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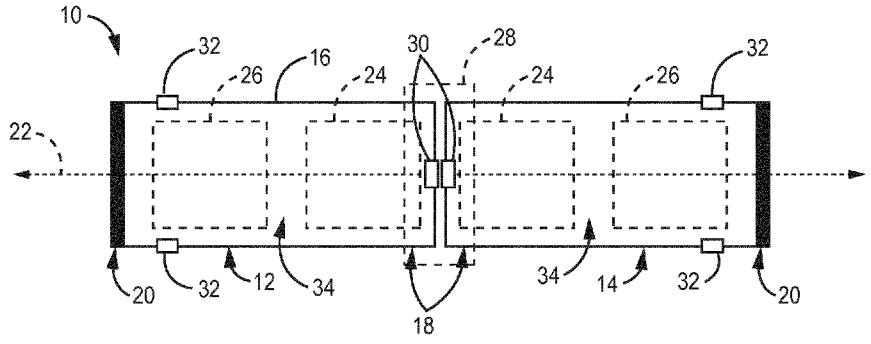

FIG. 1

(57) Abstract: A customizable device includes a first inhalation device comprising a mouth end portion and an upstream end portion and a second inhalation device comprising a mouth end portion and an upstream end portion. In a storage configuration, the first inhalation device is removably coupled to the second inhalation device via the mouth end portion. In an active configuration, the upstream end portion of the inhalation devices is coupled to the mouth end portion of the other inhalation device. A connector hub may couple the inhalation devices.

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CUSTOMIZABLE DEVICES FOR MULTIPLE CONSUMABLES

The invention relates to aerosol-generating devices. The invention relates in particular to aerosol-generating devices suitable for use with more than one consumable and may include different types of consumables.

Aerosol-generating devices, such as electronic cigarettes, are known to use a liquid to be evaporated or tobacco material to be heated. In some devices, the evaporation of a liquid is combined with heating tobacco. In other devices, two cartridges with different liquids are provided for selective parallel evaporation of different liquids. There is a need for aerosol-generating devices that provide a user with more possibilities or a choice in using different consumables.

Also, when not in use or stored, various devices suffer from leakage of liquid or tobacco through the mouthpieces, which may be particularly problematic when stored in, for example, a user's pocket or handbag. There is a need for aerosol-generating devices that mitigate or prevent leakage.

Further, various devices leave the mouthpiece exposed, even when inactive and not intended to be used. There is a need for aerosol-generating devices that can protect the mouthpiece from contamination or accidental use when the device is intended to be inactive.

Furthermore, various devices have user-accessible buttons or switches for activation, which may be susceptible to accidental manipulation and unintended power delivery to a heater. There is a need for aerosol-generating devices that mitigate or prevent unintended activation of the heater.

It would be desirable to provide a simple, easy-to-use device that provides desirable choices of aerosol-generating consumables to a user, mitigates or prevents leakage, protects the mouthpiece from contamination or accidental use, and delivers power as intended.

The present disclosure provides a customizable aerosol-generating device including a first inhalation device and a second inhalation device each having a mouth end portion. One or more inhalation devices are removably couplable to the other inhalation device via the mouth end portion. The mouth end portion of the inactive inhalation device may be coupled to the other inhalation device, which may be active. Both inhalation devices may be inactive and coupled to each other by respective mouth end portions in a storage configuration. A connector hub may be coupled between the inhalation devices.

Various aspects of the present disclosure relate to a device including a first inhalation device and a second inhalation device. The first inhalation device has a mouth end portion and an upstream end portion. The second inhalation device has a mouth end portion and an upstream end portion. The first inhalation device is removably couplable to the second inhalation device via the mouth end portion of the first inhalation device. The second inhalation device may be upstream from the first inhalation device.

The first inhalation device may be inactive when the mouth end portion of the first inhalation device is coupled to the second inhalation device. The first inhalation device may comprise a controller configured to inactivate an aerosolizer or enter a power save mode in response to the mouth end portion of the first inhalation device being coupled to the second inhalation device.

The first inhalation device may be active or activatable when the upstream end portion of the first inhalation device is coupled to the second inhalation device. The first inhalation device may be removably couplable to the second inhalation device via the upstream end portion of the second inhalation device.

Each end portion of the first inhalation device may define an axially protruding rim removably couplable to each end portion of the second inhalation device.

The device may further include a connector hub that has a first end portion removably couplable to either end portion of the first inhalation device and a second end portion removably couplable to either end portion of the second inhalation device.

Each end portion of the connector hub may be removably couplable to either end portion of either inhalation device.

Various aspects of the present disclosure relate to an assembly including the device. Each inhalation device includes a housing defining a cavity extending between the mouth end portion and the upstream end portion. Each inhalation device also includes a consumable device disposable in the cavity defining an inhalation port adjacent to the mouth end portion.

At least one consumable device may include an aerosol-generating substrate having nicotine.

Each mouth end portion of the inhalation devices may define a first feature and each consumable device has a second feature complementary to the first feature to ensure proper relative alignment.

The upstream end portion of one of the inhalation devices may define an axially extending channel engageable with one of the radially protruding keys.

Each inhalation device may include a power supply to provide energy to heat the consumable device.

Each power supply may have a controller to regulate power delivery from the power supply.

The controller may be electrically coupled to the controller of the other inhalation device to regulate power sharing between inhalation devices.

Various aspects of the present disclosure relate to a method of using the device or assembly including coupling the inhalation devices using the mouth end portions to block airflow through the inhalation ports in a storage configuration.

The method may further include coupling the inhalation devices using the mouth end portion of the first inhalation device and the upstream end portion of the second inhalation device to block the first inhalation port and expose the second inhalation port.

Utilizing the customizable aerosol-generating device provides many advantages during use and storage. Different inhalation devices may be attached to one another to provide a user with a variety of choices of different consumable combinations in one customizable device. For example, a choice may be made to make a flavour-based experience and a nicotine-based experience available in one device. Some components of the inhalation devices may be reusable while other components may be disposable or easily replaceable. Electrical connection between the inhalation devices in the storage configuration can also be used for inactivation and robust power management and power savings. The customizable device can be rearranged into a storage configuration that protects and does not expose the mouth end portion. The storage configuration may prevent the user, or an unauthorised user, from accessing the mouth end. Without access to the mouth end portion, liquid may not be released by inhalation or sucking on the mouth end portion. By sealing the ends of the inhalation device components in the storage configuration, any liquid or other consumable contents that may ordinarily leak may be sealed inside the device until the sections are uncoupled. This can prevent or reduce exposure to consumable contents whilst stored.

The terms “proximal,” “upstream,” “distal,” “downstream,” and other terms are used to describe relative positions or orientations of the components of the device. The terms “longitudinal,” “axial,” “lateral,” and “radial,” may be used regarding an imaginary longitudinal axis or axial direction, which conceptually may extend through the device. When describing components according to the present invention, these terms are used irrespective of the orientation of the device being described.

The term “aerosol-generating substrate” refers to a device or substrate that releases, upon heating, volatile compounds that may form an aerosol to be inhaled by a user. Suitable aerosol generating substrates may include plant-based material. For example, the aerosol generating substrate may include tobacco or a tobacco-containing material containing volatile tobacco flavor compounds, which are released from the aerosol generating substrate upon heating. In addition, or alternatively, an aerosol generating substrate may include a non-tobacco containing material. The aerosol generating substrate may include homogenized plant-based material. The aerosol generating substrate may include at least one aerosol former. The aerosol generating substrate may include other additives and ingredients such as flavorants. Preferably, the aerosol generating substrate is a liquid at room temperature. For example, the aerosol forming substrate may be a liquid solution, suspension, dispersion or the like. In some preferred embodiments, the aerosol generating substrate includes glycerol, propylene glycol, water, nicotine and, optionally, one or more flavorants. Preferably, the aerosol-generating substrate includes nicotine.

The term “consumable” refers to an article including an aerosol-generating substrate. The contents of the consumable may be used and eventually expended. The consumable may be replaceable for use with the customizable device.

The term “aerosol-generating device” or “consumable device” refers to a device including an aerosol generating substrate or consumable. In some cases, the terms may be used interchangeably. Preferably, the aerosol-generating device or consumable device also includes an aerosolizer, such as an atomizer or heater.

The term “tobacco” refers to a substance including tobacco, which includes tobacco blends or flavored tobacco, for example. Tobacco may be provided in various forms, such as loose tobacco, which does not retain its shape unless disposed in some type of container or reservoir.

The customizable device includes at least a first inhalation device and a second inhalation device. The inhalation devices may be coupled to one another and extend lengthwise along a longitudinal axis. In some embodiments, two inhalation devices are coupled together. The inhalation devices may each form half of the customizable device. In other embodiments, three, four, or more inhalation devices may be coupled together. The inhalation devices may be described as being connected serially or in serial, as opposed to in parallel.

Each inhalation device includes a mouth end portion from which a user may draw air from the inhalation device to use the customizable device. Preferably, the user drawing on one of the inhalation devices inhales an aerosol entrained in the drawn air from an aerosol-generating substrate of the respective inhalation device. Each inhalation device includes an upstream end

portion opposite to the mouth end portion. The upstream end portion may include air inlets to allow air to enter the inhalation device to provide airflow when the user draws on the mouth end portion. In some embodiments, when a user draws air from a mouth end portion of one inhalation device of the customizable device, air is not drawn through the other inhalation device. In other words, in some embodiments, only one inhalation device may be used at a time.

Drawing air from the mouth end portion of one of the inhalation devices preferably activates the respective inhalation device, which may be made activatable by the configuration of the inhalation devices. For example, the inhalation device may have a puff sensor configured to activate the device when a puff is detected. An activated inhalation device may generate aerosol from the aerosol-generating substrate, for example, by heating the aerosol-generating substrate.

In some embodiments, the mouth end portion has a different appearance than the upstream end portion. A user may be alerted to the proper end from which to draw air when using the customizable device. The customizable device may not activate when the user draws from the upstream end portion. The customizable device may even prevent the user from drawing air from the upstream end portion.

The inhalation devices may be removably coupled to one another. One or more inhalation devices may be removably couplable to the other inhalation device via the mouth end portion, upstream end portion, or both. In some embodiments, each end portion of one or more inhalation devices may be coupled to either end portion or another inhalation device. When the upstream end portion is used for coupling, the respective mouth end portion may be exposed for use.

The inhalation devices may be removably connectable to one another so that the devices switch between inactive, active, or activatable states. For example, coupling a first inhalation device to a second inhalation device via the mouth end of the first inhalation device may inactivate the first inhalation device; and coupling the first inhalation device to the second inhalation device via the upstream end potion of the first inhalation device may activate the first inhalation device or place the first inhalation device in an activatable state. Similarly, coupling the second inhalation device to the first inhalation device via the mouth end of the second inhalation device may inactivate the second inhalation device; and coupling the second inhalation device to the first inhalation device via the upstream end potion of the second inhalation device may activate the second inhalation device or place the second inhalation device in an activatable state.

