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PORTABLE ELECTRONIC VAPORIZING DEVICE

Abstract

The present invention relates to a portable electronic vaporizing device for use in the inhalation of vaporizable substances.

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Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS [0001] This application is a continuation of U.S. patent application Ser. No. 18/807,560, filed Aug. 16, 2024, which is a continuation of U.S. patent application Ser. No. 18/399,855, filed Dec. 29, 2023, now abandoned, which is a continuation of U.S. patent application Ser. No. 18/199,508, filed May 19, 2023, now abandoned, which is a continuation of U.S. patent application Ser. No. 17/085,692, filed Oct. 30, 2020, now abandoned, which is a continuation of U.S. patent application Ser. No. 16/822,345, filed Mar. 18, 2020, now abandoned, which is a continuation of U.S. patent application Ser. No. 16/662,631, filed Oct. 24, 2019, now abandoned, which is a continuation of U.S. patent application Ser. No. 16/373,170, filed on Apr. 2, 2019, now U.S. Pat. No. 10,517,334, issued on Dec. 31, 2019, which claims the benefit of priority from U.S. Provisional Patent Application 62/792,202 filed on Jan. 14, 2019 and claims the benefit of International Application PCT/US19/13501 filed on Jan. 14, 2019, all of which are hereby incorporated by reference herein in their entireties.

FIELD OF THE INVENTION
[0002] Aspects of the present invention relate to portable electronic vaporizing devices for use with vaporizable products.
BACKGROUND
[0003] Electronic vaporizers are common place and are generally utilized for the purpose of aroma and/or inhalation therapy. In this regard, vaporizers heat a substance, herbs for example, such as tobacco, cannabis, lavender, chamomile, and many other types of plant material. The vaporizer may work by heating the substance through the use of direct heat or the use of hot air. There are three common ways of heating the substance. The first is thermal conduction where the substance is set directly on a heating element such as a ceramic or metal plate. The second is thermal radiation in which light is used to heat the substance. The third is convection where hot air is passed over the substance.
[0004] At lower levels of heat, vapors extracted from substances such as vegetable materials are mainly aroma therapeutic (inactive fragrance) and do not usually contain the active ingredients of the substance. Without the active ingredients being present, there is no physiological reaction. At higher levels of heat, active ingredients will be increasingly included in the vapor given off during heating. Usually, aromatic vapors have already been released and are not always present at the higher heat levels. With some substances, such as cannabis, active ingredients appear at different levels of heat.
[0005] After the substance is heated a mist or vapor containing some aspect of the substance is released and either enjoyed as an aromatic or inhaled to obtain a physiological reaction. The warm air containing the substance product can be harsh on the throat and bronchial tubes. Accordingly, some vaporizers use a cooling down process that allows water moisture to be included in the vapor produced. These vaporizers enable the user to inhale a cool moist vapor that is relatively less harsh and irritating. Vaporizers are often preferred over traditional methods of heating or smoking substances due to the reduction of harsh side effects. Some of these side effects include inhalation of tar, carbon monoxide, and other carcinogens either directly or from second hand smoke. With many states imposing smoking bans in public areas, vaporizers have become popular substitutes.
[0006] Accordingly, there is a need for improved vaporizers that provide an enhanced vaporizing

experience, including vaporizers with improved quality of the vapor produced for inhalation and improved ease of use.

SUMMARY

[0007] Aspects of the invention are directed to a portable electronic vaporizing device comprising: [0008] a base having comprising a gas flow path conduit therein, the gas flow path conduit comprising a conduit inlet and a conduit outlet; [0009] a mouthpiece that is removably attachable to the base, the mouthpiece comprising: [0010] a mouthpiece housing comprising one or more mouthpiece walls at least partly defining a mouthpiece internal flow path through the mouthpiece housing; [0011] an inhalation outlet formed in a region of the one or more mouthpiece walls; and [0012] at least one mouthpiece inlet capable of being placed in communication with the conduit outlet of the base upon attachment of the mouthpiece to the base, to receive a flow of gas into the mouthpiece from the base; and [0013] an atomizer that is removably attachable to the base, the atomizer comprising: [0014] an atomizer inlet configured to receive a flow of gas into the atomizer; [0015] an atomizer housing comprising one or more atomizer housing walls that at least partially define an atomizer internal flow path therein, [0016] a container within the atomizer housing that is capable of holding a vaporizable product, [0017] a heating element capable of heating the vaporizable product held in the container, [0018] a first container inlet capable of introducing gas into the container to entrain vaporizable product; [0019] one or more second container outlets capable of flowing the gas having the vaporizable product entrained therein into atomizer internal flow path; [0020] one or more atomizer outlets capable of receiving the flows of gas from the atomizer internal flow path, and providing the flow of gas to the conduit inlet of the base, [0021] wherein the flow of gas having the vaporizable product entrained therein flows from the atomizer internal flow path and through the gas flow conduit inlet of the base to the mouthpiece inlet, and along the mouthpiece internal flow path to the inhalation outlet.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The following drawings form part of the present specification and are included to further demonstrate certain aspects of the present invention. The invention may be better understood by reference to one or more of these drawings in combination with the detailed description of specific embodiments presented herein.

[0023] FIG. **1** shows embodiments of a portable electronic vaporizing device comprising a base, atomizer and mouthpiece;

[0024] FIG. **2** is an exploded view of the device of FIG. **1**;

[0025] FIG. **3** is a schematic view of the device of FIG. **1**;

[0026] FIGS. **4**A-**4**D shows an embodiment of a base;

[0027] FIG. **5** shows a close-up schematic view of the device of FIG. **1**

[0028] FIGS. **6**A-**6**C show embodiments of an atomizer;

[0029] FIGS. **7**-**11** show views of embodiments of components of an atomizer; and

[0030] FIG. **12** shows views of embodiments of a mouthpiece.

DETAILED DESCRIPTION OF THE INVENTION

[0031] Aspects of the invention as described herein are directed to an improved portable electronic vaporizing device for the inhalation of vaporizable substances, such as aromatic substances, therapeutic substances and/or substances with physiological effects. Examples of such substances can include herbs, such as tobacco, cannabis, lavender, chamomile, and other types of plant material. In one embodiment, a vaporizable substance can comprise a cannabinoid, such as for example one or more of cannabadiol (a generally non-psychoactive therapeutic substance) and tetrahydrocannabinol (THC) (a psychoactive therapeutic substance). The vaporizable substance

may in some embodiments be in the form of an oil and/or wax product comprising the vaporizable substance, e.g., as extracted from plant material containing the substance, and may optionally be provided in combination with carriers or other additives.

