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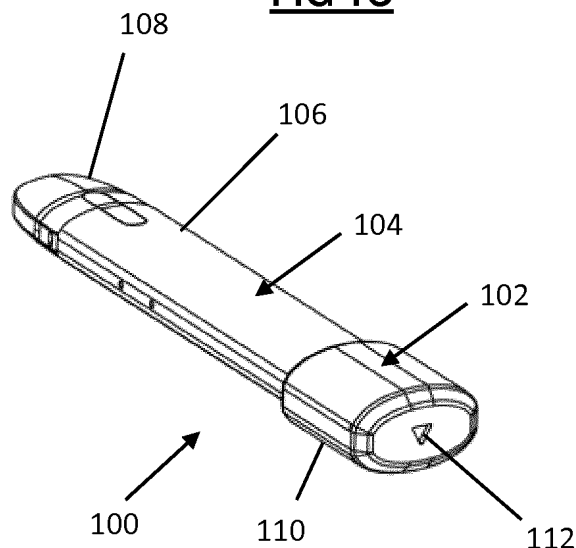
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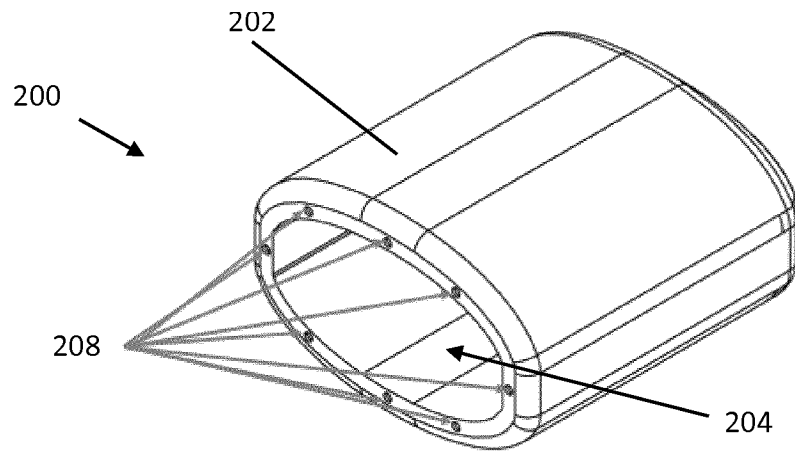
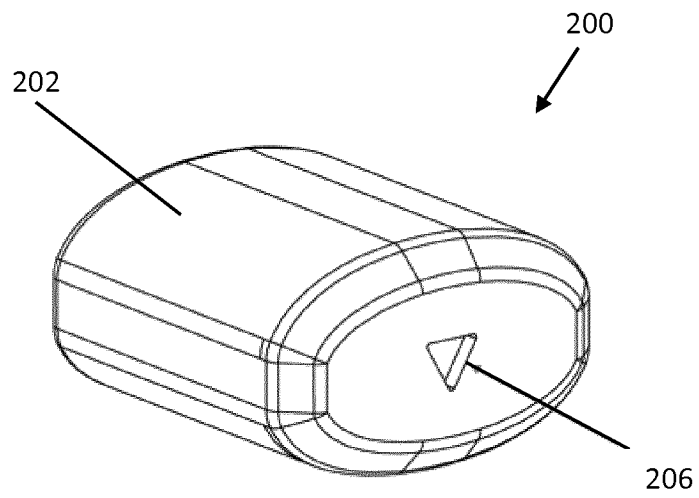
(54) **VAPOUR FILTERING DEVICE FOR A SMOKING SUBSTITUTE SYSTEM**

(57) Various embodiments provide a vapour filtering device (102, 200) for a smoking substitute system (104), the vapour filtering device comprising: a casing (110, 202) having an internal space (210) housing a vapour filter, the casing defining a cavity (204) for receiving an end portion of a main body (106) of the smoking substitute system, and the casing having a vapour intake opening (112, 206) and at least one exhaust port (208) in fluid communication with the internal space; and wherein secondary vapour is exhausted through the vapour filter when a user sucks vapour from the smoking substitute system and exhales the vapour into the vapour intake opening which filters the secondary vapour allowing filtered secondary vapour to pass out of the at least one exhaust port. Some other embodiments also provide a smoking substitute kit (100) including the vapour filtering device and the smoking substitute system.

**FIG 1C**



**FIG 2A**



**FIG 2B**

## Description

### Field of the Invention

**[0001]** The present invention relates to a vapour filtering device for a smoking substitute system and, in particular, a vapour filtering device for filtering exhalant generated from using the smoking substitute system, wherein the device comprises a cavity for receiving an end portion of a main body of the 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 byproducts. 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 include electronic systems that permit a user to simulate the act of smoking by producing an aerosol (also referred to as a "vapour") that is drawn into the lungs through the mouth (inhaled) and then exhaled. The inhaled aerosol typically bears nicotine and/or a flavourant 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 with combustible 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. There are a number of different categories of smoking substitute systems, each utilising a different smoking substitute approach.

**[0008]** One approach is the so-called "vaping" approach, in which a vaporisable liquid, typically referred to (and referred to herein) as "e-liquid", is heated by a heating device (referred to herein as an electronic cigarette or "e-cigarette" device) to produce an aerosol vapour which is inhaled by a user. The e-liquid typically includes a base liquid as well as nicotine and/or a flavourant. The resulting vapour therefore also typically

contains nicotine and/or a flavourant. The base liquid may include propylene glycol and/or vegetable glycerine.

**[0009]** A typical e-cigarette device includes a mouthpiece, a power source (typically a battery), a tank for containing e-liquid, as well as a heating device. In use, electrical energy is supplied from the power source to the heating device, which heats the e-liquid to produce an aerosol (or "vapour") which is inhaled by a user through the mouthpiece.

**[0010]** E-cigarettes can be configured in a variety of ways. For example, there are "closed system" vaping smoking substitute systems, which typically have a sealed tank and heating element. The tank is pre-filled with e-liquid and is not intended to be refilled by an end user. One subset of closed system vaping smoking substitute systems include a main body which includes the power source, wherein the main body is configured to be physically and electrically coupled to a consumable including the tank and the heating element. In this way, when the tank of a consumable has been emptied, that consumable is disposed of. The main body can be reused by connecting it to a new, replacement, consumable. Another subset of closed system vaping smoking substitute systems are completely disposable, and intended for one-use only.

**[0011]** There are also "open system" vaping smoking substitute systems which typically have a tank that is configured to be refilled by a user. In this way the entire device can be used multiple times.

**[0012]** An example vaping smoking substitute system is the myblu™ e-cigarette. The myblu™ e-cigarette is a closed system which includes a main body and a consumable. The main body and consumable are physically and electrically coupled together by pushing the consumable into the main body. The main body includes a rechargeable battery. The consumable includes a mouthpiece, a sealed tank which contains e-liquid, as well as a heater, which for this device is a heating filament coiled around a portion of a wick. The wick is partially immersed in the e-liquid, and conveys e-liquid from the tank to the heating filament. The device is activated when a microprocessor on board the main body detects a user inhaling through the mouthpiece. When the device is activated, electrical energy is supplied from the power source to the heating device, which heats e-liquid from the tank to produce a vapour which is inhaled by a user through the mouthpiece.