The customizable device may define one or more configurations, each of which may relate to different functionality of the inhalation devices. Configurations of the customizable device may include a storage configuration, a first active configuration, and a second active configuration. In the storage configuration, the inhalation devices may each be coupled to one another via the mouth end portions, which may inactivate both devices. The upstream end portions may be closed

or sealed. The customizable device may be considered closed or sealed for storage. In the first active configuration, the upstream end portion of the first inhalation device may be coupled to the mouth end portion of the second inhalation device. The first active configuration may activate, or make activatable, the first inhalation device and inactivate the second inhalation device. In the second active configuration, the upstream end portion of the second inhalation device may be coupled to the mouth end portion of the first inhalation device. The second active configuration may activate, or make activatable, the second inhalation device and inactivate the first inhalation device.

An optional third configuration may activate, or make activatable, both the first and second inhalation devices when both are coupled via the upstream end portions. Alternatively, the third configuration may inactivate both devices.

The inhalation devices may be coupled to one another using any suitable techniques, which may include a hub disposed between the inhalation devices. Non-limiting examples of suitable coupling techniques include friction fit, screw fit (e.g., threading), bayonet fit, magnetic fit, or other suitable techniques to axially retain the inhalation devices adjacent to, in proximity to, or in contact with one another. In some embodiments, the inhalation devices are secured together using friction fit engagement. In some embodiments, the hub and the inhalation devices are secured together using a screw fit or friction fit engagement.

One or more inhalation devices may be described as an assembly including at least one consumable device. In some embodiments, each inhalation device includes one consumable device. In other embodiments, each inhalation device includes two or more consumable devices. The consumable device may have an aerosol-generating substrate. The aerosol-generating substrate may have nicotine.

Substances from an aerosol-generating substrate contained in the consumable device may be transported by an airflow passing through the substrate or through the consumable device, respectively. These substances may simply be entrained by the passing airflow. For example, an airflow passing a tobacco substrate may be entrained with tobacco flavour. The substances to be inhaled may also actively be generated, for example, by heating a substrate contained in the consumable device and forming an inhalable aerosol. Also, other atomization processes may be used for aerosol generation.

The first inhalation device may include a first consumable device. The second inhalation device may include a second inhalation device. In some embodiments, the consumable devices are different types, such as a liquid containing consumable and solid substrate containing consumable. In other embodiments, the consumable devices are the same type. Even if the consumable devices are of the same types, the consumable devices may contain a different

consumable composition, for example, having different flavour or different substance combination. A user may vary and customise the device by selecting appropriate consumables for the inhalation devices to form a single, customizable device.

In some embodiments, different consumable devices contain any one or a combination of different aerosol-forming substrate, for example different tobacco material, different flavour, different nicotine content, different substance combination. In some embodiments, consumables may differ in the manner of aerosolizing the substrate. In some embodiments, different consumables may have both a different aerosol-forming substrate and manner of aerosolizing the substrate.

One or more types of consumable devices may be used or may be determined to be usable with the inhalation devices according to the invention. Examples of consumable device types are, for example, but not limited to: liquid containing cartridges or tank systems including or excluding an integrated aerosolizing element such as for example cartomizers (combined cartridge and atomizer); solid substrate containing consumables such as for example tobacco containing plugs; solid substrate containing capsules, wherein the solid substrate may be tobacco material, homogenized tobacco material or substrate in powder form; vaporisable wax; tobacco sheets that are gathered or crimped. Some consumable devices may be described as e-cigarette (e.g., e-cig) vaporisers, heated tobacco, or vaporisable wax.

The consumable devices may make use of different techniques for aerosolizing, or releasing inhalable substances from, the consumables. For example, when one consumable device has a heatable liquid, another consumable device may be a tobacco substrate or may contain a non-heated but otherwise atomized substrate. Some consumables require different temperatures to generate aerosol from the aerosol-generating substrate.

In some embodiments, one or more consumable devices includes at least part of a heater for properly heating the one or more specific consumables. In some embodiments, one or more consumable devices do not include any part of a heater. The heater may be part of the inhalation device but entirely external to the consumable.

In some embodiments, one or more consumable devices include a tobacco consumable. The inhalation device may include heaters external to the consumable device to heat the tobacco.

In various embodiments, one or more consumable devices include a heated mesh e-cig consumable. The inhalation device may deliver power to the consumable, particularly the heater mesh, to heat the substrate.

In some further embodiments, one or more consumable devices include an e-cig consumable with a susceptor. The inhalation device may include an induction coil external to the consumable device to heat the substrate.

In still further embodiments, one or more consumable devices include a heated tobacco consumable with a susceptor. The inhalation device may include an induction coil external to the consumable device to heat the substrate.

In yet further embodiments, one or more consumable devices include a conventional heated-coil e-cig consumable. The inhalation device may deliver power to the consumable, particularly the heated-coil, to heat the substrate.

In some embodiments, the inhalation devices have the same or similar outward appearance while having distinct functions. For example, the first inhalation device may include an induction heater, and the second inhalation device may include an e-cig connection or conventional tobacco heater.

One or more inhalation devices may include a housing to receive at least one of the consumable devices. The housing may at least partially define an outermost surface of the inhalation device. The housing may define one or more cavities to receive one or more consumable devices between the mouth end portion and the upstream end portion. The cavity may extend from an opening at the mouth end portion, for example, to receive one of the consumable devices. In some embodiments, each inhalation device includes a housing that defines one cavity to receive one consumable device. In other embodiments, the housing defines two or more cavities to receive two or more consumable devices.

The housing may be a rigid housing. Any suitable material or combination of materials may be used for forming the rigid housing. Examples of suitable materials include metals, alloys, plastics or composite materials containing one or more of those materials, or thermoplastics that are suitable for food or pharmaceutical applications, for example polypropylene, polyetheretherketone (PEEK), acrylonitrile butadiene styrene and polyethylene.

The housing may define one or more air inlets, for example, adjacent to, in proximity to, or at the upstream end portion. One or more passages within the housing, which may be at least partially through the consumable device, may fluidly couple the air inlets to the inhalation port of the consumable device. In some embodiments, the air inlets may include radial air inlets, which may extend through a side wall of the housing. In some embodiments, the air inlets may include axial air inlets, which may extend through an end wall of the housing.

The consumable device may take any suitable shape for engaging with the inhalation device and produce aerosol. In some embodiments, one or more of the inhalation devices may

be able to accept multiple types of consumable devices. In some embodiments, one or more of inhalation devices may be able to accept only a single type of consumable device. The customizable device may include a multiple-type inhalation device, single-type inhalation devices, or combinations thereof. In some embodiments, the consumable devices may have a conventional and familiar cylindrical shape. The inhalation device may accept conventionally-shaped consumable devices to provide ease of manufacturing.

One or more consumable devices may have the same shape and size. In some embodiments, all consumable devices have a universally similar shape in one or more dimensions, for example, the same outer or inner diameter or the same overall or cavity length. In other embodiments, different consumable devices may differ in shape in one or more dimensions.

Each consumable device may have an inhalation port. The consumable device may be inserted into the cavity such that the inhalation port is adjacent to, or in proximity to, the mouth end portion of the inhalation device. When the mouth end portion is used to couple the inhalation device, the inhalation port may also be unexposed to the user, or considered blocked for purposes of inhalation. Likewise, when the mouth end portion is free from coupling, the inhalation port may be exposed to the user, or considered available for purposes of inhalation.

Each consumable device may have an internal port. The internal port may be disposed within the housing to receive airflow from the air inlet of the housing. The internal port may be in fluid communication with the inhalation port to allow airflow from the inlet port to the inhalation port when the consumable is disposed within the cavity. In some embodiments, airflow may also activate a sensor of the consumable device, which may activate aerosolizing of the consumable or indicate an amount of consumable remaining.

In the storage configuration, the inhalation port of the first consumable device of the first inhalation device may be adjacent to, in proximity to, or in contact with the inhalation port of the second consumable device of the second inhalation device. The housing of the inhalation devices may close or seal the consumable devices from exposure, which may provide a convenient format for transporting and storing the customizable device. In this storage configuration, the customizable device may also prevent the user from using either consumable device.

In the first active configuration, the inhalation port of the first consumable device of the first inhalation device may be exposed, whereas the inhalation port of the second consumable device of the second inhalation device may be unexposed or used for coupling to the first inhalation device. The second consumable device may be closed or sealed from exposure to prevent the user from using the second consumable device while allowing use of the first consumable device.

The second active configuration may be considered the opposite of the first active configuration. In the second active configuration, the inhalation port of the second consumable device of the second inhalation device may be exposed, whereas the inhalation port of the first consumable device of the first inhalation device may be unexposed or used for coupling to the second inhalation device. The first consumable device may be closed or sealed from exposure to prevent the user from using the second consumable device while allowing use of the first consumable device.

Each consumable device may partially or entirely be inserted into a cavity. The end of the consumable device having the inhalation port may be sub flush, flush, or super flush (e.g., partial insertion) with the mouth end portion of the housing of the inhalation device. Partial insertion may facilitate the removal of the consumable after being expended. For example, a user may grip an end portion of the consumable device for removal from the cavity.

One or more consumable devices may be a single or modular integrated unit. In some embodiments, the consumable device may include an aerosol-generating substrate contained in a capsule, cartridge, reservoir, matrix, or other suitable container and a vaporizing unit that can engage with the capsule. When connected, the vaporizing unit may be powered to aerosolize an aerosol-generating substrate. The container may be considered disposable, whereas the vaporizing unit may be considered reusable over the lifetime of multiple capsules.

One or more consumable device may include protrusions to facilitate the insertion and removal of the consumable device from the cavity. In some embodiments, the consumable device includes a radially protruding key. The key may extend outwardly from an outer surface of the consumable device. The key may be disposed adjacent to, in proximity to, or at the end of the consumable device with the inhalation port. The key may be any suitable shape engageable by the user, such as a rectangular prism.

The housing of one or more inhalation devices may include axially extending channels, or cut outs, to accommodate one or more keys of a consumable device. Each channel may extend through the housing (e.g., from the cavity to an exterior of the housing). In some embodiments, each housing defines a channel extending from the mouth end portion toward the upstream end portion. In some embodiments, one or more housings define a channel extending from the upstream end portion toward the upstream end portion. In some embodiments, each housing may include at least one channel. In some embodiments, one of the inhalation devices may include at least one channel in each end portion.

The length of the channel may be sufficient to receive at least one, two, or more keys. The one or more keys may be slidable into an open end of the channel. The cooperation of at least one key and one of the channels may limit the axial movement of the consumable device relative

to the housing in at least one direction and may limit the rotational movement of the consumable device relative to the housing in at least one direction. Limited rotational movement may facilitate alignment of electrical contacts described herein. Alternatively, the consumable device may include an indent or channel and the housing includes a detent or protrusion to provide the same or similar functionality.

The housing of one or more inhalation devices may define an axially protruding rim. The channel may be formed in the axial protruding rim. The rim may be used to couple to the axially protruding rim of the housing of another inhalation device.

In some embodiments, the housings of the inhalation devices may be similar, for example, in diameter, but have different end portions. For example, a first inhalation device may include an axially protruding rim at each end portion defining a same inner diameter, and the second inhalation device may have an axially protruding rim at each end portion defining a same outer diameter. The inner diameter and the outer diameter may be sized to cooperatively engage one another to couple the inhalation devices together. Either end of the first inhalation device may couple to either end the second inhalation device due to the cooperating sizes of the respective inner and outer diameters. In some embodiments, the consumable devices used may have an identical outermost shape.

