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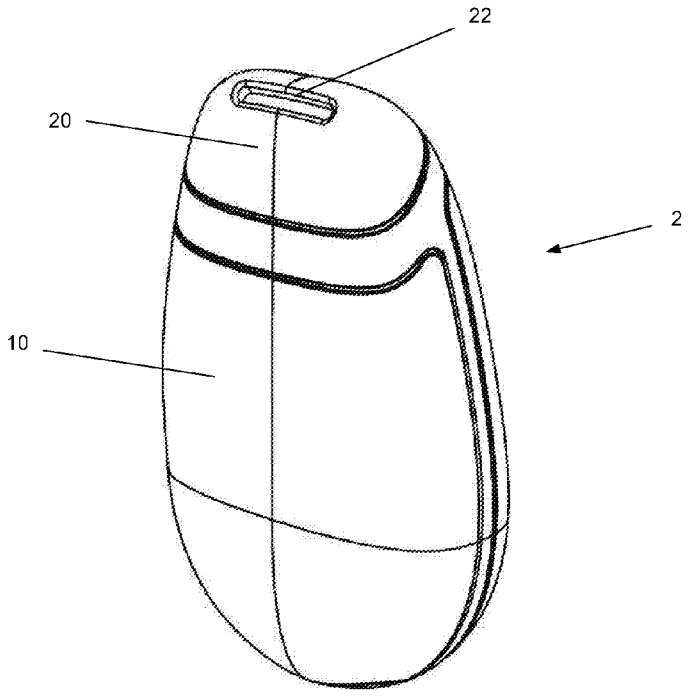


FIG. 1

(57) Abstract: A personal nebulizer or vaporizing unit with a mouthpiece, which may be detachable and replaceable. The mouthpiece includes an orifice through which vapor is emitted. The substance to be vaporized is contained in an ampoule inserted into the device, where the substance enters an atomization chamber where vaporization is achieved through piezoelectric transducers or atomizers providing sonic or ultrasonic vibration. The substance includes a variety of therapeutic, homeopathic, or naturopathic formulations, remedies, or serums. One or more light sources, vibrational sources, heating sources or elements, piezo transducers, or combinations thereof, may be provided on the mouthpiece or a portion of the device inserted into the mouth.

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INHALANT DEVICE

This application claims benefit of and priority to U.S. Provisional Applications Nos. 62/320,484, filed March 2, 2016, and 62/180,591, filed June 16, 2015, by Kathryn Cashman, et al., and is entitled to those filing dates for priority. The specification, figures, appendices and complete disclosure of U.S. Provisional Applications Nos. 62/320,484 and 62/180,591 are incorporated herein in their entireties by specific reference for all purposes.

FIELD OF INVENTION

This invention relates to a personal inhalation device. More particular, this invention relates to a handheld vaporizing device for generating a vapor for inhaling by a user.

BACKGROUND OF THE INVENTION

A variety of vaporizers or nebulizers are known in the prior art, particularly for use with tobacco or tobacco extracts. Typically, the substance to be vaporized is heated by the device, and emitted through an opening or orifice. However, such devices do not provide the ability to finely controlled the application of a therapeutic substance, or provide for the calibration and monitoring of treatments using a vaporized therapeutic substance.

SUMMARY OF INVENTION

In various embodiments, the present invention comprises a personal nebulizer or vaporizing unit. While referred to herein as a nebulizer or vaporizing unit, the device encompasses devices of all sorts, including but not limited to inhalers, nebulizers, vaporizers, humidifiers, ventilators, or other devices that are used for delivery of any sort of substance into the body via breathing, and includes but is not limited to devices that break up solutions and suspensions into small aerosol droplets for inhalation by a user.

The unit comprises an outer main shell with a mouthpiece unit at one end. The mouthpiece unit may be detachable and replaceable. In addition, the top of the shell may be removable from the base of the shell. The mouthpiece unit comprises an orifice through which vapor is emitted. A mouthpiece cover may be used to cover some or all of the mouthpiece unit. The cover may snap-fit around the perimeter, or a portion of the cover may be inserted into the orifice, or both, to secure the cover in place.