[0032] Referring to FIG. **1**, an embodiment of a portable electronic vaporizing device **1** is shown according to aspects of the disclosure herein. The portable electronic device **1** comprises a base **2**, and atomizer **3** and a mouthpiece **4**. The atomizer **3** is configured to receive a vaporizable product therein and to heat the vaporizable product to form a vapor therefrom. The mouthpiece **4** comprises an outlet where a user can inhale the vapor produced by the atomizer, optionally with water or other substances entrained therein. The base **2** provides a gas flow connection between the atomizer **3** and mouthpiece **4**, to deliver the vaporized product from the atomizer **3** to the mouthpiece **4** for delivery to the use via inhalation thereof. The base **2** can also comprise a housing for one or more components for powering and/or controlling the device **1**. For example, the base may contain compartments therein for storing a power source, such as a battery, for powering elements of the device **1** such as a heating element used in the atomizer **3**. In a case where the device is powered by a rechargeable battery, such as a lithium ion battery, the base **2** may also comprise a charging port connectable to a battery charger (not shown). The base may also have compartment doors to allow access to a battery or other components held within the housing. The base **2** may also house further control circuity for controlling the device, such as to provide predetermined heating cycles or heating programs, and may also allow for user interaction with the device via control buttons and/or control interface, a display and/or lights to signal to the user, and/or other control and operation features.

[0033] Referring to FIG. **2**, an embodiment of the device **1** is shown in exploded view, with the mouthpiece **4** and atomizer **3** removed from the base **2**. In one embodiment, the mouthpiece **4** is removably attachable to the base **2**, for example so as to allow a user to readily remove the mouthpiece for cleaning and/or replacement, as is described in further detail herein. In yet another embodiment, the atomizer may be removably attachable to the base, for example so as to allow a user to replace the atomizer **3** when no longer serviceable, for cleaning of the atomizer, and/or to more readily allow access to a container (e.g. bowl) where a vaporizable product may be loaded into the atomizer **3**. In one embodiment, both the atomizer **3** and the mouthpiece **4** may be removably attachable to the base **2**. In yet another version, the atomizer **3** may be independently removable from the base **2**. That is, the atomizer **3** may be configured to be removably attached to the base such that it can be removed therefrom, without requiring that the mouthpiece **2** be removed beforehand. Referring to FIG. **2** it can be seen that the atomizer **3** itself is external to the mouthpiece **4**, and its connection to the base **2** is also at a position that is outside the mouthpiece **4**, such that the atomizer **3** can be removed from the base **2** while the mouthpiece is kept attached to the base. Similarly, according to the embodiment as shown, the mouthpiece **4** can be removed from the base **2** independently of the atomizer **3**, as the mouthpiece **4** and its connection to the base are external to the atomizer, and so the mouthpiece **4** can be removed from the base **2** without requiring removal of the atomizer **3**. Furthermore, in the embodiment as shown in FIG. **2**, the atomizer **3** can be loaded with vaporizable product without requiring removal of the mouthpiece **4**, and without requiring passing of the vaporizable product through a portion of the mouthpiece, as the atomizer can be accessed separately from the mouthpiece.

[0034] Referring to FIG. **3**, an embodiment of a gas flow path through the portable electronic device **1** is shown. In one embodiment, a flow of ambient air is received in the atomizer **3**, where the ambient air is entrained with vaporizable product that is vaporized in the atomizer via a heating element. The gas comprising the ambient air and vaporizable product flows from the atomizer **3** to a portion of the base **2** having a gas flow conduit therein, and which provide a sealed gas flow connection between the atomizer **3** and mouthpiece **4**. The gas received into the mouthpiece **4**, where it is directed to an inhalation outlet of the mouthpiece, where the gas comprising the vaporizable product can be inhaled by the user. In one embodiment, water is provided a region of

the mouthpiece **4** such that water is entrained with the gas passing through the mouthpiece, thereby providing a more pleasant inhalation experience to the user. An embodiment of an overall flow path of gas through the device **1** is depicted via dashed lines in FIG. **3**.

[0035] Referring to FIGS. **4**A-**4**D, embodiments of the base **2**, and mechanism of attachment of the base **2** to one or more of the atomizer **3** and mouthpiece **4** are described in more detail. As shown in FIGS. **4**A-**4**D, the base **2** comprises a gas flow path conduit **200** therein, the gas flow path conduit **200** comprising a conduit inlet **201***a* and a conduit outlet **201***b*, an embodiment of which may also be viewed with respect to FIG. **5**. The conduit inlet **201***a* receives gas exhausted from the atomizer **3**, and provides a flow of gas to the mouthpiece **4**. In one embodiment, one or more airtight seals are formed between the base **2** and/or the atomizer **3** and mouthpiece **4**, so as to create an airtight gas flow path between from the atomizer, through the gas flow path conduit **200** in the base **2**, and to the mouthpiece **4**. In the embodiment as shown, the gas flow conduit **200** in the base separates an atomizer internal gas flow path from a mouthpiece internal flow path.

[0036] According to one embodiment, the atomizer **3** and/or mouthpiece **4** are removably attachable to the base **2** via a fastening feature **202** that allows for repeated removal and re-insertion of the atomizer **3** and/or mouthpiece **4** into the base. In one embodiment, the fastening feature **202** may be located on the base **2**, and/or the fastening feature **202** may be located on one or more of the atomizer **3** and mouthpiece, and/or the components may have mutually complementary fastening features that allow for repeatable removal and re-attachment of the atomizer **3** and/or mouthpiece **4** to the base **2**.

