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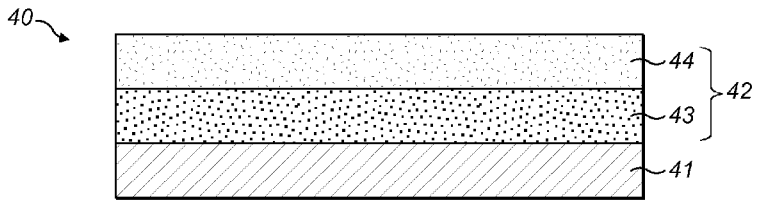



*FIG. 1*

(57) Abstract: An article (40) is provided for use with an apparatus (1) for heating smokable material (42) to volatilise at least one component of the smokable material (42). The article (40) has a carrier (41) and smokable material (42) arranged on the carrier (41). The smokable material (42) has a first layer of smokable material (43) and a second layer of smokable material (44). The first layer of smokable material (43) is located between the carrier (41) and the second layer of smokable material (44). The smokable material of the first layer of smokable material (43) has a form or chemical composition that differs from the form or chemical composition, respectively, of the smokable material of the second layer of smokable material (44).

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# ARTICLE FOR USE WITH APPARATUS FOR HEATING SMOKABLE MATERIAL

## Technical Field

The present invention relates to an article for use with apparatus for heating smokable material to volatilise at least one component of the smokable material.

## Background

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

## Summary

According to the present invention, there is provided an article for use with apparatus for heating smokable material to volatilise at least one component of the smokable material, the article comprising:

a carrier; and

smokable material arranged on the carrier;

wherein the smokable material comprises a first layer of smokable material and a second layer of smokable material, wherein the first layer of smokable material is located between the carrier and the second layer of smokable material; and

wherein the smokable material of the first layer of smokable material has a form or chemical composition that differs from the form or chemical composition, respectively, of the smokable material of the second layer of smokable material.

In an exemplary embodiment, the smokable material of one of the first and second layers of smokable material has a form or chemical composition so as to be heatable more quickly than the smokable material of the other of the first and second

layers of smokable material. In an exemplary embodiment, the smokable material of one of the first and second layers of smokable material has a form or chemical composition so as to be heatable more quickly, to volatilise at least one component of the smokable material, than the smokable material of the other of the first and second layers of smokable material.

In an exemplary embodiment, the smokable material of the first layer of smokable material has a form or chemical composition so as to be heatable more quickly than the smokable material of the second layer of smokable material. In an exemplary embodiment, the smokable material of the first layer of smokable material has a form or chemical composition so as to be heatable more quickly, to volatilise at least one component of the smokable material, than the smokable material of the second layer of smokable material.

In an exemplary embodiment, the smokable material of one of the first and second layers of smokable material comprises particles of the smokable material having a first mean particle size, and the smokable material of the other of the first and second layers of smokable material comprises particles of the smokable material having a second mean particle size that is greater than the first mean particle size.

In an exemplary embodiment, the smokable material of the first layer of smokable material comprises the particles of smokable material having the first mean particle size, and the smokable material of the second layer of smokable material comprises the particles of smokable material having the second mean particle size.

In an exemplary embodiment, the smokable material of one of the first and second layers of smokable material comprises an aerosol forming agent, and the smokable material of the other of the first and second layers of smokable material is free or substantially free of the aerosol forming agent.

In an exemplary embodiment, the smokable material of the first layer of smokable material comprises the aerosol forming agent, and the smokable material of

the second layer of smokable material is free or substantially free of the aerosol forming agent.

In an exemplary embodiment, the aerosol forming agent comprises glycerol.

In an exemplary embodiment, the first layer of the smokable material is bonded to the carrier.

In an exemplary embodiment, the first layer of the smokable material is bonded by an adhesive to the carrier.

In an exemplary embodiment, the second layer of smokable material is in contact with the first layer of smokable material.

In an exemplary embodiment, the second layer of smokable material is out of contact with the carrier.

In an exemplary embodiment, the carrier is for conducting heat through the carrier towards the smokable material.

In an exemplary embodiment, the article comprises a pouch containing the smokable material, and the carrier forms at least a portion of a wall of the pouch.

In an exemplary embodiment, the smokable material comprises tobacco.

There is also provided a cartridge for use with apparatus for heating smokable material to volatilise at least one component of the smokable material, the cartridge comprising an article as described above.

In an exemplary embodiment, the cartridge comprises a housing defining a chamber, the carrier defines part of an exterior surface of the cartridge, and the smokable material is located within the chamber.

In an exemplary embodiment, the exterior surface of the cartridge comprises a cavity for receiving a heater for heating the smokable material, and the carrier defines at least part of the cavity.

In an exemplary embodiment, the cavity has a mouth and a longitudinal axis, and a cross-sectional size of the cavity perpendicular to the axis decreases with distance from the mouth over at least a majority of a length of the cavity.

In an exemplary embodiment, the cross-sectional size of the cavity decreases with distance from the mouth over the full length of the cavity.

In an exemplary embodiment, the cavity is a wedge-shaped cavity or a dome-shaped cavity.

There is also provided a kit comprising an article as described above or a cartridge as described above, and apparatus for heating the smokable material to volatilise at least one component of the smokable material.

In an exemplary embodiment, the apparatus is for heating the smokable material to volatilise the at least one component of the smokable material without combusting the smokable material.

In an exemplary embodiment, the apparatus comprises a heating device for heating the smokable material, and a controller for controlling heating of the heating device so as to cause heating of the smokable material to volatilise the at least one component of the smokable material without combusting the smokable material.

Brief Description of the Drawings

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

Figure 1 shows a schematic cross-sectional view of an example of an article for use with apparatus for heating smokable material to volatilise at least one component of the smokable material;

Figure 2 shows a schematic cross-sectional view of an example of another article for use with apparatus for heating smokable material to volatilise at least one component of the smokable material;

Figure 3 shows a schematic cross-sectional view of an example of a cartridge for use with apparatus for heating smokable material to volatilise at least one component of the smokable material;

Figure 4 shows a schematic cross-sectional view of an example of another cartridge for use with apparatus for heating smokable material to volatilise at least one component of the smokable material;

Figure 5 shows a schematic cross-sectional view of an example of another cartridge for use with apparatus for heating smokable material to volatilise at least one component of the smokable material;

Figure 6 shows a schematic cross-sectional view of an example of another cartridge for use with apparatus for heating smokable material to volatilise at least one component of the smokable material;

Figure 7 shows a partially cut-away perspective view of an example of an apparatus for heating smokable material to volatilise at least one component of the smokable material;

Figure 8 shows a partially cut-away perspective view of an example of another apparatus for heating smokable material to volatilise at least one component of the smokable material; and

Figure 9 shows a partially cut-away perspective view of an example of another apparatus for heating smokable material to volatilise at least one component of the smokable material.

Detailed Description

As used herein, the term "smokable material" includes materials that provide volatilised components upon heating, typically in the form of an aerosol. "Smokable material" may be a non-tobacco-containing material or a tobacco-containing material. "Smokable material" may, for example, include one or more of tobacco per se, tobacco derivatives, expanded tobacco, reconstituted tobacco, tobacco extract, homogenised tobacco or tobacco substitutes. The smokable material can be in the form of ground tobacco, cut rag tobacco, extruded tobacco, gel or agglomerates. "Smokable material" also may include other, non-tobacco, products, which, depending on the product, may or may not contain nicotine.