The outer main shell further includes one or more controls, such as a button, slider, or switch, that may be used to turn the unit on or off, or control other functions, as described below. One or more lights, LEDS, or other indicators may be provided to indicate status of the unit, including, but not limited to, power status and operational status. The main shell further comprises an opening with removable cover for insertion of an ampoule or cartridge into the unit. The cartridge holds the substance to be vaporized during operation of the unit. The vaporized substance is inhaled by the user while holding the unit.

The substance to be vaporized may be in the form of a liquid, gel, gas, solid, or the like. In several embodiments, the substance comprises one or more of a therapeutic substance, homeopathic or naturopathic formulations or remedies, serums, or the like. Particular substances may be chosen or selected for particular desired effects, therapies or treatments, and substances have natural vaporization characteristics that are dependent on a variety of factors, including, but not limited to, temperature, air flow, and substance composition and chemical state. Selection of one or more substances for vaporization may be made based upon information obtained from other devices or systems, such as a breath analysis device that can capture and analyze the content of exhaled air, a health band (e.g., Fit Bit), other detection devices, or information stored in or entered into in a health or wellness computer application, program or database on a computer or mobile device (e.g., smart phone, tablet computer), which can coordinate diagnosing this information and developing recommendations for the substance or substances to be used.

In an alternative embodiment, the unit comprises an internal, refillable chamber for holding the substance to be vaporized. The refillable chamber may be filled by insertion of the substance through the opening with removable cover, or other filling port.

The interior of the unit comprises a atomization chamber, which receives the substance from the ampoule or refillable chamber through such means as a wick or other conduit. Vaporization is achieved by means of one or more piezoelectric transducers or atomizers, providing sonic or ultrasonic vibration. Vapor is emitted through conduit to the mouthpiece orifice. Calibration and control of the atomization process (e.g., temperature, size of inlet openings, rate of vaporization, timer) may be controlled by the user manually using a control on the unit, automatically controlled based upon a code or

symbol (e.g., bar code) on the ampoule read by a bar code scanner in the device after insertion, or remotely (such as by wireless connection to a computer or mobile device). This calibration and control may be performed according to the diagnosis and recommendations developed in the manner described above.

A circuit board provides control and power functions. Power may be provided by one or more batteries. The battery or batteries may be standard, replaceable batteries, or may be a rechargeable battery built into the unit, and recharged with a recharging cord or similar means. In some embodiments, a power cord and plug may be plugged into a standard electrical outlet to provide power. A wireless or Bluetooth chip provides for wireless communications. A USB, mini-USB, or similar communications port provides for direct communications, and uploading and downloading of programs or data.

Other vaporization means may be provided, such as a heat source (burner, flame, electrical). Temperature may be controlled in the manner of other parameters discussed above. In yet another embodiment, a unit has multiple vaporization elements, and can vaporize different substances from multiple refillable chambers or multiple ampoules simultaneously, in sequence, or some combination thereof.

The unit may have a computer memory storage capability, and store vaporization treatment data so that the details of the vaporization treatment can be subsequently used to evaluate clinical or medical treatment compliance and effectiveness. The information may be provided by wired or wireless connection to a health or wellness program, as described above. The unit may have one or more means of wireless communication (e.g., wireless chip, Bluetooth), and wired communication (e.g., data ports, USB ports).

The atomization chamber and conduit may be cleaned between uses using a cleaning solution, by one or more interior UV light or radiation sources along the chamber and conduit, or combinations thereof.

In yet another embodiment, one or more light sources (such as, but not limited to, light-emitting diodes (LEDs), laser diodes, fiber optics, full spectrum light sources, RGB LEDs, and the like), vibrational sources (ultrasonic or otherwise), heating sources or elements, piezo transducers, or combinations thereof, may be located on or in the mouthpiece unit, or a portion of the device insertable into the mouth, to provide light-related or other therapy to the mouth, lips and gums. Different arrangements (e.g., colors,

intensity, locations) of light sources may be provided on different mouthpiece units, which can be interchanged as desired.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a perspective view of a device in accordance with an embodiment of the present invention.

Figure 2 shows a top perspective view of the device of Figure 1.

Figure 3 shows a top view of the device of Figure 1.