In various embodiments, the axially protruding rims of the first inhalation device may each have an axially extending channel. A first channel adjacent to the mouth end portion may have a first length greater than a second length of the second channel adjacent to the upstream end portion. For example, the first channel may accommodate two consumable keys, and the second channel may accommodate only one consumable key (e.g., half the length). When disposed into the cavity of the first inhalation device, the first consumable may be sub flush with the mouth end portion of the housing. The first consumable device may have a radially protruding key that slidably engages the first channel.

The second inhalation device may have only one axially extending channel adjacent to the mouth end portion. When disposed into the cavity of the second inhalation device, the second consumable may be flush with the mouth end portion of the housing. The second consumable device may have a radially protruding key that slidably engages the channel of the second inhalation device.

In the storage configuration, the mouth end portion of the second inhalation device may be at least partially inserted into the mouth end portion of the first inhalation device in embodiments where the first consumable is sub flush with the mouth end portion of the first inhalation device. The radially protruding key of the second consumable may engage the first channel adjacent to the mouth end portion of the first inhalation device. In the first active

configuration, the mouth portion of the second inhalation device may be at least partially inserted into the upstream end portion of the first inhalation device. The radially protruding key of the second consumable may engage the second channel adjacent to the upstream end portion of the first inhalation device. In the second active configuration, the upstream end portion of the second inhalation device may be at least partially inserted into the mouth end portion of the first inhalation device. In the third configuration, the upstream end portion of the second inhalation device may be at least partially inserted into the mouth end portion of the first inhalation device.

The customizable device may include a connector hub removably coupled between the inhalation devices in various configurations. The hub may be a separate component, independently couplable to one or more ends of the inhalation devices. Each end portion of each inhalation device may have the same one or more dimensions to facilitate coupling of any end of the inhalation devices to the hub. One or more of the dimensions of the outermost surface of the inhalation device housing may be the same or identical.

In some embodiments, air inlets of an inhalation device are not blocked, closed, or sealed by the hub when connected to the upstream end portion to allow for use of the inhalation device. The inhalation port of the consumable, the opening of the housing at the mouth end portion, or both may be blocked, closed, or sealed by the hub when connected to the mouth end portion.

The hub may include a first end portion and a second end portion. The second end portion may be disposed opposite to the first end portion. A recess may be defined in each end portion to at least partially receive one end of one of the inhalation devices. Each end portion of the hub may be the same or similar. In some embodiments, each recess of the hub is the same or similar. In some embodiments, the first end portion may be removably coupled to either end portion of the first inhalation device and a second end portion removably coupled to either end portion of the second inhalation device.

Each recess may define a first inner diameter. The first inner diameter may be sized to cooperatively engage an outer diameter of the housings of the inhalation devices to couple the hub to the inhalation device.

Each recess may define a second inner diameter less than the first inner diameter. In some embodiments, the second inner diameter is defined by a shoulder formed in the recess sub flush the respective end portion. The first inner diameter may be defined above the shoulder and the second inner diameter may be defined by the shoulder. In some embodiments, the second inner diameter may be sized to cooperatively engage an outer diameter of a consumable device to couple the hub to the consumable device. For example, the consumable may be partially disposed within the cavity of the inhalation device and be super flush with the mouth end portion.

The hub may engage both the housing at the first inner diameter and the consumable device at the second inner diameter.

One or more inhalation devices may include an aerosolizer, or atomizer or heater. Preferably, the aerosolizer is disposed within (e.g., internal to the outermost surface of) the inhalation device housing. In some embodiments, one or more inhalation devices includes a heater. In some embodiments, aerosolization of the aerosol-generating substrate of the consumable may be accomplished by heating. The substrate may be heated via a heating element in the consumable device or by providing a heating element in the housing external to the consumable device. When a heating element or atomization element is disposed in the consumable device itself, the cavity may include corresponding electrical contacts for providing electrical power from a power supply, which may be at least partially disposed in the housing, to the aerosolizer in the consumable device.

Heating of the consumable is preferably performed resistively or inductively. A resistively heatable heating element may be provided in the consumable device (e.g., mesh) or in the housing external to the consumable device (e.g., resistive conductors). With inductive heating, an inductor, for example an induction coil, is preferably provided in housing external to the consumable device. A susceptor material heated by the inductor may be provided in the housing external to the consumable device, in the housing and configured to pierce into the consumable, or in the consumable device itself.

In some embodiments, one or more inhalation devices include a heating element, electrical contacts, or both. Including both may provide many options for different consumable devices to be used with the inhalation device. A user may not be required to check whether a particular inhalation device is adapted for a specific consumable that does or does not have, for example, a heater.

A heating element in the device may be arranged in or adjacent to a wall of the housing adjacent to the consumable device in the cavity. In some embodiments, resistively heatable metal tracks or resistively heatable wires may be disposed in or adjacent to the wall of the housing or resistively heatable wires may be arranged in the receiving chamber wall to heat the substrate. In some embodiments, an inductor in the form of an induction coil may be arranged in or adjacent to a wall of the housing adjacent to the consumable device, which may surround the consumable device. A susceptor may be disposed within the consumable device operatively coupled to the induction coil to receive electromagnetic power to heat the substrate.

A heating element in the inhalation device may extend into the cavity. For example, the heating element may be a resistively heated heater blade or an elongated susceptor.

One or more inhalation devices may include a power supply. The power supply may include a power source and a controller. The power source may be, for example, a battery or a capacitor. The power supply may be at least partially disposed in the housing external to the consumable device. The power supply may provide energy to heat the aerosol-generating substrate in the consumable device.

The controller may be considered part of the power supply or separate. The controller may be at least partially disposed in the housing external to the consumable device. The controller may to regulate power delivery from the power supply to one or more consumable devices (e.g., power management. In some embodiments, the controller may be configured to regulate delivery of an aerosol resulting from heating of the substrate to a user.

In some embodiments, the controller is electrically coupled to the controller of the other inhalation device to regulate power sharing between inhalation devices or, for example, to communicate between inhalation devices. In some embodiments, the hub may include a controller to facilitate power sharing between inhalation devices or, for example, to facilitate communication between the controllers of the inhalation devices.

The controller can be provided in any suitable form and may, for example, include a processor, a memory, or both. The controller can include one or more of an Application Specific Integrated Circuit (ASIC) state machine, a digital signal processor, a gate array, a microprocessor, or equivalent discrete or integrated logic circuitry. The controller can include memory that contains instructions that cause one or more components of the inhalation device to carry out a function or aspect of the inhalation device. Functions attributable to the controller in this disclosure can be embodied as one or more of software, firmware, and hardware.

The inhalation devices may include electrical or electronic circuitry to operatively connect the controller to the power supply and the consumable device. In some embodiments, the circuitry includes electrical contacts exposed at one or more end portions of the inhalation device. The electrical contacts may be disposed in or on the housing. In some embodiments, the electrical contacts are exposed axially in the rim of the inhalation device. The electrical contacts may be used for power sharing or data sharing between inhalation devices. In some embodiments, the hub may include electrical contacts, as well as electrical or electronic circuitry, to facilitate power sharing between inhalation devices or, for example, to facilitate communication between the controllers of the inhalation devices.

Power sharing may include providing power from the power supply in one inhalation device, which may be inactive, to the consumable device in the other inhalation device, which may be active. This type of power sharing may be used, for example, when the power supply of the active device has been expended. Power sharing may also include charging the power supply

of an inactive inhalation device (e.g., with a lower charge) with the power supply of the other inactive inhalation device (e.g., with a higher charge), for example, in the storage configuration. This type of power sharing may balance the charges in each power supply. Power sharing may facilitate extended operation of one or more inhalation devices before recharging or replacing the battery. In other embodiments, the inhalation devices may not share power in the storage configuration.

The controller may also facilitate power management in response to the configuration of the customizable device. In some embodiments, the inhalation devices may enter a power saving mode in response to the storage configuration. In some embodiments, the first active configuration may turn on the first inhalation device and turn off the second inhalation device, or vice versa for the second active configuration. In some embodiments, the controller may inactivate the inhalation device until the inhalation device is coupled to another inhalation device or hub. In other embodiments, controller allows activation of the inhalation device whether or not the inhalation device is coupled to another inhalation device or hub.

One or more inhalation devices may include an activator. The activator may be considered part of the controller. The activator may provide a signal or modify a connection to indicate that the heater should be turned on. The activator detects a user's action indicating an intent to use the customizable device. The user action may be, for example, a puff or manual engagement.

In some embodiments, the activator includes a puff sensor. The activator may detect when a user puffs (e.g., draws air or inhales) on the customizable device and, in response, the controller may turn on the heater to begin generating aerosol from the substrate. Non-limiting types of puff sensors may include one or more of a vibrating membrane, a piezoelectric sensor, a mesh-like membrane, a pressure sensor (e.g., capacitive pressure sensor), and an airflow switch.

In some embodiments, the activator includes a user-engageable interface. The activator may detect engagement by a user and, in response, the controller may turn on the heater. Non-limiting types of user-engageable interfaces may include one or more of a button or a switch.

The controller may turn off the heater, for example, in response to the end of a puff, after a predetermined amount of time in response to the end of the puff, or in response to detecting that a consumable has been expended.

The controller may actively prevent the heater from being turned on when the inhalation device is in the inactive position. For example, in the storage configuration, both inhalation devices may be considered inactive. In some embodiments, the controller may allow the inhalation device to be used independently when uncoupled from another inhalation device or hub. In some

embodiments, the controller may prevent the heater from being turned on unless the inhalation device is coupled to another inhalation device or hub and in the active position.

One or more components of the customizable device may be considered reusable. Non-limiting examples of reusable components include one or more of: the housing, the hub, the power supply, the heater, and the activator. One or more components of the customizable device may be considered disposable. Non-limiting examples of disposable components include one or more of: the consumable device, the consumable, the aerosol-generating substrate, the heater, the activator, and the power supply. The housing, the hub, the power supply, the heater or some components thereof, and the activator are preferably reusable over the lifetime of multiple consumable devices.

The customizable device may be used in any suitable manner to provide inhalable aerosol and to store the device. Before use, a user may couple the inhalation devices using the mouth end portion of the first inhalation device and the upstream end portion of the second inhalation device to block the first inhalation port and expose the second inhalation port, or vice versa. The second inhalation device may be used, or vice versa. To store the device, a user may couple the inhalation devices using the mouth end portions to block airflow through the inhalation ports in a storage configuration. The customizable device may be used simply to activate and inactivate inhalation devices as desired.

All scientific and technical terms used herein have meanings commonly used in the art unless otherwise specified. The definitions provided herein are to facilitate understanding of certain terms used frequently herein.

As used herein, the singular forms “a”, “an”, and “the” encompass embodiments having plural referents, unless the content clearly dictates otherwise.

As used herein, “or” is generally employed in its sense including “and/or” unless the content clearly dictates otherwise. The term “and/or” means one or all the listed elements or a combination of any two or more of the listed elements.

As used herein, “have”, “having”, “include”, “including”, “comprise”, “comprising” or the like are used in their open-ended sense, and generally mean “including, but not limited to”. It will be understood that “consisting essentially of”, “consisting of”, and the like are subsumed in “comprising,” and the like.

