the cavity at an upper end 108 of the housing 101, such that there is an interference fit between the device 102 and the consumable 104. In other examples, the device 102 and the consumable may be coupled by screwing one onto the other, or through a bayonet fitting.

[0066] The consumable 104 includes a mouthpiece (not shown in Fig. 1A to 1D) at an upper end 109 of the consumable 104, and one or more air inlets (not shown) in fluid communication with the mouthpiece such that air can be drawn into and through the consumable 104 when a user inhales through the mouthpiece. The tank 106 contains an aerosol precursor in the form of an e-liquid 103 and is located at the lower end 111 of the consumable 104.

[0067] As is particularly apparent from Figure 1A, the device housing 101 includes a single viewing region in the form of a window 105 (i.e. defined by an aperture formed in the device housing 101). This window 105 allows the amount of e-liquid 103 in the tank 106 to be visually assessed. As is evident from Figure 1C, the walls of the tank 106 are translucent to permit the e-liquid 103 to be viewed through the window 105. It is noted, however, that the only portion of the tank 106 visible is that which is aligned with the window 105, because the remaining portions of the tank 106 are obscured by the wall of the housing 101 of the device 102 defining the cavity. As is discussed above, this may limit the amount of light received by the e-liquid 103.

[0068] The window 105 formed in the device housing 101 is elongate (obround) so as to define an elongate axis, and is oriented such that the elongate axis is oblique (i.e. neither perpendicular nor parallel) with respect to a longitudinal axis of the device housing 101 (and of the system housing 131). In other words, the window 105 is slanted with respect to the longitudinal axis of the device housing 101. This means that the window 105 extends both longitudinally and transversely.

[0069] This orientation of the window 105 allows the level of e-liquid 103 to be viewed for both a vertical orientation (Figure 1A) of the longitudinal axis of the device housing 101, and a horizontal orientation (Figure 1D) of the device housing 101. In particular, the longitudinal extension of the window 105allows assessment of the level in the vertical orientation (Figure 1A) and the transverse extension of the window 105 allows assessment of the level in the horizontal orientation (Figure 1D). Thus, a user may, for example, view the e-liquid 103 level when handheld (e.g. vertical) and when resting on a surface (e.g. horizontal).

[0070] In both orientations, the meniscus 107 of the e-liquid 103 extends transversely with respect to the elongate axis of the window 105. This ensures that a range of levels can be measured (i.e. along the elongate axis) as the e-liquid 103 is depleted, whilst minimising the amount of light entering the e-liquid 103 (i.e. by only providing a strip/elongate shape through which the e-liquid 103 can be viewed).

[0071] The lower end 110 of the device 102 also includes a light 116 (e.g. an LED) located behind a small translucent cover. The light 116 may be configured to illuminate when the smoking substitute system 100 is activated. Whilst not shown, the consumable 104 may identify itself to the device 102, via an electrical interface,

RFID chip, or barcode.

[0072] Figs. 2A and 2B are schematic drawings of the device 102 and consumable 104. As is apparent from Fig. 2A, the device 102 includes a power source 118, a controller 120, a memory 122, a wireless interface 124, an electrical interface 126, and, optionally, one or more additional components 128.

[0073] The power source 118 is preferably a battery, more preferably a rechargeable battery. The controller 120 may include a microprocessor, for example. The memory 122 preferably includes non-volatile memory. The memory may include instructions which, when implemented, cause the controller 120 to perform certain tasks or steps of a method.

[0074] The wireless interface 124 is preferably configured to communicate wirelessly with another device, for example a mobile device, e.g. via Bluetooth®. To this end, the wireless interface 124 could include a Bluetooth® antenna. Other wireless communication interfaces, e.g. WiFi®, are also possible. The wireless interface 124 may also be configured to communicate wirelessly with a remote server.

[0075] The electrical interface 126 of the device 102 may include one or more electrical contacts. The electrical interface 126 may be located in a base of the aperture in the upper end 108 of the device 102. When the device 102 is physically coupled to the consumable 104, the electrical interface 126 is configured to transfer electrical power from the power source 118 to the consumable 104 (i.e. upon activation of the smoking substitute system 100).

[0076] The electrical interface 126 may be configured to receive power from a charging station when the device 102 is not physically coupled to the consumable 104 and is instead coupled to the charging station. The electrical interface 126 may also be used to identify the consumable 104 from a list of known consumables. For example, the consumable 104 may be a particular flavour and/or have a certain concentration of nicotine (which may be identified by the electrical interface 126). This can be indicated to the controller 120 of the device 102 when the consumable 104 is connected to the device 102. Additionally, or alternatively, there may be a separate communication interface provided in the device 102 and a corresponding communication interface in the consumable 104 such that, when connected, the consumable 104 can identify itself to the device 102.

[0077] The additional components 128 of the device 102 may comprise the light 116 discussed above.

[0078] The additional components 128 of the device 102 may also comprise a charging port (e.g. USB or micro-USB port) configured to receive power from the charging station (i.e. when the power source 118 is a rechargeable battery). This may be located at the lower end 110 of the device 102. Alternatively, the electrical interface 126 discussed above may be configured to act as a charging port configured to receive power from the charging station such that a separate charging port is not required.

[0079] The additional components 128 of the device 102 may, if the power source 118 is a rechargeable battery, include a battery charging control circuit, for controlling the charging of the rechargeable battery. However, a battery charging control circuit could equally be located in the charging station (if present).

[0080] The additional components 128 of the device 102 may include a sensor, such as an airflow (i.e. puff) sensor for detecting airflow in the smoking substitute system 100, e.g. caused by a user inhaling through a mouthpiece 136 of the consumable 104. The smoking substitute system 100 may be configured to be activated when airflow is detected by the airflow sensor. This sensor could alternatively be included in the consumable 104. The airflow sensor can be used to determine, for example, how heavily a user draws on the mouthpiece or how many times a user draws on the mouthpiece in a particular time period.

