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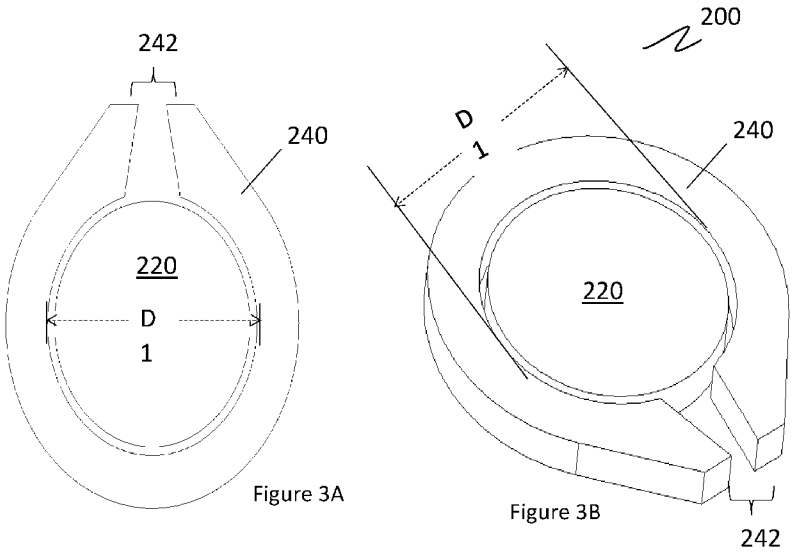

Figure 3

(57) Abstract: The disclosure relates to a unit for use with a device, the unit comprising at least one of a tobacco material and a non-tobacco material included in at least one layer, wherein the unit has a planar shape of one of the following: arcuate shape, polygonal shape, or combination thereof.

WO 2020/142003 A1

[Continued on next page]

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UNIT, DEVICE, AND METHOD FOR HEATING A UNIT

TECHNICAL FIELD

[0001] The present disclosure relates to a unit, a device and a method for heating the unit.

BACKGROUND

[0002] The following discussion of the background is intended to facilitate understanding of the present disclosure. However, it should be appreciated that the discussion is not an acknowledgment or admission that any of the material referred to was published, known or a part of the common general knowledge in any jurisdiction as at the priority date of the application.

[0003] Some heat-not-burn devices have been proposed. A typical heat-not-burn device comprises a heater, a unit including tobacco material and a filter. In the case where the unit is replaced with a new device upon consumption of the tobacco material, the filter included in the replaced device may be wastefully disposed. There exists a need to develop a device that ameliorates the afore-mentioned drawbacks of existing tobacco unit at least in part.

SUMMARY

[0004] According to one aspect of the disclosure, there is provided a unit for use with a device, the unit comprising at least one of a tobacco material and a non-tobacco material included in at least one layer, wherein the unit has a planar shape of one of the following: arcuate shape, polygonal shape, or combination thereof.

[0005] In some embodiments, the arcuate shape is circular, semi-circular, elliptical, or semi-elliptical shape, and wherein the polygonal shape is a triangular, rectangular, pentagonal, hexagonal, octagonal, heptagonal, octagonal, nonagonal, or decagonal shape.

[0006] In some embodiments, the unit having the planar shape has a prism or cylindrical shape.

[0007] In some embodiments, the unit includes at least one hole and hollow portion.

[0008] In some embodiments, the unit according to any one of the preceding claims, wherein the unit is shaped and dimensioned to be inserted to or contained in the device, and wherein the device is used for heating the unit.

[0009] In some embodiments, the at least one layer comprises a plurality of layers, and wherein the at least one of a tobacco material and a non-tobacco material is included in each of the plurality of layers.

[0010] In some embodiments, a device for heating a unit comprises a first heater including at least one first heating element arranged to heat the unit, the unit including at least one of a tobacco material and a non-tobacco material and a casing for containing the first heater and at least one filter, and that defines therein a passageway including at least one filter slot for receiving the at least one filter and a first area, wherein the casing comprises a first opening for insertion of the unit into the first area along a first direction, and wherein the at least one filter slot is disposed along the first direction in relation to the first area.

[0011] In some embodiments, the at least one first heating element comprises a plurality of first heating elements, and wherein two or more first heating elements of the plurality of first heating elements are arranged to heat the unit at different temperatures.

[0012] In some embodiments, the device further comprises a first controller arranged to control the plurality of first heating elements.

[0013] In some embodiments, the device further comprises a second heater including at least one second heating element arranged to heat the unit, wherein the casing includes a first substrate and a second substrate, and wherein the first substrate is arranged to contain therein the first heater and is rotatably attached to the second

substrate, and wherein the second substrate is arranged to contain therein the second heater.

[0014] In some embodiments, the device comprises a second controller arranged to control the at least one second heating element.

[0015] In some embodiments, in the case where the first substrate and/or the second substrate are rotated to get closer one another, the first heater is in contact with the second heater or faces the second heater at a first distance apart.

[0016] In some embodiments, the casing is arranged to be a tubular shape, and wherein the casing comprises at one end thereof the first opening and at the other end thereof a second opening, and wherein the second opening is disposed along the first direction in relation to the at least one filter slot.

[0017] In some embodiments, the at least one heating element includes a first element and a second element, and wherein the second element is arranged to protrude along an opposite direction of the first direction.

[0018] In some embodiments, the non-tobacco material is obtained from one or more of the following plant parts: - leaf, bark, trunk, fruit, seed, stem, flower, pollen, branch, root, sap, pulp, resin bagasse, calyx of the respective flora.

[0019] In some embodiments, a method of manufacturing a unit for use with a device, the method comprising the step of: preparing at least one of a tobacco material and a non-tobacco material included in at least one layer, wherein the unit has a planar shape of one of the following: arcuate shape, polygonal shape, or combination thereof.

[0020] Other aspects of the disclosure will be apparent to those of ordinary skill in the art upon review of the following description of specific embodiments of the disclosure in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] Various embodiments are described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 illustrates a unit 100 according to some embodiments of the present disclosure.

Figure 2 illustrates a unit 100 according to some embodiments of the present disclosure.

Figure 3 illustrates another embodiment of a unit 200 with a tobacco part and/or a non-tobacco part.

Figure 4 illustrates a device 300 according to some embodiments of the present disclosure.

Figure 5 illustrates a device 300 according to some embodiments of the present disclosure.

Figure 6 illustrates a part of a device 300 according to some embodiments of the present disclosure.

Figure 7 illustrates a device 600 and a device 650 according to some embodiments of the present disclosure.

Figure 8 illustrates a device 700 according to some embodiments of the present disclosure.

Figure 9 illustrates a device 800 according to some embodiments of the present disclosure.

Figures 10A and 10B illustrates the device 300 for heating a unit 200 in two possible use cases.

Figures 11A to 11D illustrate another device 1100 for heating a unit 100 or 200.

Figures 12A to 12E illustrate some embodiments for positioning and heating a unit 100 or 200.

Figure 13A and 13B are cross-sectional views of grooves or air tunnels formed in a heating device for heating unit 100/ 200.

[0022] Other arrangements are possible and it is appreciable that the accompanying drawings are not to be understood as superseding the generality of the preceding description of the disclosure.

DETAILED DESCRIPTION

[0023] Particular embodiments are described with reference to the accompany drawings. The terminology used herein is for the purpose of describing particular

embodiments only and is not intended to limit the scope of the present disclosure. Other definitions for selected terms used herein may be found within the detailed description of the disclosure and apply throughout the description. Additionally, unless defined otherwise, all technical and scientific terms used herein have the same meanings as commonly understood by one ordinary skilled in the art to which the present disclosure belongs. Where possible, the same reference numerals are used throughout the figures for clarity and consistency.

[0024] Throughout the specification, unless the context requires otherwise, the word "comprise" or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

[0025] Throughout the specification, unless the context requires otherwise, the word "include" or variations such as "includes" or "including", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

[0026] Throughout the specification, unless the context requires otherwise, the word "have" or variations such as "has" or "having", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

[0027] Throughout the specification, unless the context requires otherwise, the term "tobacco" will be understood to include intermediate and/or final products prepared from a part of the tobacco plant, such as leaves, through the process of drying or curing, and further optional processes of aging, fermenting, flavouring etc., and to include any other products derived from any forms of tobacco leaves such as ground and reconstituted tobacco material.

[0028] Throughout the specification, the term "fiber" will be understood to depict a slender and substantially elongated shape.

[0029] Throughout the specification, the term "sheet" "layer" will be understood to depict a planar surface with a substantially higher length and/or width compared to thickness.

[0030] Throughout the specification, the term 'wrapped' or 'unwrapped' refers to a covering/non-covering of a unit. The cover is for purpose of maintaining a structural integrity of the unit 100.

Unit 100

[0031] Figure 1 (figure 1A, figure 1B, figure 1C, and figure 1D) illustrates a unit 100 according to some embodiments of the present disclosure. As shown in figure 1A, the unit 100 may comprise a material 101 (e.g. a tobacco material or a non-tobacco material) wrapped with a coating means 102. The coating means 102 may be at least one sheet of paper. Alternatively, as shown in figure 1B, the unit 100 may comprise the material 101 substantially unwrapped or at least partially unwrapped. The material 101 may be formed with a resin, a powder, a tube or combinations thereof. The unit 100 may include at least one of nicotine, propylene glycol (PG), and vegetable glycol (VG). In some embodiments, the unit 100 may be shaped and dimensioned as a coin having a diameter of between 10 millimeters (mm) to 50 mm, the coin having a substantially circular surface and planar in shape.

[0032] The unit 100 may be casted, moulded, or shaped, formed by rolling, pressing, stamping, formed by injection or extruding, reconstituting or combinations of one or more of the above, and any other process. The form of the material 101 may be one of the following: cutrag, compacted into shape, powder, dust, flakes, pellet, granules (figure 1C), tablet, pill, paper, block, porous block, sheet, net, fibers, fibers woven into sheet, slices, ribbons or combinations thereof. The unit 100 may be designed for products made from loose tobacco/flavored non-tobacco and rolling paper (such as, but not limited to, roll your own (RYO) products) or other heat not burn devices. The unit 100 may be configured in the form of a capsule as shown in figure 1D.

[0033] As shown in figure 1D, a material 151 (e.g. a tobacco material or a non-tobacco material) may be covered by a coating means 152 and the coating means 152 may be an easy breakable form. Application of tactile pressure to the coating means 152 may cause deformation of the coating means 152. In particular, application of the tactile pressure with a determined strength to the coating means 152 may rupture the coating means 152, thus exposing at least part of the material 151 to outside of the coating means 152. The exposure of the material 151 to outside of the coating means 152 may contribute to generating aerosol or vapor with less heating power as compared with the material 151 that is covered by the coating means 152.

[0034] It is to be appreciated that the application of tactile pressure to the material 151 may be a squeezing action applied to two opposing ends or sides of the material 151 before use of a device 300 (figure 4). The application of the squeezing action may be via fingers of a user. It is to be appreciated that the number of the capsule(s) within the unit 100 is not limited to one shown in figure 1D and may be two or more than two.

[0035] The length of the unit 100 may be between about 5.0 millimeters (mm) and about 50.0 mm. The width of the unit 100 may be between about 5.0 and about 50.0 mm. The thickness of the unit 100 may be between about 0.10 mm and about 5.00 mm. It is to be appreciated that shape of the unit 100 is not limited to the shape as in figures 1A, 1B, 1C and 1D and may be one of plurality of shapes of unit 100 shown in figure 2.

[0036] Figure 2 illustrates a unit 100 according to some embodiments of the present disclosure. The possible units 100 as shown in Figure 2 are unwrapped, i.e. the units 100 do not require metallic foils (such as copper, aluminum or silver foils) to form a covering for maintaining the structural integrity of the unit 100. The unit 100 may have a peripheral shape of one of the following: arcuate, polygonal or any other regular or irregular shapes. The peripheral shape(s) may be planar, i.e. having a dimension, such as thickness, much smaller than other dimensions, such as length and width. The arcuate shape may include, but is not limited to, circular, semi-circular, elliptical, semi-elliptical shapes. The polygonal shape may include triangular,

rectangular, pentagonal, hexagonal, octagonal, heptagonal, octagonal, nonagonal, decagonal shape. In general, the polygonal shape may include any n-sided polygon (other than two). The unit 100 may include at least one hole (figure 2) formed therein and at least one hollow portion (not shown). The unit 100 having the planar shape may include prism, cylindrical, and other shapes. The structure of the unit 100 may include at least one layer (i.e. one layer, two-layer, multi-layer structure). In the case where the unit 100 includes a multi-layer structure, each layer structure of the multi-layer structure may be a layer including tobacco material and/or non-tobacco material. Arranging material(s) in a layered structure may contribute to optimizing the heating profile associated with each layer of the unit 100. Each layer of the unit 100 may also be formed from a different material, hence providing an assortment of flavors or taste profile to a consumer. The unit 100 may include aromatic or natural materials. At least one of a tobacco material and a non-tobacco material may be included in each of the at least one layer.

[0037] In some embodiments, in the case where the unit 100 comprises non-tobacco material, the unit 100 may be made from natural and aroma materials such as oak, maple, Pandanus amaryllifolius or screwpine, Daun Asam or tamarind, Roselle, sugarcane, lotus, Yucca, bamboo, reed, nypa fruticans, canna, mesquite, hickory, alder, anise or aniseed, Tetrapanax papyrifer or rice-paper plant or, Broussonetia papyrifera or paper mulberry, and any other plants, grasses, or flora; vegetables and fruits such as lemon, banana, grape, grapefruit, melon, pineapple, pomegranate, cucumber, durian, orange, cherry, apple, pear, mango, apricot, peach, any edible berry, fig, pumpkin, and nectarine; edible mushroom; lichen; coconut; coir; corn; corn husk; rice; glutinous rice; hazelnut; walnut; almond; peanut; pecan; any derivatives from the above natural resources. Pandanus amaryllifolius or screwpine is also referred to as Rampe. It is to be appreciated that the natural materials may be obtained from other suitable natural resources.

[0038] In some embodiments, in the case where the unit 100 comprises non-tobacco material, the unit 100 may comprise one or more natural flavours derived or extracted from any suitable herbs, spices, any fragrant plants, and any aromatic food substances present in the natural material. The natural flavours may be derived from

one or more of the following: vanilla, chamomile, sugarcane bagasse, cinnamon, mint, clove, Zanthoxylum, Wasabi, Piper betel, lilac flower, anise or aniseed, abaca, hemp, cardamom, doringin or tarap tree leaf, tea, Rampe or Pandanus amaryllifolius or screwpine, coffee bean, cacao bean, butter, honey, ginger. For example, extracts distilled from or otherwise extracted from the leaves or flowers of screwpine plants may be used to add a sweet aroma to filter elements. The extract obtained from the flowers of screwpine plants is also known as Kewra.