Figure 4 shows a side view of the device of Figure 1.

Figure 5 shows an exploded perspective view of the device of Figure 1.

Figure 6 shows another exploded perspective view of the device of Figure 1.

Figure 7 shows a view of the interior of the device of Figure 1.

Figure 8 shows another view of the interior of the device of Figure 1.

Figure 9 shows a perspective view of the device of Figure 1 with a cover.

Figure 10 shows a perspective view of the device of Figure 1 with exterior light sources.

Figure 11 shows a perspective view of the device of Figure 1 with interior light sources.

Figures 12-14 shows a perspective view of a hinged device in accordance with an embodiment of the present invention.

Figure 15 shows a side view of the device of Figure 12.

Figure 16 shows a top cutaway view of the device of Figure 12.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

In various exemplary embodiments, as seen in Figures 1-4, the present invention comprises a personal nebulizer or vaporizing unit **2**. In various embodiments, the present invention comprises a personal nebulizer or vaporizing unit. While referred to herein as a nebulizer or vaporizing unit, the device encompasses devices of all sorts, including but not limited to inhalers, nebulizers, vaporizers, humidifiers, ventilators, or other devices that are used for delivery of any sort of substance into the body via breathing, and includes but is not limited to devices that break up solutions and suspensions into small aerosol droplets for inhalation by a user.

The unit seen in Figures 1-4 comprises a main body with an outer main shell **10**, with a mouthpiece unit **20** at one end. The mouthpiece unit may be detachable and replaceable, as seen in Figure 5. In addition, as seen in Figure 6, the top **12** of the shell may be removable from the base **14** of the shell. The mouthpiece unit **20** comprises an orifice **22** through which vapor is emitted. A mouthpiece cover **24** may be used to cover some or all of the mouthpiece unit, as seen in Figure 9. The cover may snap-fit around the perimeter, or a portion of the cover may be inserted into the orifice, or both, to secure the cover in place.

The outer main shell **10** further includes one or more controls **30**, such as a button, slider, or switch, that may be used to turn the unit on or off, or control other functions, as described below. One or more lights, LEDS, or other indicators **32** may be provided to indicate status of the unit, including, but not limited to, power status and operational status.

The main shell **10** further comprises an opening with removable cover **40** for insertion of an ampoule or cartridge **50** into an ampoule holding chamber in the unit. The ampoule or cartridge holds the substance to be vaporized during operation of the unit. The vaporized substance is inhaled by the user while holding the unit.

The substance to be vaporized may be in the form of a liquid, gel, gas, solid, or the like. In several embodiments, the substance comprises one or more of a therapeutic substance, homeopathic or naturopathic formulations or remedies, serums, or the like. Particular substances may be chosen or selected for particular desired effects, therapies or treatments, and substances have natural vaporization characteristics that are dependent on a variety of factors, including, but not limited to, temperature, air flow, and substance composition and chemical state. Selection of one or more substances for vaporization may be made based upon information obtained from other devices or systems, such as a breath analysis device that can capture and analyze the content of exhaled air, a health band (e.g., Fit Bit), other detection devices, or information stored in or entered into in a health or wellness computer application, program or database on a computer or mobile device (e.g., smart phone, tablet computer), which can coordinate diagnosing this information and developing recommendations for the substance or substances to be used.

In an alternative embodiment, the unit comprises an internal, refillable chamber for holding the substance to be vaporized. The refillable chamber may be filled by insertion of the substance through the opening with removable cover **40**, or other filling port.

As seen in Figures 7-11, the interior of the unit comprises a atomization chamber **100**, which receives the substance from the ampoule **50** or refillable chamber through such means as a wick or other conduit. In several embodiments, a pump **170** is used to move the substance from the ampoule **50** means of a tube **172** inserted into the ampoule and a tube **174** that delivers the substance for vaporization. Vaporization is achieved by means of one or more piezoelectric transducers or atomizers **102**, providing sonic or ultrasonic vibration. The transducers or atomizers may be located in or on various sides of the atomization chamber, at the bottom of the atomization chamber, or just outside the atomization chamber. Vapor is emitted through conduit **120** or an extension of the atomization chamber to the mouthpiece orifice **22**.