**[0013]** The rechargeable battery may typically be recharged by plugging the main body into an external power source e.g. via a charger cable. Thus, the main body may include a connector for plugging the charger cable into the main body.

**[0014]** Vaping usually produces a visible exhalant that resembles cigarette smoke. People who vape can be subject to concern or hostility from others due to the social stigma associated with smoking. Therefore, there is a need to allow a user to vape and enjoy a smoking substitute system with the ability to dispose of the resulting

vapour so as not to disrupt or disturb people in their presence or the surrounding public.

**[0015]** The present disclosure has been devised in the light of the above considerations.

### **Summary of the Invention**

**[0016]** At its most general, the present invention relates to a vapour filtering device for a smoking substitute system, wherein the device is arranged to receive a smoking substitute system. Additionally, the vapour filtering device includes a vapour filter arranged such that secondary vapour is exhausted through the vapour filter when a user sucks vapour from the smoking substitute system and exhales the vapour into the vapour filtering device which filters the secondary vapour (e.g. removes various vapour chemicals) allowing filtered secondary vapour (e.g. clean filtered air) to pass out of the vapour filtering device. In this manner, the vapour filter device may provide a means or mechanism by which exhalant generated by vaping can be filtered or cleaned before it is introduced into an environment from which it may be subsequently inhaled by third parties. Also, the vapour filter device can be releasably coupled or attached to the smoking substitute system such that it is readily accessible for use just after a user inhales vapour from the smoking substitute system. Additionally, the vapour filter device can be coupled to the smoking substitute system so that the two elements provide a single convenient assembly for generating vapour and cleaning or filtering exhalant. As such, the vapour filter device serves the dual functions of filtering or cleaning exhalant whilst being readily accessible for use when needed.

**[0017]** According to a first aspect of the invention, there is provided a vapour filtering device (or apparatus) for a smoking substitute system (or device or apparatus), the vapour filtering device comprising: a casing (or housing) having an internal space housing a vapour filter, the casing defining a cavity (or recess) for receiving an end portion of a main body of the smoking substitute system, and the casing having a vapour intake opening (or aperture) and at least one exhaust port (or aperture/opening) in fluid communication with the internal space; and wherein secondary vapour is exhausted through the vapour filter when a user sucks vapour from the smoking substitute system and exhales the vapour into the vapour intake opening which filters the secondary vapour (e.g. removes various vapour chemicals) allowing filtered secondary vapour (e.g. clean filtered air) to pass out of the at least one exhaust port. In an embodiment only filtered secondary vapour (e.g. clean filtered air) passes out of the at least one exhaust port.

**[0018]** In this manner, the vapour filtering device can be releasably coupled to the smoking substitute system such that it is easily accessible when needed to filter or clean exhalant generated from using the smoking substitute system. For example, various vapour chemicals removed by the vapour filter may render the filtered sec-

ondary vapour substantially smell-less to the human nose and/or substantially invisible to the human eye.

**[0019]** It is to be understood that secondary vapour is the exhalant generated from using the smoking substitute system. Accordingly, a user may suck on a mouth piece of a smoking substitute system so as to inhale into the user's mouth and lungs vapour generated by the smoking substitute system. In this example, the vapour emitted from the mouth piece may be referred to as "primary vapour". This primary vapour is then exhaled by the user so as to form the "secondary vapour" and, specifically, the secondary vapour is exhaled into or through the vapour intake opening of the vapour filtering device such that the secondary vapour is forced into or through the vapour filter so as to filter the secondary vapour (e.g. remove various vapour chemicals), thereby allowing filtered secondary vapour to pass out of the exhaust port(s). In this example, the filtered secondary vapour leaving the exhaust port(s) may be referred to as "tertiary vapour".

**[0020]** The internal space may comprise a generally tubular internal space. Also, a portion of the casing containing or defining the generally tubular internal space may define a sidewall of the cavity. Additionally or alternatively, the internal space may comprise a generally planar internal space in fluid communication with the generally tubular internal space. Also, a portion of the casing containing or defining the generally planar internal space may define a base of the cavity. As such, the internal space may have a shape corresponding to a tube which is open at one end and closed at an opposing end. The casing may bound or enclose the internal space so as to have substantially the same shape as the internal space. Accordingly, the casing may also take the form of a tube which is open at one end and closed at an opposing end. In this way, the end portion of the main body of the smoking substitute system may be inserted into the casing cavity at the open end of the tube, and pushed into the casing cavity until an end of the end portion abuts an inside surface of the closed end of the tube. As such, the vapour filtering device may conveniently be coupled to the end portion of the main body of the smoking substitute system so that it is ready for use.

**[0021]** The portion of the casing containing or defining the generally tubular internal space may contain the at least one exhaust port. Also, the portion of the casing containing the generally tubular internal space may comprise an annular surface which defines the cavity opening (e.g. a perimeter of the opening). The annular surface may face away from the base of the cavity and the vapour intake opening. Further, the at least one exhaust port may comprise a plurality of exhaust ports which are circumferentially spaced around the opening (e.g. on the annular surface). Furthermore, the plurality of exhaust ports may be evenly distributed around the opening (e.g. on the annular surface). The plurality of exhaust ports may include at least eight exhaust ports. In this way, the or each exhaust port may direct filtered secondary vapour

away from a user of the vapour filtering device. Also, where the exhaust ports are distributed evenly, the secondary vapour may be channelled through the vapour filter evenly, and the filtered secondary vapour may be channelled out of the vapour filtering device evenly, that is, the secondary vapour may not be concentrated in only a certain portion or portions of the vapour filter. As such, a majority or an entirety of the vapour filter may be used to filter the secondary vapour such that filtering is improved and an operational life of the vapour filter may be prolonged.

**[0022]** The portion of the casing containing or defining the generally planar internal space may contain the vapour intake opening. Additionally or alternatively, the vapour intake opening may be accessible when the end portion of the main body of the smoking substitute system is received in the cavity. For example, the vapour intake opening may be positioned on a surface of the casing which opposes a base of the cavity. In this way, the vapour intake opening may be accessible or exposed for use whilst the vapour filtering device is coupled to the smoking substitute system. Also, the vapour filtering device may not need to be detached from the smoking substitute system for use.

**[0023]** The vapour intake opening may be triangular. As such, the vapour intake opening may have a form which closely resembles a logo, for example, a logo associated with the myblu™ e-cigarette. Advantageously, this may ensure that the vapour filtering device has a similar look-and-feel to the smoking substitute system, such that the two components appear as part of the same product or group of products.