[0039] The natural materials or aroma materials may comprise materials obtained from one or more herbs, spices, flowers or flowering plants including, but not limited to, Aconitum, African Daisy, Agapanthus, Alchemilla, Allium roseum, Albizia, Alstroemeria, Alyssum, Amaranthus, Amaryllis, Anemone, Angelonia, Anise or Aniseed, Anthurium, Aquilegia, Argeratum, Aster, Astilbe, Astrantia, Aubretia, Azalea, Baby's Breath, Bachelor's Button, Balloon Flower, Bee Balm Flower, Begonia, Bellflower, Bergenia, Black-Eyed Susan, Blanket Flower, Blazing Star, Bleeding Heart, Blue Star Flower, Bluebell, Blue-Eyed Grass, Bouvardia, Buddleja, Bush Morning Glory, Buttercup, Calendula officinalis, California Poppy, Calla Lily, Candytuft, Canna Lily, Cape Primrose, Cardinal Flower, Carnation, Celosia, Chrysanthemum, Clarkia, Clematis, Clove, Clover, Cockscomb, Columbine, Coneflower, Coral Bells, Coreopsis, Cosmos, Cotoneaster, Cranesbill Geranium, Creeping Phlox, Crocosmia, Crocus, Crown Imperial, Cuckoo Flower, Cyclamen, Daffodil, Dahlia, Daisy, Daphne, Day Lily, Delphinium, Desert Rose, Dianella, Dianthus, Diascia, Dichondra, Dietes, Dutch Iris, Echium, English Bluebell, Erica, Erigeron, Eustoma, Evening Primrose, Everlasting Daisy, Flannel Flower, Flax Flower or Linseed, Floss Flower, Forget Me Not, Forsythia, Foxglove, Frangipani or Plumeria, Freesia, French Marigold, Fuschia, Gaillardia or Blanket Flower, Gardenia, Gaura, Geranium, Gerbera, Giant Bellflower, Gladiolus, Goldenrod, Grape Hyacinth, Heartsease, Heather, Hebe or Showy Speedwell, Helenium, Heliotrope, Hellebore, Hibiscus, Hollyhock, Honesty, Honeysuckle, Hosta, Hyacinth, Hydrangea, Hypericum, Ice Plant, Iceland Poppy, Ilex, Impatiens, Iris, Ixia, Ixora, Jaborosa, Jacob's Ladder, Jasmine, Jonquil, Kaffir Lily, Kalmia, Kangaroo Paw, Knautia macedonica, Kniphofia, Kolkwitzia, Lady's Slipper, Lantana, Lavender, Lechenaultia, Lilac, Lily of the Valley, Lily, Linaria, Lisianthus, Lobelia, Lotus, Love in the Mist,

Lunaria, Lupin, Magnolia, Mallow, Maltese Cross, Mandevilla, Marguerite Daisy, Marigold, Matthiola, Mayflower, Meconopsis, Mexican Fireplant, Milkweed, Mimosa, Mina lobata, Monk's Hood, Moonflower, Morning Glory, Muscari, Narcissus, Nasturtiums, Nemesia, Nemophila, Nepeta, Nerine, Nierembergia, Nigella, Nolana, Orchid, Oriental Lily, Oriental Poppy, Ornamental Onion, Osteospermum, Osmanthus, Ox Eye Daisy, Oyster Plant, Painted Daisy, Pansy or Violet Tricolor, Passion Flower, Peace Lily, Pelargonium, Penstemon, Peony, Persian Buttercup, Peruvian Lily, Petunia, Phlox, Pincushion Flower, Pink Lady's Slipper, Plume Celosia, Pointsettia, Polyanthus, Poppy Anemone, Portulaca grandiflora, Pot Marigold, Powder Puff, Primula, Purple Coneflower, Quaker Ladies, Queen Anne's Lace, Queen of the Meadow, Queen's Cup, Quince, Rain Lily, Ranunculus, Rock Rose, Redbud, Rondeletia, Rose of Sharon or shrub althea, Rose, Rhododendron, Rudbeckia, Salvia splendens, Saponaria, Scabiosa, Scaevola, Scented Geranium, Scilla, Sedum, Shasta Daisy, Silene, Snapdragon, Snowdrop, Snowflake, Speedwell, Starflower, Statice, Strawflower, Sun Drop, Sunflower, Sweet Pea, Syringa, Tea Rose or hybrid tea rose, Tiger Flower, Tiger Lily, Tithonia, Trachelium, Trillium, Triplet Lily, Tritonia crocata, Trollius, Tropaeolum, Trumpet Vine or Hummingbird Vine, Tuberose, Fever Root, Snapdragon Root, Tulip, Urn Plant, Ursinia, Uva Ursi, Verbena, Veronica incana, Viburnum, Vinca Minor, Viola wittrockiana, Viola, Violet, Virginia Creeper, Wallflower or Erysimum, Wandflower, Water Lily, Watsonia, Wax Plant or porcelainflower, Wedelia, Weigela, Whirling Butterflies, Wild Rose or Rosa acicularis, Wild Violet, Windflower, Winter Aconite, Winter Jasmine, Winterberry, Wishbone Flower, Wisteria, Woolly Violet, Xerophyllum, Xylobium, Xylosma, Xyris difformis, Yarrow, Yellow Archangel, Yellow Bell, Yellow-Eyed Grass, Yellowhorn, Zenobia, Zephyranthes, Zinnia.

[0040] The natural materials may be obtained from one or more of the following plant parts: - leaf, bark, trunk, fruit, seed, stem, flower, pollen, branch, root, sap, pulp, resin bagasse, calyx of the respective flora.

[0041] The natural materials or aroma materials may undergo a preparatory treatment such as drying, steaming, curing, expanding, flattening, pre-cutting, heating,

and carding. The pre-treated natural materials may then undergo further processes to be formed directly into the unit.

[0042] In some embodiments, flavour or aroma elements may add and enhance natural flavours of the aerosol or vapor, and may include natural materials from plant parts and flavors from natural materials such as mint, etc. vanilla, chamomile, sugarcane bagasse, cinnamon, mint, clove, Zanthoxylum, Wasabi, Piper betel, lilac flower, abaca, hemp, cardamom, doringin or tarap tree leaf, tea, Rampe or Pandanus amaryllifolius or screwpine, coffee bean, cacao bean, butter, honey, ginger. For example, extracts distilled from or otherwise extracted from the leaves or flowers of screwpine plants may be used to add a sweet aroma to filter elements. The extract obtained from the flowers of screwpine plants is also known as Kewra.

[0043] Figure 3 illustrates one possible configuration of a unit 200 comprising a first part 220 and a second part 240. The first part 220 may be formed partially or wholly of a tobacco material, which is unwrapped, and the second part 240 may be formed from one or more non-tobacco material. Figure 3A shows a top view of the unit 200 and Figure 3B shows the perspective side view. The first tobacco part 220 may be any of the unwrapped units 100 as shown in Figure 2, and for illustration purpose is depicted as a circular coin-like shape. The second non-tobacco part 240 may have an incomplete ring like shape/structure having an opening 242 for any heated tobacco vapour from the first tobacco part 220 to be directed out therefrom. The second non-tobacco part 240 is shaped and dimensioned to enclose or encircle the first tobacco part 220. The first tobacco part 220 may be manufactured separately from the second non-tobacco part 240. The first tobacco part 220 may be formed from tobacco material having a certain level of moisture to maintain the structural integrity of the first tobacco part 220. The second non-tobacco part 240 may corresponding include materials which can absorb moisture from the first tobacco part 220 (when heated).

[0044] In use, the first tobacco part 220 and the second non-tobacco part 240 may be placed separately in a heating device, such as heating device 300. When positioned in a heating device for usage, the first tobacco part 220 may be substantially enclosed

by the second non-tobacco part 240. The second non-tobacco part 240 has an inner diameter D1 bigger than the diameter of the first tobacco part 220 such as to allow a gap to be formed between the circumference of the inner ring (as defined by the inner diameter D1) of the second non-tobacco part 240 and the circumference of the first tobacco part 220. In the embodiment shown in Figure 3, the second non-tobacco part 240 may be an absorbent filter for absorbing moisture and filtering tobacco vapor produced by the first tobacco part 220 (when heated). The absorbent filter may be formed from cellulose products which are derived from plant, such as paper, cellulose acetate tow, saw dust, cotton, polymer fibres – eg polyurethane, polyethylene, and cross-linked polymers.

[0045] The gap facilitates the passage of air around the circumference defined by the gap. The air may be suitably sucked via a suction mechanism.

[0046] It is appreciable that in some embodiments, the second non-tobacco part 240 may be formed from or contains the described natural materials or aroma materials that can produce corresponding vapours when heated.

Device 300

[0047] Figure 4 (figure 4A, figure 4B, figure 4C, figure 4D, and figure 4E) illustrates a device 300 according to some embodiments of the present disclosure. As shown in figure 4, the device 300 comprises a first substrate 311, a second substrate 321, a first heater 312, and/or a second heater 322, a filter 329a, and a filter 329b. The device 300 may comprise plastic, metallic ceramic materials, or combination(s) thereof. Hereinafter the filter 329a and the filter 329b may be collectively referred to as a filter 329.

[0048] The device 300 may be made from any plastic material such as polylactic acid (PLA); polyethylene (PE); polyethylene terephthalate (PET); polyethylene ether ketones (PEEK); polypropylene (PP); polytetrafluoroethylene (PTFE); polyvinylchloride (PVC); cellulose acetate (CA), starch based polymers, liquid crystal polymer material (LCP); polyacrylonitrile (PAN); polysiloxane or silicone; natural or synthetic rubber; paper; paper yarn; paper net; cork; carbon; graphene; any

combinations or derivatives thereof. The device 300 may include metallic materials including, but not limited to titanium, zirconium, tantalum and metals from the platinum group, suitable metal alloys, for example, stainless steel, nickel-, cobalt-, chromium-, aluminium- titanium zirconium-, hafnium-, niobium-, molybdenum-, tantalum-, tungsten-, tin-, gallium-, manganese-, gold- and iron-containing alloys; ceramic materials, including, but not limited to doped ceramics, for example, doped silicon carbides, electrically conductive ceramics, for example, molybdenum disilicide; composite materials made of at least one ceramic material and at least one metallic material; carbon; graphite; high temperature resistant plastic materials; and any combinations thereof. In general, device 300 is formed from heat resistant and heat conductive materials. The heat resistance and heat conductive materials may be able to withstand a temperature of up to 380 degrees Celsius without deformation or without being powderized.

[0049] As shown in figures 4A and 4D, the first substrate 311 may include a space to contain therein the first heater 312 and may define first portions 313, 314. The second substrate 321 may have a space to contain therein the second heater 322 and may define second portions 323, 324. Hereinafter the first substrate 311 and the second substrate 321 may be collectively referred to as a casing.

[0050] The first substrate 311 may be rotatably or pivotably attached to the second substrate 321 by connecting at least part of the first substrate 311 with at least part of the second substrate 321. The angle A1 in figure 4A may be an angle defined between the first substrate 311 and the second substrate 321. Hereinafter a state as shown in figure 4A may be referred to as a first state. Each arrow shown in figures 4A to 4E indicates a direction where the unit 100 can be inserted into the device 300. The direction may be a direction of an airflow in the device 300 during use.

[0051] The first heaters 312 may include a plurality of compartments 312a and a plurality of heating elements (not shown). The second heater 322 may include a plurality of compartments 322a and a plurality of heating elements (not shown). Each of the plurality of compartments 312a, 322a may correspond to one or more heating elements of the plurality of heating elements. The plurality of compartments 312a,

322a are formed by some rows (e.g. four rows) and some columns (e.g. five columns). Each of the plurality of compartments 312a, 322a may be square-shaped in a plan view of the first heaters 312, 322. By forming the plurality of compartments 312a, 322a, cavities 312b, 322b are respectively formed between adjacent compartments 312a, 322a. The cavities 312b, 322b may be shaped and dimension to receive (and hold) a variety of components, including the unit 100. The cavities 312b, 322b may contain replaceable hollow elements, flavour or aroma elements, additional filter units, additional net filters, additional tobacco units and one or more air channel units. The cavities (when present) may include different combinations and shapes.

[0052] It is to be appreciated that each of the number of rows and columns of the plurality of compartments 312a, 322a is not limited to particular number as above and may be determined based on at least one of factors such as size of the unit 100 and/or size of the device 300.

[0053] As shown in figures 4A and 4D, the first portion 313 and the second portion 323 may be respectively shaped at one end of the first substrate 311 and the second substrate 321. The first portion 314 and the second portion 324 may be respectively shaped at the other end of the first substrate 311 and the second substrate 321, and may have curved-shape. In the case where the first substrate 311 and/or the second substrate 321 are rotated to get closer one another to reduce the angle A1, the first heater 312 is in contact with the second heater 322 or faces the second heater 322 at a first distance apart. After the first substrate 311 and/or the second substrate 321 are rotated to get closer one another to reduce the angle A1, a shape of the device 300 may be shown in figures 4B and 4D.

[0054] The filter 329a may be disposed along a direction shown by the arrow in figure 4 in relation to the second heater 322 and a unit 100 in the form of a sheet 900 (figure 5). That is, the filter 329a may be disposed downstream of the second heater 322 and a sheet 900. The filter 329a may be disposed at the other end of the device 300. The filter 329b may be further disposed between the filter 329a and the second heater 322. The filter 329 may be a net filter but may be any other filter. The filter 329 may comprise one or more of the following types filters: - natural filler material,

fibrous tow filter, film filter, foil filter, mesh filter, fabric filter, fabric mesh filter, sheet filter, filament filter, spongy filter, laminated filter, wafer filter, honey-comb structure filter, extruded or moulded filter, paper filter. An arrangement of the size and/or position of the filter 329 may affect air flow in the device 300, and any deliverables. Such deliverables may include nicotine-containing aerosol/vapour obtained by heating the unit 100.

[0055] As shown in figures 4B, and 4D, the first substrate 311 and the second substrate 321 face one another in a second state such that the unit 100 (not shown)is inserted between the first heaters 312, 322 and heated by the first heaters 312, 322. It is to be appreciated that the device may include either the first heater 312 or the second heater 322.

[0056] In the case where the state of the device 300 is changed from the first state to the second state, the casing of the device 300 may define a first opening 330 by the first portion 313 and the second portion 323, define a second opening 340 by the first portion 314 and the second portion 324, and define a passageway 350.

[0057] The first opening 330 is a space to pass therethrough air from outside toward the passageway 350. The passageway 350 is a space to pass therethrough air flowed from the first opening 330 towards the second opening 340. A part of the passageway 350 may include a filter slot shaped and dimensioned to receive the filter 329. The filter slot may be arranged adjacent to the second opening 340. The second opening 340 is a space to pass therethrough air in the passageway 350 toward outside of the device 300. It is to be appreciated that the first opening 330 may be shaped and dimensioned to receive the unit 100.

[0058] It is to be appreciated that the filter 329 may not be disposed at the other end of the device 300 and may be disposed in the passageway 350 at a pre-determined distance apart from the other end of the device 300.

[0059] It is to be appreciated that as shown in figure 4E, the device 300 may comprise a second heater 382 arranged with a circular configuration, instead of the second heater 322. It is appreciable that other shapes and configurations are possible.

[0060] Figure 5 (figure 5A and figure 5B) illustrates a device 300 according to some embodiments of the present disclosure. As shown in figure 5A, the device 300 is in the first state so that a planar unit 900 can be inserted into a first area 370 of the device 300 via the first opening 330. The planar unit 900 may be a circular or rectangular sheet. The sheet may be substantially rigid.