The words “preferred” and “preferably” refer to embodiments of the invention that may afford certain benefits, under certain circumstances. However, other embodiments may also be preferred, under the same or other circumstances. Furthermore, the recitation of one or more

preferred embodiments does not imply that other embodiments are not useful, and is not intended to exclude other embodiments from the scope of the disclosure, including the claims.

The schematic drawings are not necessarily to scale and are presented for purposes of illustration and not limitation. The drawings depict one or more aspects described in this disclosure. However, it will be understood that other aspects not depicted in the drawing fall within the scope and spirit of this disclosure. Referring now to the drawings, in which some aspects of the present invention are illustrated.

FIGS. 1-2 are schematic diagrams of an illustrative customizable device **10**. **FIG. 1** shows the customizable device **10** in a storage configuration. **FIG. 2** shows the customizable device **10** in a configuration in which a second inhalation device **14** is in an active configuration and a first inhalation device is in an inactive configuration. Customizable device **10** includes a first inhalation device **12** removably coupled to a second inhalation device **14**. Each inhalation device **12, 14** includes a housing **16** extending longitudinally along a longitudinal axis **22** from a mouth end portion **18** and an upstream end portion **20**. In the closed configuration, the respective mouth end portions **18** are coupled to one another. Both inhalation devices **12, 14** are inactive. In the illustrated active configuration, the mouth end portion **18** of the first inhalation device **12** is coupled to the upstream end portion **20** of the second inhalation device **14**. The second inhalation device **14** is active, whereas the first inhalation device **12** is inactive.

Each inhalation device **12, 14** includes a consumable device **24** and a power supply **26**. The consumable device **24** may be removable from the housing **16**. Each consumable device **24** may have an aerosol-generating substrate, preferably including nicotine. The customizable device **10** may include an optional connector hub **28** that facilitates coupling ends of the inhalation devices **12, 14**. Each inhalation device **12, 14** may be about equal in length along the longitudinal axis **22**.

The inhalation devices **12, 14** each include one or more inhalation ports **30**. The inhalation ports **30** may be defined by the consumable devices **24**. A user may draw air through the inhalation ports **30**. In response, air may be drawn into the cavity **34** of the respective inhalation device **12, 14** through one or more air inlets **32**, which may be defined in the housing **16** of the respective inhalation device. The inhalation ports **30** are axial ports, which extend axially parallel to the longitudinal axis **22** and may be disposed on an axial-facing surface. The air inlets **32** are radial air inlets, which may extend radially relative to the longitudinal axis **22** and may be disposed on a radial-facing surface.

FIGS. 3A-7B show various views of an illustrative customizable device **100** having first inhalation device **112** having axially protruding rims **40, 41** removably coupled to a second

inhalation device **114**. Many of the parts and components depicted in **FIGS. 3A-7B** are the same or similar to those depicted in, and described with regard to, **FIGS. 1-2**. Reference is made to the discussion above for numbered elements depicted in, but not specifically discussed herein.

The first inhalation device **112** includes axially protruding rim **40** extending from the mouth end portion **18** and axially protruding rim **41** extending from the upstream end portion **20**. The second inhalation device **114** includes an axially protruding rim **42** extending from the mouth end portion **18** and an axially protruding rim **43** extending from the upstream end portion **20**. The axially protruding rims **40, 41** of the first inhalation device **112** define a same inner diameter. The rims **42, 43** of the second inhalation device **114** define a same outer diameter that is complementary to the inner diameter of the rims **40, 41** to removably couple the inhalation devices **112, 114**.

Axially protruding rim **40** defines one or more axially extending channels **44** adjacent to, in proximity with, or at the mouth end portion **18**. Rim **41** defines one or more axially extending channels **45** adjacent to, in proximity with, or at the upstream end portion **20**. Rim **42** defines one or more axially extending channels **46** adjacent to, in proximity with, or at mouth end portion **18**. Rim **43** does not define an axially extending channel.

A first and second consumable device **24, 25** each are disposable within the housing **116, 117** of one of the inhalation devices **112, 114** (see **FIG. 3B**). The consumable devices **24, 25** and the housings **116, 117** may have a generally cylindrical shape. The consumable devices **24, 25** may be the same shape. The first consumable device **24** may be disposed sub flush with the mouth end portion **18** of the first inhalation device **112**. The second consumable **25** may be disposed flush with the mouth end portion **18** of the second inhalation device **114**.

The first consumable device **24** includes a radially protruding key **50** and may be inserted into the housing **116** of the first inhalation device **112**. The key **50** slidably engages into the channel **44**. The second consumable device **25** includes a radially protruding key **51** and, as shown in **FIG. 3B,** is insertable into the housing **117** of the second inhalation device **114**. The key **51** slidably engages into the channel **46**. The keys **50, 51** may facilitate alignment of the inhalation devices **112, 114** when coupled and may facilitate removing the consumable devices **24, 25** from the respective housing **116, 117**.

In the storage configuration shown in **FIGS. 4A-B**, the mouth end portions **18** of the inhalation devices **112, 114** are removably coupled. Both devices **112, 114** are inactive. The keys **50, 51** are aligned serially and inserted into the channel **44**. The channel **44** may extend twice the distance into the respective housing **116, 117** as the other channels **45, 46**.

In the first active configuration shown in **FIGS. 5A-B**, the mouth end portion **18** of the second inhalation device **114** is removably coupled to the upstream end portion **20** of the first inhalation device **112**. The first inhalation device **112** is active, whereas the second inhalation device **114** is inactive. The key **51** of the second consumable device **25** is inserted into the channel **45** of the first inhalation device **114**.

In the second active configuration shown in **FIGS. 6A-B**, the mouth end portion **18** of the first inhalation device **112** is removably coupled to the upstream end portion **20** of the second inhalation device **112**. The second inhalation device **114** is active, whereas the first inhalation device **112** is inactive. Channel **44** is only partially occupied by key **50** of the first consumable device **24**.

Each inhalation devices includes a power supply **26** including a power source **60** (e.g., battery) and a controller **62** to regulate power from the power source **60** to other components in the customizable device **100**.

Each inhalation device **112, 114** includes electrical or electronic circuitry **52** and electrical contacts **54**. The electrical contacts **54** may be exposed axially at the face of the respective inhalation device **112, 114** to electrically couple to electrical contacts on the other inhalation device. Power between the power supplies **26** may be shared via the circuitry **52** and contacts **54**. Data may also be shared.

FIGS. 8A-11B show various views of an illustrative customizable device **200** having a first inhalation device **212** and a second inhalation device **214** coupled by a connector hub **228**. Many of the parts and components depicted in **FIGS. 8A-11B** are the same or similar to those depicted in, and described with regard to, **FIGS. 1-7B**. Reference is made to the discussion above for numbered elements depicted in, but not specifically discussed herein.

The housing **216** of each inhalation device **212, 214** are the same or similar or, at least, define a same outer diameter at each end portion **18, 20**. The consumable devices **224** may be partially disposed, or disposed super flush, with the mouth end portions **18**, which may facilitate removal of the consumable device from the housing **216**. The first and second inhalation devices **212, 214** are couplable via connector hub **228**. The connector hub **228** includes a first recess **260** and a second recess **262** opposite the first recess. The recesses **260, 262** are preferably the same. Each recess **260, 262** has a first inner surface **264** defining a first inner diameter complementary to an outer diameter of the housing **216** at the end portions **18, 20** to removably couple thereto. Each recess includes a shoulder **266** adjacent to the first inner surface **264** defining a second inner surface **268** complementary to an outer diameter of the consumable

device **224** at an end portion to removably couple thereto. An intermediate wall **270** may separate the two recesses **260, 262**.

The connector hub **228** enables the customizable device **200** to take on various configurations, such as the storage configuration (**FIGS. 9A-B**), the first active configuration (**FIGS. 10A-B**), and the second active configuration (not shown).

The connector hub **228** includes circuitry **52** and contacts **54** to facilitate electrical coupling between the inhalation devices **212, 214**. The connector hub **228** may include a controller **62** to regulate power delivery or other functionality between the inhalation devices **212, 214**, as discussed with respect to the inhalation devices **112, 114** shown in **FIGS. 3A-7B**.

FIGS. 12A-E show cross-sectional views of illustrative inhalation devices **301-305** usable in any illustrative customizable device **10, 100, 200**. Each of the inhalation devices **301-305** may include a consumable device having a substrate, preferably containing nicotine, and a manner of heating the consumable device to generate aerosol.

Inhalation device **301** includes a tobacco consumable device **24a** and a heater **64a**. The heater **64a** is disposed external to the consumable device **24a** to heat the tobacco with power from the power source **60** regulated by the controller **62** to heat the substrate.

Inhalation device **302** includes a e-cig consumable device **24b** and a mesh heater **64b**. The mesh heater **64b** is disposed internal to the consumable device **24b** and powered by the power source **60** regulated by the controller **62** to heat the substrate.

Inhalation device **303** includes an e-cig consumable device **24c** with a susceptor **65c** and an induction coil **64c**. The induction coil **64c** and the susceptor **65c** may be considered part of the heater. The induction coil **64c** is disposed external to the consumable device **24c** and the susceptor **65c** is disposed internal to the consumable device. The susceptor **65c** is heated using the induction coil **64c** powered by the power source **60** regulated by the controller **62** to heat the substrate.

Inhalation device **304** includes a tobacco consumable device **24d** with a susceptor **65d** and an induction coil **64d**. The induction coil **64d** and the susceptor **65d** may be considered part of the heater. The induction coil **64d** is disposed external to the consumable device **24d** and the susceptor **65d** is disposed internal to the consumable device. The susceptor **65d** is heated using the induction coil **64d** powered by the power source **60** regulated by the controller **62** to heat the substrate.

Inhalation device **305** includes an e-cig consumable device **24e** and a heated coil **64e**. The resistive coil heater, or heated coil, **64e** is disposed internal to the consumable device **24e** and powered by the power source **60** regulated by the controller **62** to heat the substrate.

As depicted, the resistive coil heater **710** is wrapped around at least a portion of a wick **720** configured to pull aerosol forming fluid **730** from reservoir **740**. The resistive coil heater **710** electrically couples to the power source **60** and controller **62** when the consumable device **24** is inserted into the inhalation device **112**. An air flow channel **750** is formed in the consumable device **24**. At least a portion of the resistive coil heater **710** is in communication with the air flow channel **750**. When the coil **710** is heated, fluid **730** drawn through the wick **720** in proximity to the coil **710** is heated and aerosolized. When a user draws on the mouth end of the inhalation device **112**, the aerosolized fluid may be flow into the user's mouth.

Airflow through the inhalation devices **301-305** is shown by the arrows. Similar to the inhalation devices described herein above, the air may enter through an air inlet **32** adjacent to the upstream end portion **20**, flow through the consumable device **24a-e**, and flow toward the mouth end portion **18** in response to a user drawing air through an inhalation port. The drawn air can be detected by an activator, or puff sensor, of the controller **62** and the consumable device **24a-e** can be heated.

FIG 13 is a schematic diagram of a multiple-part consumable device **324** usable in any illustrative customizable device **10, 100, 200**. The multi-part consumable device **324** includes at least two parts, including a container **370** and a vaporizing unit **372**. When connected, the vaporizing unit **372** may be powered to aerosolize an aerosol-generating substrate in the container **370**.