As used herein, the terms "flavour" and "flavourant" refer to materials which, where local regulations permit, may be used to create a desired taste or aroma in a product for adult consumers. They may include extracts (e.g., licorice, hydrangea, Japanese white bark magnolia leaf, chamomile, fenugreek, clove, menthol, Japanese mint, aniseed, cinnamon, herb, wintergreen, cherry, berry, peach, apple, Drambuie, bourbon, scotch, whiskey, spearmint, peppermint, lavender, cardamom, celery, cascarilla, nutmeg, sandalwood, bergamot, geranium, honey essence, rose oil, vanilla, lemon oil, orange oil, cassia, caraway, cognac, jasmine, ylang-ylang, sage, fennel, piment, ginger, anise, coriander, coffee, or a mint oil from any species of the genus Mentha), flavour enhancers, bitterness receptor site blockers, sensorial receptor site activators or stimulators, sugars and/or sugar substitutes (e.g., sucralose, acesulfame potassium, aspartame, saccharine, cyclamates, lactose, sucrose, glucose, fructose, sorbitol, or mannitol), and other additives such as charcoal, chlorophyll, minerals, botanicals, or breath freshening agents. They may be imitation, synthetic or natural ingredients or blends thereof. They may comprise natural or nature-identical aroma chemicals. They may be in any suitable form, for example, oil, liquid, powder, or gel.

Referring to Figure 1 there is shown a schematic cross-sectional view of an example of an article 40 according to an embodiment of the invention. The article 40 comprises a carrier 41 and smokable material 42 arranged on the carrier 41. The smokable material 42 comprises a first layer of smokable material 43 and a second layer of smokable material 44. The first layer of smokable material 43 is located between the carrier 41 and the second layer of smokable material 44. In this embodiment, the first layer of smokable material 43 is bonded by an adhesive (not shown) to the carrier 41. In other embodiments, the first layer of smokable material 43 may be bonded to the carrier 41, or arranged on the carrier 41, by some other mechanism. In this embodiment, the first layer of smokable material 43 has a first thickness within a range of about 0.5 mm to 3 mm, or 0.1 mm to 2.0 mm, or 1.0 mm to 1.4 mm. In this embodiment, the second layer of smokable material 44 has a second thickness within a range of about 0.5 mm to 3 mm, or 0.1 mm to 2.0 mm, or 1.0 mm to 1.4 mm. In other embodiments, the first and second thicknesses may be other than within these ranges.

In this embodiment, the carrier 41 is for conducting heat through the carrier 41 towards the smokable material 42. The carrier 41 comprises a metal foil, such as aluminium foil, but in other embodiments the carrier 41 may comprise paper, a non-metal foil, a polymer, a plastics material, or a combination of foil and paper, or the like. In some embodiments, the carrier 41 may comprise a first layer of material, for example a paper such as reconstituted tobacco paper, and a second layer of material, for example a metal foil, attached to the first layer of material. In some embodiments, the first layer of smokable material 43 may be more readily bondable or adherable to the material of the first layer of material than to the material of the second layer of material. In some embodiments, the material of the second layer of material may be more rigid or robust than the material of the first layer of material. Thus, in some embodiments, the first layer of material may facilitate adhering the smokable material 42 to the carrier 41, and the second layer of material may increase the rigidity and/or robustness of the carrier 41.

In this embodiment, the second layer of smokable material 44 is in contact with the first layer of smokable material 43. In other embodiments, there may be other

material between the first and second layers of smokable material 43, 44. Such other material may increase the rigidity or robustness of the article 40, may help retain the relative positions of the first and second layers of smokable material 43, 44, and/or may help hold different regions of the smokable material 42 together. An example such other material is a layer of paper, such as reconstituted tobacco paper. In this embodiment, the second layer of smokable material 44 is out of contact with the carrier 41. In other embodiments, one or more sections of the second layer of smokable material 44 may be in contact with the carrier 41.

In embodiments of the present invention, the smokable material of the first layer of smokable material 43 has a form or chemical composition that differs from the form or chemical composition, respectively, of the smokable material of the second layer of smokable material 44. In some embodiments, the smokable material of one of the first and second layers of smokable material 43, 44 has a form or chemical composition so as to be heatable more quickly, for example to volatilise at least one component of the smokable material, than the smokable material of the other of the first and second layers of smokable material 43, 44. For example, it may be the smokable material of the first layer of smokable material 43 that has the form or chemical composition so as to be heatable more quickly, for example to volatilise at least one component of the smokable material, than the smokable material of the second layer of smokable material 44.

By providing the first and second layers of smokable material 43, 44 with different forms or chemical compositions, in some embodiments progressive heating of the smokable material 42, and thereby progressive generation of aerosol for user inhalation, is achievable. More specifically, the respective forms or chemical compositions of the first and second layers of smokable material 43, 44 may be selected such that, in use, only a relatively small degree of heating of the carrier 41 is required to cause the first layer of smokable material 43 to become heated, thereby to initiate volatilisation of at least one component of the smokable material in the first layer of smokable material 43 . The volatilised component(s) may be cooled, such as by flowing air, so that they condense to form an aerosol. As the carrier 41 is further heated, the second layer of smokable material 44 may become sufficiently heated to initiate

volatilisation of at least one component of the smokable material in the second layer of smokable material 44, which also may be cooled so as to condense to form an aerosol. Accordingly, on activation by a user, components of the smokable material are able to be volatilised relatively rapidly , and components of the smokable material continue to be volatilised thereafter even after the first layer of smokable material 43 becomes exhausted of volatile components. Accordingly, progressive generation of aerosol is achievable.

In other embodiments, the difference in form or chemical composition may instead act to compensate for a greater distance between the carrier 41 and the second layer of smokable material 44, as compared to the distance between the carrier 41 and the first layer of smokable material 43. The latter distance may be zero. For example, the respective forms or chemical compositions of the first and second layers of smokable material 43, 44 may be selected such that, on heating of the carrier 41, at least one component of the smokable material of each of the first and second layers of smokable material 43, 44 is volatilised at substantially the same time. Also, aerosol may be formed from the volatilised components from each of the first and second layers of smokable material 43, 44 at substantially the same time, as a result of condensing the volatilised components by cooling.

In some embodiments, the difference in form between the first and second layers of smokable material 43, 44 may comprise a difference in mean sizes of particles of the smokable material in the first and second layers of smokable material 43, 44. That is, in some embodiments, the smokable material of one of the first and second layers of smokable material 43, 44 comprises particles of the smokable material having a first mean particle size, and the smokable material of the other of the first and second layers of smokable material 43, 44 comprises particles of the smokable material having a second mean particle size that is greater than the first mean particle size. In some embodiments, the smokable material 42 as a whole may have a mean particle size of between 0.6 and 0.9 mm or between 0.7 and 0.8 mm. The smokable material 42 may be prepared using mesh separation or sieves, for example with sieve hole sizes selected so as to separate particles of the smokable material having a particle size within the

desired range from particles of the smokable material having a particle size outside of the desired range.