[0037] In the embodiment as shown in FIGS. **4**A-**4**D, the base **2** comprises first and second recessed regions **203***a* and **203***b*, comprising cavities formed in the base **2** that are configured to receive at least a portion of the atomizer **3** and mouthpiece therein. For example, the base can comprise a first recessed region **203***a* configured to receive at least a portion of the atomizer **3** therein, and a second recessed region **203***b* configured to receive at least a portion of the mouthpiece **4** therein. In one embodiment, the fastening feature **202** is provided as part of the base, and can comprise one or more airtight sealing members **204***a*, **204***b* located in the base, such as a first airtight sealing member **204***a* provided in the first recessed region to retain the atomizer therein, and/or a second airtight sealing member **204***b* provided in the second recessed region to retain the mouthpiece **4** therein. In yet another embodiment, the fastening feature **202** may be provided on the atomizer and/or mouthpiece. For example, the mouthpiece **4** may comprise a snap region **401** that is configured to be received by the second recessed region of the base, and that comprising a fastening feature **202** thereon to retain the step region in the base, as is described in more detail hereinbelow. In one embodiment, the fastening feature that removably retains one or more of the atomizer and/or mouthpiece in their respective recessed region is also capable of providing an airtight seal between the base and atomizer and/or mouthpiece. In another embodiment, the fastening feature comprises a structural element that is separate from and/or provided in addition to an airtight sealing member. For example, in one embodiment, the base and atomizer and/or mouthpiece may be fastened together by a fastening feature that does not provide an airtight seal, but an airtight sealing member may be provided about the gas flow interfaces of the base, such as about one or more of the base conduit inlet **201***a* and conduit outlet **201***b*, to provide an airtight connection for gas flowing from the atomizer through the base conduit and into the mouthpiece **4**. According to yet another embodiment, the device comprises both fastening elements that provide an airtight seal, as well as further airtight sealing members along the gas flow path to ensure an airtight airflow. For example, referring to FIG. **4**B, an airtight sealing member **204***c* can be provided about the gas conduit outlet **201***b* to provide an airtight connection to the mouthpiece inlet.

[0038] In one embodiment, the base **2** is capable of forming a first airtight compartment **205***a* via airtight seal with the atomizer, and/or is capable of forming a second airtight compartment **205***b* via an airtight seal with the mouthpiece **4**, as shown in FIG. **5**. In one embodiment, the base comprises

a first recessed receiving region **203***a* formed therein that is configured to receive the atomizer **3**, the first recessed receiving region **203***a* comprising an annular sealing region **204***a* provided about an internal circumference **206***a* of the first recessed receiving region, to form the airtight compartment between the base and atomizer in the portion of the first recessed region below the annular sealing region. In another embodiment, the base comprises a second recessed receiving region **203***b* formed therein that is configured to receive the mouthpiece, the second recessed receiving region **203***b* comprising an annular sealing region **204***b* provided about an internal circumference **206***b* of the second recessed receiving region, to form the airtight compartment between the base and mouthpiece in the portion of the second recessed region below the annular sealing region. In another embodiment, the base comprises a first recessed receiving region **203***a* formed therein that is configured to receive the atomizer, and a second recessed region **203***b* formed therein that is configured to receive the mouthpiece, and wherein at least one of the atomizer and/or mouthpiece comprise an annular sealing region provided about an external circumference thereof, to form an airtight compartment between the base and atomizer and/or mouthpiece in the portion of the first and/or second recessed regions below the annular sealing region **204***a*, **204***b*. In another embodiment, the base comprises a second recessed region **203***b* formed therein that is configured to receive the mouthpiece, and wherein a sealing region is provided on one or more of the base and/or mouthpiece about one or more of the gas flow path conduit outlet on the base and/or the at least one mouthpiece inlet on the mouthpiece, to form an airtight seal between the gas flow conduit outlet and the mouthpiece inlet. Furthermore, in one embodiment at least a portion of the first airtight compartment in the first recessed region **203***a* forms a passage **207** for flow of gas from the atomizer to the gas flow path conduit in the base, below the annular sealing region, as shown in FIG. **5**.

[0039] In one embodiment, an annular sealing region provided about a recessed cavity in the base, and/or about a circumference of the atomizer and/or mouthpiece, comprises an elastomeric, rubber and/or silicone material. In another embodiment, the base **2** comprises one or more elastomeric, rubber and/or silicone sleeves **208** conformally lining one or more recessed regions **203***a*,**203***b*, and/or the conduit **200**. In one embodiment, the sleeve **208** may be a single sleeve piece lining at least a portion of the recessed regions **203***a*, **203** and conduit. According to yet another embodiment, at least one of the atomizer and mouthpiece can comprise an elastomeric, rubber and/or silicone sleeve conformally lining at least a part of a surface thereof that is received by first and/or second recessed regions of the base. In yet another embodiment, the sleeve **208** provided in one or more of the recessed regions **203***a*, **203***b* comprises one or more annular protrusions extending therefrom, such as by molding of the sleeve material to form the protrusions, which can serve as airtight sealing members **204***a*, **204***b* between the base and atomizer and/or mouthpiece.

[0040] In one embodiment, the base **2** comprises a second recessed receiving region **203***b* formed therein that is configured to receive the snap region **401** of the mouthpiece **4**, the second recessed receiving region comprising the annular sealing region **204***b* provided about an internal circumference thereof, to form an airtight compartment between the base and snap region of the mouthpiece in the portion of the second recessed region below the annular sealing region. In yet another embodiment, the second recessed receiving region further comprises the annular sealing region **204***c* about the conduit outlet **201***b* to form an airtight seal between the conduit outlet **204***c* and a mouthpiece inlet **402**. In one embodiment, the gas flow path conduit outlet **201***b* in the base is located below the annular sealing region **204***b* in the second recessed region, such that an interface between the gas flow path conduit outlet in the base, and the mouthpiece inlet is located in an airtight compartment portion of the second recessed receiving region. In one embodiment, the annular sealing region **204***b*, **204***c* comprises at least one of a rubber, elastomeric, and a silicone material. In yet another embodiment, the second recessed region is sized an shaped to accommodate a snap region **401** of the mouthpiece that comprises an annular indentation **403** formed about a circumference of the mouthpiece towards a bottom end **404** of the mouthpiece that

is distal to an inhalation outlet **406** of the mouthpiece, the annular indentation being configured to conformally mate with the annular sealing member in the second recessed region to so as to form the airtight compartment.

