

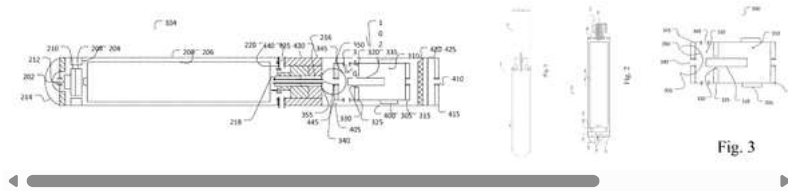


Cartomizer E-Cigarette

Abstract

An electronic cigarette with a battery unit and a cartomizer unit which includes a cartomizer component which integrates a liquid chamber for receiving a liquid solution and an atomization chamber disposed adjacent to the liquid chamber and separated therefrom by a dividing wall, the dividing wall having a dividing wall opening formed therein, and a guiding wick that extends through the dividing wall opening from the liquid chamber to the atomization chamber to supply liquid solution from the liquid chamber to the atomization chamber.

Images (6)



Classifications

■ **A24F40/44** Wicks

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Claims (19)

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What is claimed is:

1. A cartomizer unit for use in an electronic cigarette, the cartomizer unit comprising:
 - a liquid chamber for receiving a liquid solution;
 - an atomization chamber disposed adjacent to the liquid chamber and separated therefrom by a dividing wall, the dividing wall having a dividing wall opening formed therein;
 - at least one atomization chamber vent formed in the atomization chamber for receiving air and expelling a liquid solution aerosol mist; and
 - a guiding wick that extends through the dividing wall opening from the liquid chamber to the atomization chamber to supply liquid solution from the liquid chamber to the atomization chamber.
2. The cartomizer unit of claim 1, wherein the guiding wick comprises cotton.
3. The cartomizer unit of claim 1, further comprising:
 - a heating element disposed within the atomization chamber in proximity to the guiding wick for vaporizing the liquid solution supplied to the atomization chamber to provide a liquid solution aerosol mist.
4. The cartomizer unit of claim 3, further comprising an atomization chamber end cap with the heating element attached thereto such that the heating element is disposed within the atomization chamber and heating element terminals are disposed outside of the atomization chamber.
5. The cartomizer unit of claim 1, wherein the liquid chamber includes a liquid chamber end cap that is removable for allowing the liquid solution to be received by the liquid chamber.
6. The cartomizer unit of claim 5, wherein the liquid chamber end cap has an air intake opening formed therein wherein said air intake opening is covered with a semi-permeable membrane allowing air into said liquid chamber while retaining the liquid solution within the liquid chamber.
7. The cartomizer unit of claim 4, wherein the liquid chamber and the atomization chamber are disposed within a cylindrical mouthpiece tube wherein the end of said cylindrical mouthpiece tube adjacent to the liquid chamber is capped with a draw end cap and the end of said cylindrical mouthpiece tube adjacent to the atomization

US20130081642A1

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Worldwide applications

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Application US13/629,541 events

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2012-09-27 [Application filed by Individual](#)

2012-09-27 [Priority to US13/629,541](#)

2013-04-04 [Publication of US20130081642A1](#)

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2035-01-17 [Adjusted expiration](#)

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chamber is capped with a first fitting.

8. The cartomizer unit of claim 7, further comprising at least one rib attached to the outer wall of the atomization chamber or liquid chamber providing cartomizer unit annular space between the wall of the cylindrical mouthpiece tube and the atomization chamber and liquid chamber.

9. The cartomizer unit of claim 7, wherein the first fitting comprises an outer threaded fitting surrounding a cylindrical insulating core surrounding a heating element contact surrounding an axial air flow opening.

10. The cartomizer unit of claim 8, wherein the heating element terminals are connected to the heating element contact.

11. The cartomizer unit of claim 8, further comprising at least one first fitting air intake opening formed therein.

12. An electronic cigarette comprising:

a cartomizer unit comprising

a liquid chamber that contains a liquid solution,

an atomization chamber disposed adjacent to the liquid chamber and separated therefrom by a dividing wall, the dividing wall having a dividing wall opening formed therein, and a guiding wick that extends through the dividing wall opening from the liquid chamber to the atomization chamber to supply liquid solution from the liquid chamber to the atomization chamber; and

a power unit connected to the cartomizer unit.

13. The electronic cigarette of claim 12, further comprising:

a heating element disposed within the atomization chamber in proximity to the guiding wick for vaporizing the liquid solution supplied to the atomization chamber to provide a liquid solution aerosol mist.

14. The electronic cigarette of claim 12, wherein the liquid solution comprises a propylene glycol-based liquid solution.

15. The electronic cigarette of claim 12, wherein the liquid solution comprises a glycerin-based liquid solution.

16. The electronic cigarette of claim 12, wherein the liquid solution includes nicotine.

17. The electronic cigarette of claim 13, wherein the battery unit includes:

a battery;

switch controller circuitry connected to the battery configured to provide an activation signal to the heating element that causes the heating element to generate heat that vaporizes the liquid solution supplied to the atomization chamber to provide the liquid solution aerosol mist; and

a pressure sensor communicatively connected to the switch controller circuitry wherein the pressure sensor responds to a stimulus by causing the switch controller circuitry to provide the activation signal to the heating element.

18. An electronic cigarette comprising:

a mouthpiece tube having a mouthpiece opening formed in a draw end of the mouthpiece tube;

a cartomizer unit disposed within the mouthpiece tube to provide a cartomizer unit annular space between an inside wall of the mouthpiece tube and the cartomizer unit, the cartomizer unit including

(i) a liquid chamber that contains a liquid solution;

(ii) an atomization chamber disposed adjacent to the liquid chamber and separated therefrom by a dividing wall, the dividing wall having a dividing wall opening formed therein, the atomization chamber having one or more atomization chamber air intake openings formed therein, the atomization chamber further having one or more aerosol mist exit openings formed therein to provide liquid solution vapor mist communication between the atomization chamber and the cartomizer unit annular space; and

(iii) a guiding wick that extends through the dividing wall opening from the liquid chamber to the atomization chamber to supply liquid solution from the liquid chamber to the atomization chamber;

(iv) a heating element disposed within the atomization chamber in proximity to the guiding wick, the heating element responding to an activation signal by vaporizing the liquid solution supplied to the atomization chamber to provide liquid solution aerosol mist;

a first fitting disposed at a second end of the mouthpiece tube opposite the first end of the mouthpiece tube, the first fitting having an axial first fitting air flow opening formed therein to enable air flow through the first fitting to the cartomizer unit annular space;

a battery unit tube having one or more battery unit air intake openings formed therein;

a battery unit disposed within the battery unit tube to provide a battery unit annular space between an inside wall of the battery unit tube and the battery unit, the battery unit including

(i) a battery;

(ii) switch controller circuitry connected to the battery and that provides an activation signal to the heating element to generate heat that causes the heating element to vaporize the liquid solution in the atomization chamber to provide the liquid solution aerosol mist;

(iii) a pressure sensor connected to the switch controller circuitry and in air flow communication with the one or more battery unit air intake openings such that the pressure sensor responds to an air pressure change stimulus by causing the switch controller circuitry to provide the activation signal to the heating element; and

a second fitting disposed at a first end of the battery unit tube, the second fitting having an axial second fitting air flow opening formed therein, the second fitting being adapted for sealing connection to the first fitting such that the axial second fitting air flow opening is aligned with the axial first fitting air flow opening to provide air flow

communication between the battery unit annular space and the cartomizer unit annular space.

19. The electronic cigarette of claim 18, wherein the first fitting further comprises one or more first fitting air intake openings formed therein, and wherein the second fitting further comprises one or more second fitting air intake openings formed therein, the second fitting being adapted for sealing connection to the first fitting such that the one or more first fitting air intake openings are in air flow communication with the one or more second fitting air intake openings to provide air intake flow to the battery unit annular space.

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the benefit of U.S. Provisional Application No. 61/541,039, filed Sep. 29, 2011, by Robert Safari and titled "Cartomizer E-Cigarette", included by reference herein and for which benefit of the priority date is hereby claimed.

FEDERALLY SPONSORED RESEARCH

[0002] Not applicable.

SEQUENCE LISTING OR PROGRAM

[0003] Not applicable.

FIELD OF INVENTION

[0004] The present invention relates to electronic cigarettes (e-cigarettes) and, in particular, to a cartomizer e-cigarette in which a battery unit is connected to a cartomizer unit which includes a liquid chamber, an atomization chamber and a guiding wick that provides liquid solution from the liquid chamber to the atomization chamber.