Calibration and control of the atomization process (e.g., temperature, size of inlet openings, rate of vaporization, timer) may be controlled by the user manually using a control on the unit, automatically controlled based upon a code or symbol (e.g., bar code) on the ampoule, or remotely (such as by wireless connection to a computer or mobile device). This calibration and control may be performed according to the diagnosis and recommendations developed in the manner described above.

A circuit board **130** provides control and power functions. Power may be provided by one or more batteries **134**. The battery or batteries may be standard, replaceable batteries, or may be a rechargeable battery built into the unit, and recharged with a recharging cord or similar means. In some embodiments, a power cord and plug may be plugged into a standard electrical outlet to provide power. A wireless or Bluetooth chip **132** provides for wireless communications. A USB, mini-USB, or similar communications port **136** provides for direct communications, uploading and downloading of programs or data, and recharging.

Other vaporization means may be provided, such as a heat source (burner, flame, electrical). Temperature may be controlled in the manner of other parameters discussed herein. In yet another embodiment, a unit has multiple vaporization elements, and can

vaporize different substances from multiple refillable chambers or multiple ampoules simultaneously, in sequence, or some combination thereof.

In yet a further embodiment, the unit has a computer memory storage capability, and stores vaporization treatment data so that the details of the vaporization treatment, such as, but not limited to, the substance, amount of substance vaporized (i.e., dose), the time of the application, the length of time for the vaporization, and similar data. The vaporization treatment data can be recorded and stored in real time, and transmitted in real time or at a later time to a health or wellness program or similar applications, and used to evaluate clinical or medical treatment compliance and effectiveness. The information may be transmitted or downloaded by wired or wireless connection **132, 134** as described above. The unit may have one or more means of wireless communication (e.g., wireless chip, Bluetooth), and wired communication (e.g., data ports, USB ports).

The atomization chamber **100**, conduit **120**, transducers or atomizers **102**, or other components of the device, may be cleaned between uses using a cleaning solution, by one or more interior UV (ultraviolet) light or radiation sources **210** along the chamber and conduit, or combinations thereof. UV light/radiation kills cells by damaging cell DNA.

The device also may divide the main body into an upper portion **150** and lower portion **152**, hingedly attached **154**. The ampoule **50** may be inserted into the lower portion when the device is opened (the ampoule may be centered or off-centered). When closed, the ampoule is connected to the piezoelectric transducers or atomizers **102** and atomization chamber **100**, which are located in the upper portion.

In yet another embodiment, one or more light sources **200** (such as, but not limited to, light-emitting diodes (LEDs), laser diodes, fiber optics, full spectrum light sources, RGB LEDs, and the like), vibrational sources (ultrasonic or otherwise), heating sources or elements, piezo transducers, or combinations thereof (collectively, "therapy elements"), may be located on or in the mouthpiece unit, or a portion of the device insertable into the mouth, to provide light-related or other therapy to the mouth, lips and gums. The device can comprise a number of individual light sources. The configuration or patterns of light sources can vary, as well as the color and intensities (i.e., milliwatts ranges) of the light sources. Likewise, the light sources can comprise various mixes of

types of light sources. Different colors and intensities may be used for different treatments. In addition, different colors and intensities may be used in different areas.

Physicists have recognized light to be a pure form of energy that is a part of the electromagnetic radiation spectrum. Within this spectrum, the various colors of light each represent unique wavelengths and frequencies that produce therapeutic effects when absorbed through the interior of the mouth. Visible red light tends to stimulate growth at the cellular level whereas blue light has more of a soothing affect. The application of low-level light therapy on the body or areas of the mouth produces a photochemical reaction in the cell. During this process, photons of light are absorbed into the treated cell to increase and stimulate stored energy. As a result, this stored energy transforms into chemical energy that can be used to regulate cellular activity; including enhanced ATP synthesis, protein synthesis, cellular proliferation, and growth factor secretion. Low-level light therapy thus increases energy, reduces pain and inflammation, and reduces stress.

The light sources emit energy in the form of photons when switched on, delivering energy to the interior of the mouth, and penetrating the layers of mouth to produce a non-thermal photochemical effect at the cellular level. The therapy is noninvasive, and avoids the potential side effects of older forms of therapy, such as drug therapy.