[0041] As described above, in one embodiment the base **2** comprises a housing **209** that is configured to house a power source **210** for powering a heating element in the atomizer **2**, and optionally comprises one or more control elements for operating components of the device **1**. For example, in one embodiment the power source **210** can comprise a rechargeable battery, such as a lithium-ion battery. The housing may also contain outlets to connect the device with an electrical outlet and/or other devices, and may house control elements such a CPUs and/or wireless transmitters for controlling heating and vapor production with the device, either via direct or wireless input into the device by a user.

[0042] Referring to FIGS. **6**A-**6**C and **7**-**11**, an embodiment of an atomizer **3** is described. In the embodiment as shown, the atomizer **3** is removably attachable to the base, an includes an atomizer inlet **301** configured to receive a flow of gas into the atomizer **3**, and an atomizer housing **10** comprising one or more atomizer housing walls **304** that at least partially define an atomizer internal flow path therein. The atomizer **2** is further configured to contain a container **7** (e.g., a bowl) within the atomizer housing **302** that is capable of holding a vaporizable product therein. The atomizer further comprises a heating element **8** capable of heating the vaporizable product held in the container **7**. According to the embodiment as showing, the atomizer comprises a first container inlet **305** capable of introducing gas into the container **7** to entrain vaporizable product therein, and comprises one or more second container outlets **306** capable of flowing the gas having the vaporizable product entrained therein into an atomizer internal flow path **308**. Embodiments of the atomizer **3** comprise one or more atomizer outlets **309** capable of receiving the flow of gas from the atomizer internal flow path **308**, and providing the flow of gas to the conduit inlet **201***a* of the base **2**.

[0043] According to one embodiment, the at least one heating element **8** is disposed within the atomizer housing **10**. For example, the at least one heating element **8** may be disposed below a bottom surface **310** of the container **7** that is adapted to receive the vaporizable product therein. In one embodiment, the heating element comprises a ceramic heating plate, such as an alumina plate. The heating element **8** may be capable of resistively heating the container **7** via thermal contact therewith, as in direct contact with the bottom surface **310**. In one embodiment, the heating element **8** is attached to conductive elements such as wires leading to the power source (e.g. battery) to provide an applied voltage for the resistive heating. In one embodiment, the container **7** adapted to receive and hold the vaporizable product comprises a thermally conductive ceramic material, such as alumina, such that placing the container is in thermal contact with the heating element causes heating of the container.

[0044] According to yet another embodiment, the atomizer **3** comprises a bottom insulating element **9** comprising a spacer disposed between the heating element **8** and atomizer housing **10** that thermally insulates the heating element **8** from the atomizer housing **8**. The bottom insulating element **9** may also act to secure the heating element in position at a bottom end **312** of the container, such as in contact with the bottom surface of the container **7**. In one embodiment, the bottom insulating element comprises a ceramic having a lower thermal conductivity than the container and/or heating element, so as to thermally isolate the container and/or heating element from the atomizer housing. For example, in one embodiment the bottom insulating element can comprise a thermal conductivity of less than 4 W/mk, less than 3.5 W/mk and/or less than 3 W/mk, whereas the container and/or heating element may comprise a thermal conductivity of at least 10 W/mk, at least 15 w/mk and/or at least 20 W/mk.

[0045] According to another embodiment, the atomizer **3** comprise a top insulating element **311** that thermally insulates a top end **313** of the container **7** from the atomizer housing **10**. In one embodiment, the top insulating element **311** is configured to receive a carb cap **17** thereon. For

example in one embodiment, the device **1** is configured to operate with a carb cap **17** positioned upstream of the atomizer **3**, the carb cap comprising a stopper having a conduit **314** formed therein to provide a flow of ambient air into the atomizer **3**. In one embodiment, the container **7** is thermally insulated from the atomizer housing **10** by both the bottom insulating element **9** that positions the container within the housing at a bottom end of the container, and the top insulating element **311** that positions a top end of the container in the housing. In one embodiment, referring to FIG. **6**C, the top insulating element **311** comprises inner and outer annular insulating rings **5**, **6**. In one embodiment, an inner circumference of the inner annular insulating **5** ring defines the atomizer inlet **301**, and is in communication with the first inlet **305** of the container **7**. In the embodiment as shown in FIG. **6**A, the atomizer inlet **301** is directly above the first inlet **305**, and/or the atomizer inlet **301** and first container inlet may comprise the same inlet. That is, in one embodiment, the atomizer inlet may be aligned with and lead to a container inlet positioned below the inner annular ring **5** of the top insulating element **311**.

[0046] In one embodiment, the atomizer **3** comprises an outer annular ring **6** that forms an annular jacket that is flush with the outer surface of the inner annular ring **5**, and extends in an axial direction beyond the inner annular ring such that a portion of the interior surface of the outer annular ring is in contact with an outer surface of the atomizer housing **10**. In one embodiment, the outer annular ring **6** may secure the inner annular ring **5** to the atomizer housing **10** via frictional forces and/or via a snap mechanism or other fastening mechanism between a portion of the interior surface of the outer annular ring and the outer surface of the atomizer housing. In one embodiment, the outer annular ring comprises an annular jacket that forms an airtight seal with the atomizer housing.

[0047] In one embodiment, one or more of the inner and outer annular rings **5**, **6** are capable of thermally isolating the container **7** from the atomizer housing **10**, by having a lower thermal conductivity. For example, one or more of the inner and outer annular insulating rings can comprise a thermal conductivity of less than 4 W/mk, less than 3.5 W/mk and/or less than 3 W/mk, whereas the container may comprise a thermal conductivity of at least 10 W/mk, at least 15 w/mk and/or at least 20 W/mk. IN one embodiment, a bottom surface **315** of the inner annular insulating ring **5** is in contact with an upper surface **316** of the container **7**.

[0048] In one embodiment, one or more of the container **7** and/or thermally insulating element **311**, such as the inner annular ring **5**, comprise one or more apertures **318** therein that correspond to the one or more container second outlets **306**. For example, in one embodiment the inner annular ring **5** comprises one or more indentations **320** formed in the bottom surface **315** thereof, such as about a circumference thereof, which form one or more apertures **318** between the bottom surface **315** of the inner annular ring **5** and the top surface **316** of the container **7**. In yet another embodiment, the inner annular ring **5** comprises one or more apertures formed in the body thereof, such as about a circumference thereof, to provide the one or more container outlets. In yet another embodiment, the container itself comprises one or more apertures **318** formed in one or more walls thereof, wherein the one or more apertures comprise the one or more second container outlets **306**. According to certain embodiments, first container inlet **305** introduces a gas flow received through the inner insulating annular ring **5** into the container **7**, and the one or more second container outlets **306** flow gas out of the container through the one or more apertures **318**. The second container outlets **306** may thus be a separate aperture and/or opening than the first container inlet **305**, such that air comes through the inlet and passes through a separate outlet when exiting the container **7**.