[0061] The first area 370 is a part of the passageway 350 and is an area where the unit 100 is disposed during use. The sheet 900 may be the unit 100 shown in figure 1. In the case where the sheet 900 is inserted in the device 300 and the first substrate 311 and/or the second substrate 321 are subsequently rotated so that the first state shown in figure 5A is changed with the second state shown in figure 5B, the sheet 900 may be in contact with the first heater 312 and the second heater 322 and the sheet 900 is heated by the first heater 312 and the second heater 322.

[0062] In embodiments where the unit 100 includes tobacco material, the heating elements of the first heater 312 and the heating elements of the second heater 322 may also be corrugated or sufficiently patterned, arranged or configured to hold the sheet 900 in place while the user introduces the airflow and causes the heated vapour (also referred to as aerosol) from the tobacco material to flow towards the second opening 340 (e.g. a mouthpiece).

[0063] It is to be appreciated that the device 300 may comprise a controller (not shown) and the controller may control at least one of the first heater 312 and the second heater 322 so that the at least one of the first heater 312 and the second heater 322 is turned on to heat the sheet 900 at a determined temperature. The determined temperature may be determined by a user. In the case where both the first heater 312 and the second heater 322 are turned on, the first heater 312 and the second heater 322 may be turned on alternately, independently, or simultaneously. The controller may control one or more heating profiles of the first heater 312 and the second heater 322. It is to be appreciated that a controller (not shown) may control the heating elements of the second heater 322 as shown in figure 6. The controller may be an electronic or electrical controller.

[0064] Figure 6 illustrates a part of a device 300 according to some embodiments of the present disclosure. As shown in figure 6, some areas of compartments 501, 503, 505, 507, and 509 are defined for convenience of description. Each of the compartments 501, 503, 505, 507, and 509 may be heated by the corresponding one or more heating elements. The temperature for each of the compartments 501, 503, 505, 507, and 509 may be between 50 and 450 degrees Celsius. The number of the compartments 501, 503, 505, 507, and 509 may vary and can range from one to six. It is to be appreciated that the each temperature of the heating elements is not limited to particular temperature.

Advantageous Effect

[0065] According to the present disclosure, the device 300 includes at least one filter slot, wherein the at least one filter slot for receiving the filter 329 is disposed along the first direction in relation to the first area 370. That is, the filter 329 is separately disposed from the unit 100. As such, in the case where the unit 100 is replaced with a new unit upon consumption of material (e.g. tobacco material), the filter 329 (e.g. non-biodegradable filter) and the heater are not required to be replaced, thus contributing to environmental sustainability. Further, the present disclosure allows to save production cost in terms of lessening cost of combining different individual elements into one.

[0066] According to the present disclosure, the device 300 includes the unit 100, wherein the unit 100 can be shaped and dimensioned with any configuration. For instance, the unit 100 may have a planar shape of one of the following: arcuate shape, polygonal shape, or combination thereof. The planar shape may be determined in accordance with a configuration of the device 300. The shape of the unit 100 is interrelated to the shape of the device 300 for optimal condition. It is therefore the unit 100 can fit with the device 300 when inserted to the device 300. Further, a thickness, layer, shape, and/or size of the unit 100 can be configured in accordance with a user's preference in order to deliver appropriate deliverables to the user. For instance, in the case where the unit 100 is configured to be a flat shape (e.g. a

quadrangular prism), the flat shape, as compared with a cylindrical shape, contributes to spreading heat in more efficient and more homogenous manner during use of the device 300. For instance, in the case where the unit 100 is configured to have at least one hole, the at least one hole can facilitate ventilation of the unit 100 and contribute to obtaining desired deliverable of product. For instance, in the case where the unit 100 is configured to be a unit without paper, the unit 100 can contribute to environmental sustainability, device 300 including a heater can contribute to energy efficiency when heating the unit 100, and aerosol or vapor emitted from the unit 100 does not include paper taste. In the case where the user is a light smoker, by reducing an amount of the material in the unit 100, the size of the unit 100 may be configured to be thin compared with a case where the user is a heavy smoker, thus reducing energy required to heat the unit 100 and getting rid of or minimize component(s) such as the filter 329. In addition to the above, the unit 100 not including any filters therein contributes to higher designability as compared to a unit including a filter.

[0067] It is to be appreciated that the first heater 312 and the second heater 322 may be of the pin type, ring type, coil type, tunnel or external heater and other similar heating configurations or combinations of both. Other examples of the heaters will be described with reference to figure 7.

[0068] Figure 7 (figure 7A, figure 7B, figure 7C, figure 7D) illustrates devices 600, 650 according to some embodiments of the present disclosure. Figures 7A and 7B illustrate a device 600 with four heaters or heater plates labelled as 312, 322, 612, and 622. Figures 7C and 7D illustrate a device 650 with four heaters or heater plates labelled as 413, 423, 613 and 623.

[0069] As shown in figures 7A and 7B, the device 600 may comprise the two sets of second heater 322 and second heater 622 with rectangular shape. The second heater 622 may be disposed along a direction shown by the arrow in figure 7 in relation to the second heater 322. That is, the second heater 622 may be disposed downstream of the second heater 322. As shown in figure 7B, a first heater 612 is provided on the first substrate 311 and may be same shape as the second heater 622. In the case where the device 600 is in the second state as in figure 7B, the first heater 612 and the

second heater 622 face one another and heat the sheet 900 (figure 5). Similarly, in the case where the device 600 is in the second state as in figure 7B, the first heater 312 and the second heater 322 face one another and heat the sheet 900 (figure 5).

[0070] It is to be appreciated that one of the second heater 322 and the second heater 622 may be used for heating tobacco element and the other may be used for heating non-tobacco material (e.g. natural or aroma elements). It is to be appreciated that both the second heater 322 and the second heater 622 may be used for heating tobacco element. It is to be appreciated that both the second heater 322 and the second heater 622 may be used for heating non-tobacco element (e.g. natural or aroma elements).

[0071] It is to be appreciated that the shape of the second heaters 322, 622 is not limited to the shape as shown in figures 7A, 7B and may be other shape(s).

[0072] As shown in figures 7C and 7D, the device 650 may comprise the second heaters 423, 623. The second heater 623 may be disposed along a direction shown by the arrows in figures 7C and 7D in relation to the second heater 423. That is, the second heater 623 may be disposed downstream of the second heater 423. As shown in figure 7D, the first heater 613 is provided on the first substrate 311 and may be similarly shaped and dimensioned as the second heater 623. The first heater 613 may be disposed along a direction shown by the arrow in figure 7D in relation to the first heater 413. That is, the first heater 613 may be disposed downstream of the first heater 413. In the case where the device 650 is in the second state as shown in figure 7D, the first heater 613 and the second heater 623 face one another and heat the sheet 900 (figure 5). Similarly, in the case where the device 650 is in the second state as shown in figure 7D, the first heater 413 and the second heater 423 face one another and heat the sheet 900 (figure 5). As shown in figures 7C and 7D, the filter 329a may be disposed at the other end of the device 650. The filter 329b may be further disposed between the filter 329a and the second heater 623.

[0073] It is to be appreciated that the controller may comprise a first controller that controls the first heater 312 and a second controller that controls the second heater

322. In some embodiments a single controller may be used to control the first heater 312 and the second heater 322.

[0074] Figure 8 illustrates a device 700 according to some embodiments of the present disclosure. As shown in figure 8, the device 700 may include first heaters 711, 713, 715, a filter 721a, filters 721b, a first opening 730, and a second opening 740. Hereinafter the filter 721a and the filters 721b may be collectively referred to as a filter 329.In the device 700, a passageway 750 is formed to pass air from the first opening 730 to the second opening 740. The passageway 750 may include a first area 770 where the first heaters 711, 713, 715 are disposed and the unit 100 is inserted.

[0075] The first heaters 711, 713, 715 may be a circular-shaped in a plan view. The first heater 711 may be a heater to heat at one end of the unit 100 during use. The first heater 713 may be a heater comprising a plurality of heating elements and disposed upstream of the first heater 711. The first heater 715 may be a heater disposed upstream of the first heater 713. The first heater 715 may be configured so that the length of the first heater 715 is larger than the length of the first heaters 711, 713. Each of the first heaters 713, 715 may have a circle-shaped slot to receive therein the unit 100. It is appreciable that the shape of the heaters may not be circular and can include other shapes and dimensions.

[0076] The first opening 730 may be formed upstream of the first heater 715 so that the unit 100 can be inserted to the first heaters 713 and 715 along a direction shown by the arrow shown in figure 8. The first opening 730 may be formed at one end of the device 700. That is, the first opening 730 may be formed at distal end of the device 700. The second opening 740 may be formed at the other end of the device 700. That is, the second opening 740 may be formed at proximal end of the device 700. The filter 721a may be disposed at the other end of the device 700. The filters 721b may be disposed between the filter 721a and the first heater 711.

[0077] The unit 100 may be shaped and dimensioned according to a configuration of the device 700.

[0078] It is to be appreciated that the filter 721a may not be disposed at the other end of the device 700 and may be disposed at a pre-determined distance apart from the other end of the device 700.

[0079] Figure 9 illustrates a device 800 according to some embodiments of the present disclosure. As shown in figure 9, the device 800 may include first heaters 811 and 813, a filter 821a, a filter 821b, a first opening 830, and a second opening 840. Hereinafter the filter 821a and the filter 821b may be collectively referred to as a filter 821. In the device 800, a passageway 850 is formed to pass air from the first opening 830 to the second opening 840. The passageway 850 may include a first area 870 where the first heaters 811 and 813 are disposed and the unit 100 is inserted.

[0080] The first heater 811 may be a heater including a first element 811a and a second element 811b. The first element 811a may be circular shape in a plan view. The second element 811b may be configured to be an elongate protrusion to receive the unit 100. The first heater 813 may include four heating elements and disposed upstream of the first heater 811. The first heater 813 may have a circle-shaped to receive therein the unit 100. The first heater 813 may be a heater comprising at least one ring-shaped element (e.g. four ring-shaped elements) and disposed upstream of the first heater 811.

[0081] The first opening 830 may be formed upstream of the first heater 813 so that the unit 100 can be inserted to the first heater 813 and the second element 811b along a direction shown by the arrow shown in figure 9. The first opening 830 may be formed at one end of the device 800. That is, the first opening 830 may be formed at distal end of the device 800. The second opening 840 may be formed at the other end of the device 800. That is, the second opening 840 may be formed at proximal end of the device 800. The filter 821a may be disposed at the other end of the device 800. The filter 821b may be disposed between the filter 821a and the first heaters 811.

[0082] The unit 100 may be shaped and dimensioned according to a configuration of the device 800.

[0083] It is to be appreciated that the filter 821a may not be disposed at the other end of the device 800 and may be disposed at a pre-determined distance apart from the other end of the device 800.

[0084] When the first heater 811 receives the unit 100, the unit 100 is fastened to or contacts the first heater 811 to facilitate heating of the unit 100. The unit 100 may be attached to the first heater 811 via a snap-fit configuration. Subsequently, the second element 811b heats an inner surface of the unit 100 and the first heater 813 heats an outer surface of the unit 100. The first heaters 811, 813 may have varying heating gradients. Each part of the first heaters 811 and 813 may be programmed to have varied temperatures across the surface or across the element. It is to be appreciated that the number of heaters is not limited to particular number shown in figures 8, 9.

[0085] The controller may include input/output (I/O) circuits or analog/mixed-signal circuits. The controller may include a central processing unit (CPU) such as a microprocessor, a microcontroller unit (MCU), an application-specific integrated circuit (ASIC), or a field-programmable gate array (FPGA). The analog/mixed-signal circuits may include a variety of circuits including, for example, a crystal oscillator, a phase-locked loop (PLL), an analog-to-digital converter (ADC), and a digital-to-analog converter (DAC) (all not shown).

[0086] Figure 10 illustrates the heating device 300 for heating the unit 200. Figure 10A shows a use-case where only the second non-tobacco part 240 is placed in the heating device 300 for producing non-tobacco flavors. Figure 10B shows a use-case with both the first tobacco part 220 and the second non-tobacco part 240 positioned in the heating device 300. It is appreciable in the case where the second non-tobacco part 240 functions as a filter for the first tobacco part 320, filters 329, 329a, 329b may not be necessary.

[0087] In use, the top and bottom surface of the second non-tobacco part 240 (which may be in the form of a filter) are pressed by the heating device 300 to prevent air leakage in or out on the heating chamber. Any air entering the gap defined by the second non-tobacco part 240 and/or the first tobacco part 220 will exit from this

opening into the second outlet.

[0088] Figures 11A and 11B show a planar view of yet another embodiment of a heating device 1100 for use to heat a unit 100 / 200. The heating device 1100 is elongate in shape and comprises a power unit 1120 coupled to a heater unit 1140. The power unit 1120 has a battery 1130 and a controller board 1160 configured to provide electrical power to the heater unit 1140 on demand. One or more operating modes may be contemplated. For example, there may be a standby operating mode and one or more heating modes. Where there are a plurality of heating modes, each heating mode may correspond to a different heating temperature. The controller board 1160 may be a printed circuit board assembly (PCBA). The PCBA may include various integrated circuit components such as, but not limited to, an application specific integrated chip (ASIC), heat sinks etc.

[0089] The heater unit 1140 comprises a unit holder (not shown) shaped and dimensioned to receive the unit 100 or 200. The unit holder may include one or more depressions or grooves suitably formed on the surface of the heater unit 1140 to receive the unit 100/ 200. Where the heater unit 1140 is used to receive unit 200, there may comprise different depressions formed on the surface of the heater unit 1140 to receive the first part 220 and second part 240. The opening of the second part 240 is arranged to be aligned to the passageway 1180 leading to an outlet/opening of the heating device, which may be a mouthpiece adapted for a consumer to consume the heated vapor of the unit 100/ 200. As shown in Figure 11B, a filter 1200 may be suitably positioned along the opening 1180 (if required). The passage way 1180 may be have a tapered or straight end.

[0090] Figures 11C and 11D show a planar view of the heating device 1100 with similar components 1120 and 1140. The embodiments shown in Figures 11C and 11D is suited to receive a unit 200 and includes one or more protrusions 1220 formed as a barrier between the first part 220 and the second part 240. The one or more protrusions 1220 include one or more through-holes / slots 1240 for any moisture from the first part 220 to pass and to be absorbed by the second part 240.

[0091] Figures 12A to 12D illustrate the relative positioning of the first part 220

and second part 240 of the unit 200 relative to each other. Figure 12A is a perspective view of the unit 200. Figure 12B is a cross-sectional view along the line L1-L1' which shows the possibility of the first part 220 positioned on substantially the same longitudinal plane A as the second part 240, and Figure 12C is a cross-sectional view along the line L1 showing the first part 220 offset from the second part 240. In other words, the positioning of the first part 220 can be at different level, parallel to the second part 240.

[0092] Figure 12D is a cross-sectional view illustrating the heating of unit 200. The direction of air flow AF (which carries the heated tobacco vapour) may be in a substantially perpendicular direction from the heating direction as shown in the cross-sectional. Figure 12E shows the perspective view of the air flow around a gap (heating not shown) between the first part 220 and the second part 240 leading out of the opening 242.

[0093] Figure 13A and 13B are cross-sectional views of possible heating devices having one or more grooves 1320 and/or air tunnels 1340 shaped and dimensioned to facilitate air flow to the heating unit 100/ 200. It is appreciable that the one or more grooves 1320 may extend proximate the surface of the unit 100 or first part 220 to facilitate air flow in case the placement of the unit 100 or first part 220 is mis-positioned or misplaced, leading to obstruction of air-flow to any part of the air flow system.