Different arrangements (e.g., colors, intensity, locations) of light sources and other therapy elements may be provided on different mouthpiece units or other attachments, which can be interchanged as desired. The present invention in several embodiments thus comprises a phototherapy device with a plurality of light sources arrayed on an interior-facing of the mouth. Various circuit boards contain various orientations, configurations or patterns of light sources, in a variety of colors and intensities (e.g., milliwatts range). Examples of light source orientation include, but are not limited to, a fixed straight position, a variety of angled positions (i.e., angled with respect to the circuit board) allowing bi-directional ability of light to crisscross, or combinations thereof.

Different colors may be used for different treatments. In several embodiments, RGB LEDs are used. RGB LEDs are red, blue and green LEDs that combine these three colors to produce over 16 million hues of light. Not all colors are possible, as some

colors are "outside" the color triangle formed by the RGB LEDs. Further, pigment colors such as brown or pink are difficult, or impossible, to achieve. In several embodiments, RGB technology utilizes the color mixing properties of red, green, and blue LED chips that are provided on a reflector. A photo mixing material and filler resin scatters the light rays to uniformly combine the rays emitted from the LED chips. The photo mixing material and filler resin are applied onto upper sides of the light emitting diode chips while being mixed with each other, and the photo mixing material is uniformly dispersed in the filler resin.

In several embodiments, the light sources include red, blue, green and orange colors. These colors have the following effects:

Red: stimulates vitality and growth; good for fatigue and debilitating conditions; use for deficient nutrition, dormant conditions, poor appetite, constipation, depression, drowsiness, and paralysis.

Blue: slows down growth; calming; acts as a sedative; relieves excitement and inflammation; resets "biological clock" of the human body using doses of 20 minutes; blue light to Alzheimer's patients helped biological clock to sleep longer at night; use for nervousness, irritability, fussiness, feverishness; apply to all conditions where inflammation is present; use for internal bleeding, nervous conditions.

Green: slows down growth; calming; relieves excitement and inflammation; useful when combined with blue/red and yellow as a brain/nerve stimulate and laxative.

Orange: a combination of red and yellow is powerful in colds and sluggish/chronic conditions as it helps release stored energy.

The device also may contain optical fibers, or optical fiber containing extending units or arms, to carry light to the interior of the mouth or throat. Light sources may be placed in a variety of configurations or patterns, in a similar manner as described above, to allow light to impact the inner mouth and brain, or to illuminate the area inside of the mouth. Removable faceplates may also be used with the ULiv device.

The light sources can be controlled by wireless (Wi-Fi or Li-Fi) or wired connection through a control unit, or a control program or application on a computing

device, mobile or portable computing device, touchpad or tablet device, cellphone, or the like. LiFi is Light Fidelity, a bidirectional, high speed and fully networked visible light wireless communication technology similar to Wi-Fi. The user can control color, type, duration, wavelength amplitude, wavelength phase, and frequency (pulse) of the light sources, and similar characteristics of the therapy elements in general, being activated during therapeutic application, as described in further detail herein. The operator can select the frequency (pulse), wavelength, amplitude, and wave type associated with each light-emitting source. This phase relationship allows for each channel to be specifically programmed with frequency and peak-to-peak amplitude allowing multiple channels to operate at a different frequency (pulse) and amplitude. Thus, the phototherapy device can produce multiple wavelengths, multiple wave types, multiple frequencies (pulses), and multiple amplitudes.

In several embodiments, the device can provide any light frequency within the pulsing range of 0 Hz to 100,000,000,000 Hz, and can run all safe wavelengths of the electromagnetic spectrum, including visible light and near-infrared light. In several exemplary embodiments, the power output per light source ranges from 1mW to 300mW.