BACKGROUND OF THE INVENTION

- [0005] An electronic cigarette, or e-cigarette, is an electronic device that simulates the act of tobacco smoking by producing an inhaled mist or aerosol bearing the physical sensation, appearance, and the flavor and nicotine of inhaled tobacco smoke, without the odor and health risks associated with tobacco cigarettes. An e-cigarette generally uses heat or ultrasonics to vaporize a propylene glycol- or glycerin-based liquid solution into an aerosol for inhalation.
- [0006] E-cigarettes are portable, self-contained cylindrical devices the size of which depends upon battery capacity. E-cigarettes have been designed to resemble actual cigarettes, cigars or even pipes. Some e-cigarettes are reusable, with replaceable and refillable parts; others are disposable.
- [0007] E-cigarettes share three essential components. A "cartridge" serves as a mouthpiece and usually doubles as a small reservoir that holds the liquid that is to be vaporized. An atomizer serves as the heating element responsible for vaporizing the liquid to provide the aerosol mist. A battery unit serves as a battery supply in portable e-cigarette models. Other electronic components necessary for e-cigarette operation are housed within the battery unit.
- [0008] A "cartomizer" option is available for many e-cigarettes. The cartomizer replaces the separate cartridge and atomizer components with a single integrated component, hence the nomenclature "cartomizer." The cartomizer is disposable, as opposed to stand-alone atomizers that are reusable and comparatively expensive.
- [0009] The cartridge is a small, usually disposable plastic container, with openings on each end. One end is placed in the user's mouth; the other end attaches to the atomizer. The cartridge serves as both a liquid reservoir and mouthpiece, and as such, must allow the passage of liquid to the atomizer, as well as aerosol from the atomizer back to the user's mouth without allowing liquid into the mouth. This is usually accomplished using an absorbent sponge-like material placed in the cartridge to keep the liquid in place and which rests on a plastic barrier separating it from the mouthpiece opening. The mouthpiece casing is constructed with side channels that allow aerosol mist to pass from the atomizer, around the liquid reservoir, to the mouthpiece opening and, thus, into the user's mouth. When the liquid in the cartridge has been depleted, the user can usually chose between refilling it or replacing it with another pre-filled cartridge.
- [0010] The atomizer is a heating element that is responsible for vaporizing the liquid solution. The atomizer typically includes a simple filament and metal mesh to draw the liquid solution in from the cartridge. The atomizer is positioned in the center of the three components. That is, the cartridge attaches to one end of the atomizer and the battery unit attaches to the other end of the atomizer. The atomizer's filament tends to lose efficiency over time due to a build-up of sediment, or burns out entirely, requiring replacement.
- [0011] Most portable e-cigarette battery units contain a rechargeable lithium-ion battery. The housing for the battery and the electronic circuitry required for operation of the e-cigarette is usually the largest component of the e-cigarette. The battery unit typically contains an electronic airflow sensor so that activation of the e-cigarette is triggered by drawing breath through the device. A colored LED may also be included in the battery unit to announce activation of the e-cigarette.
- [0012] The contents of the liquid solution used to produce aerosol mist in e-cigarettes vary widely, but their common aspects include water and flavorings (e.g., tobacco smoke) in a propylene glycol or glycerin base. Nicotine is also included in solutions intended to fulfill a nicotine replacement role, without the carcinogenic tar associated with tobacco smoke.
- [0013] U.S. Pat. No. 7,832,410, which issued on Nov. 16, 2010, discloses an example of an electronic atomization cigarette. U.S. Pat. No. 7,832,410 is hereby incorporated by reference herein in its entirety to provide background information regarding the present invention.

SUMMARY OF THE INVENTION

- [0014] An embodiment of the invention provides a cartomizer unit for use in an electronic cigarette. The cartomizer unit includes a liquid chamber for receiving a liquid solution, an atomization chamber disposed adjacent to the liquid chamber and separated therefrom by a dividing wall, the dividing wall having a dividing wall opening formed therein, and a guiding wick that extends through the dividing wall opening from the liquid chamber to the atomization chamber to supply liquid solution from the liquid chamber to the atomization chamber.
- [0015] The features and advantages of the present invention will be more fully understood and appreciated upon consideration of the following detailed description and accompanying drawings, which set forth illustrative embodiments in which the concepts of the invention are utilized.

BRIEF DESCRIPTION OF THE DRAWINGS

- [0016] A complete understanding of the present invention may be obtained by reference to the accompanying drawings, when considered in conjunction with the subsequent, detailed description, in which:
- [0017] FIG. 1 is a drawing illustrating an embodiment of a cartomizer e-cigarette in accordance with the concepts of the present invention comprising a battery unit connected to a cartomizer unit.
- [0018] FIG. 2 is a drawing illustrating the battery unit shown in FIG. 1
- [0019] FIG. 3 is an enlarged drawing illustrating the cartomizer component which is part of the cartomizer unit shown in FIG. 1.
- [0020] FIG. 4 is a drawing illustrating the cartomizer unit shown in FIG. 1.
- [0021] FIG. 5 is a drawing illustrating the FIG. 1 embodiment in more detail of a cartomizer e-cigarette wherein the cartomizer unit is connected to the battery unit to provide a unitary cartomizer e-cigarette device.

DETAILED DESCRIPTION

- [0022] Before the invention is described in further detail, it is to be understood that the invention is not limited to the particular embodiments described, as such may, of course, vary. It is also to be understood that the terminology used herein is for the purpose of describing particular embodiments only, and not intended to be limiting, since the scope of the present invention will be limited only by the appended claims.
- [0023] Where a range of values is provided, it is understood that each intervening value, to the tenth of the unit of the lower limit unless the context clearly dictates otherwise, between the upper and lower limit of that range and any other stated or intervening value in that stated range is encompassed with the invention. The