[0081] The additional components 128 of the device 102 may include a user input, e.g. a button. The smoking substitute system 100 may be configured to be activated when a user interacts with the user input (e.g. presses the button). This provides an alternative to the airflow sensor as a mechanism for activating the smoking substitute system 100.

[0082] As shown in Fig. 2B, the consumable 104 includes the tank 106, an electrical interface 130, a vaporiser 132, one or more air inlets 134, a mouthpiece 136, and one or more additional components 138.

[0083] The electrical interface 130 of the consumable 104 may include one or more electrical contacts. The electrical interface 126 of the device 102 and an electrical interface 130 of the consumable 104 are configured to contact each other and thereby electrically couple the device 102 to the consumable 104 when the lower end 111 of the consumable 104 is inserted into the upper end 108 of the device 102 (as shown in Fig. 1A). In this way, electrical energy (e.g. in the form of an electrical current) is able to be supplied from the power source 118 in the device 102 to the vaporiser 132 in the consumable 104.

[0084] The vaporiser 132 is configured to heat and vaporise e-liquid contained in the tank 106 using electrical energy supplied from the power source 118. As will be described further below, the vaporiser 132 includes a heating filament and a wick. The wick draws e-liquid from the tank 106 and the heating filament heats the e-liquid to vaporise the e-liquid.

[0085] The one or more air inlets 134 are preferably configured to allow air to be drawn into the smoking substitute system 100, when a user inhales through the mouthpiece 136. When the consumable 104 is physically coupled to the device 102, the air inlets 134 receive air, which flows to the air inlets 134 along a gap between the device 102 and the lower end 111 of the consumable 104.

[0086] In operation, a user activates the smoking substitute system 100, e.g. through interaction with a user input forming part of the device 102 or by inhaling through

the mouthpiece 136 as described above. Upon activation, the controller 120 may supply electrical energy from the power source 118 to the vaporiser 132 (via electrical interfaces 126, 130), which may cause the vaporiser 132 to heat e-liquid drawn from the tank 106 to produce a vapour which is inhaled by a user through the mouthpiece 136.

[0087] An example of one of the one or more additional components 138 of the consumable 104 is an interface for obtaining an identifier of the consumable 104. As discussed above, this interface may be, for example, an RFID reader, a barcode, a QR code reader, or an electronic interface which is able to identify the consumable. The consumable 104 may, therefore include anyone or more of an RFID chip, a barcode or QR code, or memory within which is an identifier and which can be interrogated via the electronic interface in the device 102.

[0088] It should be appreciated that the smoking substitute system 100 shown in figures 1A to 2B is just one exemplary implementation of a smoking substitute system. For example, the system could otherwise be in the form of an entirely disposable (single-use) system or an open system in which the tank is refillable (rather than replaceable).

[0089] Fig. 3 is a section view of the consumable 104 described above. The consumable 104 comprises a tank 106 for storing e-liquid, a mouthpiece 136 and a passage 140 extending along a longitudinal axis of the consumable 104. In the illustrated embodiment the passage 140 is in the form of a tube having a substantially circular transverse cross-section (i.e. transverse to the longitudinal axis). The tank 106 surrounds the passage 140, such that the passage 140 extends centrally through the tank 106.

[0090] A tank housing 142 of the tank 106 defines an outer casing of the consumable 104, whilst a passage wall 144 defines the passage 140. The tank housing 142 extends from the lower end 111 of the consumable 104 to the mouthpiece 136 at the upper end 109 of the consumable 104. At the junction between the mouthpiece 136 and the tank housing 142, the mouthpiece 136 is wider than the tank housing 142, so as to define a lip 146 that overhangs the tank housing 142. This lip 146 acts as a stop feature when the consumable 104 is inserted into the device 102 (i.e. by contact with an upper edge of the device 102).

[0091] The tank 106, the passage 140 and the mouthpiece 136 are integrally formed with each other so as to form a single unitary component and may e.g. be formed by way of an injection moulding process. Such a component may be formed of a thermoplastic material such as polypropylene.

[0092] The mouthpiece 136 comprises a mouthpiece aperture 148 defining an outlet of the passage 140. The vaporiser 132 is fluidly connected to the mouthpiece aperture 148 and is located in a vaporising chamber 156 of the consumable 104. The vaporising chamber 156 is downstream of the inlet 134 of the consumable 104 and is fluidly connected to the mouthpiece aperture 148 (i.e. outlet) by the passage 140.

[0093] The vaporiser 132 comprises a porous wick 150 and a heater filament 152 coiled around the porous wick 150. The wick 150 extends transversely across the chamber vaporising 156 between sidewalls of the chamber 156 which form part of an inner sleeve 154 of an insert 158 that defines the lower end 111 of the consumable 104 that connects with the device 102. The insert 158 is inserted into an open lower end of the tank 106 so as to seal against the tank housing 142.

[0094] In this way, the inner sleeve 154 projects into the tank 106 and seals with the passage 140 (around the passage wall 144) so as to separate the vaporising chamber 156 from the e-liquid in the tank 106. Ends of the wick 150 project through apertures in the inner sleeve 154 and into the tank 106 so as to be in contact with the e-liquid in the tank 106. In this way, e-liquid is transported along the wick 150 (e.g. by capillary action) to a central portion of the wick 150 that is exposed to airflow through the vaporising chamber 156. The transported e-liquid is heated by the heater filament 152 (when activated e.g. by detection of inhalation), which causes the e-liquid to be vaporised and to be entrained in air flowing past the wick 150. This vaporised liquid may cool to form an aerosol in the passage 140, which may then be inhaled by a user.