[0094] In another aspect of the present disclosure there is a kit comprising a heating device and at least one unit. The heating device may be any one of the devices 300, 600, 650, 700, 800 as described in the earlier embodiments. In particular, the heating device may be a heat-not-burn device having one or more battery-powered heating system or unit for heating the at least one unit. The at least one unit may include the unit 100 as described. The at least one unit may be a single use consumable unit 100. Where there is a plurality of units 100, each of the plurality of units 100 may be shaped and dimensioned as a circular tablet. Each of the plurality of units 100 may comprise enough material for a one-time consumption (i.e. single-use). In some embodiments, the kit may include multiple heating devices, each heating

device differing from another heating device. In some embodiments, each of the plurality of units 100 may be formed of different flavors, having an assortment of tobacco and non-tobacco units 100.

[0095] In some embodiments, the unit may include the unit 200 having the first part 220 and second part 240 arranged separately from one another.

[0096] It is to be appreciated by the person skilled in the art that variations and combinations of features described above, not being alternatives or substitutes, may be combined to form yet further embodiments falling within the intended scope of the invention.

[0097] As would be understood by a person skilled in the art, each embodiment, may be used in combination with other embodiment or several embodiments.

Reference numerals

100: unit
101, 151: material
102, 152: coating means
200: unit
220: first part
240: second part
242: opening of second part
300: device
311: first substrate
312a, 322a, 501, 503, 505, 507, 509: compartment
312b, 322b: cavity
312, 413, 612, 613, 711, 713, 715, 811, 813, 821: first heater
313, 314: first portion
321: second substrate
322, 382, 423, 622, 623, 682: second heater
323, 324: second portion
329, 329a, 329b, 721, 721a, 721b, 821, 821a, 821b: filter

330, 730, 830: first opening

340, 740, 840: second opening

350, 750, 850: passageway

370, 770, 870: first area

600, 650, 700, 800: device

811a: first element

811b: second element

900: unit in the form of a sheet

1100: heating device

1120: power unit

1130: battery

1140: heater unit

1160: controller board

1180: passageway

1200: filter

1220: protrusions (on barrier)

1240: slots (on barrier)

1320: grooves (on heating device)

1340: air-tunnels (on heating device)

A1: angle

AF: Air-flow

D1: inner diameter of second part 240

CLAIMS

1. A unit for use with a heating device, the unit comprising: -

at least one layer comprising a tobacco material, wherein the unit has a planar shape of one of the following: arcuate shape, polygonal shape, or combination thereof, and wherein the tobacco material is unwrapped.

2. The unit according to claim 1, wherein the arcuate shape is circular, semi-circular, elliptical, or semi-elliptical shape, and wherein the polygonal shape is a triangular, rectangular, pentagonal, hexagonal, octagonal, heptagonal, octagonal, nonagonal, or decagonal shape.

3. The unit according to any one of the preceding claims, wherein the tobacco material comprises one of the following:- resin, powder, tube, granules, capsules.

4. The unit according to any one of the preceding claims, wherein the unit includes at least one hole and hollow portion.

5. The unit according to any one of the preceding claims, wherein the unit is shaped and dimensioned to be inserted to or contained in the device, and wherein the device is a heat-not-burn device.

6. The unit according to any one of the preceding claims, wherein the at least one layer comprises a plurality of layers, and wherein the at least one of a tobacco material and a non-tobacco material is included in each of the plurality of layers.

7. The unit according to claim 1, wherein the tobacco material is circular in shape and forms a first part of the unit, the circular tobacco first part at least partially encircled by a non-tobacco filter that forms a second part of the unit.

8. A heating device for heating a unit, the device comprising: -

a first heater having at least one first heating element arranged to heat the unit, the unit including at least one layer comprising a tobacco material included in at least one layer; and

a casing for containing the first heater and at least one filter, and that defines therein a passageway including at least one filter slot for receiving the at least one filter and a first area, wherein the casing comprises a first opening for insertion of the unit into the first area along a first direction, and wherein the at least one filter slot is disposed along the first direction in relation to the first area, and wherein the unit has a planar shape of one of the following: arcuate peripheral shape, polygonal peripheral shape, or combination thereof, and wherein the tobacco material is unwrapped.

9. The device according to claim 8, wherein the at least one first heating element comprises a plurality of first heating elements, and wherein two or more first heating elements of the plurality of first heating elements are arranged to heat the unit at different temperatures.

10. The device according to claim 9, further comprising: -

a first controller arranged to control the plurality of first heating elements.

11. The device according to claim 8, 9, or 10, further comprising: -

a second heater including at least one second heating element arranged to heat the unit, wherein the casing includes a first substrate and a second substrate, and wherein the first substrate is arranged to contain therein the first heater and is rotatably attached to the second substrate, and wherein the second substrate is arranged to contain therein the second heater.

12. The device according to according to claim 11, further comprising: -

a second controller arranged to control the at least one second heating element.

13. The device according to according to claim 11 or 12, in the case where the first substrate and/or the second substrate are rotated to get closer one another, the first

heater is in contact with the second heater or faces the second heater at a first distance apart.

14. The device according to claim 8, 9, or 10, wherein the casing is arranged to be a tubular shape, and wherein the casing comprises at one end thereof the first opening and at the other end thereof a second opening, and wherein the second opening is disposed along the first direction in relation to the at least one filter slot.

15. The device according to claim 14, wherein the at least one heating element includes a first element and a second element, and wherein the second element is arranged to protrude along an opposite direction of the first direction.

16. The device according to according to any one of claims 8 to 15, wherein the non-tobacco material is obtained from one or more of the following plant parts: - leaf, bark, trunk, fruit, seed, stem, flower, pollen, branch, root, sap, pulp, resin bagasse, calyx of the respective flora.

17. A method of manufacturing a unit for use with a heating device, the method comprising the step of:

preparing a tobacco material included in at least one layer, wherein the unit has a planar shape of one of the following: arcuate peripheral shape, polygonal peripheral shape, or combination thereof, and wherein the at least one layer is unwrapped.

18. A kit comprising

at least one heating device of any one of claims 8 to 16; and

at least one unit of any one of claims 1 to 7.

19. The kit of claim 18 and the unit of claim 7, further comprises a plurality of the first part and at least one of the second part.

AMENDED CLAIMS
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1. A unit for use with a heating device, the unit comprising: -

at least one layer comprising a tobacco material, wherein the unit has a planar shape of one of the following: arcuate shape, polygonal shape, or combination thereof, and wherein the tobacco material is at least one of a wrapped and an unwrapped configuration.

2. The unit according to claim 1, wherein the arcuate shape is circular, semi-circular, elliptical, or semi-elliptical shape, and wherein the polygonal shape is a triangular, rectangular, pentagonal, hexagonal, octagonal, heptagonal, octagonal, nonagonal, or decagonal shape.

3. The unit according to any one of the preceding claims, wherein the tobacco material comprises one of the following: resin, powder, tube, granules, capsules.

4. The unit according to any one of the preceding claims, wherein the unit includes at least one hole and hollow portion.

5. The unit according to any one of the preceding claims, wherein the unit is shaped and dimensioned to be inserted to or contained in the device, and wherein the device is a heat-not-burn device.

6. The unit according to any one of the preceding claims, wherein the at least one layer comprises a plurality of layers, and wherein the at least one of a tobacco material and a non-tobacco material is included in each of the plurality of layers.

7. The unit according to claim 1, wherein the tobacco material is circular in shape and forms a first part of the unit, the circular tobacco first part at least partially encircled by a non-tobacco filter that forms a second part of the unit.

8. A heating device for heating a unit, the device comprising: -

a first heater having at least one first heating element arranged to heat the unit, the unit including at least one layer comprising a tobacco material included in at least one layer; and

a casing for containing the first heater and at least one filter, and that defines therein a passageway including at least one filter slot for receiving the at least one filter and a first area, wherein the casing comprises a first opening for insertion of the unit into the first area along a first direction, and wherein the at least one filter slot is disposed along the first direction in relation to the first area, and wherein the unit has a planar shape of one of the following: arcuate peripheral shape, polygonal peripheral shape, or combination thereof.

9. The device according to claim 8, wherein the at least one first heating element comprises a plurality of first heating elements, and wherein two or more first heating elements of the plurality of first heating elements are arranged to heat the unit at different temperatures.

10. The device according to claim 9, further comprising: -

a first controller arranged to control the plurality of first heating elements.

11. The device according to claim 8, 9, or 10, further comprising: -

a second heater including at least one second heating element arranged to heat the unit, wherein the casing includes a first substrate and a second substrate, and wherein the first substrate is arranged to contain therein the first heater and is rotatably attached to the second substrate, and wherein the second substrate is arranged to contain therein the second heater.

12. The device according to according to claim 11, further comprising: -

a second controller arranged to control the at least one second heating element.

13. The device according to according to claim 11 or 12, in the case where the first substrate and/or the second substrate are rotated to get closer one another, the first

heater is in contact with the second heater or faces the second heater at a first distance apart.

14. The device according to claim 8, 9, or 10, wherein the casing is arranged to be a tubular shape, and wherein the casing comprises at one end thereof the first opening and at the other end thereof a second opening, and wherein the second opening is disposed along the first direction in relation to the at least one filter slot.

15. The device according to claim 14, wherein the at least one heating element includes a first element and a second element, and wherein the second element is arranged to protrude along an opposite direction of the first direction.

16. The device according to according to any one of claims 8 to 15, further comprises a non-tobacco material, wherein the non-tobacco material is obtained from one or more of the following plant parts: - leaf, bark, trunk, fruit, seed, stem, flower, pollen, branch, root, sap, pulp, resin bagasse, calyx of the respective flora.

17. A method of manufacturing a unit for use with a heating device, the method comprising the step of:

preparing a tobacco material included in at least one layer, wherein the unit has a planar shape of one of the following: arcuate peripheral shape, polygonal peripheral shape, or combination thereof, and wherein the at least one layer is at least one of a wrapped or unwrapped configuration.

18. A unit for use with a heating device, the unit comprising: -

a first part having at least one layer comprising a tobacco material, wherein the unit has a planar shape of one of the following: arcuate shape, polygonal shape, or combination thereof, and wherein the tobacco material is at least one of a wrapped and an unwrapped configuration, and

a second part comprising non-tobacco material to absorb moisture from the first part when in use

wherein the second part comprises an outlet such that when in use tobacco heated by the heating device is directed toward the outlet.

19. A kit comprising

at least one heating device of any one of claims 8 to 16; and

at least one unit of any one of claims 1 to 7, 18.

20. The kit of claim 19 and the unit of claim 7, further comprises a plurality of the first part and at least one of the second part.

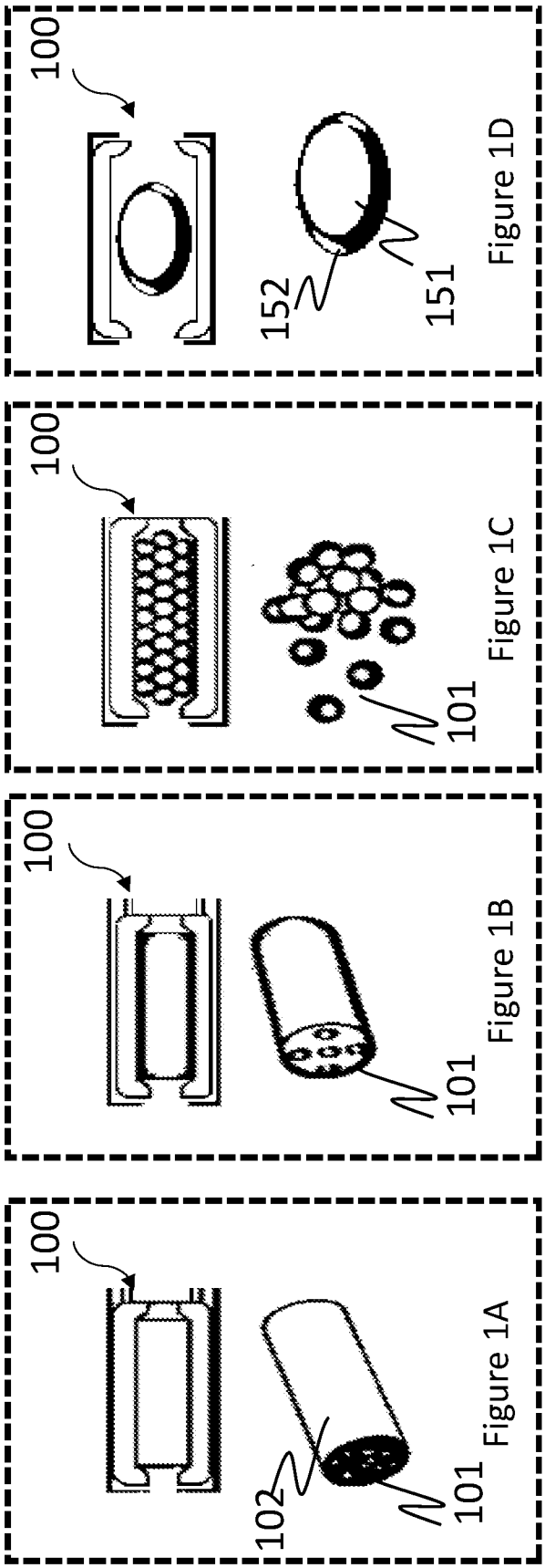
100
101
102
Figure 1A
100
101
Figure 1B
100
101
Figure 1C
100
151
152
Figure 1D