Typically, particles of smokable material having a smaller mean particle size are heatable more quickly, for example to volatilise at least one component of the smokable material, by a given heat source than are particles of the smokable material having a greater mean particle size. By providing the first and second layers of smokable material 43, 44 with different mean particle sizes, in some embodiments progressive heating of the smokable material, and thereby progressive generation of aerosol, on heating the carrier 41 is achievable substantially as discussed above. In other embodiments, simultaneous volatilisation of at least one component of the smokable material in each of the first and second layers of smokable material 43, 44 on heating the carrier 41, and simultaneous generation of aerosol using the volatilised components from each of the first and second layers of smokable material 43, 44, is achievable substantially as discussed above.

In the article 40 shown in Figure 1, the smokable material of the first layer of smokable material 43 has a form so as to be heatable more quickly, for example to volatilise at least one component of the smokable material, than the smokable material of the second layer of smokable material 44. More specifically, in this embodiment the smokable material of the first layer of smokable material 43 comprises the particles of smokable material having the first mean particle size, and the smokable material of the second layer of smokable material 44 comprises the particles of smokable material having the second mean particle size. Thus, in use, as the carrier 41 is heated, the particles of smokable material of the first layer of smokable material 43 are heated more quickly, for example to volatilise at least one component of the smokable material, than are particles of smokable material of the second layer of smokable material 44. Combined with the feature of this embodiment that the first layer of smokable material 43 also is closer to the carrier 41 than is the second layer of smokable material 44, at least one component of the smokable material of the first layer of smokable material 43 may be volatilised well in advance of components of the smokable material of the second layer of smokable material 44 on heating of the carrier 41.

In a variation to the article 40 shown in Figure 1, the smokable material of the second layer of smokable material 44 may comprise the particles of smokable material having the first mean particle size, and the smokable material of the first layer of smokable material 43 may comprise the particles of smokable material having the second mean particle size. The provision of these features may provide the compensatory effect described above, for example so that at least one component of the smokable material is volatilised in the first and second layers of smokable material 43, 44 substantially simultaneously on heating the carrier 41, or so as to reduce or avoid a potential delay in volatilisation of at least one component of the smokable material in the second layer of smokable material 44 on heating the carrier 41.

In some embodiments, the first and second layers of smokable material 43, 44 have different chemical compositions. Accordingly, depending on the chemical compositions employed, in some embodiments progressive volatilisation of at least one component of the smokable material on heating the carrier 41 is achievable substantially as discussed above. In other embodiments, simultaneous volatilisation of at least one component of the smokable material in the first and second layers of smokable material 43, 44 on heating the carrier 41 is achievable substantially as discussed above, or a potential delay in volatilisation of at least one component of the smokable material in the second layer of smokable material 44 on heating the carrier 41 is reduced or avoided on heating the carrier 41.

In some embodiments, the difference in chemical composition between the first and second layers of smokable material 43, 44 may comprise a difference in quantities by weight of an aerosol forming agent, such as glycerol, in each of the first and second layers 43, 44, as a percentage of a total weight of the smokable material of the respective first and second layers 43, 44. For example, in some embodiments, the smokable material of one of the first and second layers of smokable material 43, 44 may comprise an aerosol forming agent such as glycerol, and the smokable material of the other of the first and second layers of smokable material 43, 44 may be free, or substantially free, of the aerosol forming agent. For example, it may be the smokable material of the first

layer of smokable material 43 that comprises the aerosol forming agent. In other embodiments, both of the first and second layers of smokable material 43, 44 may comprise the aerosol forming agent, but one of the first and second layers of smokable material 43, 44 may comprise more of the aerosol forming agent than the other of the first and second layers of smokable material 43, 44, as measured by weight of the aerosol forming agent in each of the first and second layers 43, 44, as a percentage of a total weight of the smokable material of the respective first and second layers 43, 44.

In some embodiments, the difference in chemical composition between the first and second layers of smokable material 43, 44 may comprise a difference in quantities by weight of a smoke modifying substance, such as a flavourant, in each of the first and second layers 43, 44, as a percentage of a total weight of the smokable material of the respective first and second layers 43, 44. For example, in some embodiments, the smokable material of one of the first and second layers of smokable material 43, 44 may comprise a flavourant, and the smokable material of the other of the first and second layers of smokable material 44 may be free, or substantially free, of the flavourant. In some embodiments, one of the first and second layers of smokable material 43, 44 may comprise a first flavourant, and the other of the first and second layers of smokable material 43, 44 may comprise a second flavourant that is different to the first flavourant. By providing the first and second layers of smokable material 43, 44 with different quantities of smoke modifying agents or flavourants, in some embodiments a change in flavour of generated aerosol for user inhalation is achievable.

In some embodiments, the article comprises a pouch containing the smokable material, and the carrier forms at least a portion of a wall of the pouch. Referring to Figure 2 there is shown a schematic cross-sectional view of an example of such an article 50 according to an embodiment of the invention.

The article 50 comprises a pouch for use with apparatus for heating smokable material to volatilise at least one component of the smokable material. The pouch comprises a first wall 51 and a second wall 55, and the pouch contains smokable material 52 between the first wall 51 and the second wall 55. The first wall 51 functions

as a carrier, and in this embodiment the carrier 51 and the smokable material 52 correspond to the carrier 41 and smokable material 42 described above with reference to Figure 1. Thus, the smokable material 52 contained in the pouch comprises a first layer of smokable material 53 and a second layer of smokable material 54, and the first layer of smokable material 53 is located between the carrier 51 and the second layer of smokable material 54. In this embodiment, the second layer of smokable material 54 is located between the second wall 55 and the first layer of smokable material 53.

In other embodiments in which the article comprises a pouch containing smokable material and the carrier forms at least a portion of a wall of the pouch, the carrier may take any of the other forms discussed above, and the smokable material may take any of the other forms discussed above. As can be seen, in the embodiment shown in Figure 2, the first wall 51 and second wall 55 of the pouch form a closed container for the smokable material 52.

In some embodiments of the article, in which the article comprises a pouch containing smokable material and the carrier forms at least a portion of a wall of the pouch, the first wall 51 of the pouch may be made of a first material, and the second wall 55 of the pouch may be made of a second material that is a different material to the first material. In other embodiments, the first and second walls 51, 55 may be made of the same material, such as the second material. In some embodiments, the second material may be a porous material for permitting aerosol or volatilised material generated within the pouch to pass out of the pouch from within the pouch, and the first wall 51 may be made of a material that is less porous to the aerosol or volatilised material than the porous material. For example, the second material may comprise one or more materials selected from the group consisting of: fleece, viscose, non-woven material, non-woven fleece, woven material, knitted material, nylon, and polyester.

In some embodiments, the article is incorporated into a cartridge for use with apparatus for heating smokable material to volatilise at least one component of the smokable material. Referring to Figure 3 there is shown a schematic cross-sectional view of an example of such a cartridge 60 according to an embodiment of the invention.