In several further embodiments, the present invention incorporates the geometric configuration of single light technology or multiple light technologies, wavelength, amplitude and power output, referred to as the array. The geometric configuration is not limited to any single configuration and can include any geometric configuration of wavelengths, power output, amplitude, and wave types. The array is engineered to produce multiple wavelengths, power outputs, amplitudes and wave types producing therapeutic benefits to human brain and mouth area. This is accomplished by utilizing expandable software, smart chips, adaptive lenses, and light producing technology that is completely scalable and configurable to operator needs. The geometric arrangement of the light technology is not limited to any single geometric configuration, wavelength, power output, amplitude, or wave type. The array can be configured to support any geometric configuration of multiple wavelengths, multiple power outputs, multiple amplitudes, or multiple wave types.

In several embodiments, the present invention will only work with specific control boxes, accessories, or computing devices, which can be self-identifying through

"handshake" communications technology. Utilizing handshake technology will only pair specific units to specific accessories. A specific circuit board chip may be utilized in each and every piece of equipment. This can also be controlled through a phone app which will only allow the ULiv to hookup to a specific code within the program of the app. These chips include a one-of-a-kind code that forms a unique link to each other. The circuit board may be a variable frequency circuit board. Specific RF chips may be installed in each and every unit so that identifications can be placed into each piece of equipment to identify purchase dates and other necessary information.

In yet a further embodiment, the invention is equipped with an USB port and wireless circuit board that will operate and control peripheral devices by the digital interface of the device. Peripheral devices include, but are not limited to, light technology devices and any device that generates frequency or electrical pulse. The peripheral devices may be activated upon a passcode entered into a digital interface of the device.

In order to provide a context for the various aspects of the invention, the following discussion provides a brief, general description of a suitable computing environment in which the various aspects of the present invention may be implemented. A computing system environment is one example of a suitable computing environment, but is not intended to suggest any limitation as to the scope of use or functionality of the invention. A computing environment may contain any one or combination of components discussed below, and may contain additional components, or some of the illustrated components may be absent. Various embodiments of the invention are operational with numerous general purpose or special purpose computing systems, environments or configurations. Examples of computing systems, environments, or configurations that may be suitable for use with various embodiments of the invention include, but are not limited to, personal computers, laptop computers, computer servers, computer notebooks, hand-held devices, microprocessor-based systems, multiprocessor systems, TV set-top boxes and devices, programmable consumer electronics, cell phones, personal digital assistants (PDAs), tablets, smart phones, touch screen devices, smart TV, internet enabled appliances, internet enabled security systems, internet enabled gaming systems, internet enabled watches; internet enabled cars (or transportation), network PCs, minicomputers,

mainframe computers, embedded systems, virtual systems, distributed computing environments, streaming environments, volatile environments, and the like.

Embodiments of the invention may be implemented in the form of computer-executable instructions, such as program code or program modules, being executed by a computer, virtual computer, or computing device. Program code or modules may include programs, objects, components, data elements and structures, routines, subroutines, functions and the like. These are used to perform or implement particular tasks or functions. Embodiments of the invention also may be implemented in distributed computing environments. In such environments, tasks are performed by remote processing devices linked via a communications network or other data transmission medium, and data and program code or modules may be located in both local and remote computer storage media including memory storage devices such as, but not limited to, hard drives, solid state drives (SSD), flash drives, USB drives, optical drives, and internet-based storage (e.g., "cloud" storage).

In one embodiment, a computer system comprises multiple client devices in communication with one or more server devices through or over a network, although in some cases no server device is used. In various embodiments, the network may comprise the Internet, an intranet, Wide Area Network (WAN), or Local Area Network (LAN). It should be noted that many of the methods of the present invention are operable within a single computing device.

A client device may be any type of processor-based platform that is connected to a network and that interacts with one or more application programs. The client devices each comprise a computer-readable medium in the form of volatile and/or nonvolatile memory such as read only memory (ROM) and random access memory (RAM) in communication with a processor. The processor executes computer-executable program instructions stored in memory. Examples of such processors include, but are not limited to, microprocessors, ASICs, and the like.