Figure 1

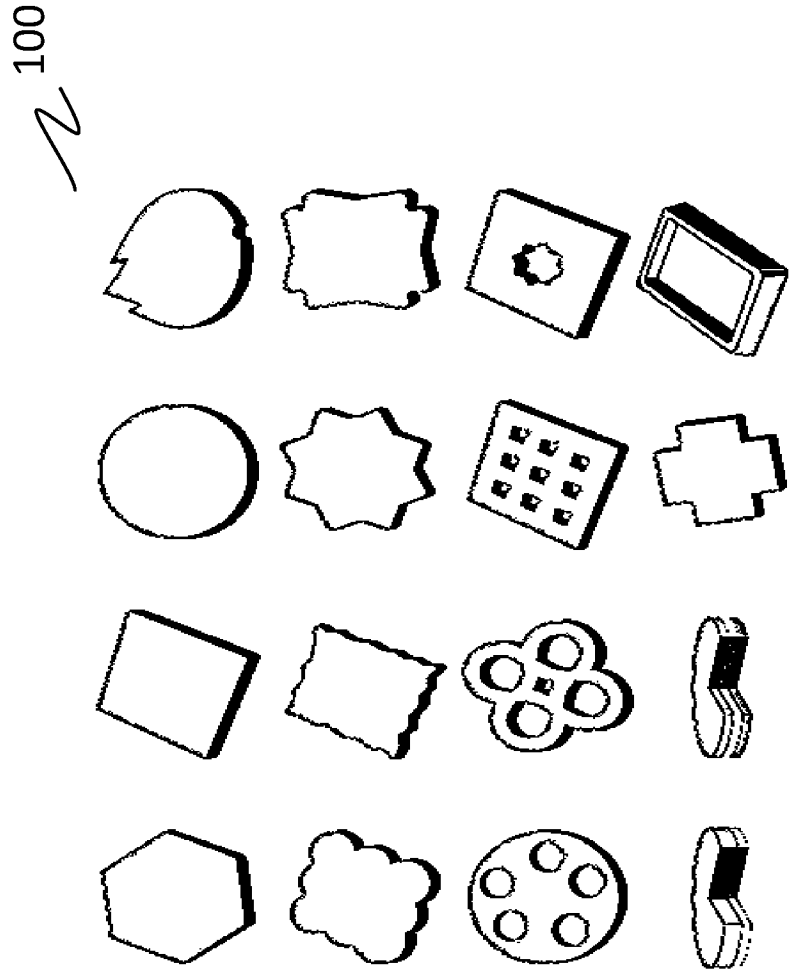

Figure 2

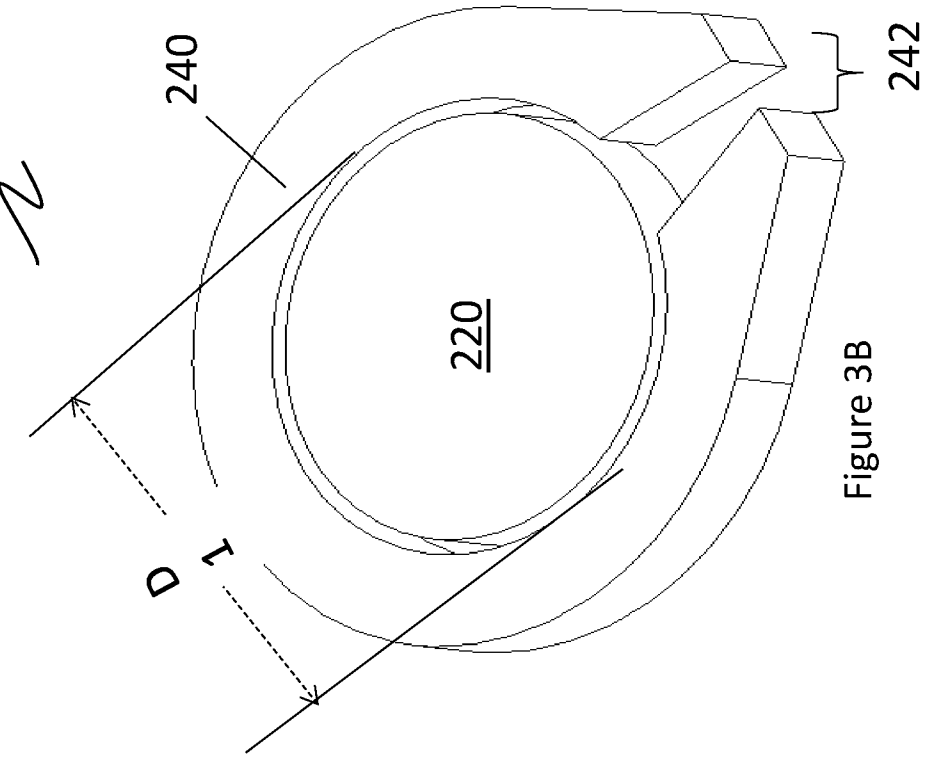

Figure 3B

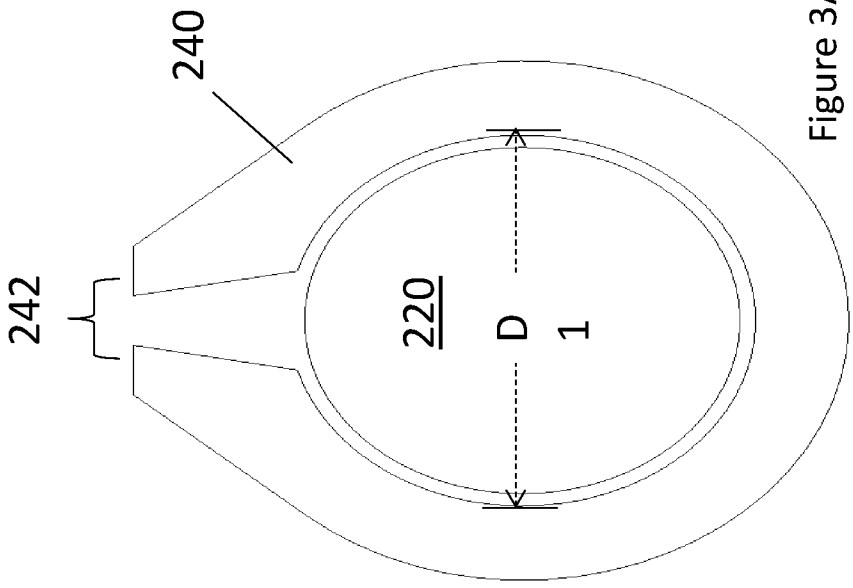

Figure 3A

Figure 3

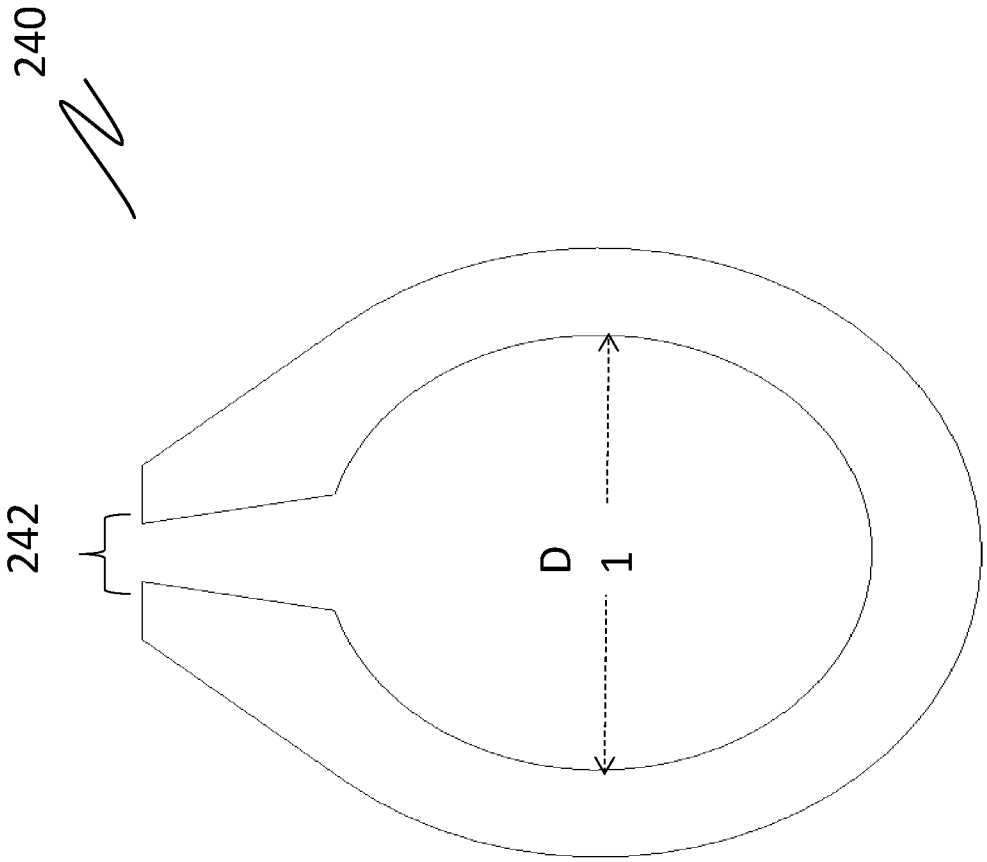

Figure 3C

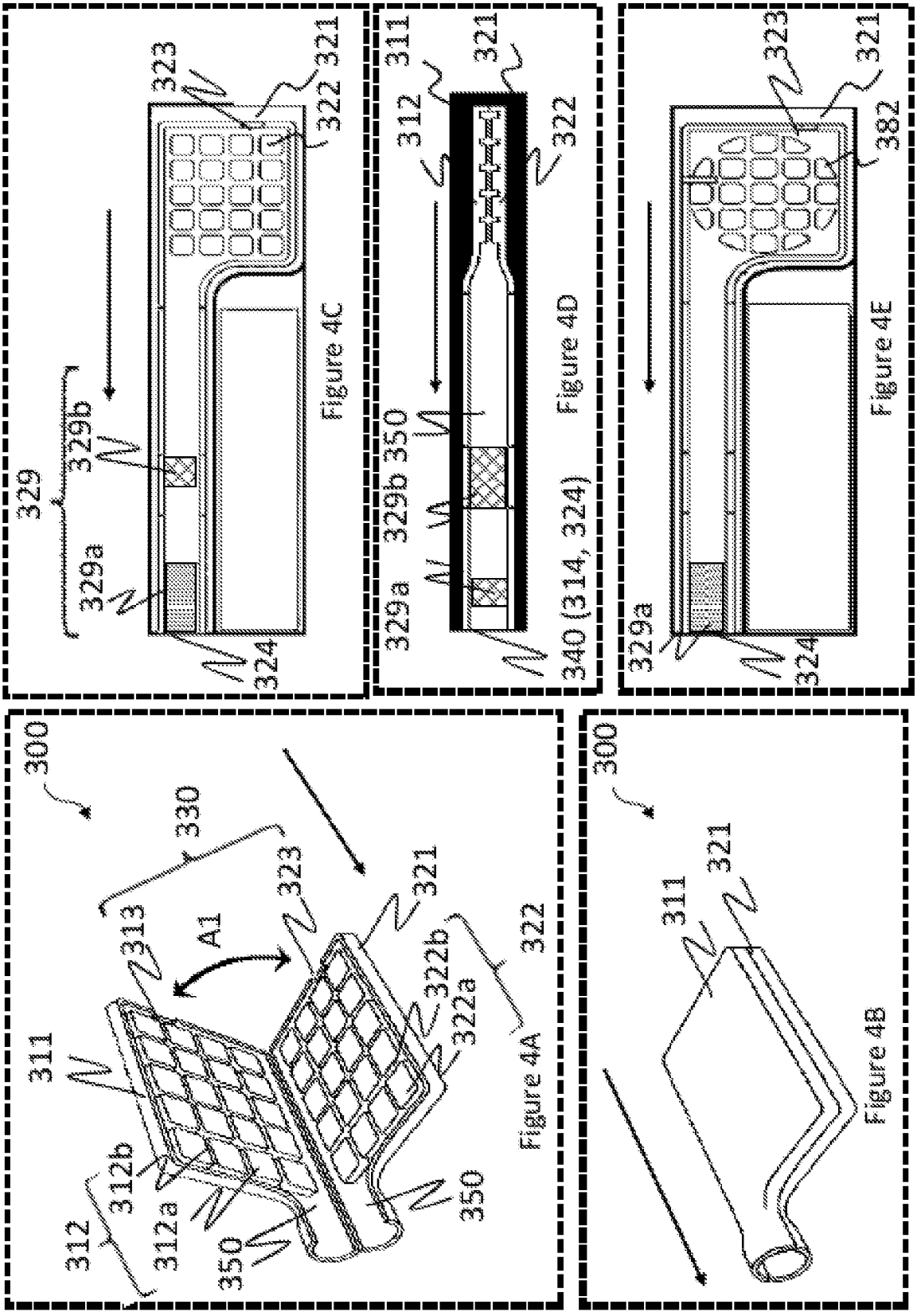
300
330
313
A1
323
321
322
322b
322a
311
312b
312a
312
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Figure 4A
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311
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Figure 4B
329
329b
329a
323
321
322
324
Figure 4C
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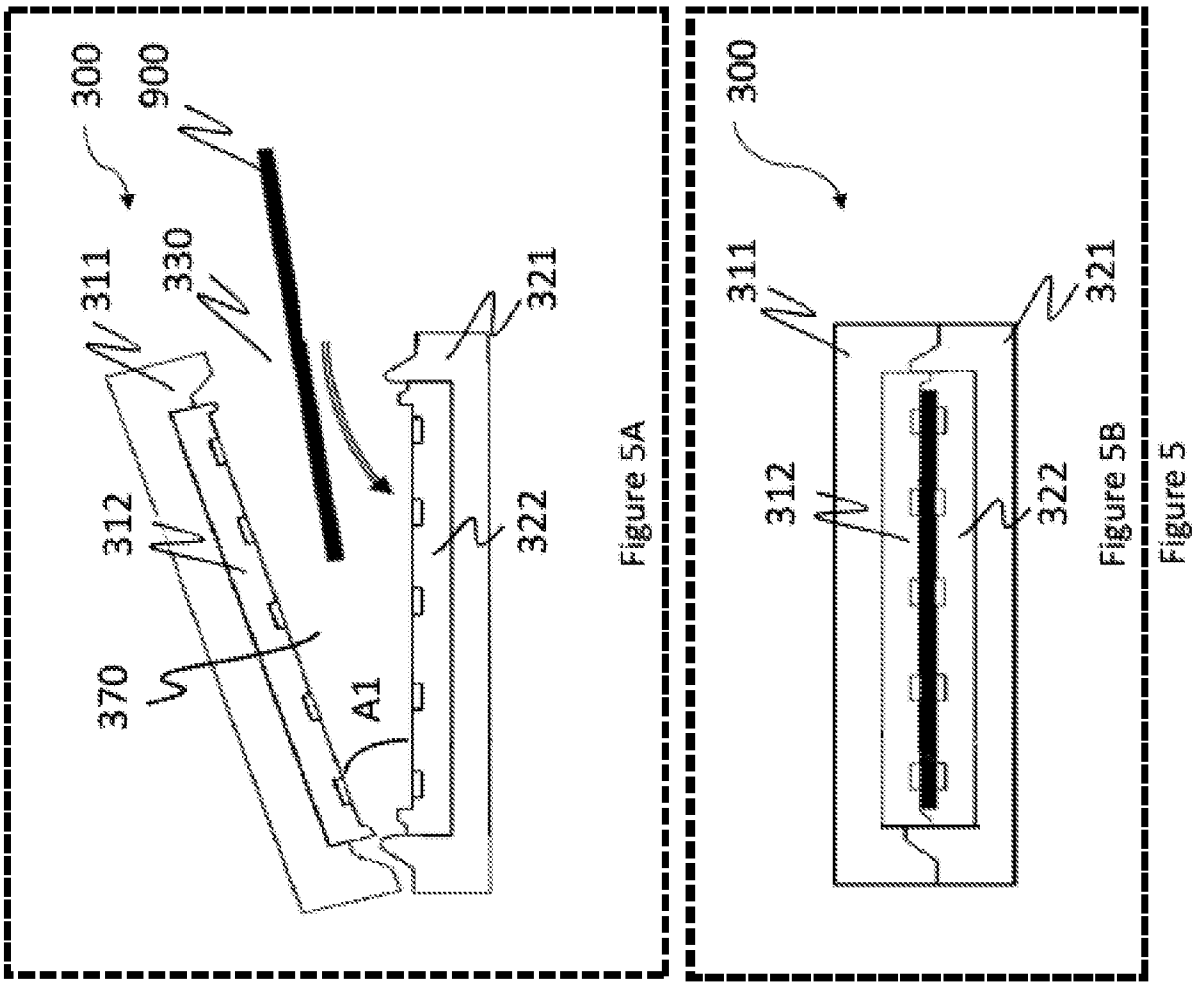
322
329a
329b 350
340 (314, 324)
Figure 4D
323
321
382
329a
324
Figure 4E
Figure 4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322
370
A1
Figure 5A
300
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312
322
Figure 5B
Figure 5