The cartridge 60 comprises a housing 65 defining a chamber 66. A carrier 61 defines part of an exterior surface of the cartridge 60, and smokable material 62 is located within the chamber 66. The "exterior surface" may be a surface that envelops the rest of the cartridge 60, or that delineates the cartridge 60. In this embodiment the carrier 61 and the smokable material 62 correspond to the carrier 41 and smokable material 42 described above with reference to Figure 1. Thus, the smokable material 62 located within the chamber 66 comprises a first layer of smokable material 63 and a second layer of smokable material 64, and the first layer of smokable material 63 is located between the carrier 61 and the second layer of smokable material 64. In this embodiment, the second layer of smokable material 64 is located between the housing 65 and the first layer of smokable material 63.

In this embodiment, air flow inlets 68 extend through the housing 65 for admitting air into the chamber 66 from an exterior of the housing 65. In other embodiments, there may be only one air flow inlet 68 in place of the plurality of air flow inlets 68. In this embodiment, apertures 69 extend through the housing 65. Each of the apertures 69 is a volatilised material outlet 69 for permitting volatilised material generated within the chamber 66 by heating of the smokable material 62 to pass from the chamber 66 out of the housing 65. In other embodiments, there may be only one aperture 69 in place of the plurality of apertures 69.

In this embodiment, the exterior surface of the cartridge 60 comprises a cavity 67 for receiving a heater for heating the smokable material 62 in use, and the carrier 61 defines at least part of the cavity 67. That is, the exterior surface of the cartridge 60 comprises a portion that is recessed to provide the cavity 67. Accordingly, in this embodiment, the carrier 61 defines part of the exterior surface of the housing 65 of the cartridge 60, as outlined above. In this embodiment, the cavity 67 is a blind hole having a mouth 67a, first and second trunk sections 67b, 67c, and a closed end 67d. The first trunk section 67b connects the mouth 67a to the second trunk section 67c, and the second trunk section 67c connects the first trunk section 67b to the closed end 67d. In this embodiment, the second trunk section 67c is of constant, or substantially constant,

cross-sectional shape and size (for example, a width, a height, a diameter, a dimension, or an area) throughout its length between the first trunk section 67b and the closed end 67d. On the other hand, a cross-sectional size (for example, a width, a height, a diameter, a dimension, or an area) of the first trunk section 67b decreases with distance from the mouth 67a so as to have a tapered profile. The tapered profile helps a user to guide the heater into the cavity 67 in use. In some embodiments, the cavity 67 may instead be a through hole.

In other embodiments, the cavity 67 may have a different shape. For example, in some embodiments, the cross-sectional size of the cavity 67 decreases with distance from the mouth 67a over the full length of the cavity 67. Referring to Figures 4 and 5 there are shown schematic cross-sectional views of examples of such cartridges 70, 80 according to two respective embodiments of the invention. Like elements in Figure 3 and Figures 4 and 5 are denoted with like reference numerals, and discussion thereof is not included in the interests of conciseness. In brief, the cavity 67 of the cartridge 70 of Figure 4 is a wedge-shaped cavity, and the cavity 67 of the cartridge 80 of Figure 5 is a dome-shaped cavity. In the embodiments shown in Figures 4 and 5, the wedge-shaped and dome-shaped cavities 67 are symmetrical or rotationally-symmetrical. In other embodiments, they may instead be asymmetrical.

Referring to Figure 6 there is shown a schematic cross-sectional view of an example of a further cartridge 90 according to an embodiment of the invention. The cartridge 90 of Figure 6 is the same as the cartridge 70 of Figure 4, except that the cartridge 90 of Figure 6 includes two of the articles 50 of Figure 2 within the chamber 66 defined by the housing 65 and connected together by means of a connector. In the cartridge 90 of Figure 6, the first wall 51, i.e. the carrier 51, of each of the pouches defines at least part of the cavity 67. Accordingly, in this embodiment, each of the respective carriers 51, and thus each of the respective pouches, defines part of the exterior surface of the cartridge 90. In another embodiment that is a variant of the embodiment shown in Figure 6, the cartridge may comprise only one article 50 of Figure 2 within the chamber 66, so that only one carrier 51 of a pouch defines at least

part of the cavity 67. The rest of the cavity 67 would be defined by one or more further elements.

In other embodiments in which the article is incorporated into a cartridge, the carrier may take any of the other forms discussed above, and the smokable material may take any of the other forms discussed above.

Each of the articles and cartridges 40, 50, 60, 70, 80, 90 shown in Figures 1 to 6, and each of the other articles and cartridges described above, is usable with an apparatus (not shown) for heating smokable material to volatilise at least one component of the smokable material. In some embodiments, the apparatus is for heating the smokable material 42, 52, 62 of the article or cartridge 40, 50, 60, 70, 80, 90 to volatilise at least one component of the smokable material 42, 52, 62 without combusting, or burning, the smokable material.

In some respective embodiments, the apparatus comprises a heating device having a heater that is for contacting, or for coming into close proximity to, the carrier 41, 51, 61 of one of the respective articles or cartridges 40, 50, 60, 70, 80, 90 discussed above and shown in Figures 1 to 6. In some embodiments, the heater has a surface profile that matches, or closely matches, a surface profile of the carrier 41, 51, 61. This helps provide good conduction of heat from the heater to the smokable material 42, 52, 62 arranged on the carrier 41, 51, 61. In some embodiments, the heater has a profile for being inserted into the cavity 67 of one of the respective cartridges 60, 70, 80, 90 discussed above and shown in Figures 3 to 6.

In some embodiments, the apparatus comprises a controller for controlling heating of the heating device so as to cause heating of the smokable material 42, 52, 62 to volatilise the at least one component of the smokable material 42, 52, 62 without combusting the smokable material 42, 52, 62. In some embodiments, the controller is for controlling the supply of power from a power source to the heating device. In some embodiments, the controller is configured to ensure that the temperature of the heater remains within a temperature range of about 150 degrees Celsius to about 300 degrees

Celsius, or about 170 degrees Celsius to about 220 degrees Celsius. In some embodiments, within this temperature range, the smokable material 42, 52, 62 of the article or cartridge 40, 50, 60, 70, 80, 90 is heated sufficiently to volatilise at least one component of the smokable material 42, 52, 62 without combusting the smokable material 42, 52, 62. In other embodiments, the temperature range of heating may be other than this range. In some embodiments, following the volatilisation of the at least one component of the smokable material 42, 52, 62, an aerosol for inhalation by a user is formed. For example, a user drawing on an outlet of the apparatus may draw air through the apparatus, which cools the volatilised component(s) of the smokable material 42, 52, 62 so that they condense to form the aerosol.

In each of the above described embodiments, the smokable material 42, 52, 62 comprises tobacco. However, in respective variations to each of these embodiments, the smokable material 42, 52, 62 may consist of tobacco, may consist substantially entirely of tobacco, may comprise tobacco and smokable material other than tobacco, may comprise smokable material other than tobacco, or may be free of tobacco. In some embodiments, the smokable material 42, 52, 62 may include an aerosol forming agent, such as glycerol.