Client devices may further comprise computer-readable media in communication with the processor, said media storing program code, modules and instructions that, when executed by the processor, cause the processor to execute the program and perform the steps described herein. Computer readable media can be any available media that can be

accessed by computer or computing device and includes both volatile and nonvolatile media, and removable and non-removable media. Computer-readable media may further comprise computer storage media and communication media. Computer storage media comprises media for storage of information, such as computer readable instructions, data, data structures, or program code or modules. Examples of computer-readable media include, but are not limited to, any electronic, optical, magnetic, or other storage or transmission device, a floppy disk, hard disk drive, CD-ROM, DVD, magnetic disk, memory chip, ROM, RAM, EEPROM, flash memory or other memory technology, an ASIC, a configured processor, CDROM, DVD or other optical disk storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other medium from which a computer processor can read instructions or that can store desired information. Communication media comprises media that may transmit or carry instructions to a computer, including, but not limited to, a router, private or public network, wired network, direct wired connection, wireless network, other wireless media (such as acoustic, RF, infrared, or the like) or other transmission device or channel. This may include computer readable instructions, data structures, program modules or other data in a modulated data signal such as a carrier wave or other transport mechanism. Said transmission may be wired, wireless, or both. Combinations of any of the above should also be included within the scope of computer readable media. The instructions may comprise code from any computer-programming language, including, for example, C, C++, C#, Visual Basic, Java, and the like.

Components of a general purpose client or computing device may further include a system bus that connects various system components, including the memory and processor. A system bus may be any of several types of bus structures, including, but not limited to, a memory bus or memory controller, a peripheral bus, and a local bus using any of a variety of bus architectures. Such architectures include, but are not limited to, Industry Standard Architecture (ISA) bus, Micro Channel Architecture (MCA) bus, Enhanced ISA (EISA) bus, Video Electronics Standards Association (VESA) local bus, and Peripheral Component Interconnect (PCI) bus.

Computing and client devices also may include a basic input/output system (BIOS), which contains the basic routines that help to transfer information between

elements within a computer, such as during start-up. BIOS typically is stored in ROM. In contrast, RAM typically contains data or program code or modules that are accessible to or presently being operated on by processor, such as, but not limited to, the operating system, application program, and data.

Client devices also may comprise a variety of other internal or external components, such as a monitor or display, a keyboard, a mouse, a trackball, a pointing device, touch pad, microphone, joystick, satellite dish, scanner, a disk drive, a CD-ROM or DVD drive, or other input or output devices. These and other devices are typically connected to the processor through a user input interface coupled to the system bus, but may be connected by other interface and bus structures, such as a parallel port, serial port, game port or a universal serial bus (USB). A monitor or other type of display device is typically connected to the system bus via a video interface. In addition to the monitor, client devices may also include other peripheral output devices such as speakers and printer, which may be connected through an output peripheral interface.

Client devices may operate on any operating system capable of supporting an application of the type disclosed herein. Client devices also may support a browser or browser-enabled application. Examples of client devices include, but are not limited to, personal computers, laptop computers, personal digital assistants, computer notebooks, hand-held devices, cellular phones, mobile phones, smart phones, pagers, digital tablets, Internet appliances, and other processor-based devices. Users may communicate with each other, and with other systems, networks, and devices, over the network through the respective client devices.

Thus, it should be understood that the embodiments and examples described herein have been chosen and described in order to best illustrate the principles of the invention and its practical applications to thereby enable one of ordinary skill in the art to best utilize the invention in various embodiments and with various modifications as are suited for particular uses contemplated. Even though specific embodiments of this invention have been described, they are not to be taken as exhaustive. There are several variations that will be apparent to those skilled in the art.

CLAIMS

What is claimed is:

1. A nebulizer or vaporization device, comprising:

a main body containing an atomization chamber and an ampoule holding chamber, said ampoule holding chamber configured to hold a substance-containing ampoule, and said atomization chamber comprising one or more piezoelectric transducers or atomizers configured to vaporize or atomize the substance with sonic or ultrasonic energy;

at least one mouthpiece with an orifice; and

a conduit extending between the atomization chamber and the orifice.

2. The device of claim 1, wherein the at least one mouthpiece is removably attached to the main body.

3. The device of claim 2, further comprising two or more mouthpieces.

4. The device of claim 1, further comprising a mouthpiece cover.

5. The device of claim 1, further comprising a plurality of ultraviolet light sources configured to provide ultraviolet light inside the atomization chamber or conduit, or both.