**[0024]** The vapour filter may comprise a glass-fibre filter or a Cambridge filter. That is, the vapour filter may include the same filter material as a Cambridge filter pad. The exact composition of the filtered secondary vapour will depend on the volume (e.g. size and shape) and construction (e.g. material properties) of the vapour filter. In an embodiment, the vapour filter is arranged so as to remove any visible vapour (e.g. visible to the human eye) from the secondary vapour. In an embodiment, the vapour filter is arranged so as to remove any smell (e.g. detectable to the human nose) from the secondary vapour. In an embodiment, the vapour filter is arranged so that the filtered secondary vapour consists of only clean filtered air. Accordingly, the vapour filtering device may be particularly useful in situations such as driving in a car with those who don't like to vape, vaping in a family living room, or vaping with close friends in public. These situations are examples of usage areas where exhaling a large plume of vapour may not be considered courteous or sociable.

**[0025]** A shape of the casing and/or cavity may substantially match a cross-sectional shape of the end portion of the main body of the smoking substitute system. Additionally or alternatively, a cross-sectional shape of the casing and/or cavity may be substantially oval. The cavity may have a size and shape that is complementary

to a size and shape of the end portion of the main body. For example, the cavity may be arranged to form an interference fit with the end portion of the main body. This may ensure that the end portion of the main body is securely held in the cavity. In an embodiment, the cavity has a cross-sectional shape which is substantially oval, or oval wherein a maximum diameter of the oval shape is truncated. Additionally, the casing may have a cross-sectional shape which is substantially oval, or oval wherein a maximum diameter of the oval shape is truncated. In this way, the vapour filtering device may be easily attached to and detached from the smoking substitute system. Also, the vapour filtering device may have the same look-and-feel as the smoking substitute system, such that the two components appear as part of the same product or group of products.

**[0026]** According to a second aspect of the invention there is provided a smoking substitute kit including: a vapour filtering device according to the first aspect; and a smoking substitute system comprising a main body and a consumable, the consumable being engaged with the main body; wherein the cavity is arranged to receive an end portion of the main body such that, when the end portion of the main body is received in the cavity, the vapour intake opening is accessible (or exposed) such that secondary vapour is exhausted through the vapour filter when a user sucks vapour from the smoking substitute system and exhales the vapour into the vapour intake opening which filters the secondary vapour (e.g. removes various vapour chemicals) allowing filtered secondary vapour (e.g. clean filtered air) to pass out of the at least one exhaust port. In an embodiment, only filtered secondary vapour (e.g. clean filtered air) passes out of the at least one exhaust port.

**[0027]** Thus, as discussed above, the vapour filtering device can be releasably coupled to the smoking substitute system such that it is easily accessible when needed to filter or clean exhalant generated from using the smoking substitute system. For example, various vapour chemicals removed by the vapour filter may render the filtered secondary vapour substantially smell-less to the human nose and/or substantially invisible to the human eye.

**[0028]** The main body may have an engagement end which is engageable with the consumable, the engagement end being on an opposite end of the main body relative to the end portion.

**[0029]** The cavity may have a size and shape that is complementary to a size and shape of the end portion of the main body, e.g. so that an interference fit may be formed between the cavity and the end portion of the main body when the end portion is received in the cavity.

**[0030]** The consumable is configured for engagement with the main body (e.g. so as to form a closed smoking substitute system). The consumable may also be referred to as a "cartridge" or "pod" for the smoking substitute system. For example, the consumable may comprise components of the system that are disposable, and the

main body may comprise non-disposable or non-consumable components (e.g. power supply, controller, sensor, etc.) that facilitate the delivery of aerosol by the consumable. In such an embodiment, an aerosol former (e.g. e-liquid) may be replenished by replacing a used consumable with an unused consumable.

**[0031]** Alternatively, the consumable may be reusable. In such embodiments an aerosol former (e.g. e-liquid) of the consumable may be replenished by re-filling e.g. a reservoir of the consumable with the aerosol former (rather than replacing a consumable component of the apparatus). In light of this, it should be appreciated that some of the features described herein as being part of the consumable may alternatively form part of a main body.

**[0032]** The main body 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 main body, such that there is an interference fit between the main body and the consumable. Alternatively, the main body and the consumable may be physically coupled together by screwing one onto the other, or through a bayonet fitting.

**[0033]** Thus, the consumable and main body may comprise one or more engagement portions for engagement with one another. In this way, one end of the consumable may be coupled with the main body, whilst an opposing end of the consumable may define a mouthpiece of the smoking substitute system.

**[0034]** The smoking consumable may comprise a reservoir configured to store an aerosol former, such as an e-liquid. The e-liquid may, for example, comprise a base liquid and e.g. nicotine. The base liquid may include propylene glycol and/or vegetable glycerine. The e-liquid may also contain a flavourant, to provide a flavour to the user.

**[0035]** The reservoir may be in the form of a tank. At least a portion of the tank may be translucent. For example, the tank may comprise a window to allow a user to visually assess the quantity of e-liquid in the tank. A housing of the smoking substitute apparatus may comprise a corresponding aperture (or slot) or window that may be aligned with a translucent portion (e.g. window) of the tank. The reservoir may be referred to as a "clearomizer" if it includes a window, or a "cartomizer" if it does not.

**[0036]** The consumable may comprise a passage for fluid flow therethrough. The passage may extend through (at least a portion of) the consumable, between openings that may define an inlet and an outlet of the passage. The outlet may be at a mouthpiece of the consumable. 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). The passage may be at least partially defined by the tank. The tank may substantially (or fully) define the passage. In this respect, the tank may surround the passage.

**[0037]** The consumable may comprise an aerosol generator. The aerosol generator may comprise a wick. The aerosol generator may further comprise a heater.

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 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.

**[0038]** The heater may comprise a heating element, which 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 may be 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.

**[0039]** The main body may comprise a power source. The power source may be electrically connected (or connectable) to a heater of the smoking substitute apparatus (e.g. when engaged with the main body). The power source may be a battery (e.g. a rechargeable battery). A connector (e.g. in the form of a USB connector) may be provided on the end portion of the main body for recharging this battery.

**[0040]** The consumable may comprise an electrical interface for interfacing with a corresponding electrical interface of the main body. One or both of the electrical interfaces may include one or more electrical contacts. Thus, when the main body is engaged with the consumable, the electrical interface may be configured to transfer electrical power from the power source to a heater of the consumable.

**[0041]** The electrical interface may also be used to identify the consumable from a list of known types. For example, the consumable may have a certain concentration of nicotine and the electrical interface may be used to identify this. The electrical interface may additionally or alternatively be used to identify when a consumable is connected to the main body.

**[0042]** The main body may comprise an interface, which may, for example, be in the form of an RFID reader, a barcode or QR code reader. This interface may be able to identify a characteristic (e.g. a type) of a consumable engaged with the main body. 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.

**[0043]** The main body may comprise a controller, which may include a microprocessor. The controller may be configured to control the supply of power from the power source to the heater of the smoking substitute ap-

paratus (e.g. via the electrical contacts). 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.