[0095] The smoking substitute system 200 shown in figures 4A to 4C shares many of the same features of the system described above, and for that reason, corresponding reference numerals have been used (albeit, with the first digit replaced to represent the different embodiment).

[0096] This embodiment differs from that previously described in that the system 200 comprises two elongate viewing regions (rather than a single region) in the form of first 214a and second 214b elongate window portions of a window 205. The second window portion 214b is oriented such that its elongate axis extends transversely with respect to a longitudinal axis of the device housing 201. In particular, the second window portion 214b forms a loop that extends about the system housing 231 (i.e. about the longitudinal axis of the hosing 201). The first window portion 214a is oriented such that its elongate axis extends longitudinally (i.e. parallel to the longitudinal axis of the housing 201). The first window portion 214a joins with the second window portion 214b at its upper end, so as to form a generally L-shaped window.

[0097] In this way, when the system housing 231 is oriented vertically (Figure 4A), the meniscus 207 of the aerosol precursor 203 in the tank 206 (i.e. indicating the level of precursor) may be viewed through the first window portion 214a, and when the system housing 231 is oriented horizontally (Figure 4C) the aerosol precursor level may be viewed through the second window portion 214b. In both orientations, the meniscus 207 extends transversely with respect to the elongate axis of the corresponding window portion 214a, 214b.

[0098] The window 205 (and window portions 214a,

214b) are partly defined by the consumable 204 and partly defined by the device 202, when the consumable 204 is received in a cavity 215 defined by the device housing 201. As is apparent from Figure 4B in particular, the walls of the tank 206 of the consumable 204 are translucent, such that the e-liquid 203 can be viewed through the walls of the tank 206. The tank 206 comprises a raised region 217 in the shape of the window 205. Thus, the raised region 217 comprises a longitudinal portion 223a and a transverse portion 223b (which respectively define the first 214a and second 214b portions of the window 205 when formed).

[0099] The raised region 217 defines a lip 219 that abuts (i.e. seats against) an upper edge 221 of the device housing 201 when the consumable 204 is engaged in the cavity 215. The shape of the upper edge 221 of the device housing 201 is complementary to the lip 219 (which defines a lower edge of the raised region 217 of the tank 206), such that the lip 219 and upper edge 221 sit flushly against one another. In particular, the upper end of the device housing 201 comprises a longitudinally extending slot 225 that accommodates the longitudinal portion 223a of the raised region 217 of the tank 206 when the consumable 204 and device 202 are engaged.

[0100] The longitudinal slot 225, in combination with the longitudinal portion 223a of the raised region 217, helps to guide the consumable 204 into the cavity 215. This is facilitated by the shape of the longitudinal portion 223a, which has a rounded/tapered distal end.

[0101] When the consumable 204 is received in the cavity 215, the non-raised region of the tank 206 enters the cavity, whilst the raised region 217 is retained above the cavity 215 by the contact of the lip 219 with the upper edge 221 of the housing 201. In this way, only the raised region 217 of the tank 217 is visible (view of the remainder of the tank 206 being obstructed by the device housing 201). Thus, the window 205 is defined by the combination of the consumable 204 and the device 202.

[0102] Figures 5A and 5B illustrate a further smoking substitute system 300. Again, due to similarities with the previously described systems 100, 200, corresponding reference numerals have been used. Like the previously described embodiment, this system 300 comprises a plurality of viewing regions in the form of front 314a, rear 314b, and side 314c, 314d window portions that are joined to form a window 305.

[0103] The system housing 331 (defined by a combination of the device housing 301 and the consumable housing 329) comprises opposing front 327a and rear 327b walls that are joined by opposing side walls 327c, 327d extending therebetween. The distance between the front 327a and rear 327b walls define a depth of the housing 331 and the distance between the side walls 327b, 327c define a width of the system housing 331, which is greater than the depth.

[0104] The front window portion 314a is formed in the front wall 327a of the system housing 331, the rear window portion 314b is formed in the rear wall 327b and each of the side window portions 314c, 314d is formed in a respective side wall 327c, 327d. In this way, the window portions 314a, 314b, 314c, 314d form a loop that extends about the longitudinal axis of the system housing 331.

[0105] Each of the front 314a and rear 314b window portions extends transversely with respect the longitudinal axis of the system housing 331. The rear window portions 314b, however, is located closer to the consumable 304 end of the system housing 331 than the front window portion 314a. Each of the side window portions 314c, 314d extends obliquely with respect to the longitudinal axis of the system housing 331. In particular, each side window portion 314c, 314d is sloped towards the consumable 304 end of the housing 331 in a direction from the front window portion 314a to the rear window portion 314b.

[0106] Like the previously discussed embodiments, this arrangement allows assessment of the level of aerosol precursor 303 in the tank 306 in both a vertical orientation and a horizontal orientation. In the vertical orientation (as depicted in the figures) the precursor level can be viewed through both of the side window portions 314c, 314d. As is apparent from Figure 5B in particular, in this vertical orientation, the meniscus 307 of the precursor 303 extends transversely with respect to the elongate axes of the side window portions 314c, 314d.

[0107] Whilst not shown, it should be appreciated that, in the horizontal orientation, the precursor level can be viewed through either the side window portions 314c, 314d (due to their oblique orientation) or through the front 314a or rear 314b window portions. If the system 300 is positioned with the front wall 327 directed upwards (or downwards) the precursor level can be viewed through the side window portions 314c, 314d. If the system 300 positioned such that one of the side walls 327c, 327d is directed upwards then the precursor level can be viewed through the front 314a or rear 314b window portion.