The specific embodiments described above are intended to illustrate the invention. However, other embodiments may be made without departing from the spirit and scope of the invention as defined in the claims, and it is to be understood that the specific embodiments described above are not intended to be limiting.

CLAIMS:

1. A device comprising:

a first inhalation device comprising a mouth end portion and an upstream end portion; and

a second inhalation device upstream from the first inhalation device and comprising a mouth end portion and an upstream end portion;

wherein the first inhalation device is removably couplable to the second inhalation device via the mouth end portion of the first inhalation device.

2. The device according to any one of the preceding claims, wherein the first inhalation device comprises a controller configured to inactivate an aerosolizer or enter a power save mode in response to the mouth end portion of the first inhalation device being coupled to the second inhalation device.

3. The device according to any one of the preceding claims, wherein the first inhalation device is removably couplable to the second inhalation device via the upstream end portion of the second inhalation device.

4. The device according to any one of the preceding claims, wherein each end portion of the first inhalation device defines an axially protruding rim removably couplable to each end portion of the second inhalation device.

5. The device according to any one of the preceding claims, further comprising a connector hub that comprises a first end portion removably couplable to either end portion of the first inhalation device and a second end portion removably couplable to either end portion of the second inhalation device.

6. The device according to claim 5, wherein each end portion of the connector hub is removably couplable to either end portion of either inhalation device.

7. An assembly comprising the device according to any of the preceding claims, wherein each inhalation device comprises:

a housing defining a cavity extending between the mouth end portion and the upstream end portion; and

a consumable device disposable in the cavity defining an inhalation port adjacent to the mouth end portion.

8. The assembly according to claim 7, wherein at least one consumable device comprises an aerosol-generating substrate comprising nicotine.

9. The assembly according to any one of claim 7 or 8, wherein each mouth end portion of the inhalation devices defines a first feature and each consumable device comprises a second feature complementary to the first feature to ensure proper relative alignment.

10. The assembly according to claim 9, wherein the upstream end portion of one of the inhalation devices defines an axially extending channel engageable with one of the radially protruding keys.

11. The assembly according to any one of claims 7 to 10, wherein each inhalation device comprises a power supply to provide energy to heat the consumable device.

12. The assembly according to claim 11, wherein each power supply comprises a controller to regulate power delivery from the power supply.

13. The assembly according to claim 12, wherein the controller is electrically coupled to the controller of the other inhalation device to regulate power sharing between inhalation devices.

14. A method of using the device or assembly according to any one of the preceding claims, comprising coupling the inhalation devices using the mouth end portions to block airflow through the inhalation ports in a storage configuration.

15. A method of using a device or assembly according to any one of the preceding claims, comprising coupling the inhalation devices using the mouth end portion of the first inhalation device and the upstream end portion of the second inhalation device to block the first inhalation port and expose the second inhalation port.

5

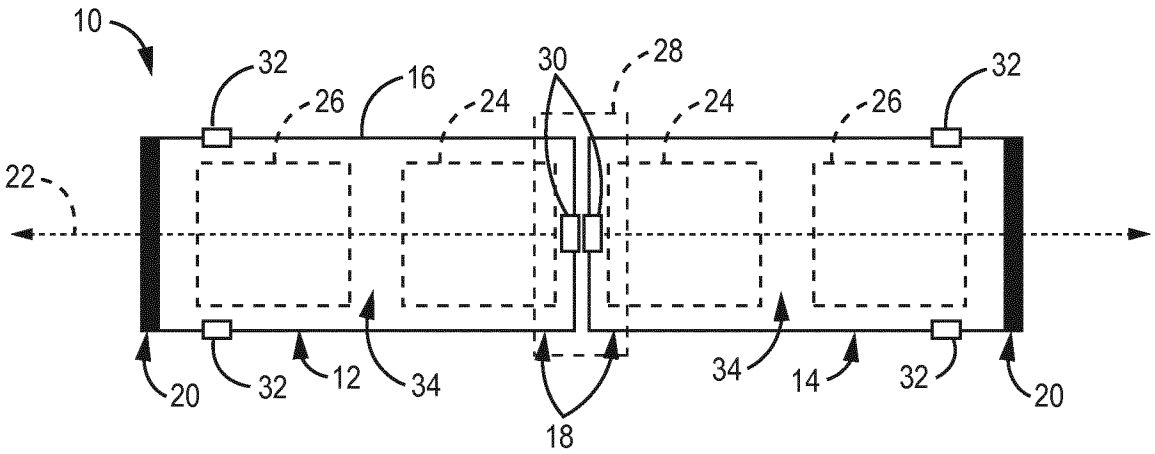

FIG. 1

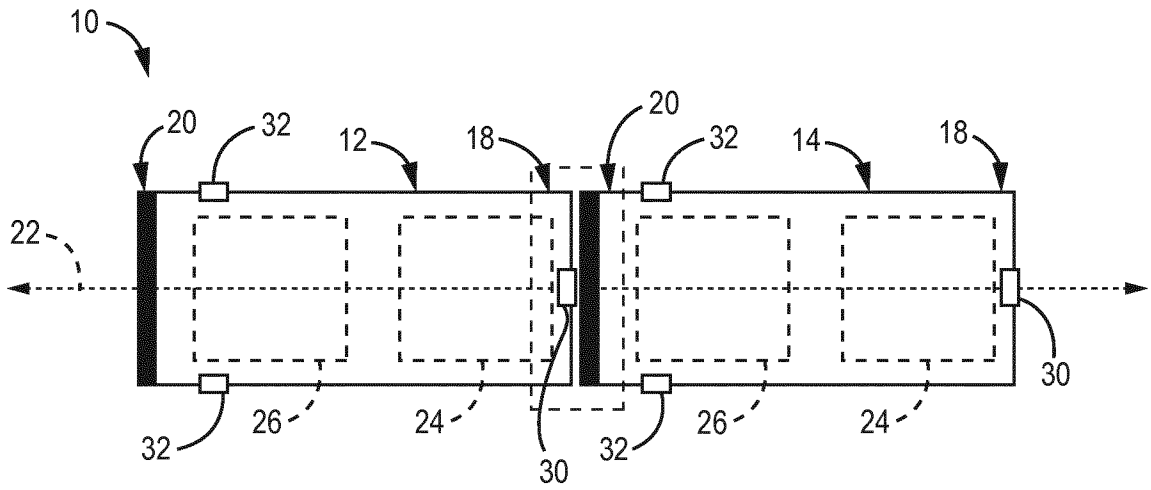

FIG. 2

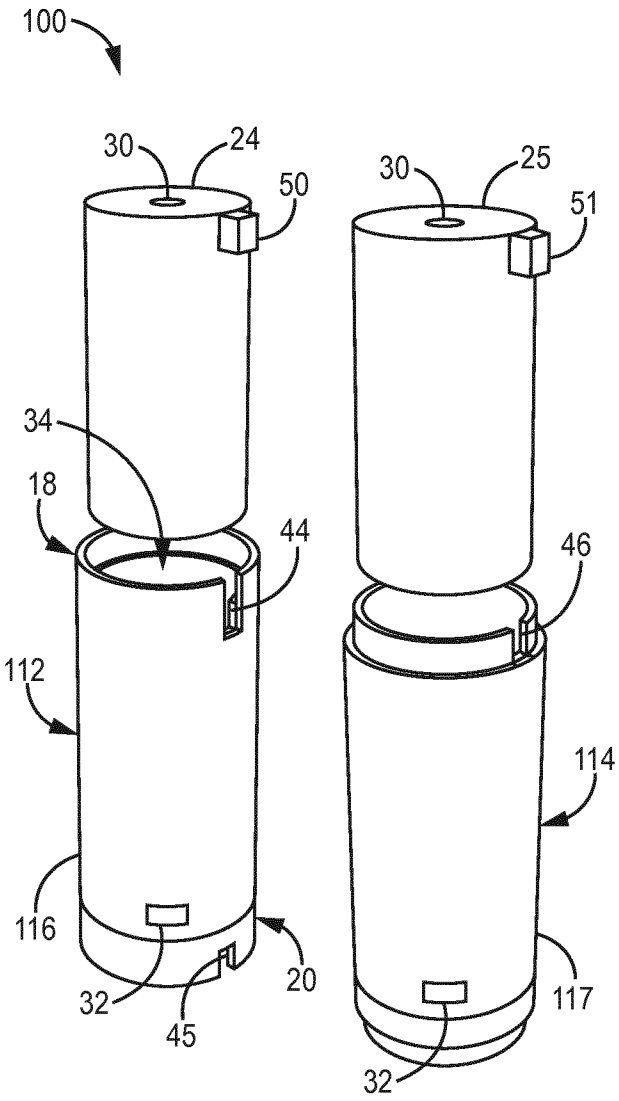
100
30
24
50
30
25
51
34
18
44
46
112
114
116
20
32
45
117
32