**[0044]** The main body 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]** A puff sensor may be provided that is configured to detect a puff (i.e. inhalation from a user). The puff 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 puff sensor may, for example, be in the form of a pressure sensor or an acoustic sensor. That is, the controller may control power supply to the heater of the consumable in response to a puff detection by the sensor. The control may be in the form of activation of the heater in response to a detected puff. That is, the smoking substitute system may be configured to be activated when a puff is detected by the puff sensor. The puff sensor may form part of the consumable or the main body.

**[0046]** The invention includes the combination of the aspects and preferred features described except where such a combination is clearly impermissible or expressly avoided.

### Summary of the Figures

**[0047]** So that the invention may be understood, and so that further aspects and features thereof may be appreciated, embodiments illustrating the principles of the invention will now be discussed in further detail with reference to the accompanying figures, in which:

Figure 1A is a front view of a smoking substitute kit according to an embodiment of the invention;

Figure 1B is a side view of the smoking substitute kit of Figure 1B;

Figure 1C is a perspective view of the smoking substitute kit of Figure 1C;

Figure 2A is a perspective bottom-end view of a vapour filtering device according to an embodiment of the invention;

Figure 2B is a perspective top-end view of the vapour filtering device of Figure 2A;

Figure 2C is a cross-sectional side view of the vapour

filtering device of Figure 2A;

Figure 3A is a schematic side view of a smoking substitute system that may be used with a vapour filtering device according to an embodiment of the invention, where the smoking substitute system is in an engaged position;

Figure 3B is a schematic side view of the smoking substitute system of Figure 3A, where the smoking substitute system is in a disengaged position; and

Figure 3C is a cross-sectional diagram of a consumable of the smoking substitute system of Figure 3A.

### Detailed Description of the Invention

**[0048]** Aspects and embodiments of the present invention will now be discussed with reference to the accompanying figures. Further aspects and embodiments will be apparent to those skilled in the art. All documents mentioned in this text are incorporated herein by reference.

**[0049]** Figures 1A, 1B and 1C show a smoking substitute kit 100 that is an embodiment of the invention. The kit 100 includes a vapour filtering device 102 and a smoking substitute system 104. The smoking substitute system 104 includes a main body 106 and a consumable 108 which is engageable with the main body 106. A smoking substitute system similar to system 104 is described in more detail below in relation to Figures 3A-3C. It can be seen that the vapour filtering device 102 has a casing 110 which defines a cavity for receiving an end portion of the main body 106 of the smoking substitute system 104. Also, as seen more particularly on Figure 1C, the casing 110 has a vapour intake opening or aperture 112. The vapour intake opening 112 provides an entrance or entryway into an internal space (not shown) inside the casing 110. This internal space includes a vapour filter (not shown). Also, although not shown in Figures 1A, 1B and 1C, the casing includes at least one exhaust port which is in fluid communication with the internal space of the casing 110. In this way, exhalent can enter the internal space via the vapour intake opening 112 and be filtered by the vapour filter such that filtered secondary vapour passes out of the exhaust port. In an embodiment, the filtered secondary vapour is clean filtered air. In an embodiment, the vapour filter removes various vapour chemicals from the secondary vapour to form filtered secondary vapour. Specifically, the various vapour chemicals removed may render the filtered secondary vapour substantially smell-less to the human nose and/or substantially invisible to the human eye.

**[0050]** Figures 2A, 2B and 2C show a vapour filtering device 200 that is an embodiment of the invention. The vapour filtering device 102 of Figures 1A, 1B and 1C may be similar to the vapour filtering device 200 of Figures 2A, 2B and 2C.

**[0051]** Figures 2A and 2B show external views of the vapour filtering device 200, whereas Figure 2C shows a cross-sectional view of the vapour filtering device 200 so that internal elements of the device can be seen.

**[0052]** In the embodiment depicted in Figures 2A, 2B and 2C, the vapour filtering device 200 includes a housing or casing 202 which defines a cavity 204 for receiving an end portion of a main body of the smoking substitute system. Also, the casing 202 has a vapour intake opening 206 and at least one exhaust port 208. In the embodiment shown there are eight exhaust ports; however, it is to be understood that in some other embodiments there may be a greater or lesser number of exhaust ports 208.

**[0053]** As seen more particularly on Figure 2C, the casing 202 includes an internal space 210 housing a vapour filter (not shown). The vapour intake opening 206 and the or each exhaust port 208 are in fluid communication with the internal space 210. The internal space 210 may include a generally tubular internal space 212 in fluid communication with a generally planar internal space 214. A portion of the casing 202 which contains the generally tubular internal space 212 defines a sidewall 216 of the cavity 204. A portion of the casing 202 which contains the generally planar internal space 214 defines a base 218 of the cavity. The generally planar internal space 214 may be in fluid communication with a first end of the generally tubular internal space 212. It is to be understood that the first end of the generally tubular internal space 212 is a bottom end as viewed in Figure 2C. That is, the first end of the generally tubular internal space 212 is substantially vertically aligned with the base 218 of the cavity 204.

**[0054]** In view of the above, the internal space 210 has the general form of a cylinder which is closed at one end (i.e. the end with the base 218) and is open at an opposing end (i.e. the end surrounding the cavity opening). Also, a cross-sectional shape of the casing 202 and/or the cavity 204 substantially matches a cross-sectional shape of an end portion of a main body of a smoking substitute system. For example, considering Figure 1C, the end portion of the main body 106 has a substantially oval cross-section, or a cross-section having a generally oval shape but wherein the maximum diameter is truncated. Therefore, a cross-sectional shape of the casing 202 and/or the cavity 204 may have a similar shape, i.e. an oval or a truncated oval. Stated differently, the cavity 204 (and the casing 202) has a cross-sectional shape that it is complementary to or substantially matches a shape of the end portion of the main body 106. In this manner, the end portion of the main body 106 may form an interference fit with the cavity 204 (and the casing 202), so that the vapour filtering device 200 and the smoking substitute system 104 may be releasably coupled together. For completeness, the vapour filtering device 200 may be removed from the smoking substitute system 104 by pulling the two elements apart.

**[0055]** The portion of the casing 202 containing the generally planar internal space 214 contains the vapour

intake opening 206. Specifically, the vapour intake opening 206 is positioned on a surface of the casing 202 which opposes the base 218 of the cavity 204. The vapour intake opening 206 may be positioned substantially centrally on the surface so as to simplify use of the vapour filtering device 200 and to improve its appearance by making it more symmetrical. Since the vapour intake opening 206 is exposed even when the vapour filtering device 200 is coupled to a smoking substitute system, the vapour filtering device 200 can be used whilst coupled to the smoking substitute system. As seen more particularly in Figure 2A, the vapour intake opening 206 has a substantially triangular shape. As such, the vapour intake opening 206 may have a form which closely resembles a logo, for example, a logo associated with the myblu™ e-cigarette. However, in some other embodiments, the vapour intake opening 206 may have a different shape, such as, a circle, a square or an irregular shape.