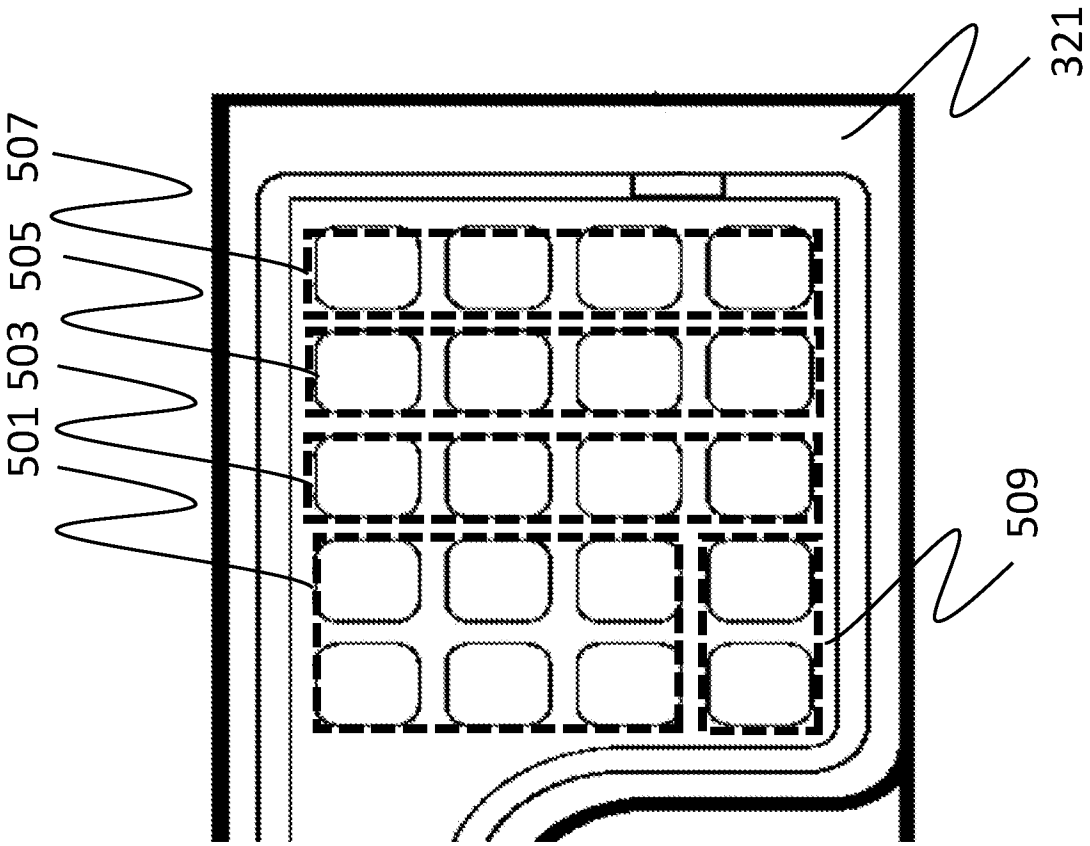
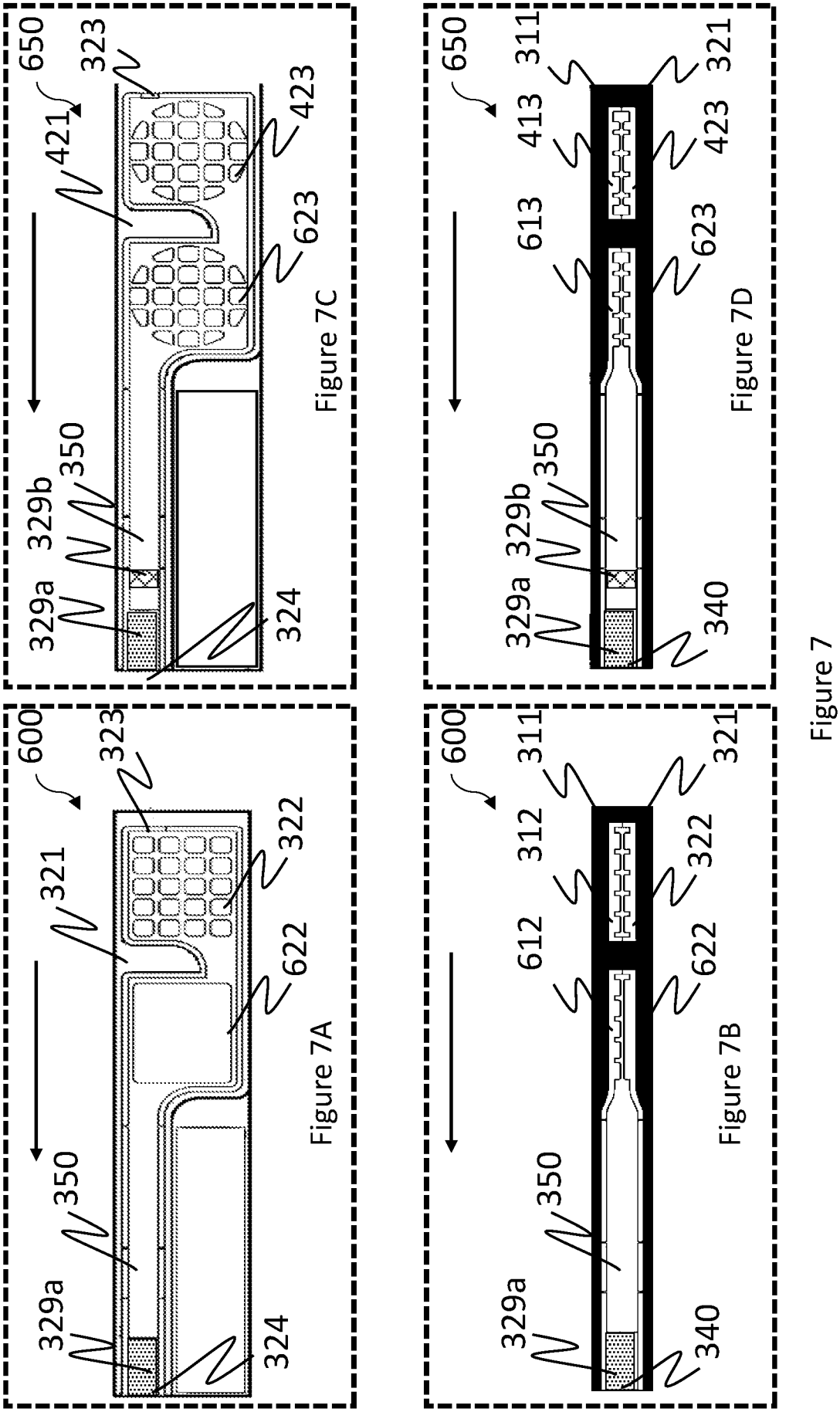


Figure 6


650
323
421
423
623
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329b
329a
324
Figure 7C
650
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321
413
423
613
623
350
329b
329a
340
Figure 7D
600
323
321
322
622
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329a
324
Figure 7A
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312
322
612
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350
329a
340
Figure 7B