- upper and lower limits of these smaller ranges may independently be included in the smaller ranges is also encompassed within the invention, subject to any specifically excluded limit in the stated range. Where the stated range includes one or both of the limits, ranges excluding either or both of those included limits are also included in the invention.
- [0024] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. Although any methods and materials similar or equivalent to those described herein can also be used in the practice or testing of the present invention, a limited number of the exemplary methods and materials are described herein.
- [0025] It must be noted that as used herein and in the appended claims, the singular forms "a", "an", and "the" include plural referents unless the context clearly dictates otherwise.
- [0026] All publications mentioned herein are incorporated herein by reference to disclose and describe the methods and/or materials in connection with which the publications are cited. The publications discussed herein are provided solely for their disclosure prior to the filing date of the present application. Nothing herein is to be construed as an admission that the present invention is not entitled to antedate such publication by virtue of prior invention. Further, if dates of publication are provided, they may be different from the actual publication dates and may need to be confirmed independently.
- [0027] FIG. 1 generally shows an embodiment of a cartomizer e-cigarette **100**. The cartomizer e-cigarette **100** includes a cartomizer unit 102 and a battery unit 104 that attaches to the cartomizer unit **102**, as described in greater detail below.
- [0028] Turning now to FIG. 2, the battery unit **104** is shown in detail and separated from the cartomizer unit **102**. The battery unit **104** is disposed within a cylindrical battery unit tube **200** to provide a battery unit annular space **204** between an inside wall of the battery unit tube **200** and the battery **206**. In one embodiment, the cylindrical battery unit tube **200** is made from a metal to provide a durable product. In another embodiment, the cylindrical battery unit tube **200** is made from a plastic material to provide a more light weight product that more closely mimics the experience of a real cigarette. In the illustrated embodiment, the battery unit **104** has one or more battery unit air intake openings **202** formed near the "lighted" end of the e-cigarette **100**. The one or more battery unit air intake openings **202** are in air flow communication with the battery unit annular space **204**. The battery unit **104** includes a battery (e.g., a rechargeable lithium-ion battery) **206** that is electrically connected to switch controller circuitry **208**. Switch controller circuitry **208** provides an activation signal to the heating element in the cartomizer unit **104** as discussed hereunder. A pressure sensor **210** is connected to the switch controller circuitry **208** and is in air flow communication with the one or more battery unit air intake openings **202**. The pressure sensor **210** responds to an air pressure change stimulus by causing the switch controller circuitry **208** to provide the activation signal to the heating element in the cartomizer unit **104**.
- [0029] In the illustrated embodiment, a light emitting diode (LED) **212** is communicatively connected to the switch controller circuitry **208**. A light cap **214** fits into an open end of the battery unit tube **200**. The light cap **214** may be translucent and tinted so that, when the LED **212** is illuminated in response to the activation signal received from the switch controller circuitry **208**, the light cap **214** simulates the burning end of a lit tobacco cigarette. Battery units of the type described above are commercially available from Desay Polypower Battery Co., Ltd. located in Guangdong, China.
- [0030] In the illustrated embodiment, a second threaded male brass fitting **216** is disposed at a second end of the battery tube **200**. The second fitting **216** has an axial second air flow opening **218** formed therein. The second fitting **216** further includes one or more second fitting air intake openings **220** formed therein to provide air flow communication through the second fitting **216** to the battery unit annular space **204**. The second fitting **216** is adapted for sealing connection to the first fitting of the cartomizer unit **104** such that the axial second fitting air flow opening **218** aligns with the axial first fitting air flow opening of the cartomizer unit **104** to provide air flow communication between the battery unit annular space **204** and the cartomizer annular space in the cartomizer unit **104**, as more fully described below.
- [0031] Turning now to FIG. 3, the cartomizer component **300** of the cartomizer unit **104** is shown in detail. In the illustrated embodiment, the cartomizer component **300** includes a liquid chamber **310** that contains a liquid solution. In some embodiments, the liquid chamber **310** is refillable by removing the liquid chamber end cap **315** and introducing new liquid solution to the liquid chamber **310**. In other embodiments, the liquid chamber **310** may be sealed. In either case, the cartomizer component **300** may be removable and may be replaced with a new cartomizer component **300** that contains new liquid solution in the liquid chamber **310**. The liquid solution in the replacement cartomizer component **300** may be the same as or different than the liquid solution contained in the previous cartomizer component **300**. The liquid solution typically is a propylene glycol- or glycerin-based solution of the type well known to those skilled in the art. The liquid solution typically includes a flavoring, e.g., tobacco, and may also include nicotine, as is also well known to those skilled in the art.
- [0032] In the illustrated embodiment, the cartomizer component **300** further includes an atomization chamber **320** disposed adjacent to the liquid chamber **310** and separated therefrom by a dividing wall **325** that has a dividing wall opening **330** formed therein. A guiding wick **335**, e.g., a cotton wick, extends through the dividing wall opening **330** from the liquid chamber **310** to the atomization chamber **320** to supply liquid solution from the liquid chamber **310** to the atomization chamber **320**. In the illustrated embodiment, an atomization chamber air intake opening **340** is formed in an end wall **345** of the atomization chamber **320**. In one embodiment of the invention, the atomization chamber air intake opening **340** is an oval shape and disposed diagonally in the end wall **345**. Those skilled in the art will appreciate that one or more air intake openings may be formed in the walls of the atomization chamber **320**. The atomization chamber **320** also has one or more vapor exit openings **365** formed therein to provide liquid solution aerosol mist communication between the atomization chamber **320** and the cartomizer unit annular space, as discussed in greater detail below.
- [0033] A heating element **350** is disposed within the atomization chamber **320** in proximity to the guiding wick **335**. In the illustrated embodiment, the heating element **350** comprises a simple wire coil filament that is wrapped around a cylindrical insulating core. The heating element **350** responds to an activation signal by vaporizing the liquid solution supplied to the atomization chamber **320** to provide liquid solution aerosol mist.
- [0034] Turning now to FIG. 4, the cartomizer component **300** is shown disposed in the cartomizer unit **102**. The generally cylindrical cartomizer component **300** is disposed within a cylindrical mouthpiece tube **400**. In one embodiment, the cylindrical mouthpiece tube **400** is made from a metal to provide a durable product. In another embodiment, the cylindrical mouthpiece tube **400** is made from a plastic material to provide a more light weight product that more closely mimics the experience of a real cigarette. The cartomizer component **300** is of lesser diameter than the mouthpiece tube **400** so as to provide a cartomizer unit annular space **405** between the inside wall of the mouthpiece tube **400** and the outside wall of the cartomizer unit **102**. In some embodiments, a plurality of spaced apart ribs **305** are formed on the outside wall of the cartomizer component **300** to provide stability to the cartomizer component **300** within the mouthpiece tube **400** while still permitting air flow in the cartomizer unit annular space **405**. The mouthpiece tube **400** has a draw opening **410** formed in it so that a user can apply the inhale portion of the user's breath to the cartomizer unit annular space **405**. In the illustrated embodiment, a draw end cap **415**, e.g., a plastic cap, covers the draw end of the cylindrical mouthpiece tube **400** except for the axially located draw opening **410** formed through the cap **415**.
- [0035] The illustrated embodiment also includes a metal mesh pad **420** and a porous vinyl foam pad **425** disposed within the mouthpiece tube **400** between the liquid chamber **310** and the draw end of the mouthpiece tube **400**. Both the metal mesh pad **420** and the vinyl foam pad **425** are circular in shape and of approximately the same diameter as the inner wall of the mouthpiece tube **400**. The metal mesh pad **420** and the vinyl foam pad **425** remove liquid solution droplets that may exist within the aerosol mist passing from the cartomizer unit annular space **405** to the draw opening **410** to prevent the liquid solution droplets from reaching the user's mouth during a user inhale.
- [0036] As discussed above, the illustrated cartomizer unit **102** is, in keeping with the cylindrical shape of the e-cigarette **100**, a generally cylindrical unitary structure that may be formed in a variety of physical formations and may be formed by any suitable technique well known to those skilled in the art, including encapsulation techniques. The cartomizer component **300** may be made of any suitable material well known to those skilled in the art, such as those used for drug delivery, liquid encapsulated capsules, or other encapsulation materials. Single wall or multi-wall structures may be used to tailor stability, strength and rupture resistance of the cartomizer component **300**.
- [0037] In the illustrated embodiment, a first threaded female brass fitting **435** is disposed at a second end of the mouthpiece tube **400**. The first fitting **435** has an axial air flow opening **445** formed therein to enable air flow through the first fitting **435** to the cartomizer unit annular space **405**. The first fitting **435** also includes one

or more first fitting air intake openings **440** formed at the end of the threaded portion of the first fitting **435**.

- [0038] FIG. 5 shows the sealed connection of the cartomizer unit **102** and the battery unit **104** by the threaded engagement of the male fitting **216** of the battery unit **104** with the female fitting **435** of the cartomizer unit **102** to provide the unitary structure of the cartomizer e-cigarette **100**. FIG. 5 further shows that, when the first and second fittings are connected, the one or more first fitting air intake openings **440** are in air flow communication with the one or more second fitting air intake openings **220** to provide air intake flow to the battery unit annular space **204**.
- [0039] With reference to FIG. 5, when a user applies an inhale portion of the user's breath to the mouthpiece end of the cartomizer unit **102**, the pressure sensor **210** senses a pressure change in the interior of the e-cigarette **100** and causes the switch controller circuitry **208** to activate the heating element **350** by applying a current from the electronically connected battery **206**, thereby producing a liquid solution aerosol mist in the atomization chamber **320**. The user's inhale also causes air intake at the first fitting air intake openings **440**, which is passed through the second fitting air intake openings **220**, through the axial second air flow opening **218** and axial first air flow opening **445** in the second fitting **216** and first fitting **435**, respectively, to combine with the liquid solution aerosol mist formed in the atomization chamber **320** and pass through cartomizer unit annular space **405** and the draw end opening **410** into the user's mouth. At the same time, air flow passes through the battery unit air intake openings **202**, through the battery unit annular space **204** and the axial second air flow opening **218** and axial first air flow opening **445** in the second fitting **216** and first fitting **435**, respectively, to also combine with the liquid solution aerosol mist flowing to the user's mouth through the draw opening **410**.
- [0040] It should be further understood that the examples and embodiments pertaining to the systems and methods disclosed herein are not meant to limit the possible implementations of the present technology. Further, although the subject matter has been described in a language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described above. Rather, the specific features and acts described above are disclosed as example forms of implementing the Claims.
- [0041] Since other modifications and changes varied to fit particular operating requirements and environments will be apparent to those skilled in the art, the invention is not considered limited to the example chosen for purposes of disclosure, and covers all changes and modifications which do not constitute departures from the true spirit and scope of this invention.
- [0042] Since other modifications and changes varied to fit particular operating requirements and environments will be apparent to those skilled in the art, the invention is not considered limited to the example chosen for purposes of disclosure, and covers all changes and modifications which do not constitute departures from the true spirit and scope of this invention.
- [0043] Since other modifications and changes varied to fit particular operating requirements and environments will be apparent to those skilled in the art, the invention is not considered limited to the example chosen for purposes of disclosure, and covers all changes and modifications which do not constitute departures from the true spirit and scope of this invention.