FIG. 3A

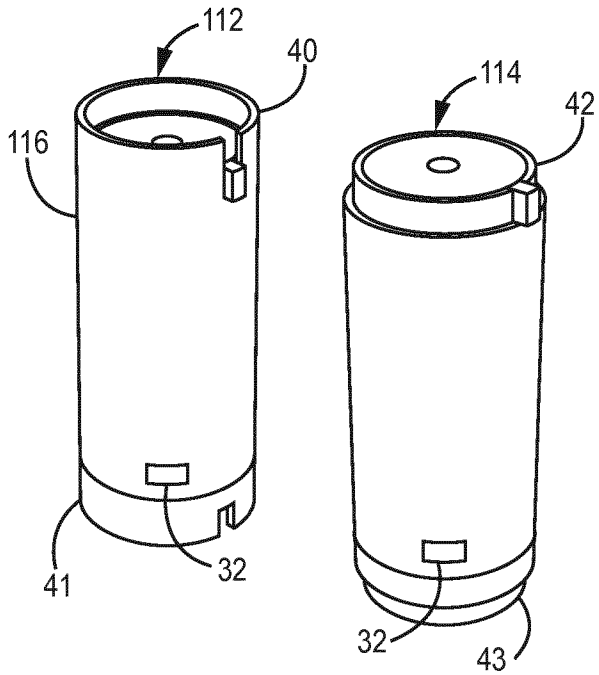
112
40
116
114
42
41
32
32
43

FIG. 3B

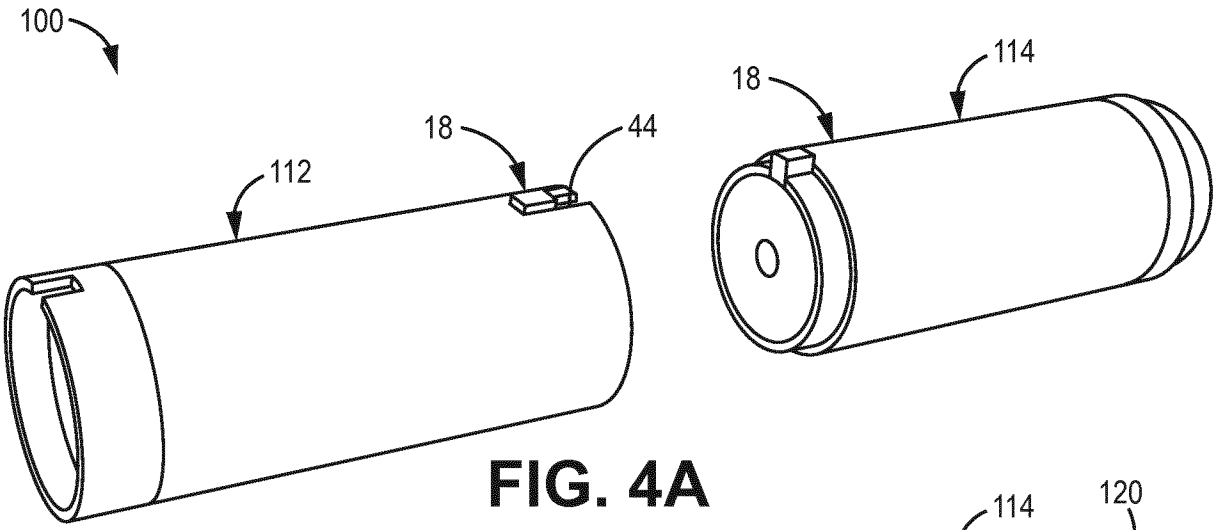

FIG. 4A

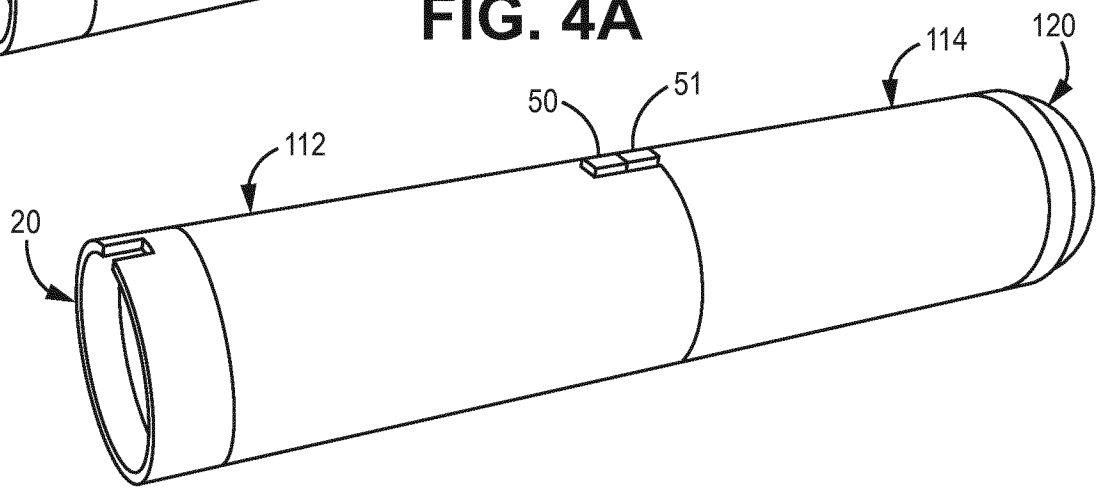

FIG. 4B

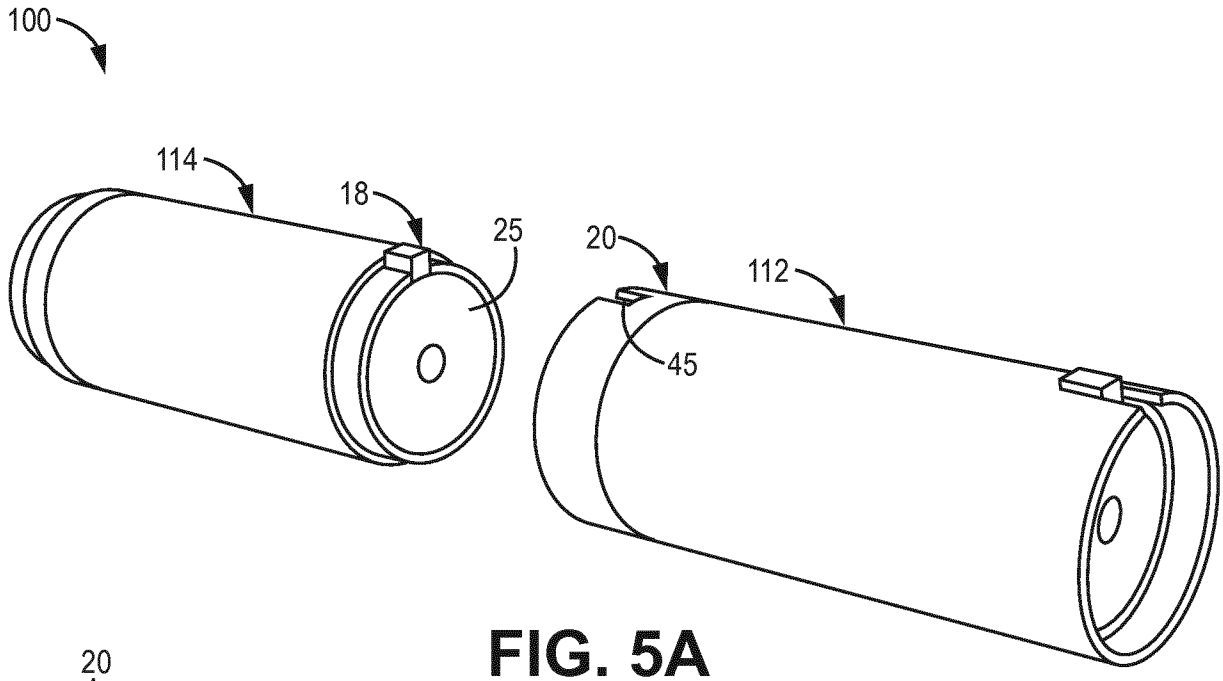

FIG. 5A

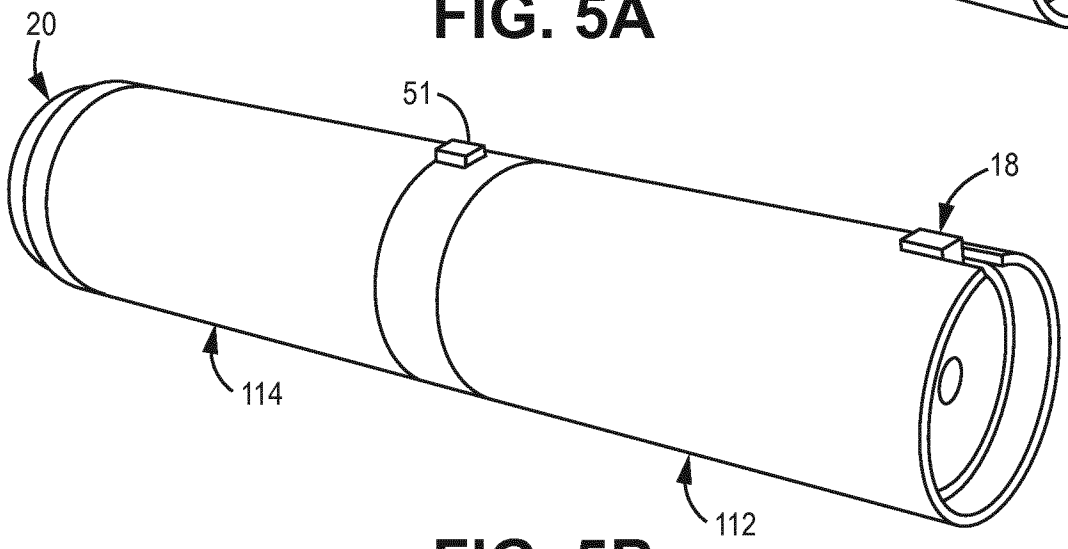

FIG. 5B

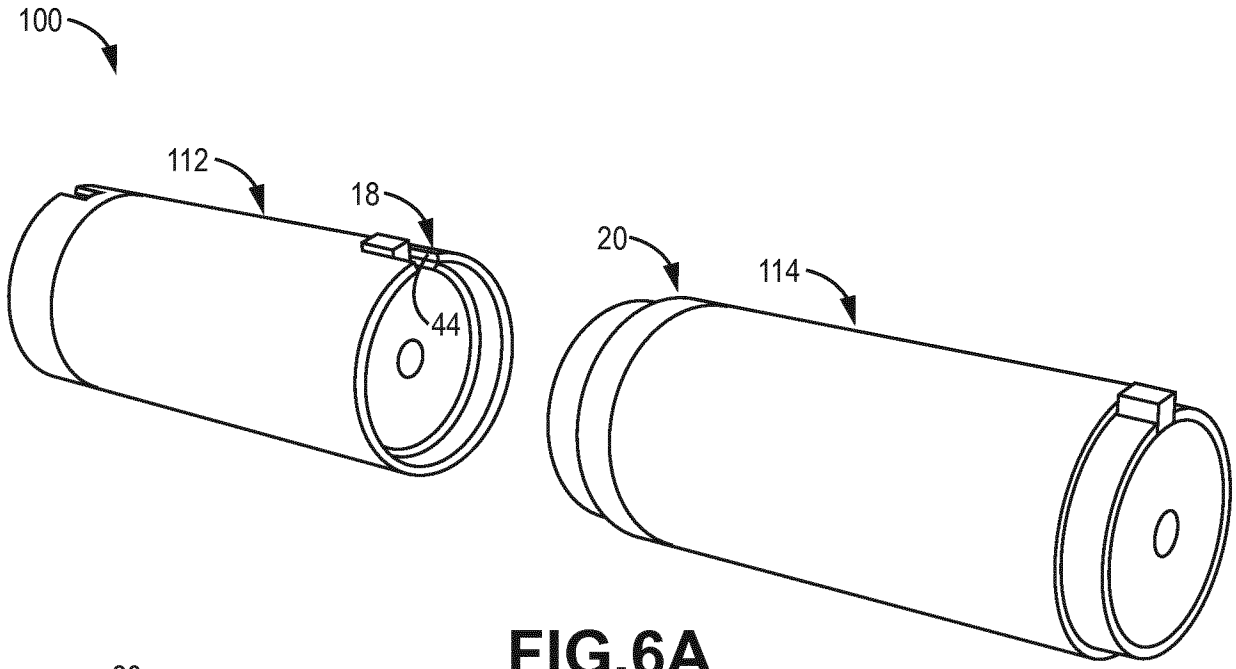

FIG.6A

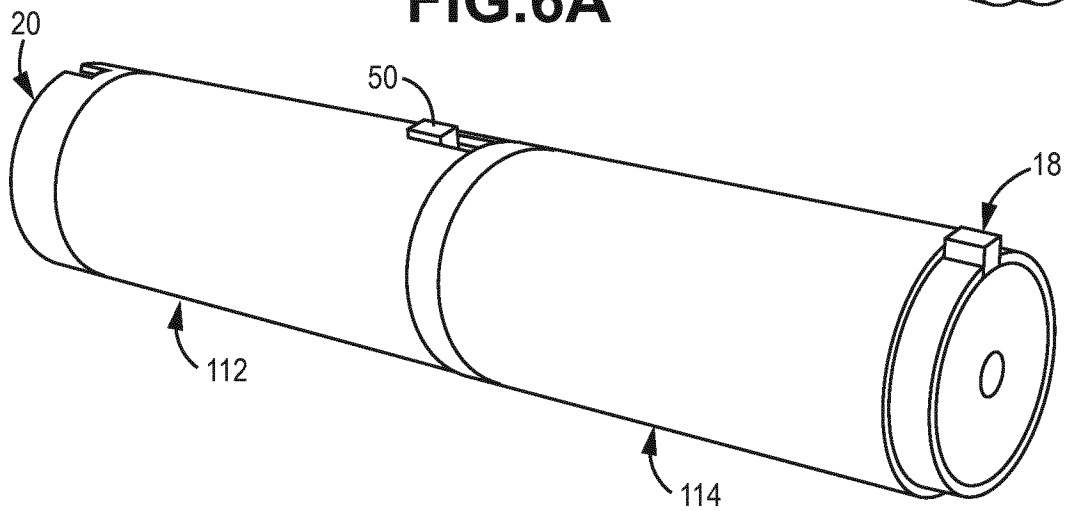

FIG. 6B

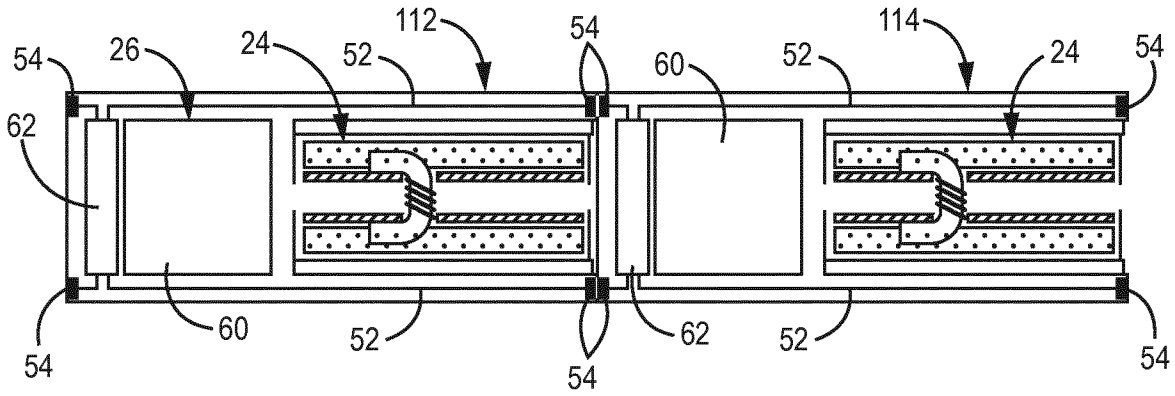
54
26
24
52
112
54
60
52
114
24
54
62
54
60
52
54
62
52
54