In each of the above described embodiments, the article or cartridge 40, 50, 60, 70, 80, 90 is a consumable article or cartridge. Once all, or substantially all, of the volatile component(s) of the smokable material 42, 52, 62 in the article or cartridge 40, 50, 60, 70, 80, 90 has/have been spent, the user may remove the article or cartridge 40, 50, 60, 70, 80, 90 from the apparatus and dispose of the article or cartridge 40, 50, 60, 70, 80, 90. The user may subsequently re-use the apparatus with another of the articles or cartridges 40, 50, 60, 70, 80, 90. However, in other respective embodiments, the article or cartridge 40, 50, 60, 70, 80, 90 may be non-consumable, and the combination of the apparatus and the article or cartridge 40, 50, 60, 70, 80, 90 may be disposed of together once the volatile component(s) of the smokable material 42, 52, 62 has/have been spent.

In some embodiments, the apparatus discussed above may be sold, supplied or otherwise provided separately from the article or cartridge 40, 50, 60, 70, 80, 90 with which the apparatus is usable. However, in other embodiments, the apparatus and one or more of the articles and/or cartridges 40, 50, 60, 70, 80, 90 may be provided together as a kit.

Referring to Figure 7, there is shown a partially cut-away perspective view of an example of an apparatus 1 for heating smokable material to volatilise at least one component of the smokable material. The apparatus 1 is particularly suitable for use with a cartridge 60 as described above with reference to Figure 3. The apparatus 1 has a body 10 which is generally tubular and elongate, has first and second opposite longitudinal ends 11, 12, and defines an interface for co-operating with the cartridge 60. In this embodiment, the interface comprises a recess 13 for receiving the cartridge 60. In other embodiments, the interface can take a different form, such as a shelf, a surface, or a projection, and optionally requires mechanical mating with the cartridge 60 in order to cooperate with the cartridge 60. The first longitudinal end 11 of the body 10 defines an opening 14 into the recess 13 at a first end of the recess 13. The opening 14 is shaped and sized so that the cartridge 60 is movable through the opening 14 to allow a user to insert the cartridge 60 into the recess 13 and/or to remove the cartridge 60 from the recess 13.

In this embodiment, the mouthpiece 30 is generally tubular and elongate and has first and second opposite longitudinal ends 31, 32. The mouthpiece 30 comprises an inlet 34 at the second longitudinal end 32 of the mouthpiece 30, an outlet 35 at the first longitudinal end 31 of the mouthpiece 30, and a channel 36 fluidly connecting the inlet 34 with the outlet 35. The second longitudinal end 32 of the mouthpiece 30 comprises a connector (not shown) that is releasably engageable with a connector (not shown) of the first longitudinal end 11 of the body 10, so as to connect the mouthpiece 30 to the body 10. In other embodiments, the mouthpiece 30 and the body 10 may be permanently connected, such as through a hinge or flexible member. When the apparatus 1 is in use, the first longitudinal end 31 of the mouthpiece 30 forms a first

longitudinal end of the apparatus 1, and the second longitudinal end 12 of the body 10 forms a second longitudinal end of the apparatus 1.

In this embodiment, the recess 13 and the opening 14 into the recess 13 are defined by the body 10 of the apparatus 1. In this embodiment, the heating device 20 comprises a heater 21 extending along a longitudinal axis of the recess 13. The heater 21 has a rectangular cross-sectional shape in a plane perpendicular to the axis. However, in other embodiments, the cross-sectional shape of the heater 21 may be other than rectangular, such as square, cylindrical, elliptical or polygonal. The heater 21 is suitable for insertion into the cavity 67 of the cartridge 60. The heater 21 has a length in the direction of the axis, a width perpendicular to the length, and a height perpendicular to the width and the length. The width and height of the heater 21 are slightly less than the width and height, respectively, of the cavity 67 of the cartridge 60, to facilitate insertion of the heater 21 into the cavity 67. The heating device 20 comprises a retainer 18 that is fixed to the body 10 so as to retain the heater 21 in position relative to the body 10. In this embodiment, the heater 21 extends from a second end of the recess 13 to the first end of the recess 13. That is, the heater 21 extends along the full axial length of the recess 13. However, in other embodiments, the heater 21 may extend along only part of the length of the recess 13 from the second end of the recess 13. The apparatus 1 shown also has electrical components such as an electrical power source 15 (such as a rechargeable or non-rechargeable battery), a controller 16 and an actuator 17 for enabling user activation of the heater 21.

Referring to Figure 8, there is shown an example of an apparatus 2 suitable for use with a cartridge 70, 90 as described above with reference to Figures 4 and 6 respectively for heating smokable material to volatilise at least one component of the smokable material. The apparatus 2 may be operated in much the same way as the apparatus 1 of Figure 7. Like elements in Figures 7 and 8 are indicated with like reference numerals. In the example shown the heating device 20 has a wedge-shape heater 21 which projects into the recess 13. The wedge-shape heater 21 can be inserted into the cavity 67 of the cartridges 70, 90 to heat the carrier 61, 51. In an embodiment,

the wedge-shape heater 21 fits snugly in the cavity 67 for efficient heat transfer to the carrier 61, 51 and the smokable material 52, 62.

In this embodiment, the heater 21 is a folded heater 21 comprising a first heater portion 21a and a second heater portion 21b. The heater 21 has a fold 21c therein, and the first heater portion 21a is connected to the second heater portion 21b at the fold 21c. The fold 21c forms a distal end of the heater 21, which distal end is distal from the retainer 18. The first heater portion 21a defines an upper surface of the heater 21, and the second heater portion 21b defines a lower surface of the heater 21. In this embodiment, the first and second heater portions 21a, 21b lie substantially in respective first and second planes, and the first and second planes meet at an acute angle.

Referring to Figure 9, an example of an apparatus 3 suitable for use with a cartridge 80 as described above with reference to Figure 5 for heating smokable material to volatilise at least one component of the smokable material is shown. The apparatus 3 may be operated in much the same way as the apparatus 1, 2 of Figures 7 and 8. Like elements in Figures 7, 8 and 9 are indicated with like reference numerals. The heater 21 is for insertion into the cavity 67 of the cartridge 80 shown in Figure 5. The heater 21 has an external dome-shaped surface profile that matches, or closely matches, the dome-shaped surface profile of the cavity 67 of the cartridge 80. Therefore, when the heater 21 is located in the cavity 67, the heater 21 is a close fit with the carrier 61. This helps provide good conduction of heat from the heater 21 to the carrier 61 and the smokable material 62 thereon. In this embodiment, the external dome-shaped surface profile of the heater 21 comprises a surface that is a combination of curved and polygonal portions. However, in other embodiments, the external dome-shaped surface profile may be defined by a surface of the heater 21 that is only polygonal or only curved.

In order to address various issues and advance the art, the entirety of this disclosure shows by way of illustration and example various embodiments in which the claimed invention may be practised and which provide for a superior article or a superior cartridge for use with apparatus for heating smokable material to volatilise at

least one component of the smokable material. The advantages and features of the disclosure are of a representative sample of embodiments only, and are not exhaustive and/or exclusive. They are presented only to assist in understanding and teach the claimed and otherwise disclosed features. It is to be understood that advantages, embodiments, examples, functions, features, structures and/or other aspects of the disclosure are not to be considered limitations on the disclosure as defined by the claims or limitations on equivalents to the claims, and that other embodiments may be utilised and modifications may be made without departing from the scope and/or spirit of the disclosure. Various embodiments may suitably comprise, consist of, or consist in essence of, various combinations of the disclosed elements, components, features, parts, steps, means, etc. The disclosure may include other inventions not presently claimed, but which may be claimed in future.