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Family To Family Citations				
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US20150053217A1 *	2012-10-25	2015-02-26	Matthew Steingraber	Electronic cigarette
WO2015027473A1 *	2013-08-30	2015-03-05	吉瑞高新科技股份有限公司	Battery component and electronic cigarette
US8997753B2	2012-01-31	2015-04-07	Altria Client Services Inc.	Electronic smoking article
WO2015054870A1 *	2013-10-17	2015-04-23	吉瑞高新科技股份有限公司	Battery assembly and electronic cigarette
WO2015054885A1 *	2013-10-18	2015-04-23	Nicoventures Holdings Limited	Electronic vapour provision system
US9078473B2	2011-08-09	2015-07-14	R.J. Reynolds Tobacco Company	Smoking articles and use thereof for yielding inhalation materials
US9095175B2	2010-05-15	2015-08-04	R. J. Reynolds Tobacco Company	Data logging personal vaporizing inhaler
WO2015117704A1 *	2014-02-10	2015-08-13	Philip Morris Products S.A.	An aerosol-generating system having a heater assembly and a cartridge for an aerosol-generating system having a fluid permeable heater assembly
EP2918181A1 *	2014-01-27	2015-09-16	Shenzhen Smaco Technology Limited	Disposable electronic cigarette with a u-shaped tar guide and with a fiber pipe
US20150272216A1 *	2014-03-31	2015-10-01	Westfield Limited (Ltd.)	Personal vaporizer with liquid supply by suction
WO2015157969A1 *	2014-04-17	2015-10-22	吉瑞高新科技股份有限公司	Electronic cigarette
WO2015158195A1 *	2014-04-16	2015-10-22	林光裕	Electronic cigarette and method for assembling same
WO2015180160A1 *	2014-05-30	2015-12-03	深圳市杰仕博科技有限公司	Electronic atomization apparatus with air inlet capable of being opened and closed
EP2953187A1 *	2014-06-06	2015-12-09	Jinzheng Huang	Battery for electronic cigarette
WO2015184580A1 *	2014-06-03	2015-12-10	深圳麦克韦尔股份有限公司	Electronic cigarette holder and electronic cigarette
US20150359261A1 *	2014-06-13	2015-12-17	Shenzhen First Union Technology Co., Ltd.	Atomizer and electronic cigarette having same
WO2016004576A1 *	2014-07-08	2016-01-14	深圳市康尔科技有限公司	Electronic cigarette allowing liquid to be injected from top and heating assembly to be replaced at bottom
WO2015179002A3 *	2014-03-11	2016-01-21	Voodoo Science Llc	Electronic cigarette assembly with disposable tank
US9259035B2	2010-05-15	2016-02-16	R. J. Reynolds Tobacco Company	Solderless personal vaporizing inhaler
US9277770B2	2013-03-14	2016-03-08	R. J. Reynolds Tobacco Company	Atomizer for an aerosol delivery device formed from a continuously extending wire and related input, cartridge, and method
US20160120223A1 *	2014-10-29	2016-05-05	Jarrett KEEN	E-vaping section for an e-vaping device
WO2016073709A1 *	2014-11-05	2016-05-12	Altria Client Services Llc	Electronic vaping device
US9352288B2	2010-05-15	2016-05-31	Rai Strategic Holdings, Inc.	Vaporizer assembly and cartridge
CN105636463A *	2013-09-05	2016-06-01	吉瑞高新科技股份有限公司	Battery components and electronic cigarettes

WO2016109701A1 *	2014-12-31	2016-07-07	Voodoo Science Llc	Enhanced modular electronic cigarette assembly with disposable elements including tanks
US9423152B2	2013-03-15	2016-08-23	R. J. Reynolds Tobacco Company	Heating control arrangement for an electronic smoking article and associated system and method
US20160262455A1 *	2015-03-10	2016-09-15	Shenzhen Smoore Technology Limited	Electronic cigarette
US9451791B2	2014-02-05	2016-09-27	Rai Strategic Holdings, Inc.	Aerosol delivery device with an illuminated outer surface and related method
CN105962417A *	2015-03-13	2016-09-28	方特慕控股第私人有限公司	Aerosol generating component for an electronic smoking device, electronic smoking device and method for generating an inhalant
US20160286858A1 *	2013-12-30	2016-10-06	Qiuming Liu	Electronic cigarette, and battery rod and atomizer
US9491974B2	2013-03-15	2016-11-15	Rai Strategic Holdings, Inc.	Heating elements formed from a sheet of a material and inputs and methods for the production of atomizers
US20160338413A1 *	2015-09-02	2016-11-24	Shenzhen First Union Technology Co., Ltd.	Atomizing head, atomizer and electronic cigarette having same
US20160345621A1 *	2015-06-01	2016-12-01	San Li	Pre-vapor formulation of an electronic vaping device and/or methods of manufacturing the same
US20170006918A1 *	2015-07-07	2017-01-12	Smisss Technology Co., Ltd.	Cigarette distillation and atomization device
US20170013878A1 *	2015-07-16	2017-01-19	Njoy, Inc.	Vaporizer tank with atomizer
US20170027230A1 *	2015-07-31	2017-02-02	Avanzato Technology Corp.	Disposable assembly for vaporizing e-liquid and a method of using the same
EP3127441A1 *	2015-08-06	2017-02-08	Fontem Holdings 1 B.V.	Electronic smoking device with a glass capillary tube
WO2017035720A1 *	2015-08-31	2017-03-09	深圳瀚星翔科技有限公司	E-cigarette
US9597466B2	2014-03-12	2017-03-21	R. J. Reynolds Tobacco Company	Aerosol delivery system and related method, apparatus, and computer program product for providing control information to an aerosol delivery device via a cartridge
US9609895B2	2014-08-21	2017-04-04	Rai Strategic Holdings, Inc.	System and related methods, apparatuses, and computer program products for testing components of an aerosol delivery device
US9609893B2	2013-03-15	2017-04-04	Rai Strategic Holdings, Inc.	Cartridge and control body of an aerosol delivery device including anti-rotation mechanism and related method
EP3035813A4 *	2013-08-20	2017-04-05	VMR Products, LLC	Vaporizer
US9645134B1	2013-09-09	2017-05-09	Celerion, Inc.	Isotopically-labeled solvents and the use of same in testing e-cigarettes
EP3162226A4 *	2014-06-25	2017-06-07	Lin, Guangrong	Electronic cigarette
JP2017517246A *	2014-04-01	2017-06-29	ジー. デー ソチエタ ベル アツィオ ニ G. D S o c i e t a P e r A z i o n i	Disposable electronic cigarette cartridge and manufacturing method thereof
US9717276B2	2013-10-31	2017-08-01	Rai Strategic Holdings, Inc.	Aerosol delivery device including a positive displacement aerosol delivery mechanism
US9743691B2	2010-05-15	2017-08-29	Rai Strategic Holdings, Inc.	Vaporizer configuration, control, and reporting
US9795170B1 *	2016-08-07	2017-10-24	Xiaochun Zhu	E-liquid separation mechanism and electronic cigarette having the same
US9801416B2	2006-10-18	2017-10-31	Rai Strategic Holdings, Inc.	Tobacco-containing smoking article
US9814262B2	2012-07-11	2017-11-14	Sis Resources, Ltd.	Hot-wire control for an electronic cigarette
US9833019B2	2014-02-13	2017-12-05	Rai Strategic Holdings, Inc.	Method for assembling a cartridge for a smoking article
US9839238B2	2014-02-28	2017-12-12	Rai Strategic Holdings, Inc.	Control body for an electronic smoking article
US9839237B2	2013-11-22	2017-12-12	Rai Strategic Holdings, Inc.	Reservoir housing for an electronic smoking article
WO2017210898A1 *	2016-06-08	2017-12-14	深圳麦克韦尔股份有限公司	Electronic cigarette and atomizing device thereof
US9854841B2	2012-10-08	2018-01-02	Rai Strategic Holdings, Inc.	Electronic smoking article and associated method
USD806941S1	2015-04-22	2018-01-02	Altria Client Services Llc	E-vapor device including pre-sealed cartridge