[0108] Whilst not immediately apparent in the figures, the window 305 is formed only when the consumable 304 is engaged with the device 302. The tank 306 comprises a raised region having the same shape as the window 305 (when formed) and that defines a lip at a lower edge thereof. The lip engages with an upper edge of the device housing 301 when the tank 306 is received in the cavity of the device housing 301. Thus, the non-raised regions of the tank 306 are received in the cavity, whilst the raised region remains supported above the cavity (so as to be visible and so as to define the window 305).

[0109] While exemplary embodiments have been described above, many equivalent modifications and variations will be apparent to those skilled in the art when given this disclosure. Accordingly, the exemplary embodiments set forth above are considered to be illustrative and not limiting.

[0110] 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.

[0111] 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%.

[0112] 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 smoking substitute system comprising a housing defining a cavity for receipt of a liquid aerosol precursor, the housing comprising one or more elongate viewing regions extending along respective elongate axes, the one or more viewing regions arranged such that for both vertical and horizontal orientations of the housing the meniscus of the aerosol precursor is visible through a viewing region of the one or more viewing regions and extends transversely with respect to the elongate axis of the viewing region.

2. A smoking substitute system according to claim 1 wherein the housing is elongate and extends along a longitudinal axis and the one or more viewing regions comprises an angled viewing region having a respective elongate axis that is oriented obliquely with respect to the longitudinal axis.

3. A smoking substitute system according to claim 2 wherein the angled viewing region extends on an angle of between 40 and 80 degrees with respect to the longitudinal axis.

4. A smoking substitute system according to any one of the preceding claims wherein the one or more viewing regions comprises first and second viewing regions that are oriented so as to be orthogonal to one another.

5. A smoking substitute system according to claim 4 wherein the first and second orthogonal viewing regions are joined.

6. A smoking substitute system according to claim 5 wherein the first and second viewing regions are joined at respective ends so as to form an L-shape.

7. A smoking substitute system according to claim 4 wherein the first and second orthogonal viewing regions are spaced from one another.

8. A smoking substitute system according to any one of claims 4 to 7 wherein the housing is elongate and extends along a longitudinal axis and one of the first and second orthogonal viewing regions is oriented so as to be parallel to the longitudinal axis and the other of the first and second orthogonal viewing regions is oriented so as to be perpendicular to the longitudinal axis.

9. A smoking substitute system according to any one of the preceding claims, wherein the housing comprises opposing longitudinally extending front and rear walls spaced by opposing side walls, a first viewing region of the one or more viewing regions being formed in the front and/or rear wall and a second viewing region of the one or more viewing regions being formed in one of the side walls.

10. A smoking substitute system according to any one of the preceding claims comprising a smoking substitute device and a consumable configured for engagement with the device, the consumable comprising a tank for receipt of the liquid aerosol precursor.

11. A smoking substitute device according to claim 9 wherein a portion of the tank is receivable in a cavity of the device and, when received therein, a portion of the tank remains outside of the cavity, the portion of the tank remaining outside of the cavity defining the one or more viewing regions.

12. A smoking substitute device according to claim 11, wherein the tank comprises a raised region that defines the one or more viewing regions when the portion of the tank is received in the cavity of the device.

13. A smoking substitute device according to claim 12 wherein the raised region defines a lip for engagement with an edge of the device defining an opening to the cavity of the device.

14. A smoking substitute system according to any one of claims 10 to 13 wherein the consumable compris-

es heater and the device includes a power source for supplying power to the heater when the consumable is engaged with the device.