**[0056]** The portion of the casing 202 containing the generally tubular internal space 212 contains the or each exhaust port 208. Specifically, a second end of the generally tubular internal space 212 may terminate in the or each exhaust port 208. It is to be understood that the second end of the generally tubular space 212 is a top end as viewed in Figure 2C. That is, the second end of the generally tubular internal space 212 is substantially vertically aligned with the cavity 204 opening. As seen more particularly, on Figure 2B, the second end of the generally tubular internal space 212 is defined by a ring-shaped or annular surface of the casing 202 which defines an opening of the cavity 204. A plurality of exhaust ports 208 are circumferentially spaced on the annular surface around the opening of the cavity 204. In an embodiment, the plurality of exhaust ports 208 are evenly distributed around the opening. In an embodiment, the plurality of exhaust ports 208 includes eight exhaust ports; however, it is to be understood that in some other embodiments there may be more or less than eight exhaust ports. In an embodiment, at least some exhaust ports may be joined together to form exhaust slots.

**[0057]** As mentioned above, the internal space 210 houses a vapour filter. In an embodiment, the vapour filter includes a glass-fibre filter or a Cambridge filter. That is, the vapour filter may be the same type of filter as is used in a Cambridge filter pad. In an embodiment, the vapour filter may be contained in both the generally tubular internal space 212 and the generally planar internal space 214. However, in some other embodiments, the vapour filter may be contained in only one of the generally tubular internal space 212 and the generally planar internal space 214. In an embodiment, the casing 202 may be made from two-parts which are secured together along a plane which is parallel to a depth of the cavity 204. For example, the plane may slice through a centre of the base 218. Also, each of the two parts may include one or more releasable mechanical fasteners, for example, a releasable snap-engagement mechanism, such that they can be releasably secured together to form the



structure shown in Figures 2A, 2B and 2C. In this way, the two parts may be separated so that the vapour filter is removable and replaceable such that an old expired filter can be swapped for a new filter. Once the new filter is in position, the two parts can be snap-fitted to each other again. This functionality can improve the lifespan of the vapour filtering device 200.

**[0058]** In an embodiment, the casing 202 may be constructed from a plastic material. Also, the casing may be manufactured using a 3D printing technique or a plastic moulding technique.

**[0059]** An exemplary use and operation of the vapour filtering device 200 will now be described. A user of a smoking substitute system (e.g. the smoking substitute system 104 of Figures 1A-1C described above, or the smoking substitute system 301 of Figures 3A-3C described below) sucks on a mouthpiece to inhale vapour (aka primary vapour) generated by the smoking substitute system. The user may inhale the primary vapour into their mouth and lungs, following which the user exhales the vapour (aka secondary vapour or exhalent) into the vapour intake opening 206. The secondary vapour is then forced through the internal space 210 which contains the vapour filter such that the vapour filter filters the secondary vapour (e.g. removes various vapour chemicals) so that filtered secondary vapour (aka tertiary vapour) passes out of the exhaust ports 208. In an embodiment, the filtered secondary vapour is clean filtered air. An example path of secondary vapour and filtered secondary vapour into, around, and out of the vapour filtering device 200 is shown by arrowed dashed and dotted lines in Figure 2C.

**[0060]** Where the vapour filtering device 200 is connected or coupled to the smoking substitute system to form an assembly, the user may flip the assembly through 180 degrees so that they can inhale the primary vapour from the mouth piece of the smoking substitute system and subsequently exhale the secondary vapour into the vapour intake opening 206 of the vapour filtering device 200. Of course, the vapour filtering device 200 may also be used whilst not connected or coupled to a smoking substitute device. In this case, the user may first bring the smoking substitute system to their mouth to inhale the primary vapour from the mouth piece and, subsequently, the user may bring the vapour filtering device 200 to their mouth to exhale the secondary vapour through the vapour intake opening 206.

**[0061]** Figures 3A and 3B illustrate a smoking substitute system in the form of an e-cigarette system 301. The system may, for example, be used with vapour filtering device 102 or the vapour filtering device 200 described above. For example, the system 301 may correspond to smoking substitute system 104 shown in Figures 1A to 1C. The system 301 comprises an e-cigarette device defining a main body 302 of the system 301, and an e-cigarette consumable (or "pod") 303. In the illustrated embodiment the consumable 303 is removable from the main body (e-cigarette device), so as to be a replaceable component of the system 301. In other words, the e-cig-

arette system 301 is a closed system. A cross-sectional view of the consumable 303 is shown in Figure 3C.

**[0062]** As is apparent from Figures 3A and 3B, the consumable 303 is configured to engage the main body 302. The main body 302 includes an engagement portion 317, which is in the form of a cavity disposed at a first end of the main body 302. The engagement portion 317 of the main body 302 is arranged to engage an engagement portion 318 on the consumable 303. Figure 3A shows the main body 302 and the consumable 303 in an engaged state, whilst Figure 3B shows the main body 302 and the consumable 303 in a disengaged state. When engaged, the engagement portion 318 of the consumable 303 is received in the cavity of the engagement portion 317 of the main body 302, and is retained in the engaged position by way of a snap-engagement mechanism. In other embodiments, the main body 302 and consumable 303 may be engaged by screwing one into (or onto) the other, through a bayonet fitting, or by way of an interference fit.

The system 301 is configured to vaporise an aerosol-former, which in the illustrated embodiment, is in the form of a nicotine-based e-liquid 304. The e-liquid 304 comprises nicotine and a base liquid including propylene glycol and/or vegetable glycerine. The e-liquid 304 may also comprise a flavourant, for producing a flavoured aerosol.

**[0063]** As is more apparent from Figure 3C, the e-liquid 304 is stored within a reservoir in the form of a tank 305 that forms part of the consumable 303. In the illustrated embodiment, the consumable 303 is a "single-use" consumable 303. That is, upon exhausting the e-liquid 304 in the tank 305, the intention is that the user disposes of the entire consumable 303. In other embodiments, the e-liquid (i.e. aerosol former) may be the only part of the system that is truly "single-use". That is, the tank may be refillable with e-liquid or the e-liquid may be stored in a non-consumable component of the system. For example, the e-liquid may be stored in a tank located in the main body or stored in another component that is itself not single-use (e.g. a refillable cartomizer).

**[0064]** The tank 305 surrounds, and thus defines a portion of, a passage 306 that extends between an inlet 307 and an outlet 308 at opposing ends of the consumable 303. In this respect, the passage comprises an upstream end at the end of the consumable 303 that engages with the main body 302, and a downstream end at an opposing end of the consumable 303 that comprises a mouthpiece 309 of the system 301. When the consumable 303 is engaged with the main body 302, a user can inhale (i.e. take a puff) via the mouthpiece 309 so as to draw air through the passage 306, and so as to form an airflow (indicated by arrows) in a direction from the inlet 307 to the outlet 308 of the passage 306. Although not illustrated, the passage 306 may be partially defined by a tube (e.g. a metal tube) extending through the consumable 303. The passage 306 is in fluid communication with a gap defined between the consumable 303 and the main body 302 (when engaged) such that air outside of the

system 301 is drawn into the passage 306 (during an inhale).