WO2018000351A1 *	2016-06-30	2018-01-04	惠州市吉瑞科技有限公司深圳分公司	Electronic cigarette
US9864947B1	2016-11-15	2018-01-09	Rai Strategic Holdings, Inc.	Near field communication for a tobacco-based article or package therefor
USD807574S1	2016-08-12	2018-01-09	Altria Client Services Llc	E-vapor device including pre-sealed cartridge
US20180007967A1 *	2016-07-08	2018-01-11	Rai Strategic Holdings, Inc.	Aerosol delivery device with condensing and non-condensing vaporization
US9877510B2	2014-04-04	2018-01-30	Rai Strategic Holdings, Inc.	Sensor for an aerosol delivery device
US20180027876A1 *	2016-07-28	2018-02-01	Rai Strategic Holdings, Inc.	Aerosol delivery devices including a selector and related methods
US9885702B1	2013-09-09	2018-02-06	Celerion, Inc.	Isotopically-labeled solvents and the use of same in testing E-cigarettes
US9888722B2 *	2015-10-22	2018-02-13	Shenzhen Smoore Technology Limited	Electronic cigarette and atomizing assembly and atomizing element thereof
US20180055090A1 *	2016-08-31	2018-03-01	Altria Client Services Llc	Methods and systems for cartridge identification
US9907341B1 *	2017-03-09	2018-03-06	Shenzhen Kanger Technologies Co., Ltd.	E-liquid separation mechanism and electronic cigarette having the same
US9913493B2	2014-08-21	2018-03-13	Rai Strategic Holdings, Inc.	Aerosol delivery device including a moveable cartridge and related assembly method
US9918495B2	2014-02-28	2018-03-20	Rai Strategic Holdings, Inc.	Atomizer for an aerosol delivery device and related input, aerosol production assembly, cartridge, and method
US9924741B2	2014-05-05	2018-03-27	Rai Strategic Holdings, Inc.	Method of preparing an aerosol delivery device
US9936733B2	2016-03-09	2018-04-10	Rai Strategic Holdings, Inc.	Accessory configured to charge an aerosol delivery device and related method
US9955726B2	2014-05-23	2018-05-01	Rai Strategic Holdings, Inc.	Sealed cartridge for an aerosol delivery device and related assembly method
US9955733B2	2015-12-07	2018-05-01	Rai Strategic Holdings, Inc.	Camera for an aerosol delivery device
WO2018084835A1 *	2016-11-01	2018-05-11	GS Holistic, LLC	Handheld vaporizer
US9974334B2	2014-01-17	2018-05-22	Rai Strategic Holdings, Inc.	Electronic smoking article with improved storage of aerosol precursor compositions
US9980516B2	2015-03-09	2018-05-29	Rai Strategic Holdings, Inc.	Aerosol delivery device including a wave guide and related method
US9999258B2	2015-04-22	2018-06-19	Altria Client Services Llc	Pod assembly, dispensing body, and e-vapor apparatus including the same
US9999250B2	2010-05-15	2018-06-19	Rai Strategic Holdings, Inc.	Vaporizer related systems, methods, and apparatus
US10004259B2	2012-06-28	2018-06-26	Rai Strategic Holdings, Inc.	Reservoir and heater system for controllable delivery of multiple aerosolizable materials in an electronic smoking article
US10015987B2	2015-07-24	2018-07-10	Rai Strategic Holdings Inc.	Trigger-based wireless broadcasting for aerosol delivery devices
US10015989B2	2016-01-27	2018-07-10	Rai Strategic Holdings, Inc.	One-way valve for refilling an aerosol delivery device
US10015991B1	2016-12-29	2018-07-10	Altria Client Services Llc	Hybrid E-vaping cartridge, E-vaping device including a hybrid E-vaping cartridge, and method of making thereof
US10027016B2	2015-03-04	2018-07-17	Rai Strategic Holdings Inc.	Antenna for an aerosol delivery device
US10028537B1	2015-04-22	2018-07-24	Altria Client Services Llc	Pod assembly, dispensing body, and E-vapor apparatus including the same
US10031183B2	2013-03-07	2018-07-24	Rai Strategic Holdings, Inc.	Spent cartridge detection method and system for an electronic smoking article
US10028534B2	2016-04-20	2018-07-24	Rai Strategic Holdings, Inc.	Aerosol delivery device, and associated apparatus and method of formation thereof
US10034988B2	2012-11-28	2018-07-31	Fontem Holdings I B.V.	Methods and devices for compound delivery
USD825102S1	2016-07-28	2018-08-07	Juul Labs, Inc.	Vaporizer device with cartridge
US10045568B2	2013-12-23	2018-08-14	Juul Labs, Inc.	Vaporization device systems and methods
US10045567B2	2013-12-23	2018-08-14	Juul Labs, Inc.	Vaporization device systems and methods

US10051891B2	2016-01-05	2018-08-21	Rai Strategic Holdings, Inc.	Capacitive sensing input device for an aerosol delivery device
US10058123B2	2014-07-11	2018-08-28	R. J. Reynolds Tobacco Company	Heater for an aerosol delivery device and methods of formation thereof
US10058125B2	2015-10-13	2018-08-28	Rai Strategic Holdings, Inc.	Method for assembling an aerosol delivery device
US10058130B2	2013-12-23	2018-08-28	Juul Labs, Inc.	Cartridge for use with a vaporizer device
US10076139B2	2013-12-23	2018-09-18	Juul Labs, Inc.	Vaporizer apparatus
US10080387B2	2016-09-23	2018-09-25	Rai Strategic Holdings, Inc.	Aerosol delivery device with replaceable wick and heater assembly
US10085485B2	2016-07-06	2018-10-02	Rai Strategic Holdings, Inc.	Aerosol delivery device with a reservoir housing and a vaporizer assembly
US10092036B2	2015-12-28	2018-10-09	Rai Strategic Holdings, Inc.	Aerosol delivery device including a housing and a coupler
US10092713B2	2010-05-15	2018-10-09	Rai Strategic Holdings, Inc.	Personal vaporizing inhaler with translucent window
US10104915B2	2013-12-23	2018-10-23	Juul Labs, Inc.	Securely attaching cartridges for vaporizer devices
US10104913B2	2015-04-22	2018-10-23	Altria Client Services Llc	Pod assembly, dispensing body, and E-vapor apparatus including the same
US10104912B2	2016-01-20	2018-10-23	Rai Strategic Holdings, Inc.	Control for an induction-based aerosol delivery device
US10111470B2	2013-12-23	2018-10-30	Juul Labs, Inc.	Vaporizer apparatus
US10117460B2	2012-10-08	2018-11-06	Rai Strategic Holdings, Inc.	Electronic smoking article and associated method
US10136672B2	2010-05-15	2018-11-27	Rai Strategic Holdings, Inc.	Solderless directly written heating elements
USD834743S1	2013-10-14	2018-11-27	Altria Client Services Llc	Smoking article
USD836541S1	2016-06-23	2018-12-25	Pax Labs, Inc.	Charging device
US10159278B2	2010-05-15	2018-12-25	Rai Strategic Holdings, Inc.	Assembly directed airflow
US10172387B2	2013-08-28	2019-01-08	Rai Strategic Holdings, Inc.	Carbon conductive substrate for electronic smoking article
US10172388B2	2015-03-10	2019-01-08	Rai Strategic Holdings, Inc.	Aerosol delivery device with microfluidic delivery component
US10172392B2	2016-11-18	2019-01-08	Rai Strategic Holdings, Inc.	Humidity sensing for an aerosol delivery device
US10194694B2	2016-01-05	2019-02-05	Rai Strategic Holdings, Inc.	Aerosol delivery device with improved fluid transport
US10194693B2	2013-09-20	2019-02-05	Fontem Holdings 1 B.V.	Aerosol generating device
US10201185B2	2014-05-12	2019-02-12	Loto Labs, Inc.	Vaporizer device
US10201187B2	2015-11-02	2019-02-12	Rai Strategic Holdings, Inc.	User interface for an aerosol delivery device
EP3214957B1	2014-11-07	2019-02-13	Nicoventures Holdings Limited	Container containing a nicotine solution
USD841231S1	2013-01-14	2019-02-19	Altria Client Services, Llc	Electronic vaping device mouthpiece
US10206431B2	2016-11-18	2019-02-19	Rai Strategic Holdings, Inc.	Charger for an aerosol delivery device
US10206429B2	2015-07-24	2019-02-19	Rai Strategic Holdings, Inc.	Aerosol delivery device with radiant heating
USD842536S1	2016-07-28	2019-03-05	Juul Labs, Inc.	Vaporizer cartridge
US10231485B2	2016-07-08	2019-03-19	Rai Strategic Holdings, Inc.	Radio frequency to direct current converter for an aerosol delivery device
US10238145B2	2015-05-19	2019-03-26	Rai Strategic Holdings, Inc.	Assembly substation for assembling a cartridge for a smoking article
US10244793B2	2005-07-19	2019-04-02	Juul Labs, Inc.	Devices for vaporization of a substance
US10251425B2	2015-07-06	2019-04-09	Njoy, Llc	Vaporizing device with power component
US10258086B2	2016-01-12	2019-04-16	Rai Strategic Holdings, Inc.	Hall effect current sensor for an aerosol delivery device
US10264821B2	2016-03-21	2019-04-23	Altria Client Services Llc	Electronic vaping device
USD848057S1	2016-06-23	2019-05-07	Pax Labs, Inc.	Lid for a vaporizer
US10279934B2	2013-03-15	2019-05-07	Juul Labs, Inc.	Fillable vaporizer cartridge and method of filling
USD849993S1	2013-01-14	2019-05-28	Altria Client Services	Electronic smoking article