[0049] Furthermore, in one embodiment, the top insulating element **311** is removable from the atomizer housing **10** to allow access to the container **7**. For example, the insulating element **311** may be removable by simply lifting or twisting the top insulating element form the atomizer housing **10**. According to yet another embodiment, the atomizer housing **10** comprises a lower portion **322** that is threaded, and that may be complementary to a threaded socket in the first recessed region **203***a* of the base **2**, so the atomizer can be screwed into the threaded socket of the

base. In yet another embodiment a lower portion of the atomizer housing may connects to the base via a magnet, span mechanism or other fastening feature.

[0050] According to one embodiment, atomizer housing at least partially directs gas from the one or more second container gas outlets **306** along the internal atomizer gas flow path **308** (shown as a dashed line in FIG. **6**B), in a passage **324** formed between walls of the container **7** and the atomizer housing **10**. The atomizer housing **10** can comprises one or more apertures/outlets **309** formed therein to flow gas from the internal atomizer gas flow path **308** to the airtight passage **207** that is external to the atomizer housing in the first recessed region **203***a* of the base **2**. In one embodiment, the atomizer housing apertures/outlets **309** are located at a lower end of the atomizer housing, and the atomizer housing **10** redirects flow of the gas from the one or more second container gas outlets **306** in a downward direction along a passage **324** formed between the housing walls and container walls, to the atomizer housing apertures/outlets **309**. As shown in FIG. **6**B, in one embodiment a flow of gas through the atomizer **8** comprises a flow through the first container inlet into a top of the container, flow out of the container through second container outlets that are separate from the inlet, and that are towards a top **313** of the container, flow downward between the atomizer housing and container wall towards a bottom of the atomizer and through apertures of the atomizer towards the bottom of the atomizer housing.

[0051] In one embodiment, the one or more second container outlets **306** are located radially externally to the first container inlet **305**, and/or are positioned in an arrangement circumferentially surrounding the first container inlet **305**. The second container outlets **306** may also be located towards a top end of the atomizer and/or container. In a further embodiment, the apertures and/or outlets **309** for exhausting gas from the atomizer are located below the first container inlet and/or second container outlet, towards a lower end of the atomizer.

[0052] Further embodiments of the atomizer are described herein. For example, in one embodiment, inside the atomizer housing **10**, a container comprising a bowl **7** is positioned on top of the heating element **8**, and may be made of a highly thermally conductive material, which can include ceramic, quartz, or metals, allowing efficient heat transfer. The heating element **8** and the bowl **7** are secured and insulated by the bottom insulating element **9** and top insulating element **311** respectively, these two elements firmly locating the heating element **8** and bowl **7** within the atomizer. These two elements are made with low thermally conductive, yet high heat withstanding, material so that minimal heat is lost from the heating element and bowl. The top insulating element comprises an outer annular ring comprising sleeve **6**, made of an insulating material, like silicone or plastic. The sleeve **6** fastens to the housing **10** and makes an airtight seal while the inner annular ring **5** insulates and positions the bowl **7**. The sleeve **6** may also protect the user from heat and serves as a grip for screwing and unscrewing the atomizer.

[0053] After extended use the bowl **7** may become dirty. Because the top insulating element comprising in inner annular ring **5** and sleeve (**6**) are removable, the bowl can be taken out and easily cleaned. When the sleeve and top insulating element are assembled on the atomizer housing the bowl is held in place and a sealed airpath is formed. Air may enter the top of the bowl through a carb cap **17**. The carb cap **17** may be capable of directing high velocity air to the bottom of the bowl, where the material is vaporized. Air then exits the top of the bowl as vapor through the second outlets which are apertures in the inner annular ring (**5**) above the bowl. These slots/apertures could also be cut into the top of the bowl. The vapor travels through the slots in the inner annular ring and down a gap formed between the bowl and the atomizer housing. The vapor can leaves the bottom of the atomizer and travels through an airpath into the mouthpiece. FIG. **6**B shows a cross sectional view of the assembled atomizer with the carb cap and illustrates the airflow through the atomizer, entering through the carb cap and exiting out of the bottom of the atomizer.

[0054] In certain embodiments, material that leaks out of the bowl **7** can seep down into the bottom of the atomizer near the connection point. Accordingly, it may be important for this area to be sealed so that the leaking material does not inhibit the passing of the current from power source to

heating element. This seal is provided by the electrode insulator **11** which holds the electrode **12**. The electrode insulator secures and holds separately the electrode from the housing. One lead wire of heating element **8** can be held between the insulator and the housing **10**, the other lead wire can be held between the insulator and the electrode, therefore a current path in and out of the heating element can be created. There can be also grooves cut into the atomizer housing to position these lead wires. The electrode insulator can press the wires into these grooves and make a water and airtight seal against the housing and electrode which may prevents leaking. In certain embodiments, material may also leak out of the bottom of the atomizer through the air cuts in the housing **10**. Accordingly, it may be important that this material does not reach the connection point on the atomizer or the power source. When the atomizer is connected to the base, a rib **14** running around the bottom of the atomizer housing **10** can create a seal. This seal can create a separation between the air holes and connection point and may prevent any material from reaching the electrical connection points on the atomizer or base.

[0055] Furthermore, because the bowl **7**, heating element **8** and inner annular ring **5** may interact with sticky material during use, there is a chance for them to become stuck together. In certain embodiments, if the bowl is twisted during use, for example while the user is tightening or untightening the atomizer by gripping the sleeve, the heating element could be twisted and could lead to subsequent breaking of its lead wires. Accordingly, features may be included in the atomizer housing **10** and inner annular ring **5**. For example, slots in the atomizer housing **10** may line up with embossed features **16** in the inner annular ring **5**, so that the two lock together and cannot be twisted independently. This protects the heating element from damage when tightening or loosening the atomizer from the base.