**[0065]** The smoking substitute system 301 is configured to vaporise the e-liquid 304 for inhalation by a user. To provide this, the consumable 303 comprises a heater having of a porous wick 310 and a resistive heating element in the form of a heating filament 311 that is helically wound around a portion of the porous wick 310. The porous wick 310 extends across the passage 306 (i.e. transverse to a longitudinal axis of the passage 306) and opposing ends of the wick 310 extend into the tank 305 (so as to be submerged in the e-liquid 304). In this way, e-liquid 304 contained in the tank 305 is conveyed from the opposing ends of the porous wick 310 to a central portion of the porous wick 310 so as to be exposed to the airflow in the passage 306 (i.e. caused by a user inhaling).

**[0066]** The helical filament 311 is wound about this exposed central portion of the porous wick 310 and is electrically connected to an electrical interface in the form of electrical contacts 312 mounted at the end of the consumable that is proximate the main body 302 (when engaged). When the consumable 303 is engaged with the main body 302, the electrical contacts 312 contact corresponding electrical contacts (not shown) of the main body 302. The main body electrical contacts are electrically connected to a power source (not shown) of the main body 302, such that (in the engaged position) the filament 311 is electrically connected to the power source. In this way, power can be supplied by the main body 302 to the filament 311 in order to heat the filament 311. This heat is transferred from the filament 311 to the porous wick 310 which causes e-liquid 304 conveyed by the porous wick 310 to increase in temperature to a point at which it vaporises. The vaporised e-liquid becomes entrained in the airflow and, between the vaporisation point at the filament 311 and the outlet 308 of the passage 306, condenses to form an aerosol. This aerosol is then inhaled, via the mouthpiece 309, by a user of the system 301.

**[0067]** The power source of the main body 302 may be in the form of a battery (e.g. a rechargeable battery). The main body 302 comprises a connector (not shown) in the form of e.g. a USB or USB-C port for recharging the battery. The connector is disposed on an end face 320 of the main body 302, which is at second end of the main body 302, opposite the first end comprising the engagement portion 317. The connector is arranged to engage a corresponding connection interface in a charger to recharge the battery.

**[0068]** The main body 302 may also comprise a controller that controls the supply of power from the power source to the main body electrical contacts (and thus to the filament 311). That, is the controller may be configured to control a voltage applied across the main body electrical contacts, and thus the voltage applied across the filament 311. In this way, the filament 311 may only be heated under certain conditions (e.g. during a puff and/or only when the system is in an active state). In this

respect, the main body 302 may include a puff sensor (not shown) that is configured to detect a puff (i.e. inhalation). The puff sensor may be operatively connected to the controller so as to be able to provide a signal, to the controller, which is indicative of a puff state (i.e. puffing or not puffing). The puff sensor may, for example, be in the form of a pressure sensor or an acoustic sensor.

**[0069]** Although not shown, the main body 302 and consumable 303 may comprise a further interface which may, for example, be in the form of an RFID reader, a barcode or QR code reader. This interface may be able to identify a characteristic (e.g. a type) of a consumable 103 engaged with the main body 302. In this respect, the consumable 303 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.

**[0070]** An end portion 322 of the main body 302, which includes the end face 320 with the connector, is sized and shaped so that it is receivable in a cavity of a vapour filtering device (e.g. cavity 204 of vapour filtering device 200). In particular, a cross-sectional shape of the end portion 322 of the main body 302 may correspond to a shape of the cavity 204, so that an interference fit may be formed when the main body 302 is inserted into the cavity 204.

**[0071]** The features disclosed in the foregoing description, or in the following claims, or in the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for obtaining the disclosed results, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

**[0072]** While the invention has been described in conjunction with the exemplary embodiments described above, many equivalent modifications and variations will be apparent to those skilled in the art when given this disclosure. Accordingly, the exemplary embodiments of the invention set forth above are considered to be illustrative and not limiting. Various changes to the described embodiments may be made without departing from the spirit and scope of the invention.

**[0073]** For the avoidance of any doubt, any theoretical explanations provided herein are provided for the purposes of improving the understanding of a reader. The inventors do not wish to be bound by any of these theoretical explanations.

**[0074]** Any section headings used herein are for organizational purposes only and are not to be construed as limiting the subject matter described.

**[0075]** 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.

**[0076]** 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%.

**[0077]** 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 vapour filtering device for a smoking substitute system, the vapour filtering device comprising:

a casing having an internal space housing a vapour filter, the casing defining a cavity for receiving an end portion of a main body of the smoking substitute system, and the casing having a vapour intake opening and at least one exhaust port in fluid communication with the internal space; and  
wherein secondary vapour is exhausted through the vapour filter when a user sucks vapour from the smoking substitute system and exhales the vapour into the vapour intake opening which filters the secondary vapour allowing filtered secondary vapour to pass out of the at least one exhaust port.

2. The vapour filtering device of claim 1, wherein the internal space comprises a generally tubular internal space, and wherein a portion of the casing containing the generally tubular internal space defines a side-wall of the cavity.
3. The vapour filtering device of claim 2, wherein the internal space comprises a generally planar internal space in fluid communication with the generally tubular internal space, and wherein a portion of the casing containing the generally planar internal space defines a base of the cavity.

4. The vapour filtering device of claim 3, wherein the portion of the casing containing the generally planar internal space contains the vapour intake opening.
5. The vapour filtering device of claim 3 or 4, wherein the portion of the casing containing the generally tubular internal space contains the at least one exhaust port.
6. The vapour filtering device of claim 5, wherein the portion of the casing containing the generally tubular internal space comprises an annular surface which defines an opening of the cavity, and a plurality of exhaust ports are spaced around the opening.
7. The vapour filtering device of claim 6, wherein the plurality of exhaust ports are evenly distributed around the opening.
8. The vapour filtering device of claim 6 or 7, wherein the plurality of exhaust ports includes at least eight exhaust ports.
9. The vapour filtering device of any preceding claim, wherein the vapour filter comprises a glass-fibre filter or a Cambridge filter.
10. The vapour filtering device of any preceding claim, wherein a shape of the casing and/or the cavity substantially matches a cross-sectional shape of the end portion of the main body of the smoking substitute system.
11. The vapour filtering device of any preceding claim, wherein a cross-sectional shape of the casing and/or the cavity is substantially oval.
12. The vapour filtering device of any preceding claim, wherein the vapour intake opening is triangular.
13. The vapour filtering device of any preceding claim, wherein the vapour intake opening is accessible when the end portion of the main body of the smoking substitute system is received in the cavity.
14. A smoking substitute kit including:
  - a vapour filtering device according to any preceding claim; and
  - a smoking substitute system comprising a main body and a consumable, the consumable being engaged with the main body;
  - wherein the cavity is arranged to receive an end portion of the main body such that, when the end portion of the main body is received in the cavity, the vapour intake opening is accessible such that secondary vapour is exhausted through the vapour filter when a user sucks vapour from the

smoking substitute system and exhales the vapour into the vapour intake opening which filters the secondary vapour allowing filtered secondary vapour to pass out of the at least one exhaust port.