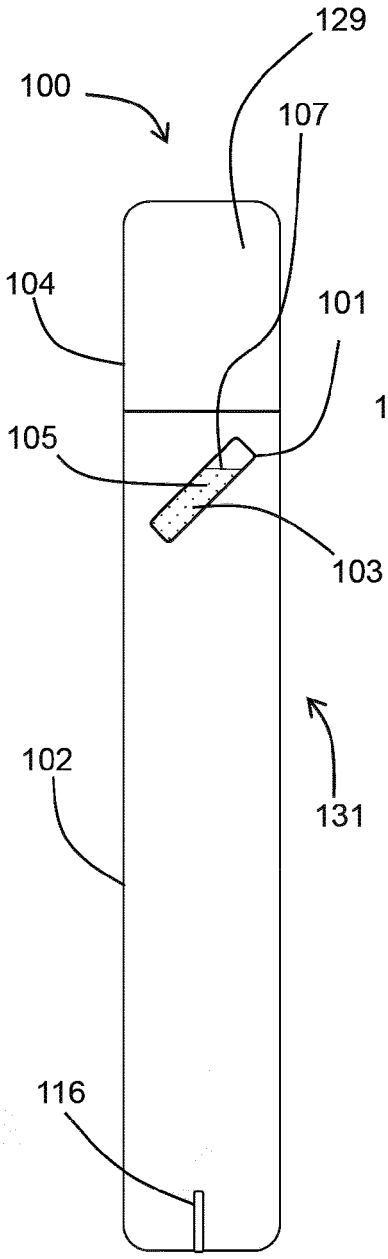

FIG 1A

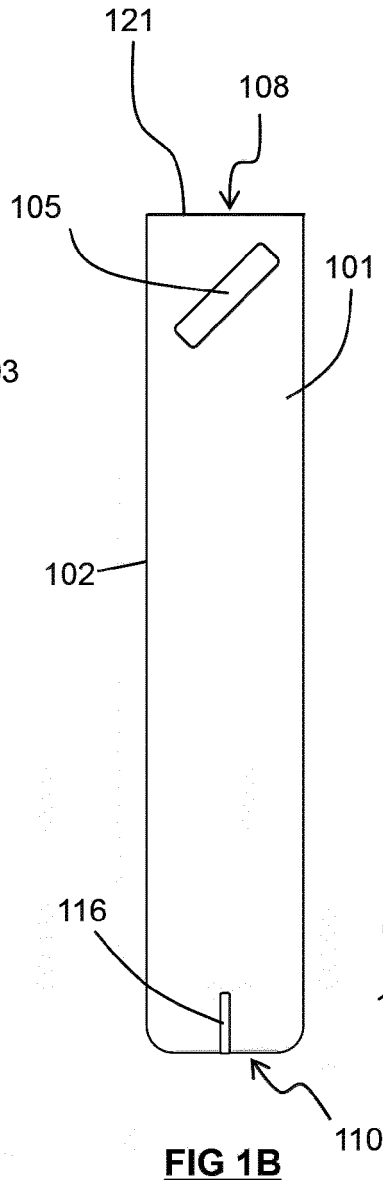

FIG 1B

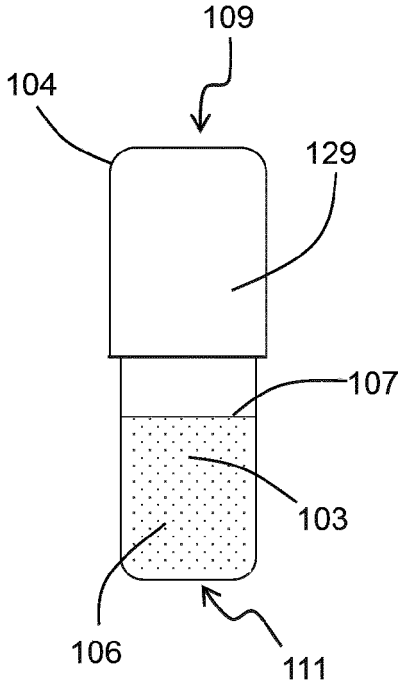

FIG 1C

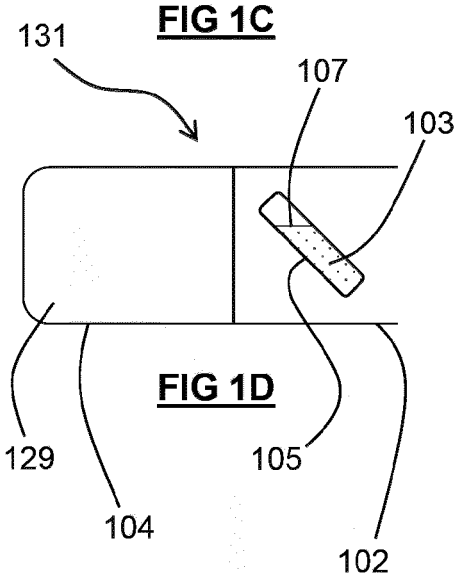

FIG 1D

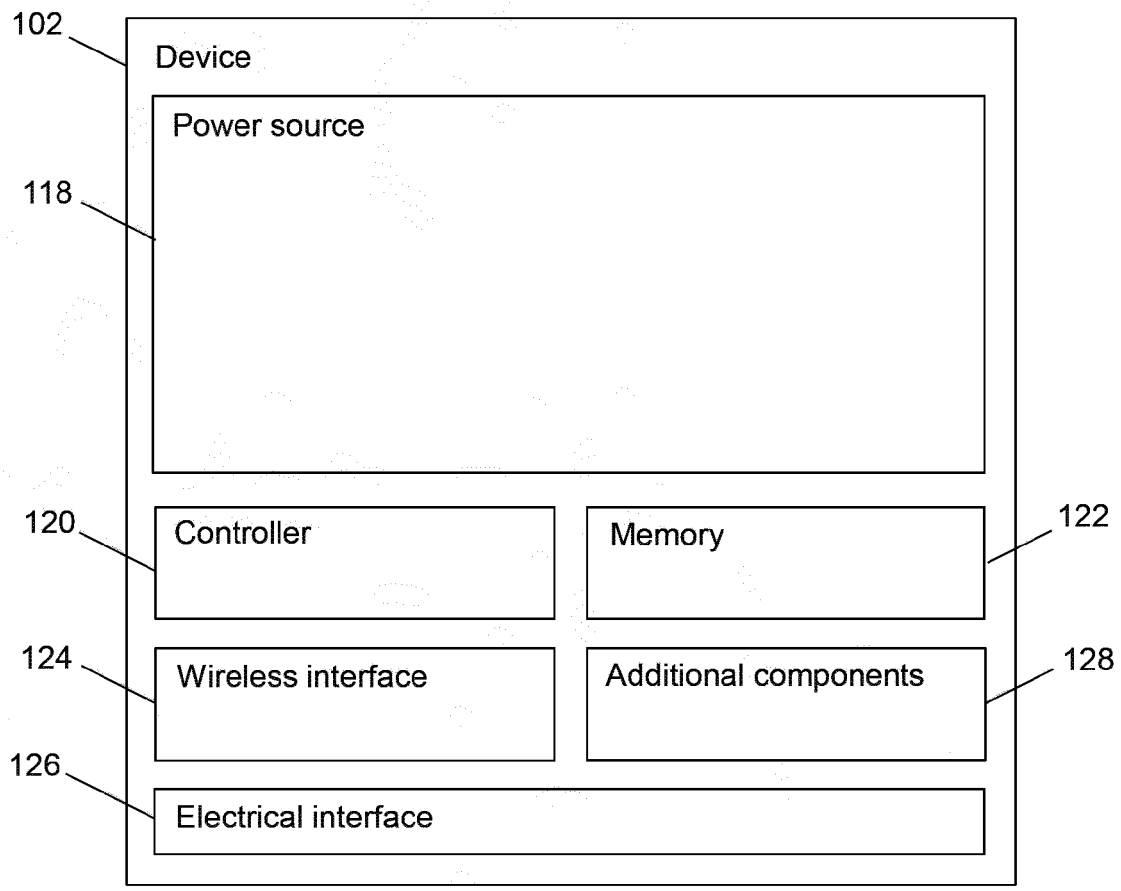
102
Device
Power source
118
120
Controller
Memory
122
124
Wireless interface
Additional components
128
126
Electrical interface