# CLAIMS

1. An article for use with apparatus for heating smokable material to volatilise at least one component of the smokable material, the article comprising:

a carrier; and

smokable material arranged on the carrier;

wherein the smokable material comprises a first layer of smokable material and a second layer of smokable material, wherein the first layer of smokable material is located between the carrier and the second layer of smokable material; and

wherein the smokable material of the first layer of smokable material has a form or chemical composition that differs from the form or chemical composition, respectively, of the smokable material of the second layer of smokable material.

2. An article according to claim 1, wherein the smokable material of one of the first and second layers of smokable material has a form or chemical composition so as to be heatable more quickly than the smokable material of the other of the first and second layers of smokable material.

3. An article according to claim 2, wherein the smokable material of the first layer of smokable material has a form or chemical composition so as to be heatable more quickly than the smokable material of the second layer of smokable material.

4. An article according to any of claims 1 to 3, wherein the smokable material of one of the first and second layers of smokable material comprises particles of the smokable material having a first mean particle size, and the smokable material of the other of the first and second layers of smokable material comprises particles of the smokable material having a second mean particle size that is greater than the first mean particle size.

5. An article according to claim 4, wherein the smokable material of the first layer of smokable material comprises the particles of smokable material having the first mean

particle size, and the smokable material of the second layer of smokable material comprises the particles of smokable material having the second mean particle size.

6. An article according to any of claims 1 to 5, wherein the smokable material of one of the first and second layers of smokable material comprises an aerosol forming agent, and the smokable material of the other of the first and second layers of smokable material is free or substantially free of the aerosol forming agent.

7. An article according to claim 6, wherein the smokable material of the first layer of smokable material comprises the aerosol forming agent, and the smokable material of the second layer of smokable material is free or substantially free of the aerosol forming agent.

8. An article according to any of claims 1 to 7, wherein the first layer of the smokable material is bonded to the carrier.

9. An article according to any of claims 1 to 8, wherein the carrier is for conducting heat through the carrier towards the smokable material.

10. An article according to any of claims 1 to 9, wherein the article comprises a pouch containing the smokable material, and wherein the carrier forms at least a portion of a wall of the pouch.

11. A cartridge for use with apparatus for heating smokable material to volatilise at least one component of the smokable material, the cartridge comprising an article according to any of claims 1 to 10.

12. A cartridge according to claim 11, comprising a housing defining a chamber, wherein the carrier defines part of an exterior surface of the cartridge, and wherein the smokable material is located within the chamber.

13. A cartridge according to claim 11 or claim 12, wherein the exterior surface of the cartridge comprises a cavity for receiving a heater for heating the smokable material, and wherein the carrier defines at least part of the cavity.

14. A cartridge according to claim 13, wherein the cavity has a mouth and a longitudinal axis, and wherein a cross-sectional size of the cavity perpendicular to the axis decreases with distance from the mouth over at least a majority of a length of the cavity.

15. A cartridge according to claim 13 or claim 14, wherein the cavity is a wedge-shaped cavity or a dome-shaped cavity.

16. A kit comprising an article according to any of claims 1 to 10 or a cartridge according to any one of claims 11 to 15, and apparatus for heating the smokable material to volatilise at least one component of the smokable material.

17. A kit according to claim 16, wherein the apparatus is for heating the smokable material to volatilise the at least one component of the smokable material without combusting the smokable material.

18. A kit according to claim 16 or claim 17, wherein the apparatus comprises a heating device for heating the smokable material, and a controller for controlling heating of the heating device so as to cause heating of the smokable material to volatilise the at least one component of the smokable material without combusting the smokable material.

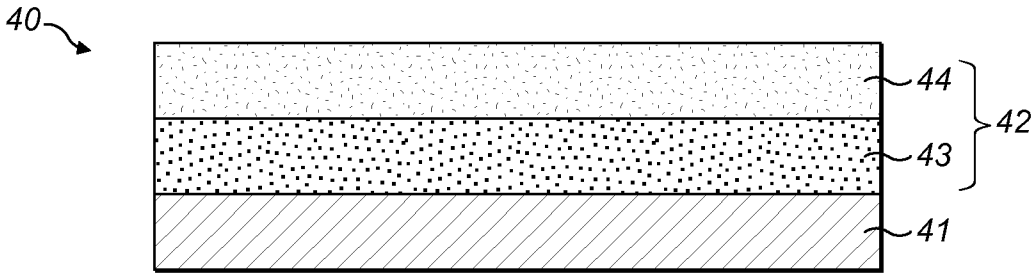



FIG. 1

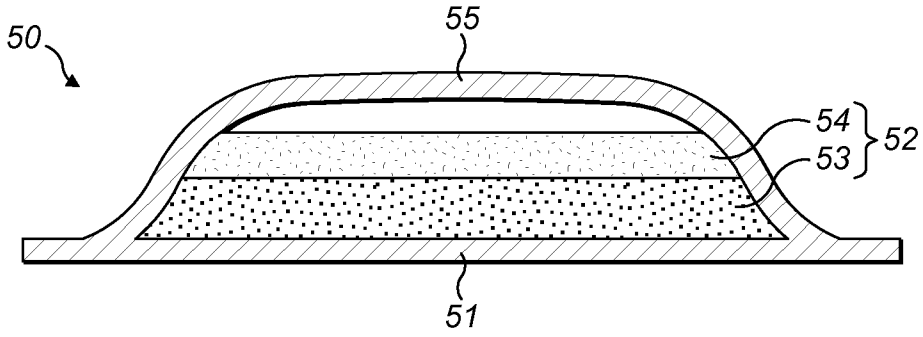



FIG. 2

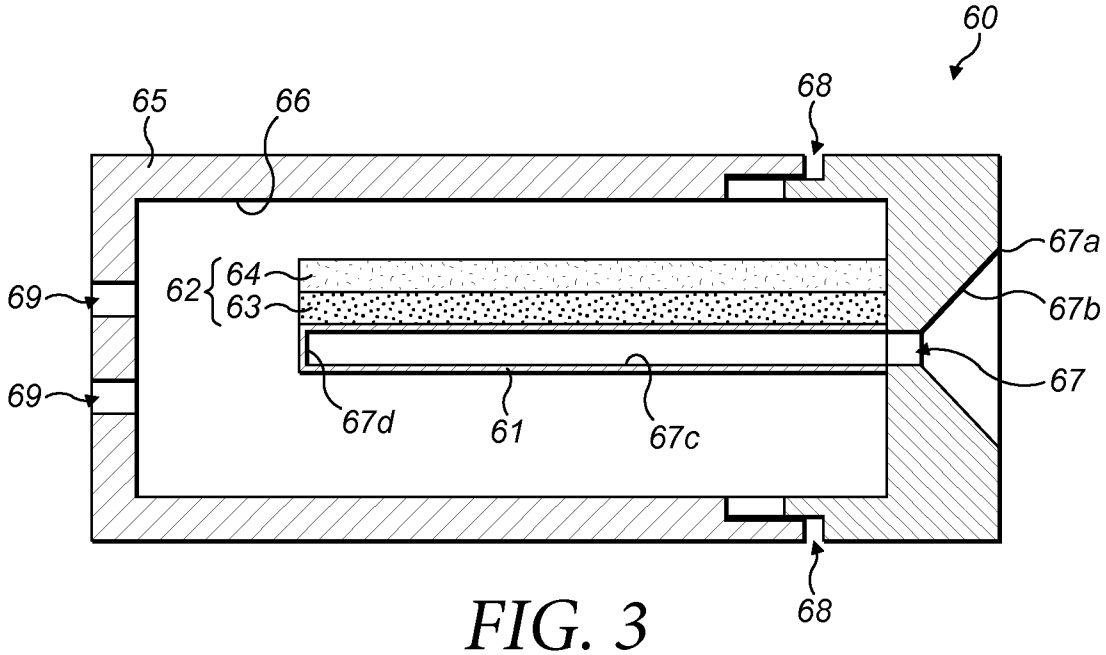

60
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66
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67a
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62
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63
67b
69
67
67d
61
67c
68