Figure 7

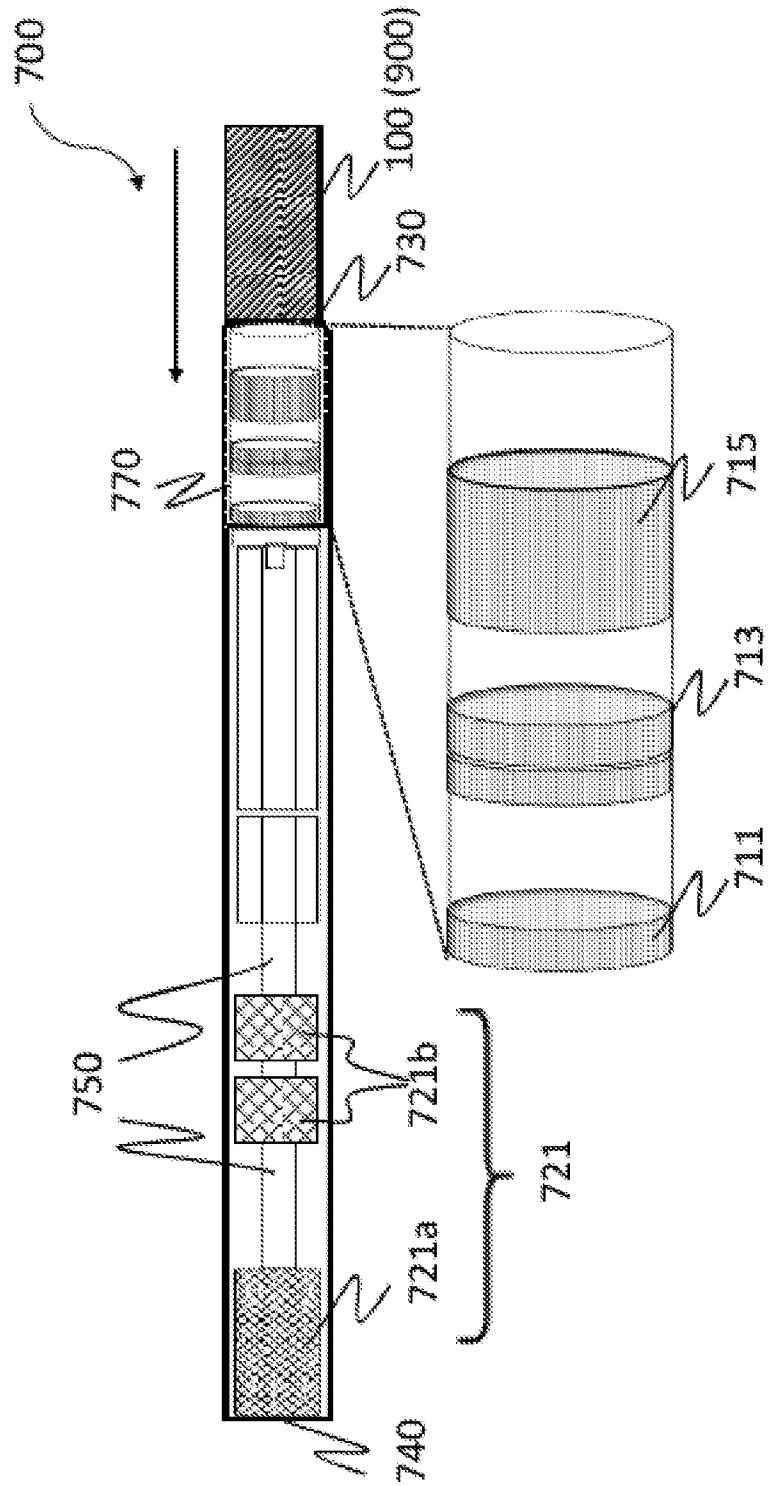

Figure 8

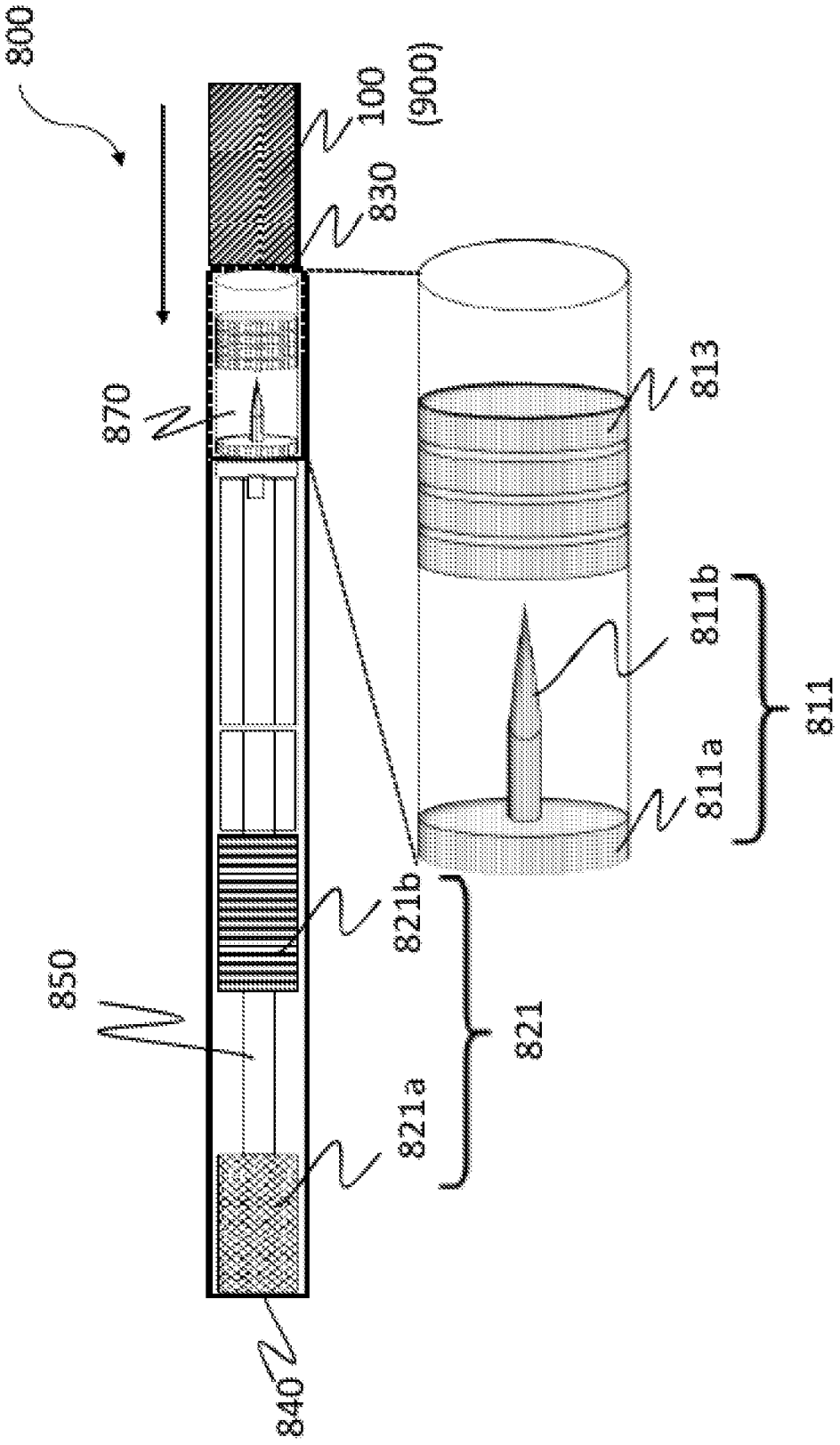

Figure 9

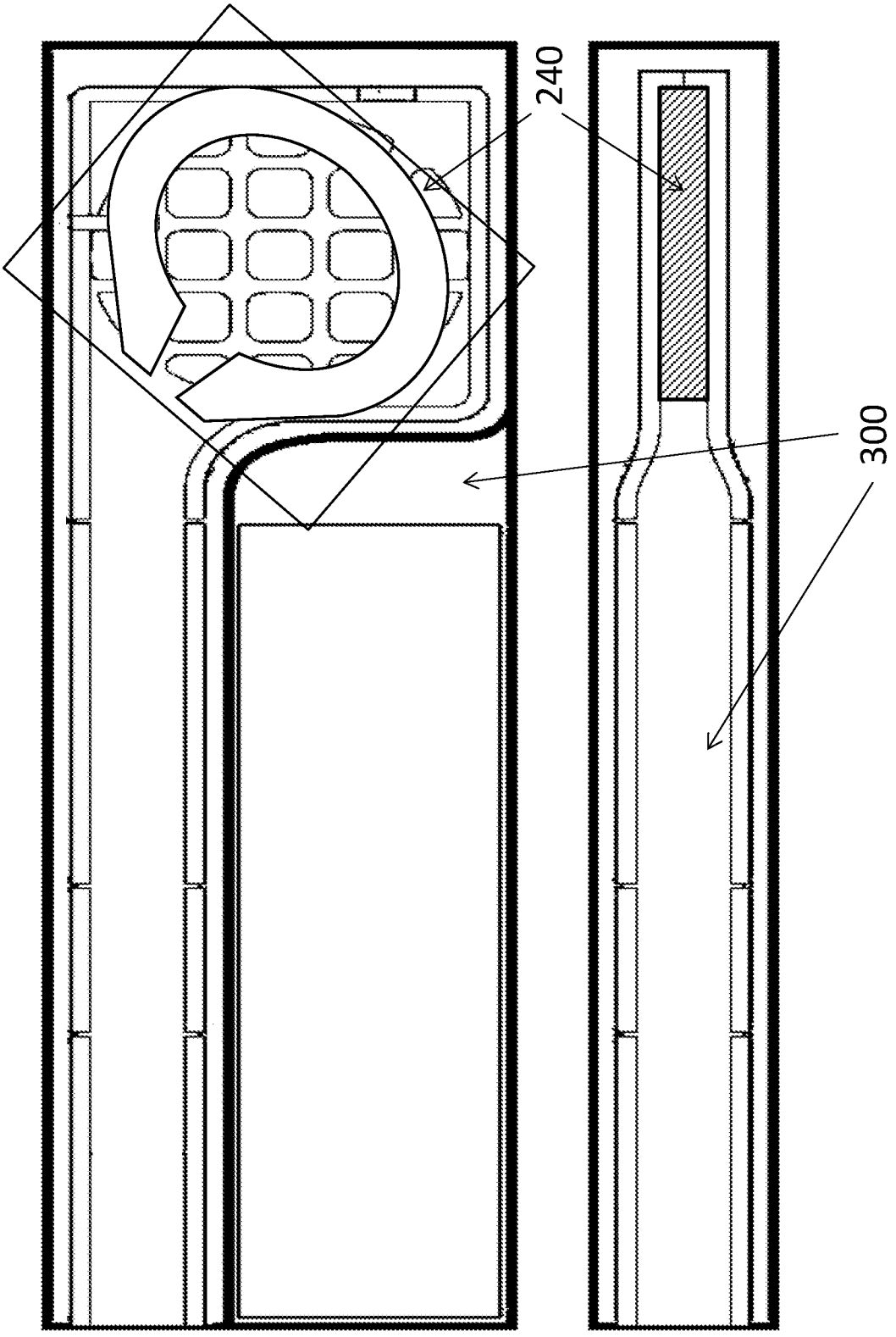

Figure 10A

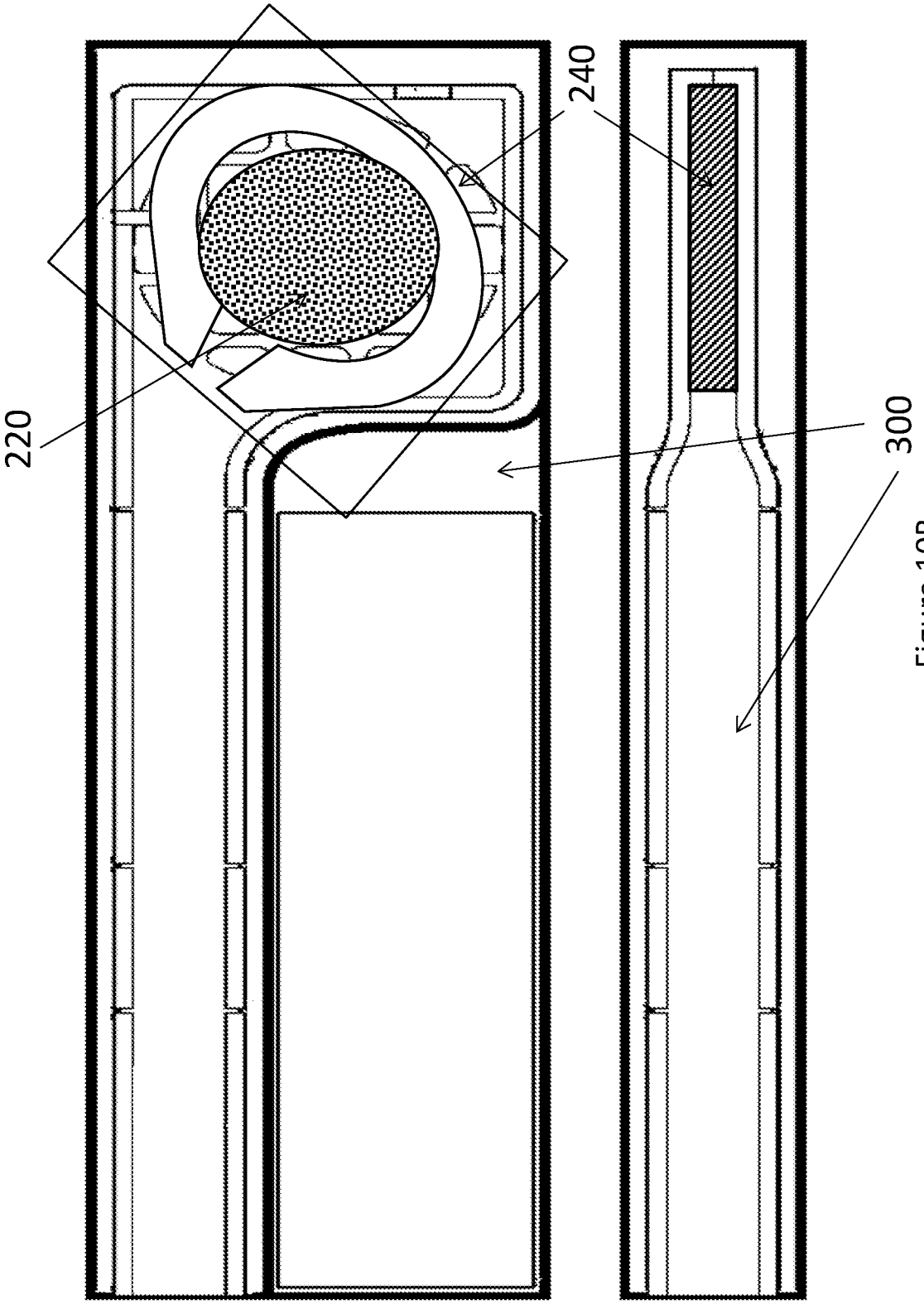

Figure 10B

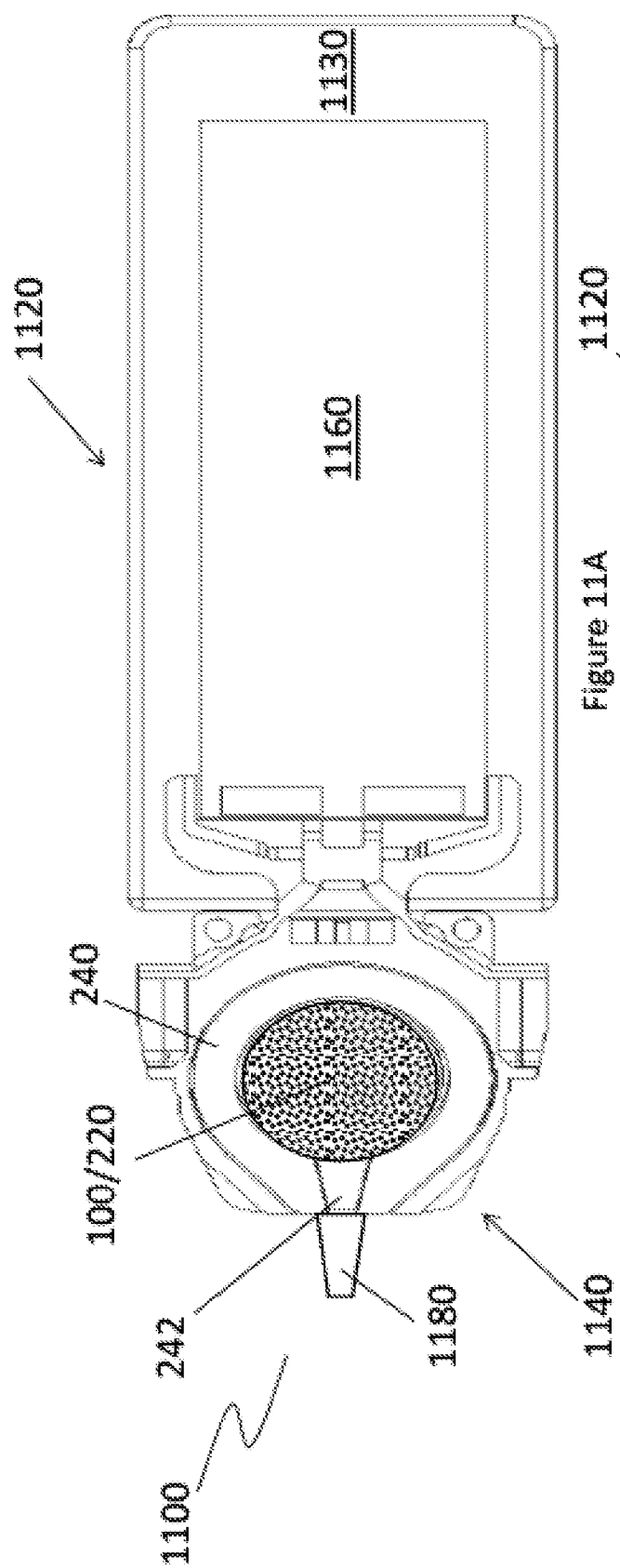

Figure 11A

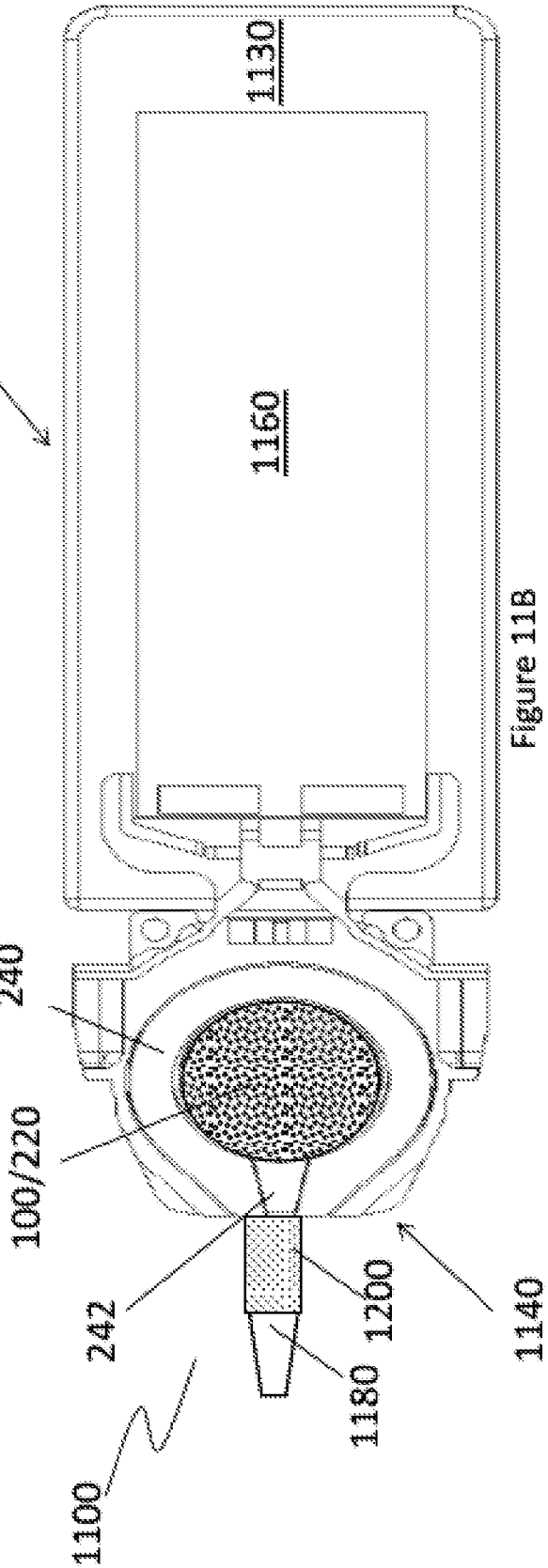

Figure 11B

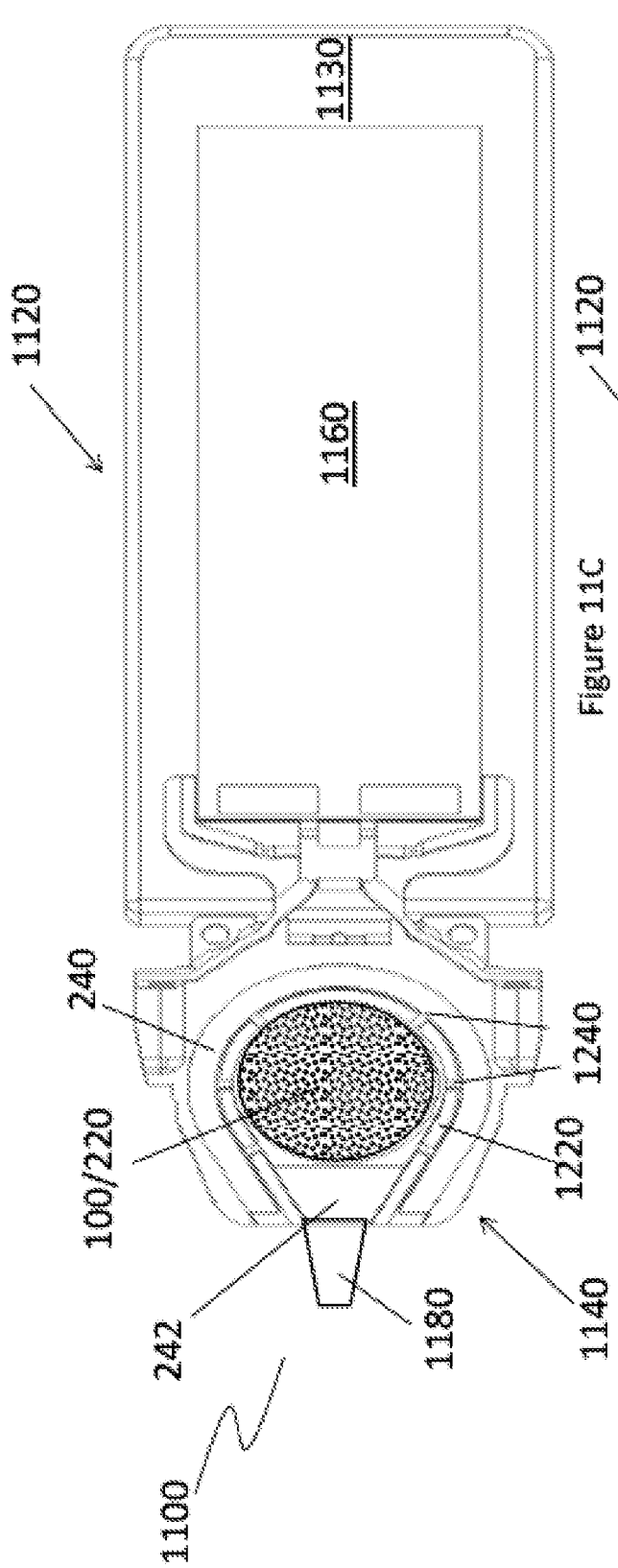

Figure 11C

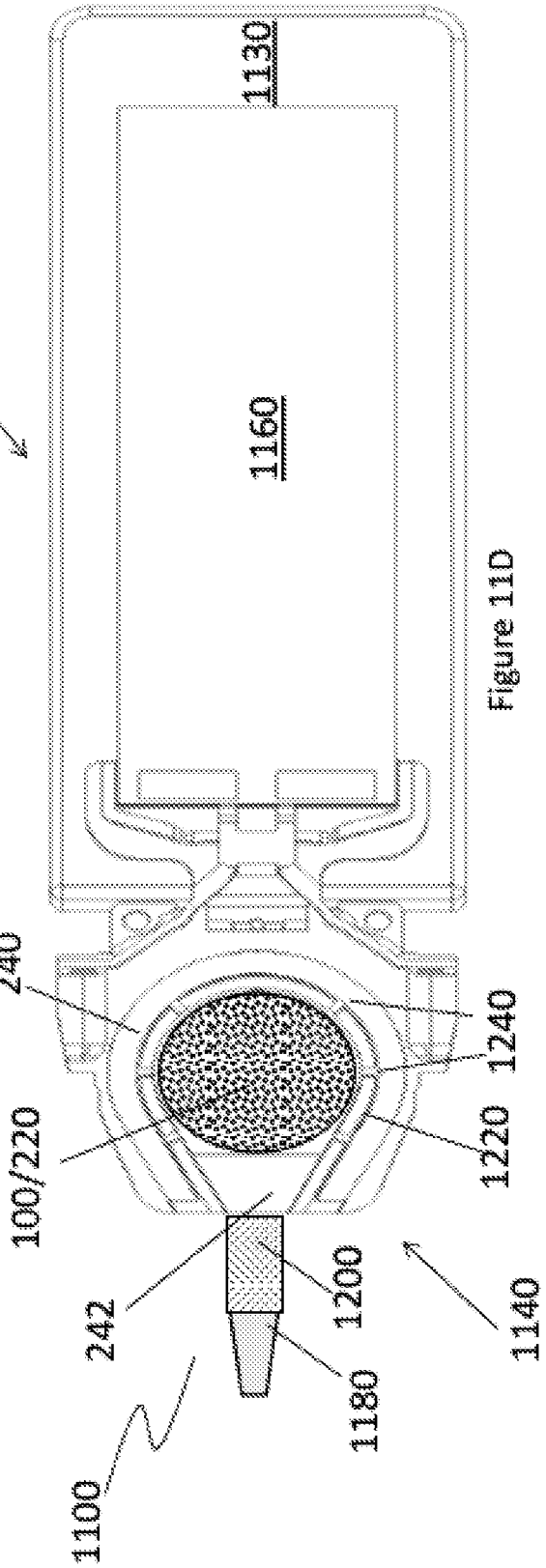

Figure 11D

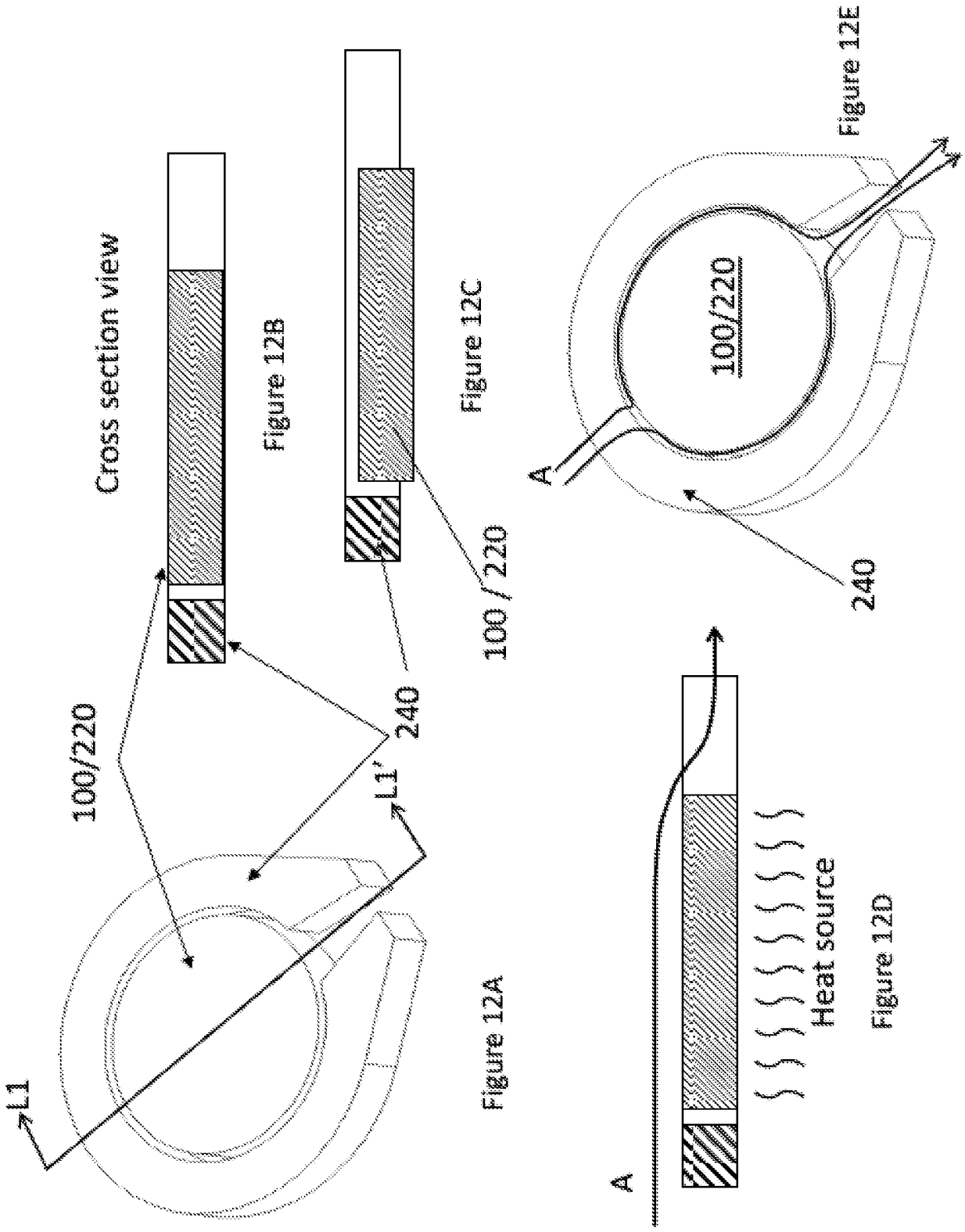
L1
100/220
L1'
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Figure 12A
Cross section view
Figure 12B
100 / 220
Figure 12C
A
Heat source
Figure 12D
100/220
A
240
Figure 12E

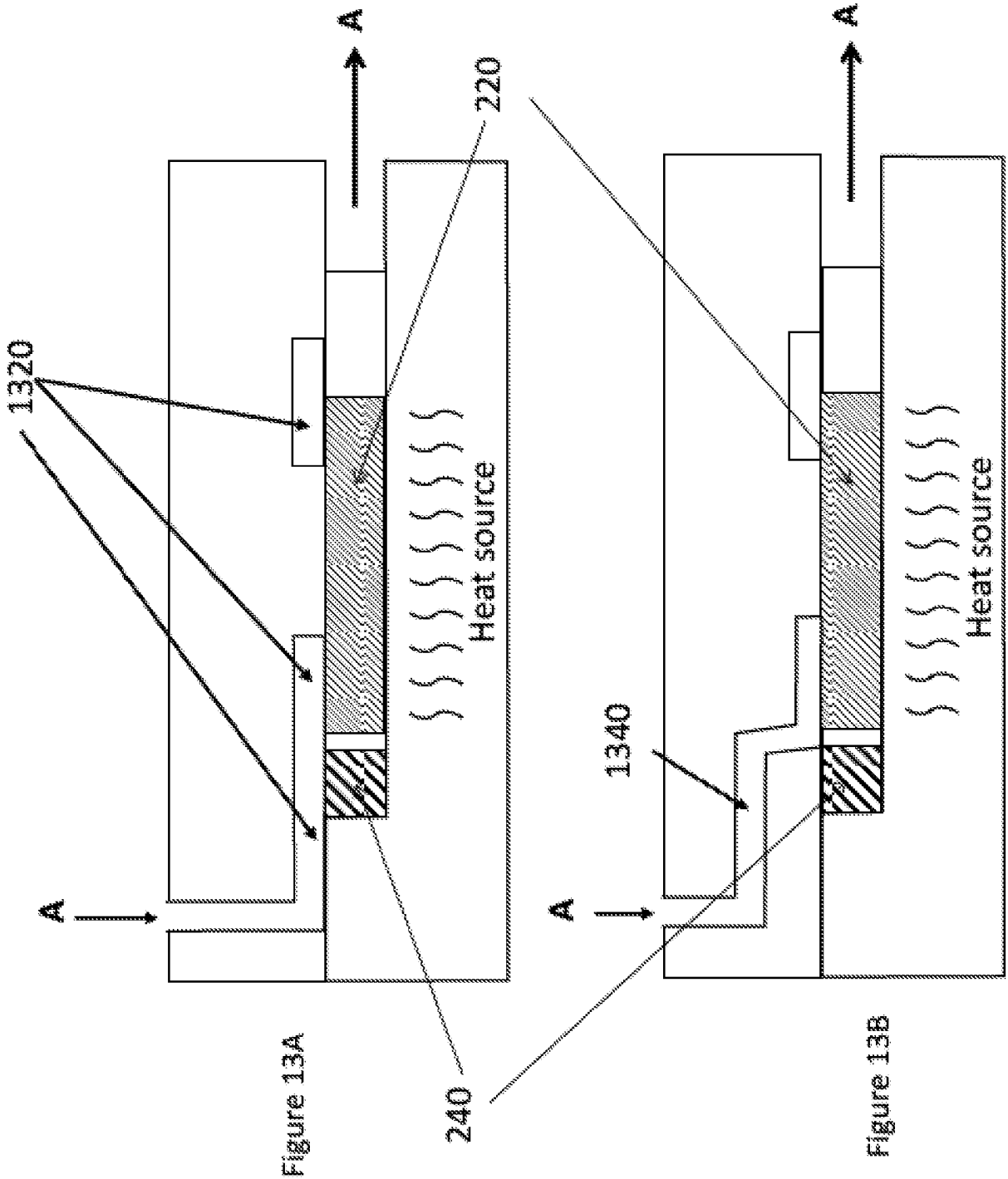

Figure 13A

Figure 13B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2019/050633

A. CLASSIFICATION OF SUBJECT MATTER

A24B 3/18 (2006.01) ***A24D 1/08 (2006.01)*** *H05B 1/00 (2006.01)*

According to International Patent Classification (IPC)

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24B 3/00; A24D 1/00

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)

FAMPAT: Tobacco, planar, arcuate shape, polygonal shape, hole, hollow, layer, casing containing heater, filter, 烟草, 平面, 多边形, 孔, 空心, 层, 壳, 加热器, 过滤, and related terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 2017/202953 A1 (PHILIP MORRIS PRODUCTS SA) 30 November 2017 Page 2 Lines 17-24, Page 11 Line 1-Pg. 12 Line 1, Page 15 Lines 9-25, Page 16 Line 6-Page 17 Line 3; Figures 1, 3, 4-7	1-7, 17 18, 19
X Y	CN 106136305 A (SHANGHAI TOBACCO GROUP CO LTD) 23 November 2016 Pages 2-5, 10, 13, 17, 19; Figures 1-4 of the machine translation	1-7, 17 18, 19
A	US 2009/0293889 A1 (KUMAR A. ET AL.) 3 December 2009 Paragraphs [0009, 0010, 0017, 0020-0026, 0085-0087, 0122]; Figures 1A-F	1-7, 17-19
A	US 2006/0191548 A1 (STRICKLAND J. A. ET AL.) 31 August 2006 Paragraphs [0003-0015, 0035, 0043, 0055, 0291]; Figures 1-5	1-7, 17-19
X Y	CN 108236130 A (SHENZHEN INNOKIN ELECTRONIC TECH CO LTD) 3 July 2018 Paragraphs [0020, 0043]; Figure 5 of the machine translation	8-16 18, 19

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

*Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05/03/2020 *(day/month/year)*	*18/03/2020* *(day/month/year)*

Name and mailing address of the ISA/SG

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2019/050633

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 107594623 A (CHINA TOBACCO ZHEJIANG IND CO ET AL.) 19 January 2018 Paragraphs [0029]; Figure 5 of the machine translation	8-16, 18, 19