USD849996S1	2016-06-16	2019-05-28	Pax Labs, Inc.	Vaporizer cartridge
WO2019100229A1 *	2017-11-22	2019-05-31	惠州市吉瑞科技有限公司深圳分公司	Atomization assembly and electronic cigarette
WO2019104457A1 *	2017-11-28	2019-06-06	惠州市吉瑞科技有限公司深圳分公司	Atomizer assembly for easily adding e-liquid, and electronic cigarette
WO2019104576A1 *	2017-11-30	2019-06-06	惠州市吉瑞科技有限公司深圳分公司	Electronic atomization device
US10314340B2	2017-04-21	2019-06-11	Rai Strategic Holdings, Inc.	Refillable aerosol delivery device and related method
USD851830S1	2016-06-23	2019-06-18	Pax Labs, Inc.	Combined vaporizer tamp and pick tool
US10321711B2	2015-01-29	2019-06-18	Rai Strategic Holdings, Inc.	Proximity detection for an aerosol delivery device
US10333339B2	2016-04-12	2019-06-25	Rai Strategic Holdings, Inc.	Charger for an aerosol delivery device
RU2692831C2 *	2014-11-17	2019-06-28	Макнейл АБ	Disposable cartridge for use in electronic nicotine delivery system
US10334880B2	2016-03-25	2019-07-02	Rai Strategic Holdings, Inc.	Aerosol delivery device including connector comprising extension and receptacle
US10349684B2	2015-09-15	2019-07-16	Rai Strategic Holdings, Inc.	Reservoir for aerosol delivery devices
US10349674B2	2017-07-17	2019-07-16	Rai Strategic Holdings, Inc.	No-heat, no-burn smoking article
US10363707B2 *	2016-09-05	2019-07-30	G.D Societa' per Azioni	System and method for in-line controlling the ultrasonic welding of plastic components of an electronic cigarette
US10405581B2	2016-07-08	2019-09-10	Rai Strategic Holdings, Inc.	Gas sensing for an aerosol delivery device
US10405582B2	2016-03-10	2019-09-10	Pax Labs, Inc.	Vaporization device with lip sensing
US10405579B2	2016-04-29	2019-09-10	Rai Strategic Holdings, Inc.	Methods for assembling a cartridge for an aerosol delivery device, and associated systems and apparatuses
US20190297949A1 *	2014-05-21	2019-10-03	Philip Morris Products S.A.	Aerosol-generating system comprising a fluid permeable susceptor element
US10433585B2	2016-12-28	2019-10-08	Altria Client Services Llc	Non-combustible smoking systems, devices and elements thereof
US10440992B2	2015-12-07	2019-10-15	Rai Strategic Holdings, Inc.	Motion sensing for an aerosol delivery device
US10463076B2 *	2016-04-11	2019-11-05	Altria Client Services Llc	Electronic vaping device
US10470495B2	2015-10-21	2019-11-12	Rai Strategic Holdings, Inc.	Lithium-ion battery with linear regulation for an aerosol delivery device
US10477896B2	2016-10-12	2019-11-19	Rai Strategic Holdings, Inc.	Photodetector for measuring aerosol precursor composition in an aerosol delivery device
USD868366S1	2015-04-22	2019-11-26	Altria Client Services Llc	Electronic vapor device
US10492530B2	2016-11-15	2019-12-03	Rai Strategic Holdings, Inc.	Two-wire authentication system for an aerosol delivery device
US10500600B2	2014-12-09	2019-12-10	Rai Strategic Holdings, Inc.	Gesture recognition user interface for an aerosol delivery device
US10505383B2	2017-09-19	2019-12-10	Rai Strategic Holdings, Inc.	Intelligent charger for an aerosol delivery device
US10512282B2	2014-12-05	2019-12-24	Juul Labs, Inc.	Calibrated dose control
US10517330B2	2017-05-23	2019-12-31	RAI Strategic Holdings, Inc.	Heart rate monitor for an aerosol delivery device
US10517332B2	2017-10-31	2019-12-31	Rai Strategic Holdings, Inc.	Induction heated aerosol delivery device
US10517326B2	2017-01-27	2019-12-31	Rai Strategic Holdings, Inc.	Secondary battery for an aerosol delivery device
US10524509B2	2016-11-18	2020-01-07	Rai Strategic Holdings, Inc.	Pressure sensing for an aerosol delivery device
US10524508B2	2016-11-15	2020-01-07	Rai Strategic Holdings, Inc.	Induction-based aerosol delivery device
US10537137B2	2016-11-22	2020-01-21	Rai Strategic Holdings, Inc.	Rechargeable lithium-ion battery for an aerosol delivery device
USD874059S1	2015-04-22	2020-01-28	Altria Client Servies Llc	Electronic vaping device
USD874720S1	2015-04-22	2020-02-04	Altria Client Services, Llc	Pod for an electronic vaping device
US10555558B2	2017-12-29	2020-02-11	Rai Strategic Holdings, Inc.	Aerosol delivery device providing flavor control

US10575558B2	2014-02-03	2020-03-03	Rai Strategic Holdings, Inc.	Aerosol delivery device comprising multiple outer bodies and related assembly method
US10582726B2	2015-10-21	2020-03-10	Rai Strategic Holdings, Inc.	Induction charging for an aerosol delivery device
US10602775B2	2016-07-21	2020-03-31	Rai Strategic Holdings, Inc.	Aerosol delivery device with a unitary reservoir and liquid transport element comprising a porous monolith and related method
US10602774B2	2015-04-22	2020-03-31	Altria Client Services Llc	E-vapor devices including pre-sealed cartridges
JP2020048575A *	2013-09-30	2020-04-02	日本たばこ産業株式会社	Non-burning type flavor inhaler
US10617151B2	2016-07-21	2020-04-14	Rai Strategic Holdings, Inc.	Aerosol delivery device with a liquid transport element comprising a porous monolith and related method
US10653183B2	2016-11-18	2020-05-19	Rai Strategic Holdings, Inc.	Power source for an aerosol delivery device
US10660370B2	2017-10-12	2020-05-26	Rai Strategic Holdings, Inc.	Aerosol delivery device including a control body, an atomizer body, and a cartridge and related methods
US10667561B2	2013-11-12	2020-06-02	Vmr Products Llc	Vaporizer
USD887632S1	2017-09-14	2020-06-16	Pax Labs, Inc.	Vaporizer cartridge
US20200194758A1 *	2017-09-27	2020-06-18	Japan Tobacco Inc.	Battery unit and flavor inhaler
US10701981B2	2015-04-22	2020-07-07	Altria Client Services Llc	Pod assembly and e-vapor apparatus including the same
US10709173B2	2014-02-06	2020-07-14	Juul Labs, Inc.	Vaporizer apparatus
WO2020143039A1 *	2019-01-11	2020-07-16	惠州市吉瑞科技有限公司深圳分公司	Heating assembly and smoking device
CN111491528A *	2018-11-16	2020-08-04	韩国烟草人参公社	Aerosol generating device and system
US10765144B2	2014-08-21	2020-09-08	Rai Strategic Holdings, Inc.	Aerosol delivery device including a moveable cartridge and related assembly method
US10765146B2	2016-08-08	2020-09-08	Rai Strategic Holdings, Inc.	Boost converter for an aerosol delivery device
CN111642819A *	2020-06-30	2020-09-11	英华达 (上海) 科技有限公司	Electronic cigarette with filtering function
US10806181B2	2017-12-08	2020-10-20	Rai Strategic Holdings, Inc.	Quasi-resonant flyback converter for an induction-based aerosol delivery device
EP3510649B1	2016-09-09	2020-10-21	RAI Strategic Holdings, Inc.	Power source for an aerosol delivery device
US10820630B2	2015-11-06	2020-11-03	Rai Strategic Holdings, Inc.	Aerosol delivery device including a wirelessly-heated atomizer and related method
US20200345069A1 *	2018-01-24	2020-11-05	Nicoventures Trading Limited	Vapor provision apparatus and systems
US10827783B2	2017-02-27	2020-11-10	Rai Strategic Holdings, Inc.	Digital compass for an aerosol delivery device
US10842199B2	2014-11-17	2020-11-24	Mceuil Ab	Electronic nicotine delivery system
US10842197B2	2017-07-12	2020-11-24	Rai Strategic Holdings, Inc.	Detachable container for aerosol delivery having pierceable membrane
US10842193B2	2016-10-04	2020-11-24	Altria Client Services Llc	Non-combustible smoking device and elements thereof
US10865001B2	2016-02-11	2020-12-15	Juul Labs, Inc.	Fillable vaporizer cartridge and method of filling
US10888119B2	2014-07-10	2021-01-12	Rai Strategic Holdings, Inc.	System and related methods, apparatuses, and computer program products for controlling operation of a device based on a read request
US10912333B2	2016-02-25	2021-02-09	Juul Labs, Inc.	Vaporization device control systems and methods
US10918134B2	2015-10-21	2021-02-16	Rai Strategic Holdings, Inc.	Power supply for an aerosol delivery device
US10945462B2	2016-04-12	2021-03-16	Rai Strategic Holdings, Inc.	Detachable power source for an aerosol delivery device
US10952468B2	2013-05-06	2021-03-23	Juul Labs, Inc.	Nicotine salt formulations for aerosol devices and methods thereof
US10959458B2	2016-06-20	2021-03-30	Rai Strategic Holdings, Inc.	Aerosol delivery device including an electrical generator assembly
US10966460B2	2015-07-17	2021-04-06	Rai Strategic Holdings, Inc.	Load-based detection of an aerosol delivery device in an assembled arrangement
WO2021071084A1 *	2019-10-11	2021-04-15	주식회사 케이티앤지	Liquid cartridge and aerosol-generating device comprising same
US20210120872A1 *	2015-01-28	2021-04-29	Nicoventures Trading Limited	Apparatus for heating aerosol generating material