FIG 2A

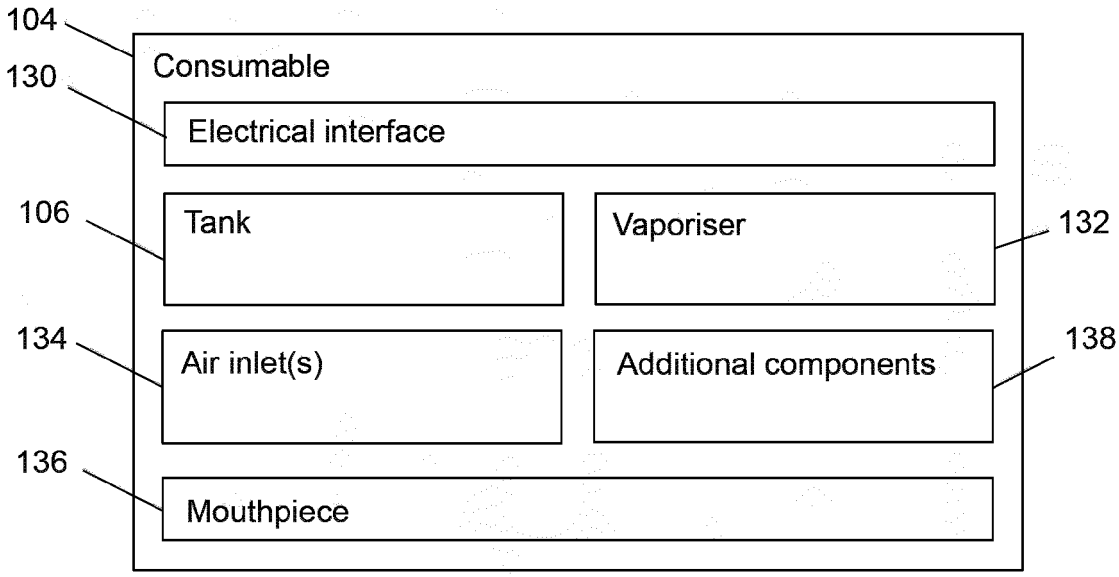
104
Consumable
130
Electrical interface
106
Tank
Vaporiser
132
134
Air inlet(s)
Additional components
138
136
Mouthpiece

FIG 2B

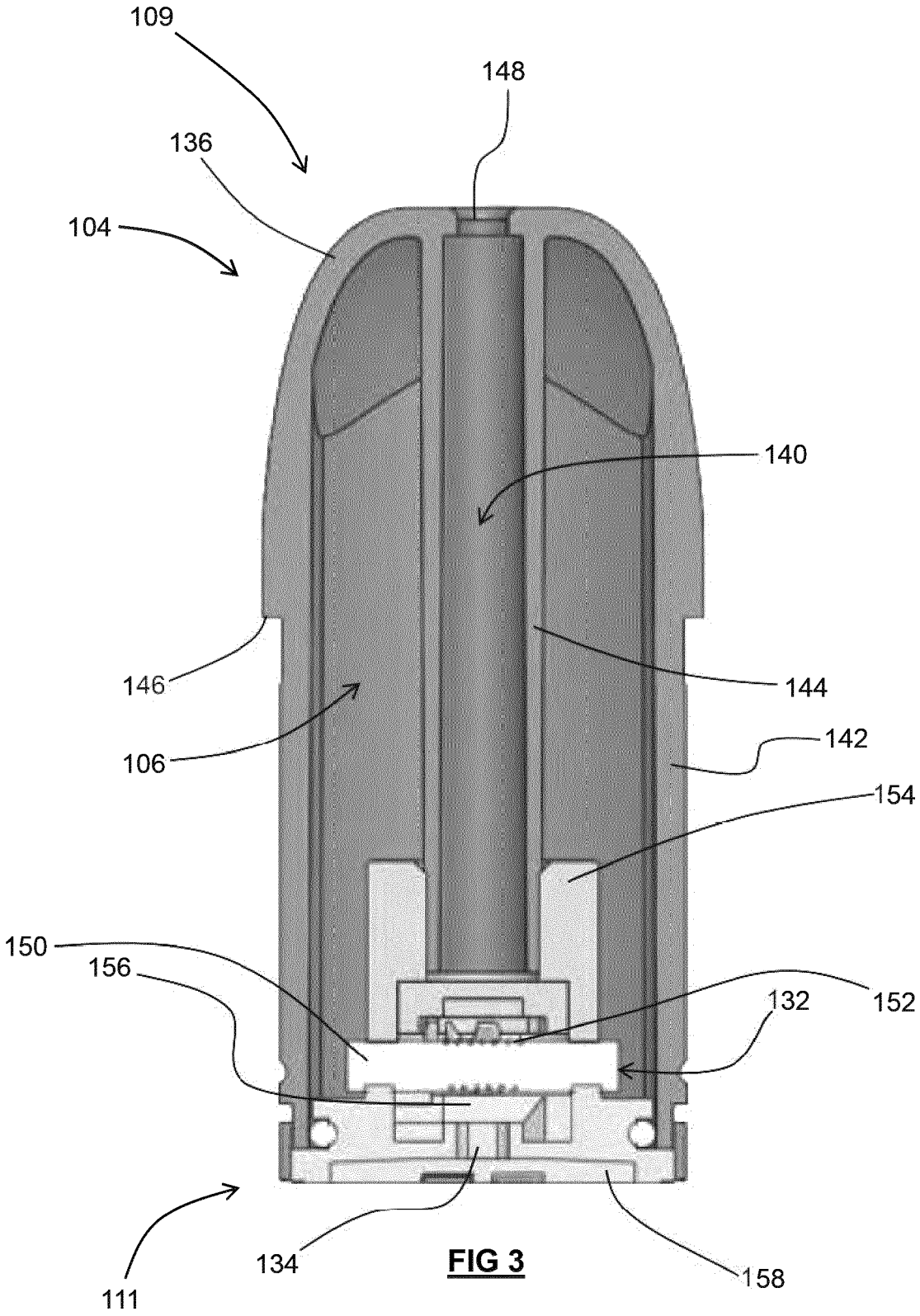
109
148
136
104
140
146
144
106
142
154
150
156
152
132
134
158
111