A	US 2017/0303588 A1 (BATISTA R. N.) 26 October 2017 Paragraphs [0109-0112]; Figure 1	8-16, 18, 19
A	US 2017/0164657 A1 (BATISTA R. N.) 15 June 2017 Paragraphs [0086-0089]; Figures 2A, 2B	8-16, 18, 19

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2019/050633

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:

   because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:

   because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:

   because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please refer to Supplemental Box (Continuation of Box No. III).

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2019/050633

Supplemental Box
(Continuation of Box No. III)

This International Searching Authority found multiple inventions in this international application, as follows:

Invention I: Claims 1-7 and 17 (in full) and 18 and 19 (in part) relate to a unit for use with a device for heating the unit, the unit comprising: a tobacco material included in at least one layer, wherein the unit has a planar shape of one of the following: arcuate peripheral shape, polygonal peripheral shape, or combination thereof, and wherein the at least one layer is unwrapped.

Invention II: Claims 8-16 (in full) and 18 and 19 (in part) relate to a device suitable for heating a unit, the device comprising: a first heater including at least one first heating element arranged to (suitable for) heat the unit, the unit including at least one of a tobacco material and a non-tobacco material and wherein the unit has a planar shape of one of the following: arcuate peripheral shape, polygonal peripheral shape, or combination thereof, and wherein the at least one layer is unwrapped; and a casing for containing the first heater and at least one filter, and that defines therein a passageway including at least one filter slot for receiving the at least one filter and a first area, wherein the casing comprises a first opening suitable for insertion of the unit into the first area along a first direction, and wherein the at least one filter slot is disposed along the first direction in relation to the first area.

Please refer to **Box No. IV** of Written Opinion of The International Searching Authority (Form PCT/ISA/237) for detailed explanation.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/SG2019/050633

Note: This Annex lists known patent family members relating to the patent documents cited in this International Search Report. This Authority is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		CA 2951105 A1	14/01/2016