US11000069B2	2015-05-15	2021-05-11	Rai Strategic Holdings, Inc.	Aerosol delivery device and methods of formation thereof
US11019685B2	2014-02-06	2021-05-25	Juul Labs, Inc.	Vaporization device systems and methods
US11013266B2	2016-12-09	2021-05-25	Rai Strategic Holdings, Inc.	Aerosol delivery device sensory system including an infrared sensor and related method
US11019850B2	2018-02-26	2021-06-01	Rai Strategic Holdings, Inc.	Heat conducting substrate for electrically heated aerosol delivery device
WO2021102652A1 *	2019-11-25	2021-06-03	深圳雾芯科技有限公司	E-liquid
US11033054B2	2015-07-24	2021-06-15	Rai Strategic Holdings, Inc.	Radio-frequency identification (RFID) authentication system for aerosol delivery devices
US11039645B2	2017-09-19	2021-06-22	Rai Strategic Holdings, Inc.	Differential pressure sensor for an aerosol delivery device
US11044937B2	2014-11-07	2021-06-29	Nicoventures Trading Limited	Solution comprising nicotine in unprotonated form and protonated form
US11051554B2	2014-11-12	2021-07-06	Rai Strategic Holdings, Inc.	MEMS-based sensor for an aerosol delivery device
US11090450B2	2015-05-06	2021-08-17	Altria Client Services Llc	Non-combustible smoking device and components thereof
US11103012B2	2016-11-17	2021-08-31	Rai Strategic Holdings, Inc.	Satellite navigation for an aerosol delivery device
US11134544B2	2015-07-24	2021-09-28	Rai Strategic Holdings, Inc.	Aerosol delivery device with radiant heating
US11134715B2	2017-03-24	2021-10-05	Altria Client Services Llc	Methods and devices for cartridge authentication
US11207626B2 *	2017-07-19	2021-12-28	Vertigo Vapor LLC	Liquid restriction apparatus for use in a vaporizer
US11207478B2	2016-03-25	2021-12-28	Rai Strategic Holdings, Inc.	Aerosol production assembly including surface with micro-pattern
US11229239B2	2013-07-19	2022-01-25	Rai Strategic Holdings, Inc.	Electronic smoking article with haptic feedback
US11247003B2	2010-08-23	2022-02-15	Darren Rubin	Systems and methods of aerosol delivery with airflow regulation
US11246344B2	2012-03-28	2022-02-15	Rai Strategic Holdings, Inc.	Smoking article incorporating a conductive substrate
WO2022050560A1	2020-09-07	2022-03-10	Kt&G Corporation	Aerosol-generating apparatus and cartridge used for the aerosol-generating apparatus
US11291252B2	2015-12-18	2022-04-05	Rai Strategic Holdings, Inc.	Proximity sensing for an aerosol delivery device
US11297876B2	2017-05-17	2022-04-12	Rai Strategic Holdings, Inc.	Aerosol delivery device
US11337456B2	2017-07-17	2022-05-24	Rai Strategic Holdings, Inc.	Video analytics camera system for an aerosol delivery device
US11344683B2	2010-05-15	2022-05-31	Rai Strategic Holdings, Inc.	Vaporizer related systems, methods, and apparatus
US11357936B2	2016-02-25	2022-06-14	Altria Client Services Llc	Method and devices for controlling electronic vaping devices
US11357934B2	2015-04-22	2022-06-14	Altria Client Services Llc	Pod assembly, dispensing body, and e-vapor apparatus including the same
USRE49114E1 *	2011-06-28	2022-06-28	Juul Labs, Inc.	Electronic cigarette with liquid reservoir
US11412781B2	2016-02-12	2022-08-16	Rai Strategic Holdings, Inc.	Adapters for refilling an aerosol delivery device
US11452826B2	2016-03-24	2022-09-27	Nicoventures Trading Limited	Mechanical connector for electronic vapor provision system
US11504489B2	2015-07-17	2022-11-22	Rai Strategic Holdings, Inc.	Contained liquid system for refilling aerosol delivery devices
US11510433B2	2013-12-05	2022-11-29	Juul Labs, Inc.	Nicotine liquid formulations for aerosol devices and methods thereof
WO2022267884A1 *	2021-06-25	2022-12-29	深圳市吉迦科技有限公司	Atomizer and aerosol generation device
US11564417B2	2018-05-04	2023-01-31	Shenzhen Smoore Technology Limited	Heating assembly, atomizer and electronic atomizing device
US11589621B2	2017-05-23	2023-02-28	Rai Strategic Holdings, Inc.	Heart rate monitor for an aerosol delivery device
USD980507S1	2015-04-22	2023-03-07	Altria Client Services Llc	Electronic vaping device
US11612702B2	2007-12-18	2023-03-28	Juul Labs, Inc.	Aerosol devices and methods for inhaling a substance and uses thereof
US20230157361A1 *	2021-11-19	2023-05-25	Shenzhen Smoore Technology Limited	Composite liquid guide cotton, heating assembly, vaporizer, and electronic vaporization device

US11666098B2	2014-02-07	2023-06-06	Rai Strategic Holdings, Inc.	Charging accessory device for an aerosol delivery device and related system, method, apparatus, and computer program product for providing interactive services for aerosol delivery devices
US11696604B2	2014-03-13	2023-07-11	Rai Strategic Holdings, Inc.	Aerosol delivery device and related method and computer program product for controlling an aerosol delivery device based on input characteristics
US20230337736A1 *	2014-06-27	2023-10-26	Fontem Ventures B.V.	Electronic smoking device and capsule system
US11924728B2	2017-05-03	2024-03-05	Nicoventures Trading Limited	Method and an aerosol delivery device for transmitting aerosol delivery
US11937637B2	2018-01-24	2024-03-26	Nicoventures Trading Limited	Aerosol source for a vapor provision system
US11937646B2	2018-01-24	2024-03-26	Nicoventures Trading Limited	Vapor provision system
US11937647B2	2016-09-09	2024-03-26	Rai Strategic Holdings, Inc.	Fluidic control for an aerosol delivery device
KR20240042543A *	2014-02-10	2024-04-02	필립모리스 프로덕츠 에스.에이.	An aerosol-generating system having a fluid-permeable heater assembly
US20240164444A1 *	2020-01-08	2024-05-23	Shenzhen Relx Technology Co., Ltd.	Vaporization device
US12004574B2	2017-12-29	2024-06-11	Nicoventures Trading Limited	Data capture across devices
US12069790B2	2017-01-17	2024-08-20	Nicoventures Trading Limited	Apparatus for heating smokable material
US12089640B2	2011-02-11	2024-09-17	Nicoventures Trading Limited	Inhaler component
US12143914B2	2017-12-29	2024-11-12	Nicoventures Trading Limited	Device identification method
USD1052163S1	2015-04-22	2024-11-19	Altria Client Services Llc	Electronic vaping device
US12274824B2	2015-10-01	2025-04-15	Nicoventures Trading Limited	Aerosol provision system
US12279646B2	2014-02-06	2025-04-22	Juul Labs, Inc.	Cartridge of vaporization device systems having unequal transverse cartridge dimensions
US12285042B2	2013-03-12	2025-04-29	Rai Strategic Holdings, Inc.	Electronic smoking article having a vapor-enhancing apparatus and associated method
US12357025B2	2018-01-24	2025-07-15	Nicoventures Trading Limited	Aerosol source for a vapor provision system
US20250234920A1 *	2014-02-28	2025-07-24	Ayr Ltd.	Electronic vaporiser system
US12369632B2	2013-03-14	2025-07-29	Rai Strategic Holdings, Inc.	Electronic smoking article with improved storage and transport of aerosol precursor compositions
US12414585B2	2016-07-22	2025-09-16	Fontem Ventures B.V.	Electronic smoking device
US12439976B2	2014-02-28	2025-10-14	Ayr Ltd.	E-cigarette personal vaporizer
US12447290B2	2008-10-23	2025-10-21	Nicoventures Trading Limited	Inhaler
US12472316B2	2016-09-09	2025-11-18	Rai Strategic Holdings, Inc.	Analog control component for an aerosol delivery device
US12478112B2	2018-10-30	2025-11-25	R.J. Reynolds Tobacco Company	Smoking article cartridge
USRE50713E1	2014-10-02	2025-12-30	Cue Vapor Limited	Disposable tank electronic cigarette, method of manufacture and method of use
US12514294B2	2020-07-01	2026-01-06	Nicoventures Trading Limited	3D-printed substrate for aerosol delivery device
US12550938B2	2021-04-28	2026-02-17	Rai Strategic Holdings, Inc.	Aerosol delivery devices including a selector and related methods
Family To Family Citations				
US10517530B2	2012-08-28	2019-12-31	Juul Labs, Inc.	Methods and devices for delivering and monitoring of tobacco, nicotine, or other substances
US10653180B2	2013-06-14	2020-05-19	Juul Labs, Inc.	Multiple heating elements with separate vaporizable materials in an electric vaporization device
US9549573B2	2013-12-23	2017-01-24	Pax Labs, Inc.	Vaporization device systems and methods
US11478021B2	2014-05-16	2022-10-25	Juul Labs, Inc.	Systems and methods for aerosolizing a vaporizable material
US10383368B2 *	2015-07-06	2019-08-20	Michael Raymond Larson	Atypical vaporizing apparatus
EP3162227B1 *	2015-10-28	2023-07-12	Fontem Ventures B.V.	Electronic smoking device, cartomizer and liquid reservoir