[0056] In one embodiment, the bowl itself can include a rib **15** around its bottom face, which is the face that interacts with the heating element. This rib may have three functions, it can positions the bowl, cover the heating element, and/or minimize heat loss, and it can shroud the heating element from debris. The debris could be water or liquid material that leaks down into the heating elements environment. Since the heating element may operate at a high temperature, a substance of room temperature contacting the heating element can result in significant thermal shock which could damage or permanently break the heating element. The rib on the bottom of the bowl blocks debris by creating a protective wall around the heating element.

[0057] Referring to FIGS. **1-3**, **5** and **12**, embodiments of the mouthpiece **4** are further described. In one embodiment, the mouthpiece **4** is removably attachable to the base **2**. The mouthpiece can generally comprise a mouthpiece housing **408**, comprising one or more mouthpiece walls **410** at least partly defining a mouthpiece internal flow path **412** through the mouthpiece housing (e.g., as shown in FIG. **3**). The mouthpiece can further comprises the inhalation outlet **406** formed in a region of the one or more mouthpiece walls **410**, such as towards a top end **405** of the mouthpiece **4**. The mouthpiece can further comprise at least one mouthpiece inlet **402** capable of being placed in communication with the conduit outlet **201***b* of the base **2** upon attachment of the mouthpiece **4** to the base **2**, to receive a flow of gas into the mouthpiece **4** from the base **2**. In some embodiments a gas flowed through the mouthpiece from the mouthpiece inlet **402** to the inhalation outlet **406**, may take a convoluted path through the interior volume of the mouthpiece and along the internal flow path, such as for example when a water filtering region is provided as part of the mouthpiece.

[0058] In one embodiment, the mouthpiece comprises a snap region **401** that is configured to removably attach the mouthpiece to the base. For example, in one embodiment, the base can comprises the second recessed receiving region **203***b* for receiving the mouthpiece therein via the snap region **401**, which may be shaped and sized to fit within the second recesses receiving region. The snap region **401** may be located at the bottom end **404** of the mouthpiece, and in certain embodiments the mouthpiece inlet **402** may located in the snap region **401**, of the mouthpiece. In one embodiment, the second receiving region **403***b* may be at least partially lined with a rubber, silicone, and/or elastomeric sleeve to conformally mate the second recessed region with the snap

region of the mouthpiece. In yet another embodiment, at least a portion of the snap region of the mouthpiece may be lined with a rubber, silicone, and/or elastomeric sleeve to conformally mate the second recessed region with the snap region of the mouthpiece. As yet another example, in one embodiment, the sleeve **208** comprises an annular sealing region **204***b* that protrudes inwardly from sidewalls of the second recessed region to contact and form an airtight seal with the mouthpiece.

[0059] In yet another embodiment, the mouthpiece comprises one or more water filtering regions **414***a*, **414***b*, capable of holding a volume of water therein, the water filtering region being located along the mouthpiece internal flow path, such that water vapor becomes entrained into gas passing through water in the water filtering region. In the embodiment as shown in FIG. **3**, a volume of water can be provided to partly fill in internal volume of the mouthpiece volume along a lower region of the internal mouthpiece volume.

[0060] In one embodiment, the at least one mouthpiece inlet **402** is located towards a bottom region **404** of the mouthpiece housing **408**, and the inhalation outlet **406** is located distal to the at least one mouthpiece inlet **402** at an upper region **405** of the mouthpiece housing. According to yet another embodiment, the mouthpiece **4** comprises a plurality of chambers **416***a*, **416***b* that are connected to one another along the mouthpiece internal flow path **412**. For example, the mouthpiece can comprise a first chamber **416***a* that is internal to a second chamber **416***b*, and wherein a flow of gas along the mouthpiece internal flow path **412** passes through the first chamber and into the second chamber. In one embodiment, the second chamber at least partially circumferentially surrounds the first chamber. In one embodiment, the mouthpiece comprises one or more internal walls **418** defining the first chamber **416***a*, and wherein the second chamber **416***b* is defined between the one or more internal walls **418** and the mouthpiece housing **408**. In one embodiment, lower portions of the first and second chambers **416***a*, **416***b* comprise water filtering regions configured to receive and hold water therein. Furthermore, in one embodiment, the first and second chamber are connected to each other by at least one port **420** formed in the one or more internal walls **418**.

[0061] In the embodiment as shown in FIG. **3**, the first chamber **416***a* comprises a first chamber inlet **422** that is positioned above the at least one port **420** formed in the one or more internal walls, which port may be located at or below a level of water in the chambers when water is provided in the mouthpiece. In one embodiment, a flow of gas exiting the first chamber inlet **422** is directed by the one or more internal walls **418** towards the water filtering region in a lower portion of the first chamber **416***a*, and the gas exits the water filtering region in the lower portion of the first chamber **416***a* through the one or more ports **420** to enter a water filtering region of a lower portion of the second chamber **461***b*, and wherein gas having water vapor therein exits the water filtering region of the lower portion of the second chamber and is directed by the passage formed between the housing walls **410** and internal walls **418** to be output from the mouthpiece via the inhalation outlet. In the embodiment as shown in FIG. **3**, the first chamber inlet **422** is at the end of a tube **424** extending upwardly into the first chamber **416***a*, the tube comprising an aperture to receive gas from the mouthpiece inlet, and wherein the first chamber inlet is located at a location that is higher than the port connecting the chambers. In another embodiment, the one or more internal walls **481** comprise a conically-shaped internal wall, and the mouthpiece housing comprises a conical housing wall about the conically-shaped internal wall.

[0062] In one embodiment, the mouthpiece **4** comprises a snap region **401** with one or more fastening features **202** on an external surface **426** thereof to fasten the snap region to the recessed region **203***b* of the base **2**. In one embodiment, the fastening feature **202** may provide a sealing fit between the snap region and the recessed region when the snap region is inserted into the recessed region. In one embodiment, the fastening features may be able to removably fasten the mouthpiece to the base such that mouthpiece can withstand at least 2 lbs, at least 3 lbs and/or at least 5 lbs of vertical force before the snap region of the mouthpiece releases from the recessed region of the base.

