

UNIT, DEVICE, AND METHOD FOR HEATING A UNIT

TECHNICAL FIELD

5 **[0001]** The present disclosure relates to a unit, a device and a method for heating the unit.

BACKGROUND

10 **[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.

15 **[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

20 **[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.

25 **[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,
5 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.

10 **[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
15 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
20 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
25 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.

5 **[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
10 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.

15 **[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
20 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.

25

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

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

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

10 Figure 6 illustrates a device 600 and a device 650 according to some embodiments of the present disclosure.

Figure 7 illustrates a device 700 according to some embodiments of the present disclosure.

Figure 8 illustrates a device 800 according to some embodiments of the present disclosure.

15 **[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

20 **[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
25 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 word “tobacco” will be understood to include 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.

Unit 100

[0030] 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 unwrapped and may be formed with a resin, a powder, or a tube. The unit

100 may include at least one of nicotine, propylene glycol (PG), and vegetable glycol (VG).

[0031] The unit 100 may be casted, moulded, or shaped, formed by rolling, pressing, stamping, formed by injection or extruding, reconstituting or 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.

[0032] 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.

[0033] It is to be appreciated that the application of tactile pressure to the material 151 may be a squeezing action provided by fingers of the user to the material 151 before use of a device 300 (figure 3). It is to be appreciated that the number of the capsule is not limited to one shown in figure 1D and may be more than two.

[0034] The length of the unit 100 may be between about 5.0 mm and about 50.0 mm. The width of the unit 100 may be between about 5.0 and about 50.0mm. 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, and 1C and may be one of shapes of unit 100 shown in figure 2.

[0035] Figure 2 illustrates a unit 100 according to some embodiments of the present disclosure. The unit 100 may have a planar shape of one of the following: arcuate, polygonal or any other shape shown in figure 2. 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 have at least one hole (figure 2) and at least one hollow portion (not shown). The unit 100 including 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 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 the each layer structure can contribute to optimizing a result as characteristics of the each layer structure, thus giving optimal condition such as optimal heating condition or giving sequence of heating. 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.

[0036] 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.

[0037] 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.

[0038] 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,

5 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

10 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,

15 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,

20 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,

25 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.

[0039] The natural materials may be obtained from one or more of the following

30 plant parts: - leaf, bark, trunk, fruit, seed, stem, flower, pollen, branch, root, sap, pulp, resin bagasse, calyx of the respective flora.

[0040] 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.

5 **[0041]** 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
10 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.

Device 300

15 **[0042]** Figure 3 (figure 3A, figure 3B, figure 3C, figure 3D, and figure 3E) illustrates a device 300 according to some embodiments of the present disclosure. As shown in figure 3, the device 300 comprises a first substrate 311, a first heater 312, a second substrate 321, 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
20 filter 329a and the filter 329b may be collectively referred to as a filter 329.

[0043] 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
25 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-,
30 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.

[0044] As shown in figures 3A and 3D, 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.

[0045] The first substrate 311 may be rotatably 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 3A may be an angle defined between the first substrate 311 and the second substrate 321. Hereinafter a state as shown in figure 3A may be referred to as a first state. Each arrow shown in figures 3A to 3E 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.

[0046] 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 hold a variety of components including the unit 100. The cavities 312b, 322b may contain changeable hollow elements, flavour or aroma

elements, additional filter units, additional net filters, additional tobacco units and one or more air channel units.

[0047] 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
5 may be determined based on at least one of factors such as size of the unit 100 and/or size of the device 300.

[0048] As shown in figures 3A, and 3D, 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
10 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
15 closer one another to reduce the angle A1, a shape of the device 300 may be shown in figures 3B and 3D.

[0049] The filter 329a may be disposed along a direction shown by the arrow in figure 3 in relation to the second heater 322 and a sheet 900 (figure 4). That is, the filter 329a may be disposed downstream of the second heater 322 and a sheet 900. The filter
20 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,
25 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.

[0050] As shown in figures 3B, and 3D, the first substrate 311 and the second
30 substrate 321 face one another so that the unit 100 can be inserted between the first

heaters 312, 322 and heated by the first heaters 312, 322. Hereinafter a state as shown in figure 3B may be referred to as a second state.

5 **[0051]** 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.

10 **[0052]** 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 to the second opening 340. A part of the passageway 350 may be a filter slot for receiving the filter 329. The filter slot may be shaped nearby 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.

15 **[0053]** 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.

[0054] It is to be appreciated that as shown in figure 3E, the device 300 may comprise a second heater 382 with circular shape, instead of the second heater 322.

20 **[0055]** Figure 4 (figure 4A and figure 4B) illustrates a device 300 according to some embodiments of the present disclosure. As shown in figure 4A, the device 300 is in the first state so that a sheet 900 can be inserted into a first area 370 of the device 300 via the first opening 330

25 **[0056]** 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 4A is changed with the second state shown in figure 4B, the sheet 900 may be in contact with the first heater 312 and the second heater 322 and are heated by the first heater 312 and the second heater 322.

[0057] Assume that 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 to hold the sheet 900 in place while the user introduces the airflow and causes the aerosol from the tobacco material to flow towards the second opening 340 (e.g. a mouthpiece).