US9961940B2	2016-01-22	2018-05-08	Funai Electric Co., Ltd.	Vaporizing assembly and vapor generating device
US11660403B2	2016-09-22	2023-05-30	Juul Labs, Inc.	Leak-resistant vaporizer device
US10092038B2 *	2016-09-23	2018-10-09	Yongjie James Xu	Single use cartridge with contact point
US11759817B2 *	2016-09-30	2023-09-19	China Tobacco Hunan Industrial Co., Ltd.	Ultrasonic electronic cigarette atomizer
US10130122B2	2016-10-28	2018-11-20	Funai Electric Co., Ltd.	Supply item for vapor generating device
EP3550998A1	2016-12-12	2019-10-16	VMR Products LLC	Vaporizer cartridge
CA3050415C	2017-02-08	2022-06-21	Japan Tobacco Inc.	Cartridge and inhaler
CA3047676A1	2017-02-24	2018-08-30	Philip Morris Products S.A.	An aerosol-generating system and a cartridge for an aerosol-generating system having a two-part liquid storage compartment
US11696368B2	2017-02-24	2023-07-04	Altria Client Services Llc	Aerosol-generating system and a cartridge for an aerosol-generating system having a two-part liquid storage compartment
UA126674C2	2017-02-24	2023-01-11	Філін Моппїс Продактс С.А.	DIE CAST HOLDER FOR AEROSOL GENERATING ELEMENT IN AEROSOL GENERATING SYSTEM
CN107006896B *	2017-05-05	2019-04-09	湖北中烟工业有限责任公司	A kind of composite ceramic atomizer and preparation method thereof
WO2018211035A1 *	2017-05-18	2018-11-22	Jt International S.A.	Vaporizer unit for a personal vaporizer device
US10603459B2	2017-07-20	2020-03-31	Eric Kotch	Variable viscosity vaporizer cartridge
UA127587C2	2017-09-18	2023-10-25	Філін Моппїс Продактс С.А.	CARTRIDGE FOR AEROSOL GENERATING SYSTEM
USD870962S1	2018-09-07	2019-12-24	Vessel Brand, Inc.	Vape pen
USD871665S1	2018-10-09	2019-12-31	Vessel Brand, Inc.	Vape pen
EP3906074A1	2018-12-31	2021-11-10	Juul Labs, Inc.	Cartridges for vaporizer devices
EP4017299B1	2019-08-22	2025-05-21	Juul Labs, Inc.	Battery for vaporizer device
US12207686B1	2024-09-06	2025-01-28	My Next Idea, LLC	Vortexer for cap of personal vaporizer

* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
US9351522B2	2016-05-31	Cartomizer e-cigarette
JP7273905B2	2023-05-15	Shisha device that heats the substrate without burning
US12465703B2	2025-11-11	Inhaler component
EP3178334B1	2025-01-29	Electronic smoking device with a liquid reservoir that allows the addition of additives
US9986769B1	2018-06-05	Atomizer for an electronic cigarette
CN108289503B	2020-11-24	Sliding attachment for electronic smoking devices
CN108289505B	2021-02-05	Electronic cigarette with multi-chamber liquid reservoir
CN113825418B	2024-09-17	Aerosol delivery device providing flavor control
EP3554291B1	2020-11-04	Aerosol-generating system comprising multiple aerosol-forming substrates and a liquid transfer element
US9848635B2	2017-12-26	Apparatus for creating liquid tobacco extract
CN106028852B	2019-06-28	Electronic cigarette and electronic cigarette assembly method
US20150342259A1	2015-12-03	E-liquid vaporizing apparatus
CN107105778B	2019-12-20	Electronic smoking device
KR101172110B1	2012-08-13	Aerosol Electronic Cigarette
WO2018037562A1	2018-03-01	Non-combustion flavor inhaler
US20150230522A1	2015-08-20	Self-Powered Electronic Vaporizer

US20120199146A1	2012-08-09	Electronic cigarette
KR20150144741A	2015-12-28	Flavor enhancement for e-cigarette
CA2903178A1	2014-09-18	An aerosol-generating system with a replaceable mouthpiece cover
US20220400774A1	2022-12-22	Power Optimization Electronic Cigarette Device
EP3787427B1	2025-07-16	Smoking substitute device having a liquid impermeable filter between the mouthpiece and the liquid tank
AU2013101626A4	2014-03-06	Electronic hookah
TWI609637B	2018-01-01	Non-combustible flavor applicator
CN120154135A	2025-06-17	An aerosol supply system

Priority And Related Applications

Child Applications (1) ▲

Application	Priority date	Filing date	Relation	Title
US15/140,413	2011-09-29	2016-04-27	Continuation	Cartomizer E-Cigarette

Priority Applications (2) ▲

Application	Priority date	Filing date	Title
US13/629,541	2011-09-29	2012-09-27	Cartomizer e-cigarette
US15/140,413	2011-09-29	2016-04-27	Cartomizer E-Cigarette

Applications Claiming Priority (2) ▲

Application	Filing date	Title
US201161541039P	2011-09-29	
US13/629,541	2012-09-27	Cartomizer e-cigarette

Legal Events ▲

Date	Code	Title	Description
2015-12-06	FEPP	Fee payment procedure	Free format text: PAYOR NUMBER ASSIGNED (ORIGINAL EVENT CODE: ASPN); ENTITY STATUS OF PATENT OWNER: LARGE ENTITY
2016-01-28	ZAAA	Notice of allowance and fees due	Free format text: ORIGINAL CODE: NOA
2016-01-29	ZAAB	Notice of allowance mailed	Free format text: ORIGINAL CODE: MN/=.
2016-05-11	STCF	Information on status: patent grant	Free format text: PATENTED CASE
2020-01-20	FEPP	Fee payment procedure	Free format text: MAINTENANCE FEE REMINDER MAILED (ORIGINAL EVENT CODE: REM.); ENTITY STATUS OF PATENT OWNER: SMALL ENTITY
2020-07-06	LAPS	Lapse for failure to pay maintenance fees	Free format text: PATENT EXPIRED FOR FAILURE TO PAY MAINTENANCE FEES (ORIGINAL EVENT CODE: EXP.); ENTITY STATUS OF PATENT OWNER: SMALL ENTITY
2020-12-21	AS	Assignment	Owner name: SWISSX USA, CALIFORNIA Free format text: ASSIGNMENT OF ASSIGNORS INTEREST;ASSIGNOR:SAFARI, ROBERT;REEL/FRAME:054708/0349 Effective date: 20201218
2020-12-21	FEPP	Fee payment procedure	Free format text: SURCHARGE, PETITION TO ACCEPT PYMT AFTER EXP, UNINTENTIONAL (ORIGINAL EVENT CODE: M1558); ENTITY STATUS OF PATENT OWNER: LARGE ENTITY

			<p>Free format text: PETITION RELATED TO MAINTENANCE FEES FILED (ORIGINAL EVENT CODE: PMFP); ENTITY STATUS OF PATENT OWNER: LARGE ENTITY</p> <p>Free format text: PETITION RELATED TO MAINTENANCE FEES GRANTED (ORIGINAL EVENT CODE: PMFG); ENTITY STATUS OF PATENT OWNER: LARGE ENTITY</p> <p>Free format text: ENTITY STATUS SET TO UNDISCOUNTED (ORIGINAL EVENT CODE: BIG.); ENTITY STATUS OF PATENT OWNER: LARGE ENTITY</p>
2020-12-21	MAFP	Maintenance fee payment	<p>Free format text: PAYMENT OF MAINTENANCE FEE, 4TH YEAR, LARGE ENTITY (ORIGINAL EVENT CODE: M1551); ENTITY STATUS OF PATENT OWNER: LARGE ENTITY</p> <p>Year of fee payment: 4</p>
2020-12-21	PRDP	Patent reinstated due to the acceptance of a late maintenance fee	Effective date: 20201221
2020-12-21	STCF	Information on status: patent grant	Free format text: PATENTED CASE
2024-01-22	FEPP	Fee payment procedure	Free format text: MAINTENANCE FEE REMINDER MAILED (ORIGINAL EVENT CODE: REM.); ENTITY STATUS OF PATENT OWNER: LARGE ENTITY
2024-07-08	STCH	Information on status: patent discontinuation	Free format text: PATENT EXPIRED DUE TO NONPAYMENT OF MAINTENANCE FEES UNDER 37 CFR 1.362
2024-07-30	FP	Lapsed due to failure to pay maintenance fee	Effective date: 20240531

Concepts ▲

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atomisation	claims,abstract,description			52	0.000
liquid	claims,abstract,description			51	0.000
liquid solution	claims,abstract,description			50	0.000
electronic cigarette	claims,abstract,description			32	0.000
heat treatment	claims,description			24	0.000
aerosol	claims,description			19	0.000
mist	claims,description			18	0.000
activation	claims,description			11	0.000
communication	claims,description			10	0.000
Glycerine	claims,description			7	0.000
Propylene glycol	claims,description			6	0.000
vaporization	claims,description			6	0.000
(-)-Nicotine	claims,description			5	0.000
nicotine	claims,description			5	0.000
nicotine	claims,description			5	0.000
change	claims,description			3	0.000
glycerol	claims,description			3	0.000
sealing	claims,description			3	0.000
Cotton	claims			1	0.000
membrane	claims			1	0.000

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