[0063] In yet another embodiment, the at least one mouthpiece inlet **402** may direct gas into the

mouthpiece in a direction that is not co-linear with and/or that is other than a direction that gas exits the mouthpiece via the inhalation outlet **406**. For example, the at least one mouthpiece inlet may direct gas into the mouthpiece in a direction that is substantially perpendicular to a direction that gas exits the mouthpiece via the inhalation outlet.

[0064] In one embodiment, the at least a portion of the mouthpiece housing, and even the entire mouthpiece housing, may be formed of glass. In one embodiment, the snap region **401** of the mouthpiece may also be formed of glass. Internal structures such as internal walls between compartments, and tubes for introduction of gas, may also be formed of glass. In one embodiment, the snap region **401** of the mouthpiece comprise a greatest diameter D.sub.1 (the largest diameter along the height of the snap region, see e.g. FIG. **12**) that is at least 20 mm, at least 30 mm, and/or at least 50. In some embodiments, the snap region **401** may be considered to be that portion of the mouthpiece that is received by the recessed region of the base. As shown in FIG. **12**, a body region **428** that is clear of the recessed region when the mouthpiece is connected to the base, may in some embodiments have a diameter that exceeds that of the snap region **401** that fits within the base. Furthermore, in one embodiment an internal volume of the mouthpiece **4** is configured to accept at least 1 fluid ounces of water therein during operation a device comprising the mouthpiece.

[0065] In one embodiment, referring to FIG. **12**, the snap region **401** of the mouthpiece can comprises a fastening feature **202** comprising a circumferentially bulging protrusion **430** along a height of the snap region, where a diameter D of the protrusion **430** exceeds a minimum diameter D.sub.2 of the recessed region of the base at some point along the height of the region (e.g., at a point where a sealing member **204***b* protrudes into the recessed region, see FIG. **4**A). In certain embodiments, passing the bulging protrusion **430** past the minimum diameter D.sub.2 of the recessed region causes the snap region to be removably retained in the recessed region. In one embodiment, the mouthpiece further comprises a fastening feature **202** comprising an annular indentation **432** formed about a circumference of the snap region portion of the mouthpiece. For example, the annular indentation may be configured to conformally mate with the circumferential sealing member **204***b* extending from a sidewall of the recessed region of the base, so as to form a seal therebetween. In one embodiment, the annular indentation can comprise an annular groove and/or annular channel formed in the mouthpiece housing at the snap region. In one embodiment, the annular indention may be located above the at least one mouthpiece gas inlet in the snap region, and/or the circumferentially bulging protrusion may have the at least one mouthpiece inlet formed therein. According to yet another embodiment, the fastening feature comprises a tapering snap region profile, the snap region having a first region adjacent the bottom of the mouthpiece housing (e.g., at the bulging protrusion) having a first diameter D.sub.1, and a second region that is spaced apart from the first region (e.g. at the annular indentation) having a second diameter D.sub.3, and wherein the diameter of the snap region decreases from the first region to the second region (e.g., D3 is less than D1).

[0066] In one embodiment, a method of using a portable electronic vaporizer as described according to any of the embodiments herein, can comprise loading vaporizable product into the container, optionally at least partially filling the mouthpiece with water in water filter regions thereof, activating the heating element to at least partially vaporize the product in the container, and inhaling gas exiting the mouthpiece inlet, the gas comprising ambient air having vaporize product and water vapor entrained therein.

Claims

1. A portable electronic vaporizing device comprising: a base comprising a gas flow path therein and a housing for one or more components for electrically connecting to a power source and/or controlling the device, the gas flow path comprising a flow path inlet and a flow path outlet; a mouthpiece that is configured to receive gas from the flow path, the mouthpiece comprising: a

mouthpiece housing comprising one or more mouthpiece walls at least partly defining a mouthpiece internal flow path through the mouthpiece housing; an inhalation outlet formed in a region of the one or more mouthpiece walls; and at least one mouthpiece inlet capable of being placed in communication with the flow path outlet of the base, to receive a flow of gas into the mouthpiece from the base; and an atomizer comprising: an atomizer housing comprising one or more atomizer housing walls; a container configured to be placed within the atomizer housing that is capable of holding a vaporizable product, the container comprising one or more container sidewalls, wherein the one or more container sidewalls and the one or more atomizer housing walls are configured to form a passage therebetween that at least partly defines an atomizer internal flow path; a heating element capable of heating the vaporizable product held in the container, the heating element being configured to be electrically connected to the one or more components for electrically connecting to the power source and/or controlling the device that are housed in the base; an inlet capable of introducing gas into the container to entrain vaporizable product, one or more container outlets capable of flowing the gas having the vaporizable product entrained therein into the atomizer internal flow path, one or more atomizer outlets capable of receiving the flow of gas from the atomizer internal flow path, and providing the flow of gas to the flow path inlet of the base, wherein the atomizer internal flow path is configured to redirect the gas received from the container in a direction away from the inlet, and wherein the flow of gas having the vaporizable product entrained therein flows from the atomizer internal flow path and through the gas flow path of the base, and along the mouthpiece internal flow path to the inhalation outlet.

2. The portable electronic vaporizing device of claim 1, wherein at least a part of the atomizer is removably attachable to the base.

3. The portable electronic vaporizing device of claim 1, wherein the atomizer further comprises a removable annular ring configured to fit over at least a portion of the atomizer housing, the removable annular ring configured to at least partly direct gas to the atomizer internal flow path.

4. The portable electronic vaporizing device of claim 1, further comprising a removable carb cap configured to fit over the annular ring and seal a top portion of the atomizer, and wherein gas is introduced into the container through an aperture in the carb cap.

5. The portable electronic vaporizing device according to claim 1, wherein the atomizer is removable from the base independently of removal of the mouthpiece.

6. The portable electronic vaporizing device according to claim 1, wherein the base comprises a first recessed receiving region formed therein that is configured to removably receive the atomizer, and a second recessed receiving region formed therein that is configured to removably receive the mouthpiece.

7. The portable electronic vaporizing device according to claim 6, wherein an airtight seal is formed between the between the base and the atomizer and/or between the base and the mouthpiece, in one or more of the first and second recessed receiving regions.

8. The portable electronic vaporizing device according to claim 6, wherein the base comprises one or more of (i) at least one conformal liner disposed in the first recessed receiving region that is configured to conformally receive at least a portion of the atomizer, and (ii) at least one conformal liner disposed in the second recessed receiving region that is configured to conformally receive at least a portion of the mouthpiece.