[0058] 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 heating profile 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 5.

[0059] Figure 5 illustrates a part of a device 300 according to some embodiments of the present disclosure. As shown in figure 5, 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. Each temperature to heat the compartments 501, 503, 505, 507, and 509 may be respectively at 410, 355, 200, 100, and 50 degrees Celsius. The number of the compartments 501, 503, 505, 507, and 509 may be respectively six, four, four, four, and two. It is to be appreciated that the each temperature of the heating elements is not limited to particular temperature.

25 Advantageous Effect

[0060] 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.

[0061] 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.

[0062] 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 6.

[0063] Figure 6 (figure 6A, figure 6B, figure 6C, figure 6D) illustrates a device 600, 650 according to some embodiments of the present disclosure. Figures 6A and 6B illustrate a device 600 with four heaters. Figures 6C and 6D illustrate a device 650 with four heaters.

5 **[0064]** As shown in figures 6A and 6B, the device 600 may comprise the second heater 322 and a second heater 622 with rectangular shape. The second heater 622 may be disposed along a direction shown by the arrow in figure 6 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 6B, a first heater 612 is provided on the first substrate
10 311 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 6B, the first heater 612 and the second heater 622 face one another and heat the sheet 900 (figure 4). Similarly, in the case where the device 600 is in the second state as in figure 6B, the first heater 312 and the second heater 322 face one another and heat the sheet 900 (figure 4).

15 **[0065]** 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
20 622 may be used for heating non-tobacco element (e.g. natural or aroma elements).

[0066] It is to be appreciated that the shape of the second heaters 322, 622 is not limited to the shape as shown in figures 6A, 6B and may be other shape as shown in figures 6C, 6D.

[0067] As shown in figures 6C and 6D, the device 650 may comprise the second
25 heaters 423, 623. The second heater 623 may be disposed along a direction shown by the arrows in figures 6C and 6D 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 6D, 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
30 along a direction shown by the arrow in figure 6D 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 6D, the first heater 613 and the second heater 623 face one another and heat the sheet 900 (figure 4). Similarly, in the case where the device 650 is in the second state as shown in figure 6D,
5 the first heater 413 and the second heater 423 face one another and heat the sheet 900 (figure 4). As shown in figures 6C and 6D, 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.

[0068] It is to be appreciated that the controller may comprise a first controller that
10 controls the first heater 312 and a second controller that controls the second heater 322.

[0069] Figure 7 illustrates a device 700 according to some embodiments of the present disclosure. As shown in figure 7, 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
15 329. 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.

[0070] 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
20 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 to receive therein the unit 100.

[0071] 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 7. 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
25 30 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.

[0072] The unit 100 may be shaped and dimensioned according to a configuration of the device 700.

- 5 **[0073]** 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.

[0074] Figure 8 illustrates a device 800 according to some embodiments of the present disclosure. As shown in figure 8, 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.

- 15 **[0075]** 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.

[0076] 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 8. 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.

[0077] The unit 100 may be shaped and dimensioned according to a configuration of the device 800.

[0078] 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
5 other end of the device 800.

[0079] When the first heater 811 receives the unit 100, the unit 100 is fastened to the first heater 811. 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 gradients. Each part of the first heaters 811 and 813 may be
10 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 7, 8.

[0080] 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
15 microprocessor, a microcontroller, 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).

[0081] 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.

[0082] As would be understood by a person skilled in the art, each embodiment, may
25 be used in combination with other embodiment or several embodiments.

Reference numerals

100: unit

- 101, 151: material
- 102, 152: coating means
- 300: device
- 311: first substrate
- 5 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
- 10 322, 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
- 15 350, 750, 850: passageway
- 370, 770, 870: first area
- 600, 650, 700, 800: device
- 811a: first element
- 811b: second element
- 20 900: sheet
- A1: angle

CLAIMS

1. 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
5 one layer, wherein the unit has a planar shape of one of the following: arcuate shape, polygonal shape, or combination thereof.
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,
10 rectangular, pentagonal, hexagonal, octagonal, heptagonal, octagonal, nonagonal, or decagonal shape.
3. The unit according to any one of the preceding claims, wherein the unit having the planar shape has a prism or cylindrical shape.
- 15 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 used
20 for heating the unit.
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
25 non-tobacco material is included in each of the plurality of layers.
7. A device for heating a unit, the device comprising: -
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;
30 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.

5 8. The device according to claim 7, 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 9 The device according to claim 8, further comprising: -
 a first controller arranged to control the plurality of first heating elements.

 10. The device according to claim 7, 8, or 9, further comprising: -
 a second heater including at least one second heating element arranged to heat
15 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.

20 11. The device according to according to claim 10, further comprising: -
 a second controller arranged to control the at least one second heating element.

 12. The device according to according to claim 10 or 11, in the case where the first
 substrate and/or the second substrate are rotated to get closer one another, the first heater
25 is in contact with the second heater or faces the second heater at a first distance apart.

 13. The device according to claim 7, 8, or 9, 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
30 disposed along the first direction in relation to the at least one filter slot.

14. The device according to claim 13, 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.

5 15. The device according to according to any one of claims 7 to 14, 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.

10 16. 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.

15