FIG. 3

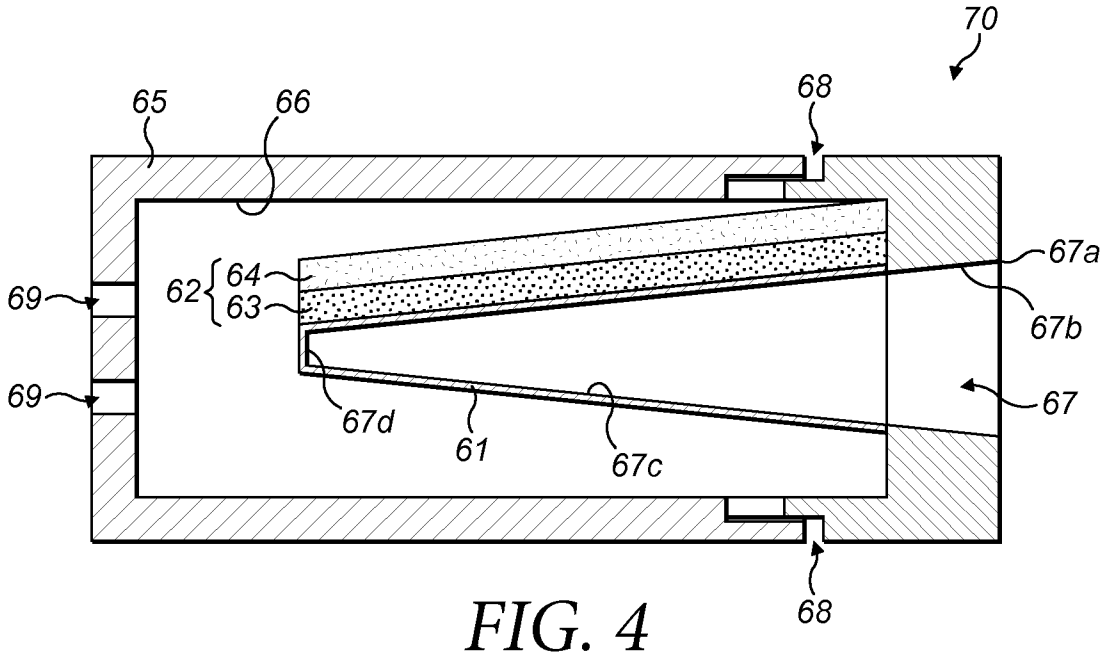

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67a
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67b
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67d
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67c
68