FIG 3

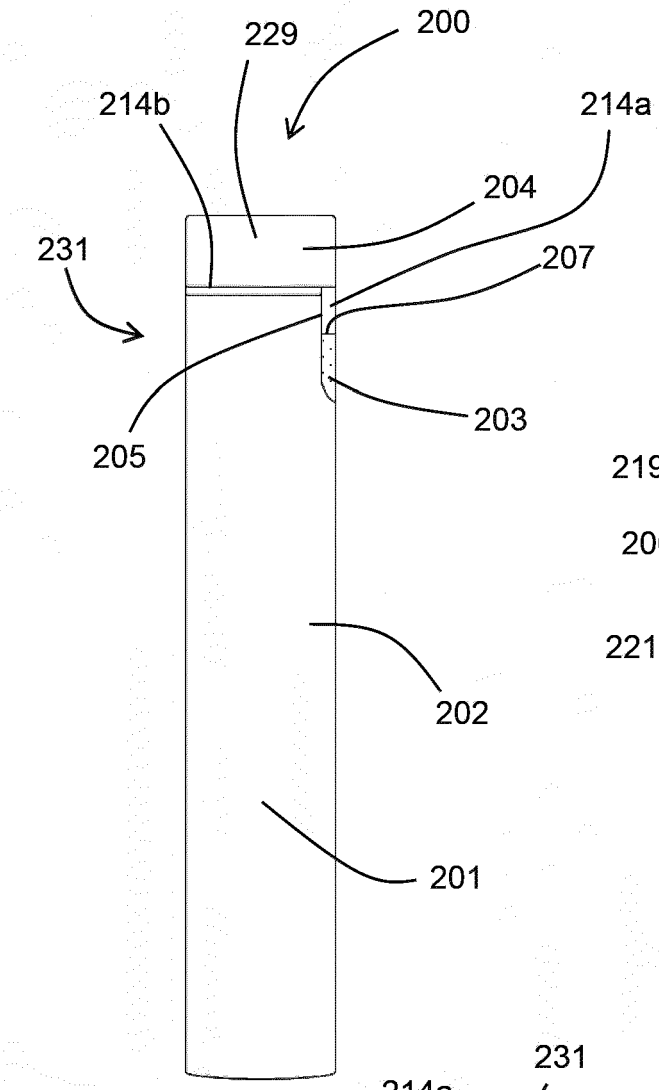

FIG 4A

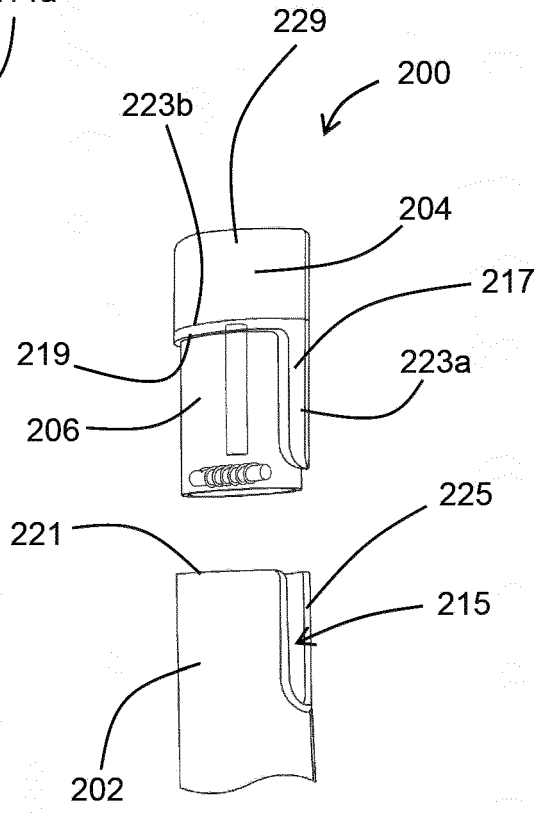

FIG 4B

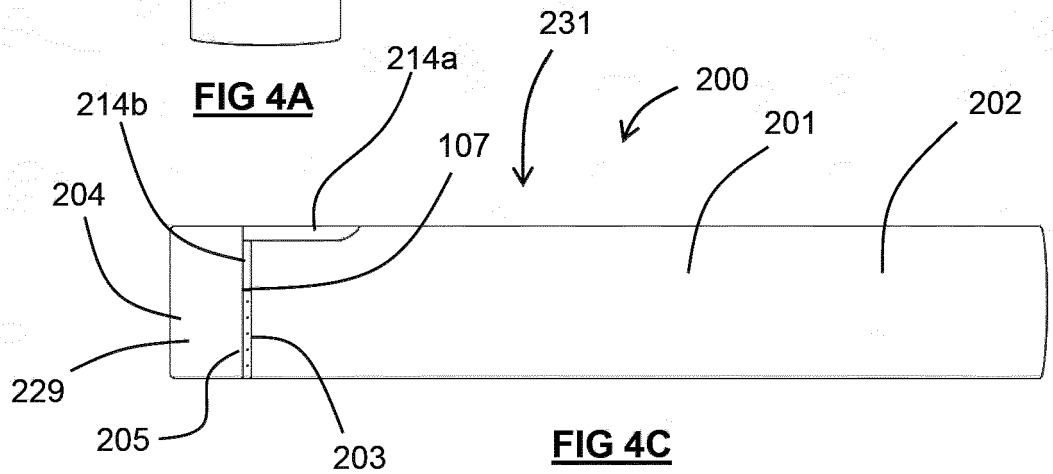

FIG 4C

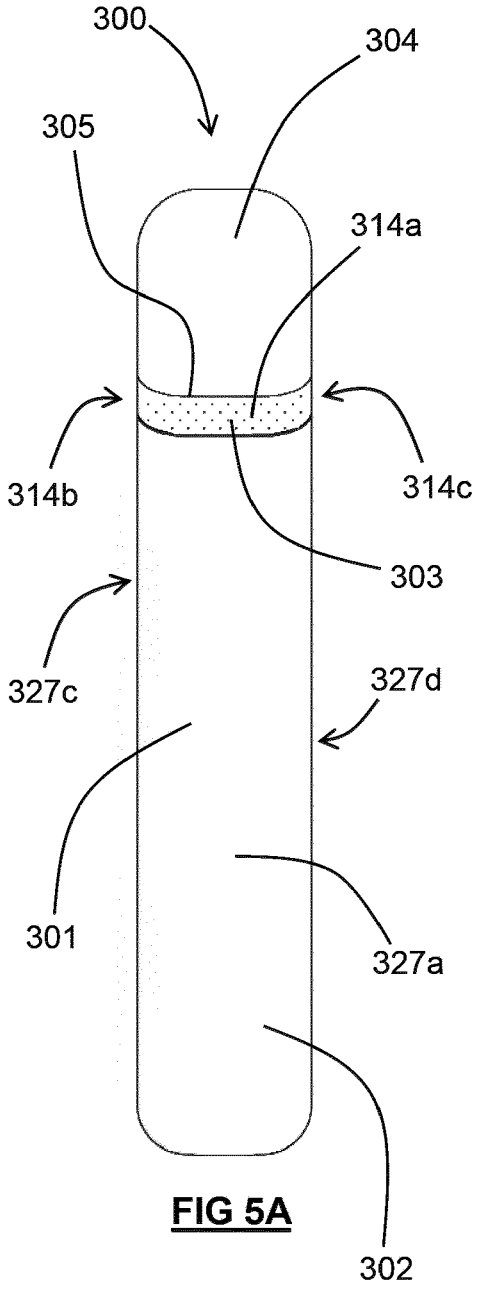
300
304
305
314a
314b
314c
303
327c
327d
301
327a
302

FIG 5A

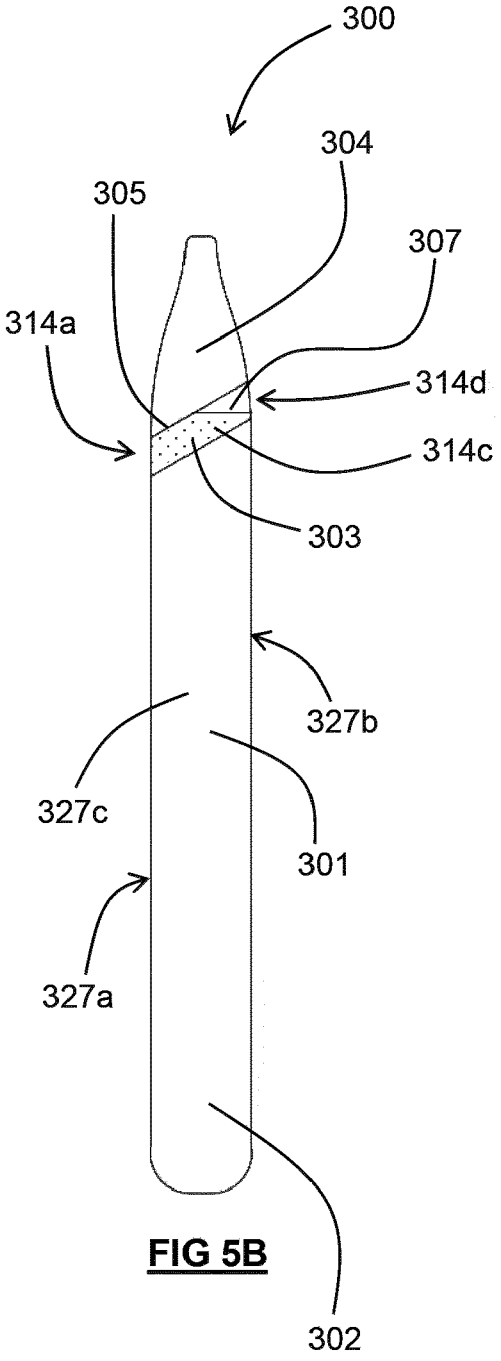
300
304
305
307
314a
314d
314c
303
327b
327c
301
327a
302

FIG 5B

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EUROPEAN SEARCH REPORT

Application Number
EP 19 19 6541

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

A24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 March 2020	Schwertfeger, C

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18-03-2020

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