9. The portable electronic vaporizing device according to claim 8, wherein the base comprises the at least one conformal liner disposed in the second recessed receiving region that is configured to conformally receive an outer circumferential surface of a fastening region located at a lower portion of the mouthpiece.

10. The portable electronic vaporizing device according to claim 1, wherein the atomizer comprises a heating element disposed below a bottom surface of the container that adapted to receive the vaporizable product.

11. The portable electronic vaporizer device according to claim 1, wherein the one or more

container outlets in the atomizer that flow the gas having the vaporizable product entrained therein out of the container and into the atomizer internal flow path, are located towards a top end of the atomizer and radially externally to the inlet, and are positioned in an arrangement circumferentially surrounding the inlet.

12. The portable electronic vaporizing device according to claim 11, wherein the one or more container outlets comprise one or more of: (i) one or more apertures formed in one or more walls located at an upper portion of the container; (ii) one or more apertures formed between a top surface of the container and an annular ring disposed above the container, the annular ring comprising one or more indentations formed in a bottom surface about a circumference thereof that form the one or more apertures between the bottom surface of the annular ring and the top surface of the container; and (iii) one or more apertures formed about a circumference of an annular ring disposed above the container.

13. The portable electronic vaporizer device according to claim 1, wherein the flow of gas through the atomizer comprises flow through the inlet into a top of the container, flow out of the container through the one or more container outlets that are separate from the inlet and disposed towards a top end of the atomizer, and wherein the atomizer housing at least partially directs gas from the one or more container gas outlets along the internal atomizer gas flow path, in a passage formed between walls of the container and the atomizer housing, and wherein the atomizer housing comprises one or more apertures formed therein to flow gas from the internal atomizer gas flow path to an airtight passage that is external to the atomizer housing.

14. The portable electronic vaporizer device according to claim 1, wherein the mouthpiece internal flow path comprises a convoluted flow path from the at least one mouthpiece inlet to the inhalation outlet, the mouthpiece comprising a first chamber that is internal to a second chamber that at least partially circumferentially surrounds the first chamber, and wherein the flow of gas along the mouthpiece internal flow path is received in the at least one mouthpiece inlet, passes through the first chamber and into the second chamber, and out of the inhalation outlet.

15. The portable electronic vaporizer device according to claim 1, wherein the base comprises a threaded socket that allows for a complementarily threaded part of the atomizer to be screwed into the threaded socket of the base.

16. The portable electronic vaporizer according to claim 1, wherein the atomizer comprise a top insulating element that insulates a top end of the container from the atomizer housing, and wherein the top insulating element is removable from the atomizer housing to allow access to the container.

17. The portable electronic vaporizer according to claim 1, wherein the heating element heats via resistive heating, and is attached to conductive elements leading to a power source comprising a battery to provide an applied voltage for the resistive heating.

18. The portable electronic vaporizer according to claim 1, wherein the mouthpiece comprises a fastening region at a bottom region of the mouthpiece that is configured to be received by a recessed region of the base.

19. The portable electronic vaporizer according to claim 1, wherein the outer surface of the fastening region is configured to conformally mate with along the circumference thereof with an internal circumferential surface of a recessed cavity region of the base, so as to form an airtight seal between the internal circumferential surface of the recessed cavity region of the base and the outer surface of the fastening region of the mouthpiece.

20. The portable electronic vaporizer according to claim 19, wherein the fastening region comprises a tapering profile, the fastening region having a first region adjacent the bottom of the mouthpiece housing having a first diameter, and a second region that is spaced apart from the first region having a second diameter, and wherein the diameter of the fastening region decreases from the first region to the second region.

21. The portable electronic vaporizer according to claim 1, wherein a mouthpiece internal flow path comprises a convoluted flow path from the at least one mouthpiece inlet to the inhalation outlet, the

mouthpiece comprising a first chamber that is internal to a second chamber that at least partially circumferentially surrounds the first chamber, and wherein the flow of gas along the mouthpiece internal flow path is received in the at least one mouthpiece inlet, passes through the first chamber and into the second chamber, and out of the inhalation outlet.

22. The portable electronic vaporizer according to claim 21, wherein the at least one mouthpiece inlet is located in the fastening region at the bottom region of the mouthpiece, and the first and second chambers are disposed above the fastening region in an upper region of the mouthpiece.

23. The portable electronic vaporizer according to claim 21, wherein the mouthpiece comprises one or more internal walls defining the first chamber, and wherein the second chamber is defined between the one or more internal walls and the mouthpiece housing.

24. The portable electronic vaporizer according to claim 23, wherein lower portions of the first and second chambers comprise water filtering regions configured to receive and hold water therein.

25. The portable electronic vaporizer according to claim 23, wherein the first and second chamber are connected to each other by at least one port formed in the one or more internal walls.

26. The portable electronic vaporizer according to claim 25, wherein the first chamber comprises a first chamber inlet that is positioned above the at least one port formed in the one or more internal walls.

27. The portable electronic vaporizer according to claim 23, wherein a flow of gas exiting the first chamber inlet is directed by the one or more internal walls towards the water filtering region in a lower portion of the first chamber, and wherein gas exits the water filtering region in the lower portion of the first chamber through the one or more ports to enter a water filtering region of a lower portion of the second chamber, and wherein gas having water vapor therein exits the water filtering region of the lower portion of the second chamber and is output from the mouthpiece via the inhalation outlet.

28. The portable electronic vaporizer according to claim 27, wherein the first chamber inlet is at the end of a tube extending upwardly into the first chamber, the tube comprising an aperture to receive gas from the mouthpiece inlet, and wherein the first chamber inlet is located at a location that is higher than the port connecting the chambers.

29. The portable electronic vaporizer according to claim 23, wherein the one or more internal walls comprise a conically-shaped internal wall, and the mouthpiece housing comprises a conical housing wall about the conically-shaped internal wall.

30. A method of using a portable electronic vaporizer according to claim 1, the method comprising: loading vaporizable product into the container; at least partially filling the mouthpiece with water in water filter regions thereof; activating the heating element to at least partially vaporize the product in the container, and inhaling gas exiting the mouthpiece inlet, the gas comprising ambient air having vaporize product and water vapor entrained therein.