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15. The smoking substitute kit of claim 14, wherein the cavity is sized and shaped to form an interference fit with the end portion of the main body of the smoking substitute system.

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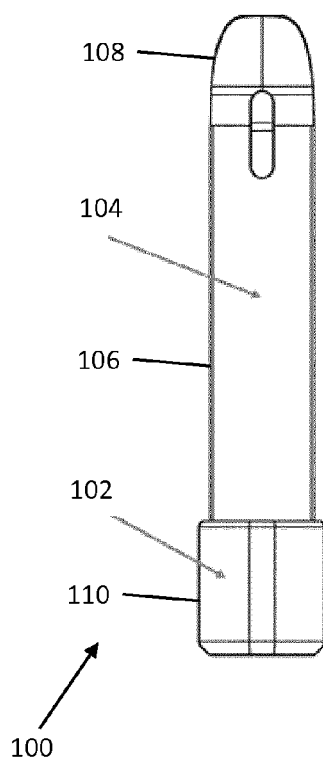
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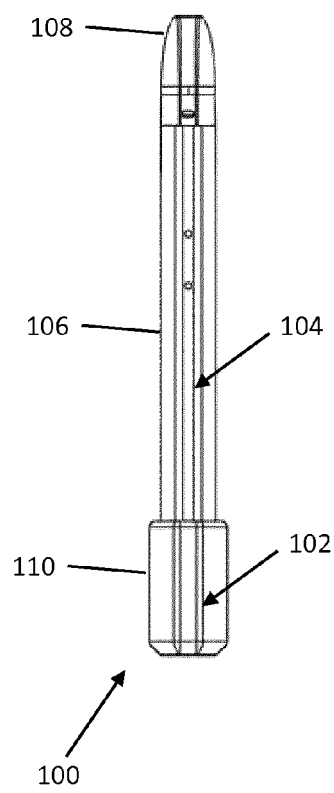
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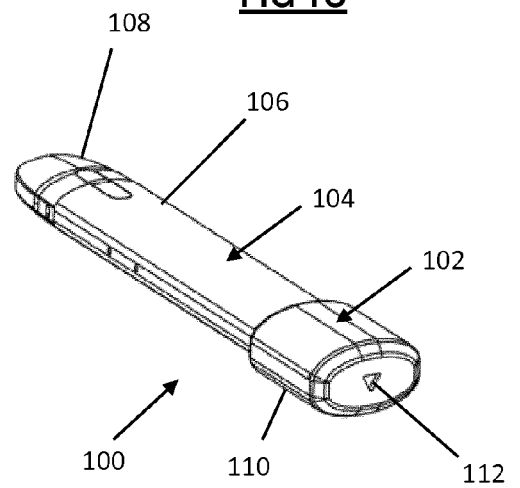
**FIG 1A**



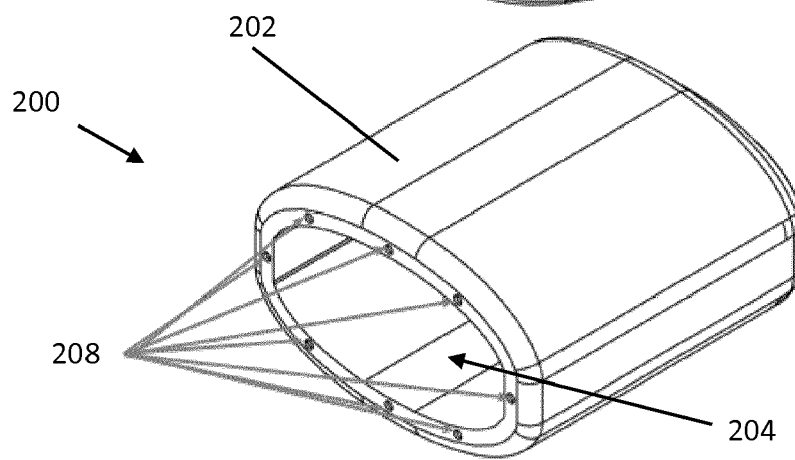
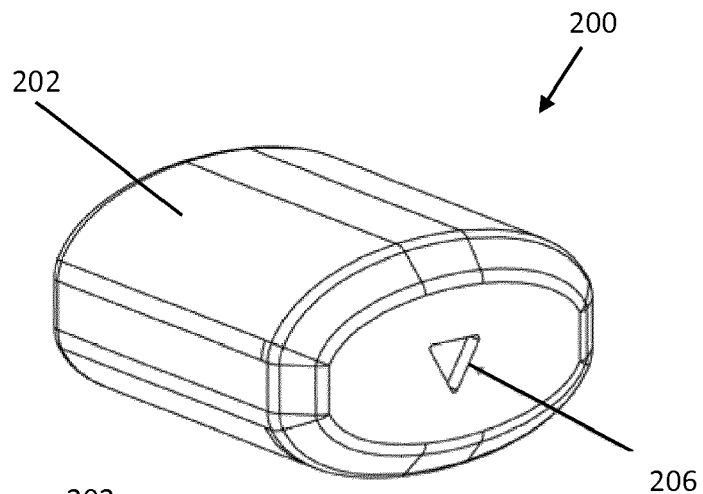
**FIG 1B**