FIG. 4

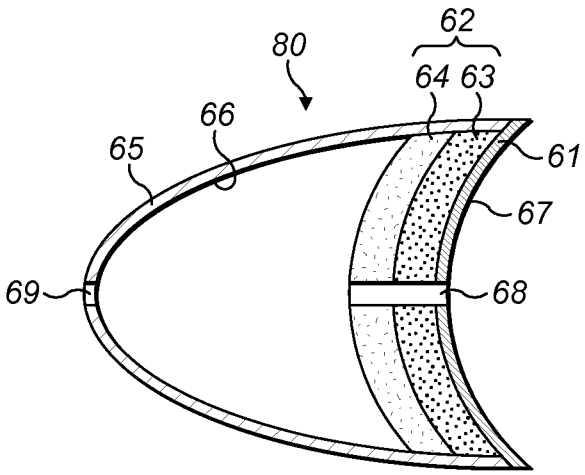

62
80
64 63
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68

FIG. 5

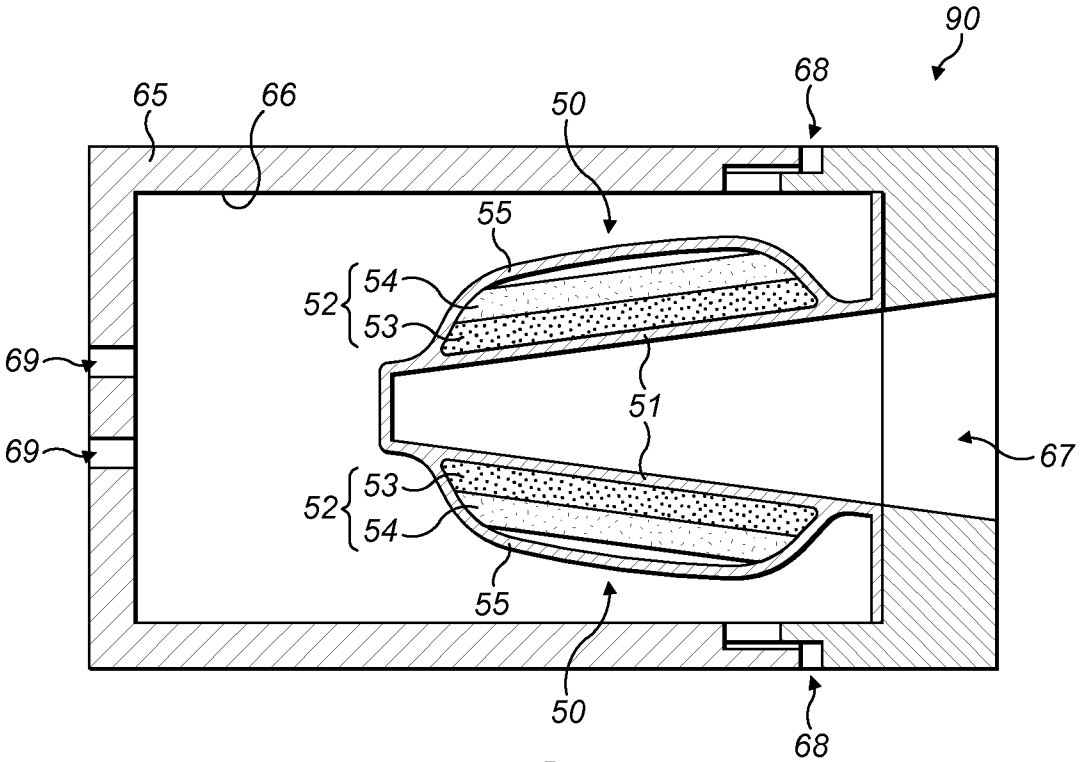

90
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FIG. 6

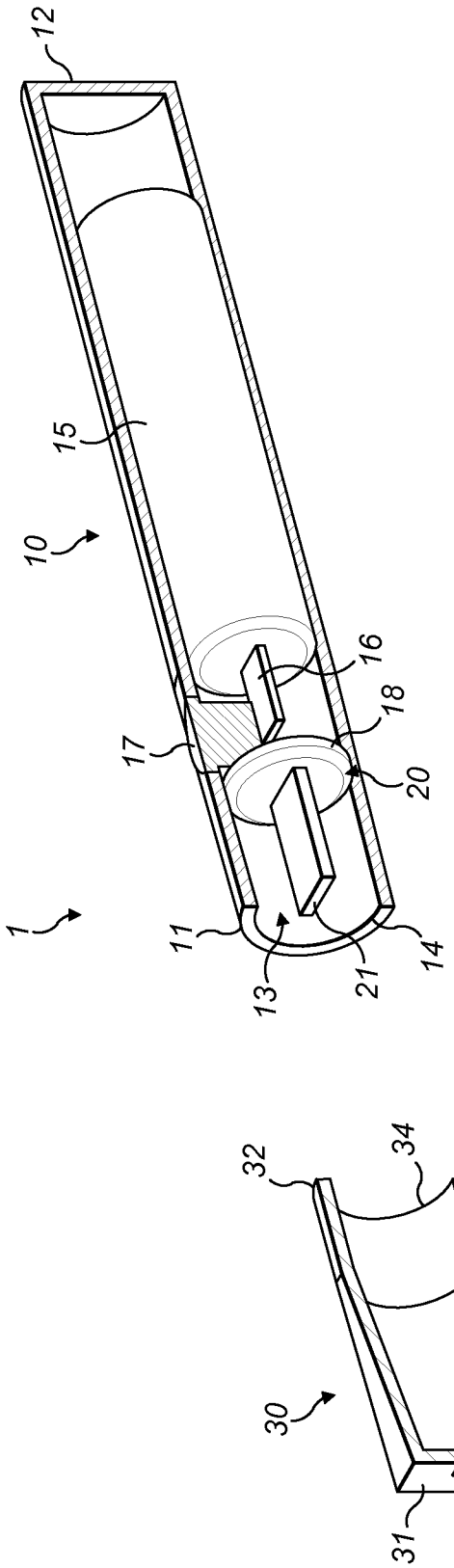



FIG. 7

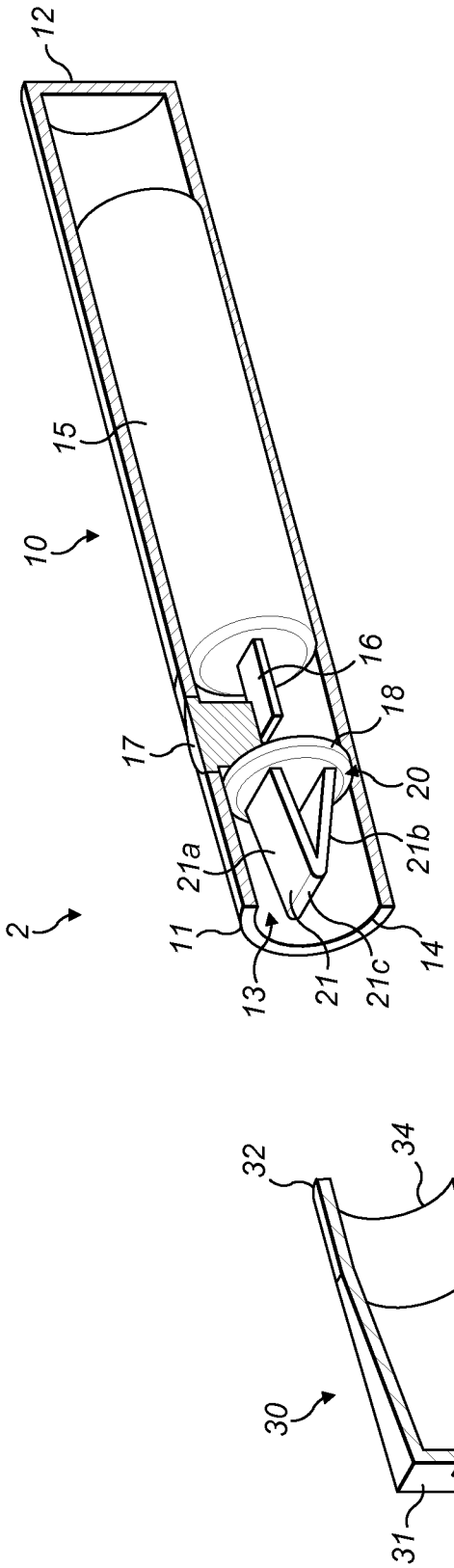



FIG. 8

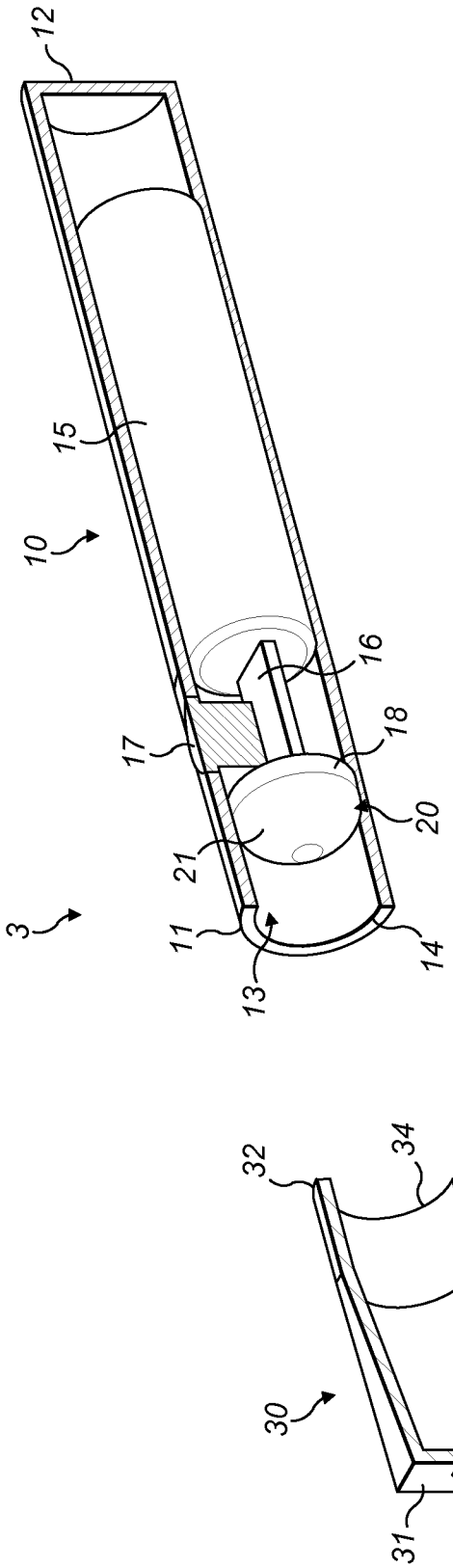



FIG. 9