FIG. 7A

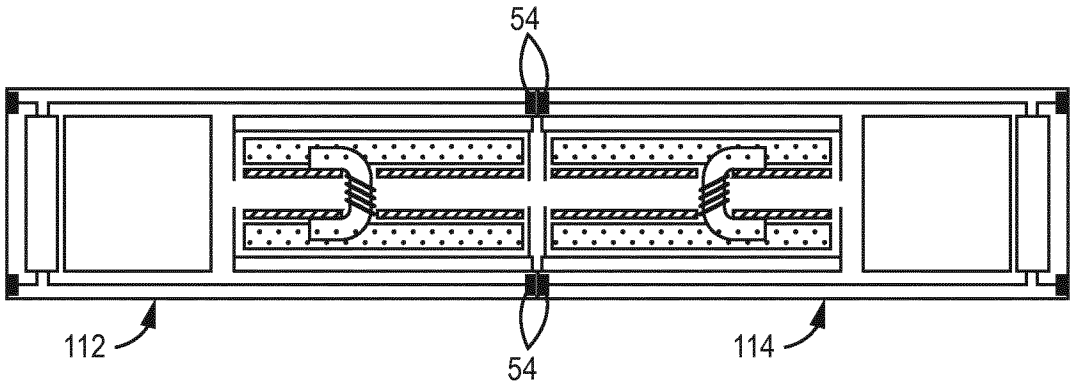
54
112
54
114

FIG. 7B

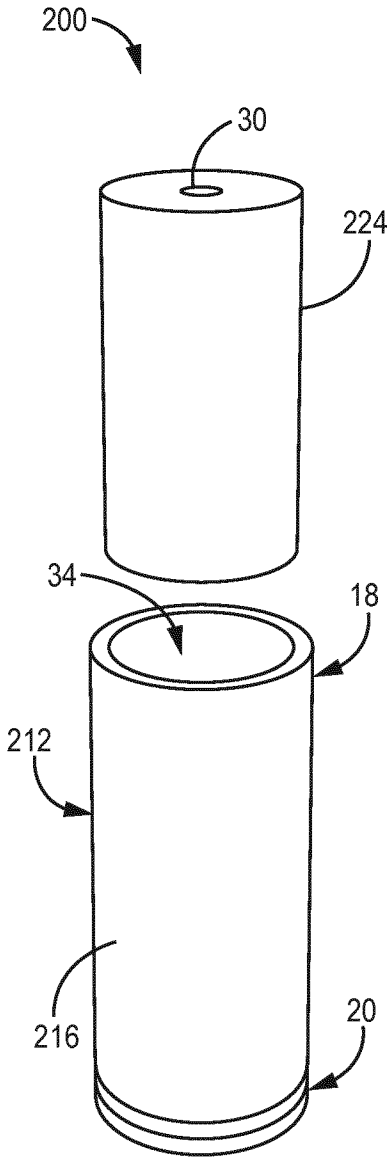

FIG. 8A

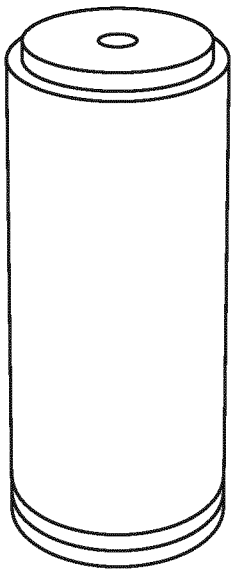

FIG. 8B

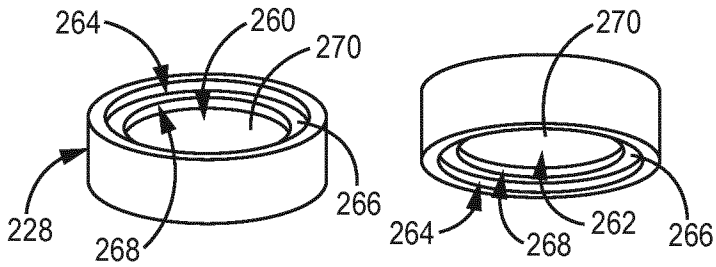

FIG. 8C

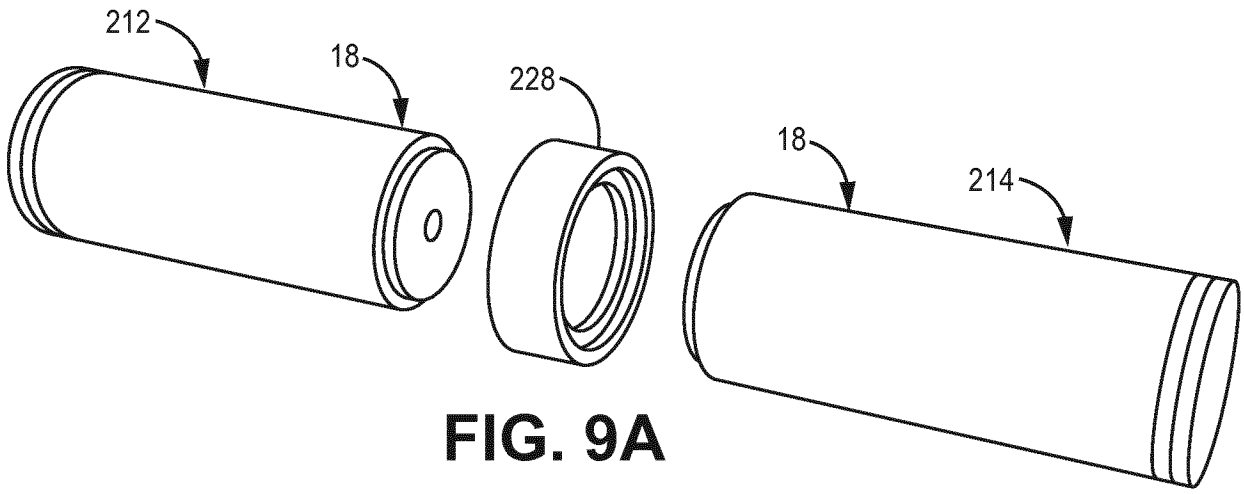

FIG. 9A

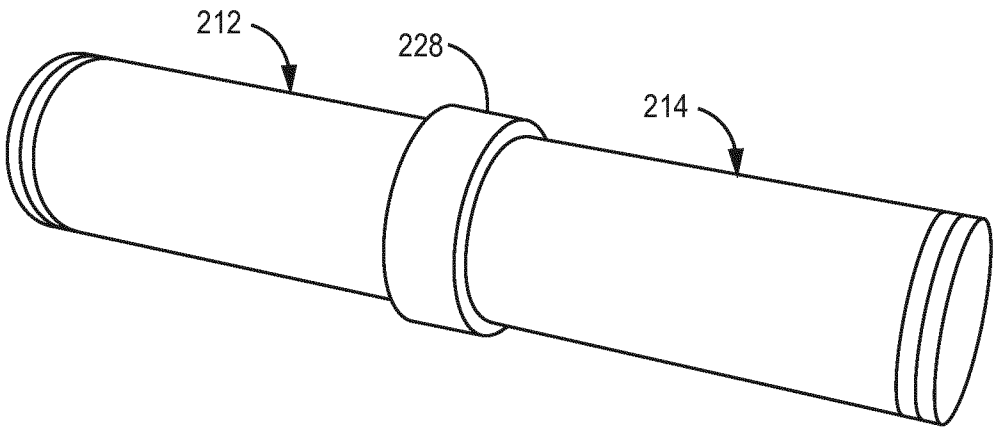

FIG. 9B

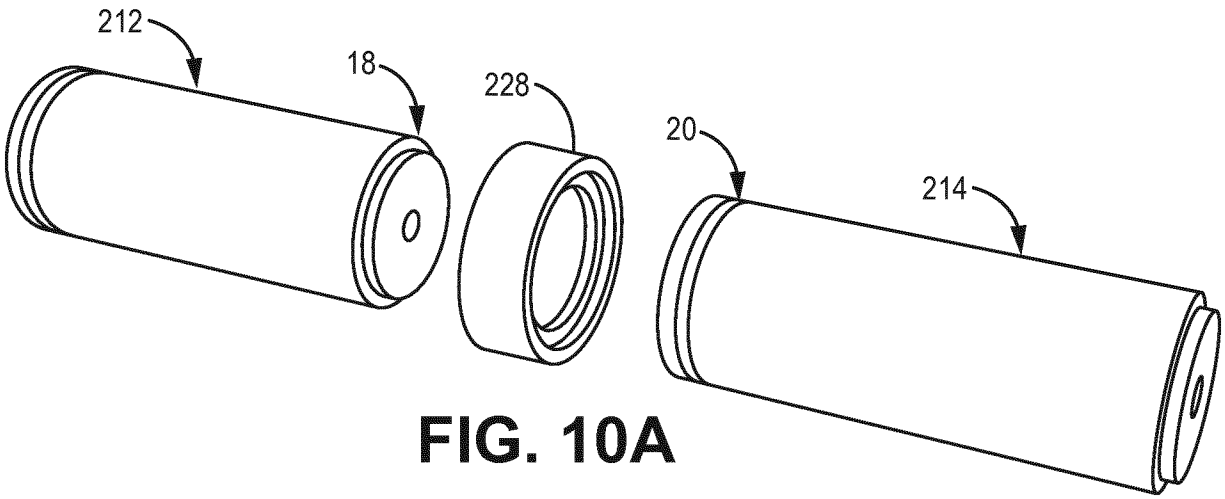

FIG. 10A

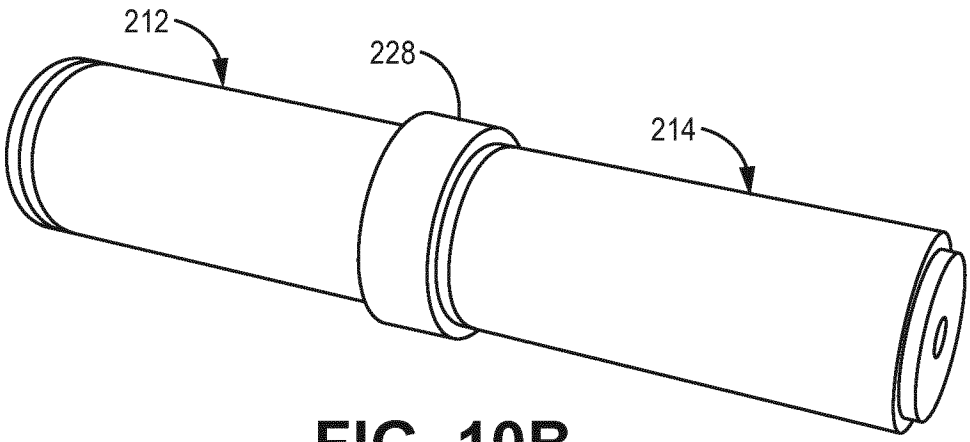

FIG. 10B

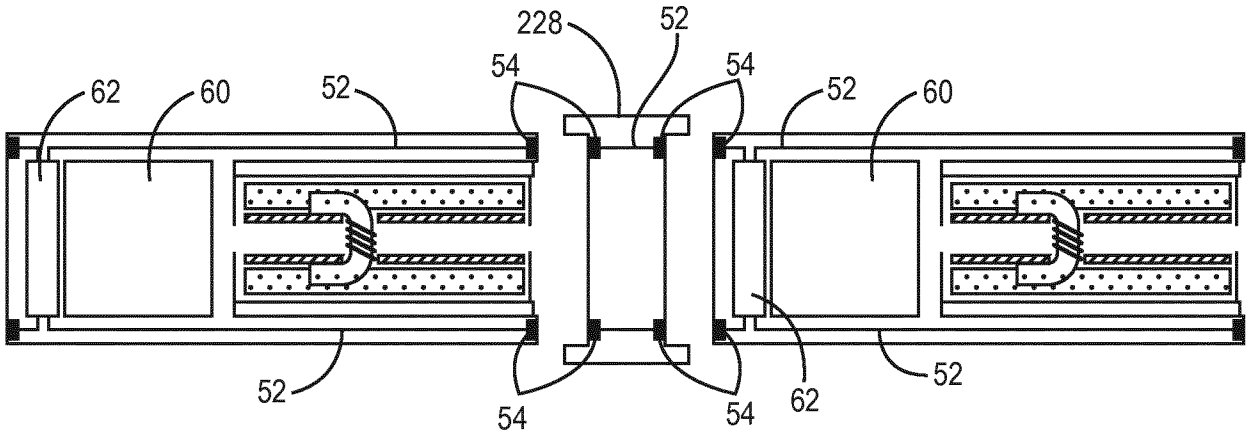

FIG. 11A

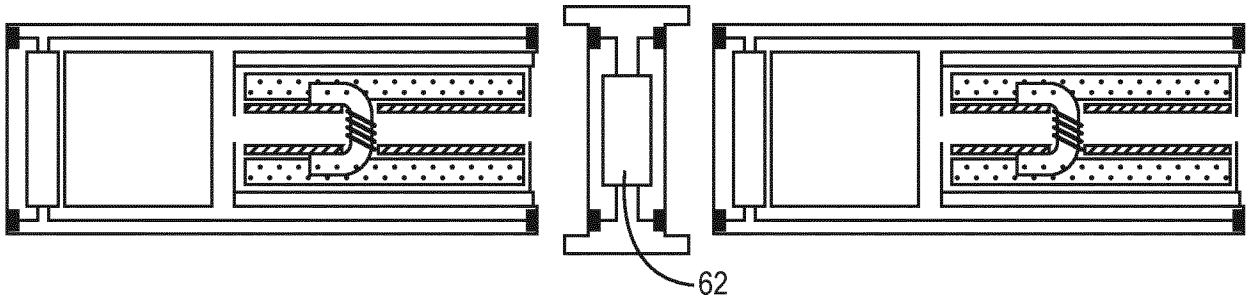

FIG. 11B

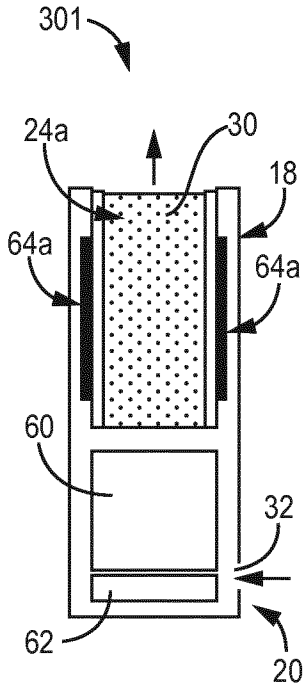

FIG. 12A

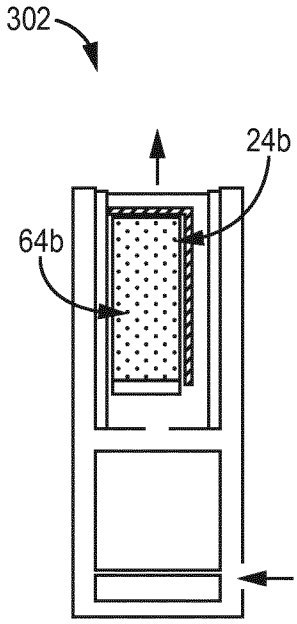

FIG. 12B

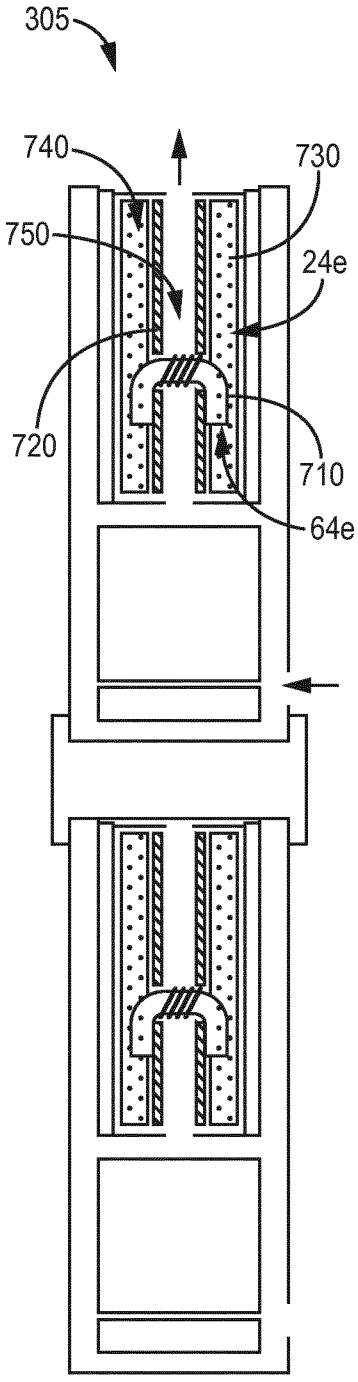

FIG. 12E

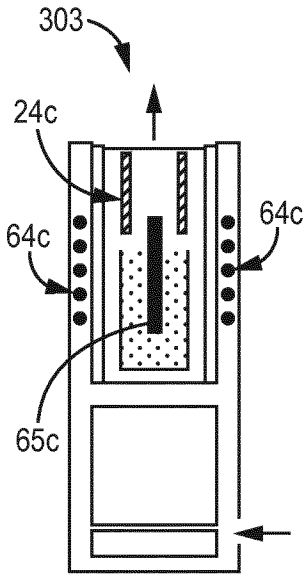

FIG. 12C

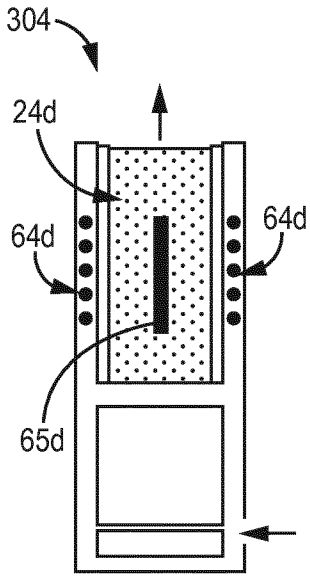

FIG. 12D

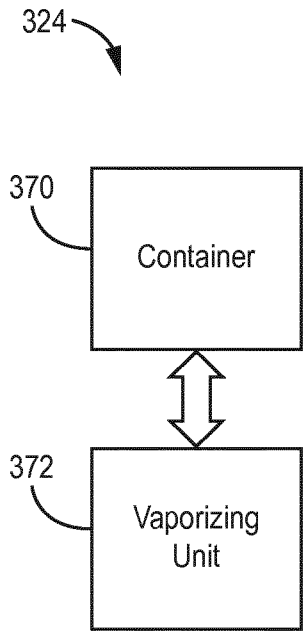

FIG. 13

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/059951

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61M15/00 A61M15/06 A24F47/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61M A24F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	WO 2016/075748 A1 (JAPAN TOBACCO INC) 19 May 2016 (2016-05-19) paragraphs [0028], [0030], [0037], [0038], [0043]; figures 1-7,13	1-15
X,P	EP 3 219 212 A1 (JAPAN TOBACCO INC [JP]) 20 September 2017 (2017-09-20) paragraphs [0028], [0030], [0037], [0038], [0043]; figures 1-7,13	1-15
A	WO 2016/124780 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 11 August 2016 (2016-08-11) page 13, lines 21-32; figures 1a,2a,2b,6	1-11
A	WO 2016/135342 A2 (BRITISH AMERICAN TOBACCO (INVESTMENTS) LTD [GB]) 1 September 2016 (2016-09-01) figures 1-5	1-11

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
9 May 2018	22/05/2018

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Louarn, Arzhur

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/059951

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

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PCT/EP2018/059951

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