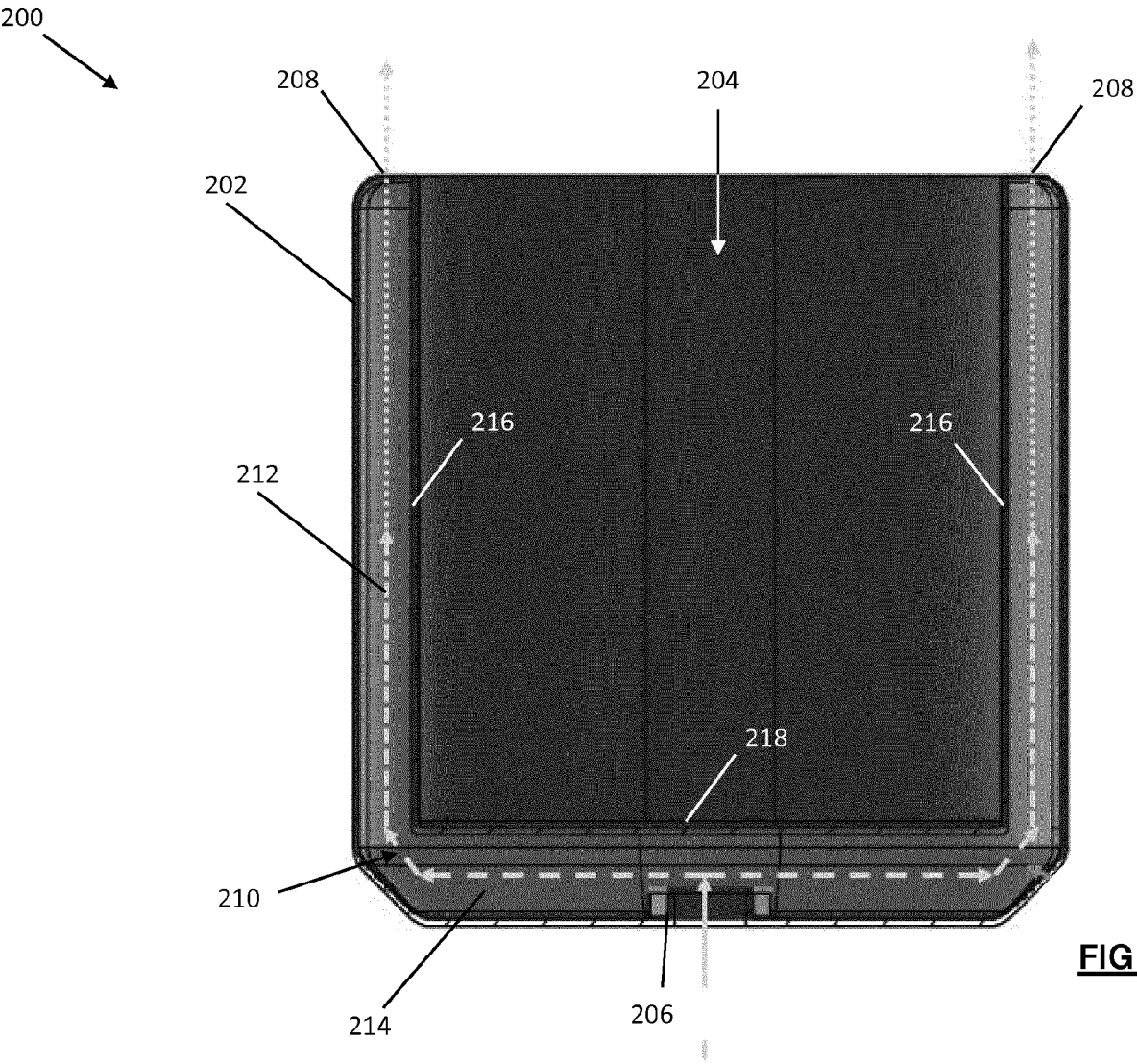
**FIG 1C**



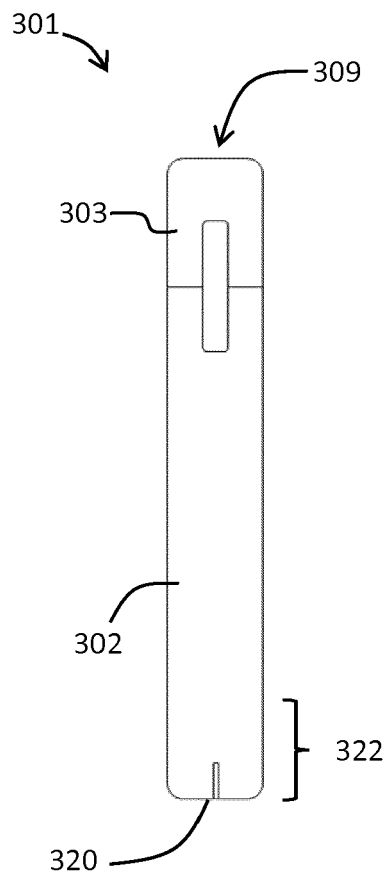
**FIG 2A**



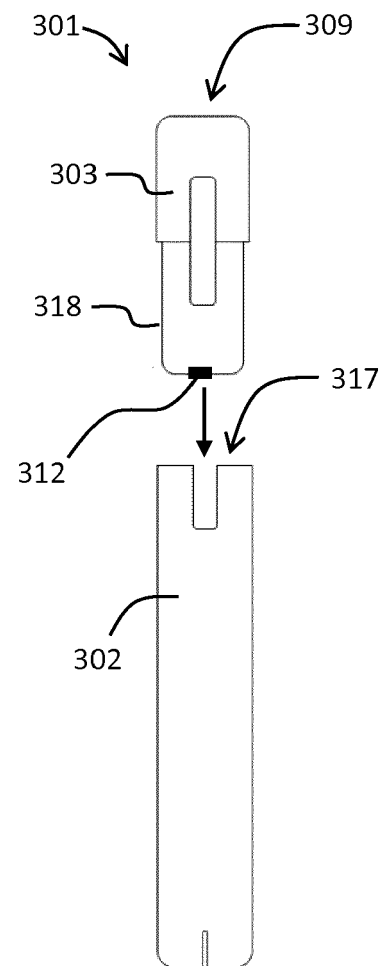
**FIG 2B**



**FIG 2C**

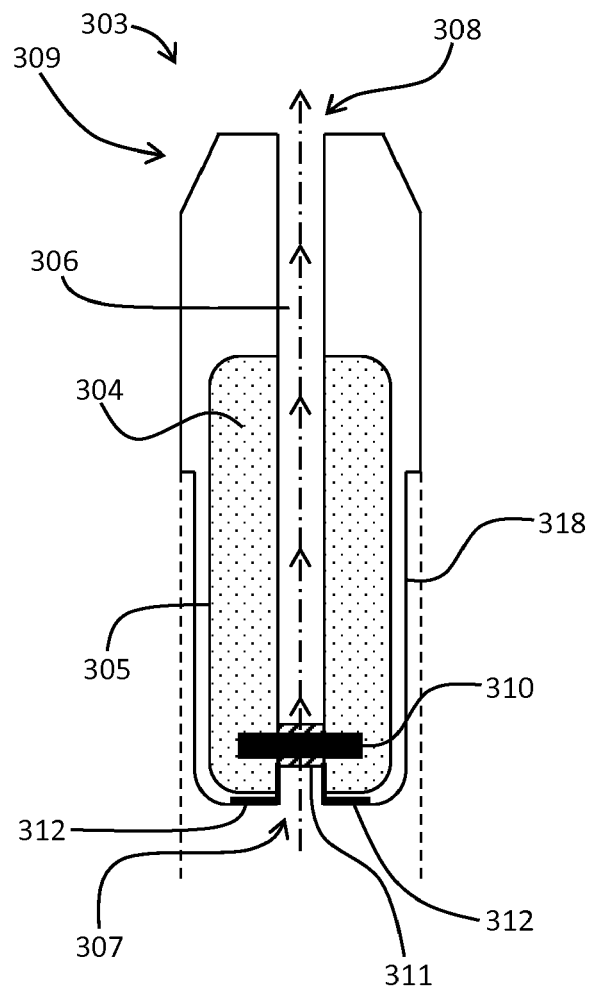


**FIG 3A**



**FIG 3B**





**FIG 3C**



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Application Number  
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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                       |                                  |                                         |
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| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                       |                                  | TECHNICAL FIELDS SEARCHED (IPC)         |
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| Munich                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                       | 11 October 2019                  | Kirchmayr, Katrin                       |
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