6. The device of claim 1, further comprising one or more internal power sources.

7. The device of claim 1, wherein the one or more internal power sources comprises one or more batteries.

8. The device of claim 1, further comprising a wireless communications chip.

9. The device of claim 1, further comprising one or more communications ports in the main body.

10. The device of claim 1, further comprising a control unit.

11. The device of claim 1, further comprising computer-readable memory storage.

12. The device of claim 1, further comprising a scanner inside the main body, configured to read a bar code or marking on an ampoule.

13. The device of claim 1, further comprising means for controlling operation of the device.

14. The device of claim 1, further comprising one or more exterior light sources, therapy elements, or combinations thereof, disposed on the main body or mouthpiece.

15. The device of claim 14, wherein said light sources comprise one or more of light-emitting diodes (LEDs), laser diodes, fiber optics, full spectrum light sources, RGB LEDs, or combinations thereof.

16. The device of claim 14, wherein said therapy elements comprise one or more of vibrational sources or heating sources, or combinations thereof.

17. The device of claim 1, wherein said device is portable and hand-held.

18. The device of claim 1, further comprising a pump configured to move substance from the ampoule to the one or more piezoelectric transducers or atomizers

19. A nebulizer or vaporization device, comprising:

a main body with an upper portion and a lower portion hingedly connected, said lower portion containing an ampoule holding chamber, said ampoule holding chamber configured to hold a substance-containing ampoule, and said upper portion containing an atomization chamber and one or more piezoelectric transducers or atomizers configured to vaporize or atomize the substance with sonic or ultrasonic energy and said lower portion containing an ampoule holding chamber, said ampoule holding chamber configured to hold a substance-containing ampoule, and said atomization chamber comprising one or more piezoelectric transducers or atomizers configured to vaporize or atomize the substance with sonic ultrasonic energy; and

an orifice in the upper portion configured to emit the vaporized or atomized substance.

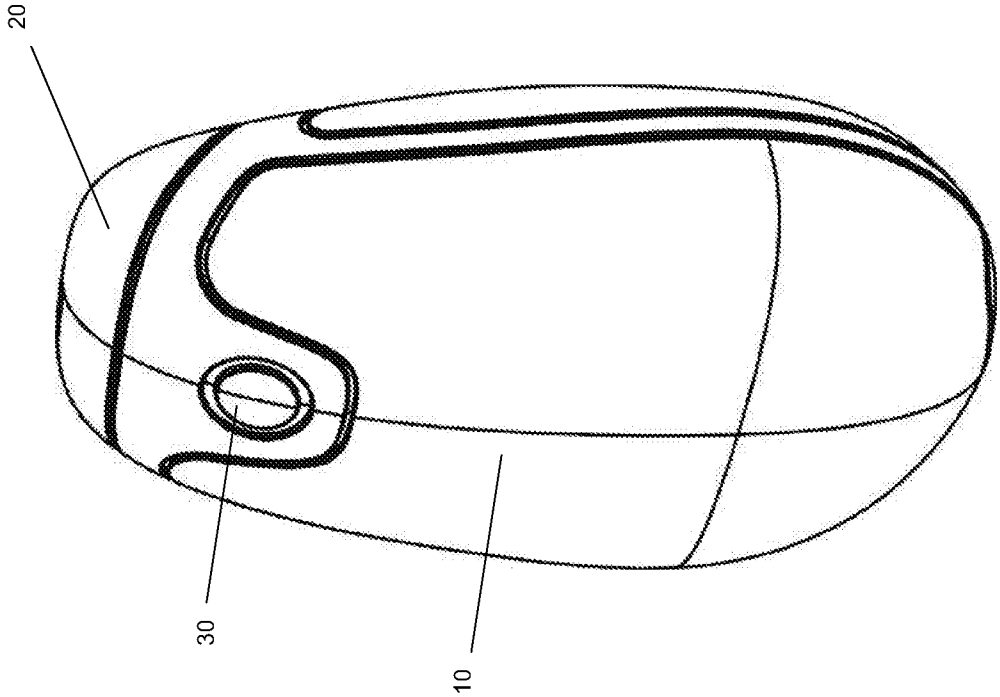


FIG. 2

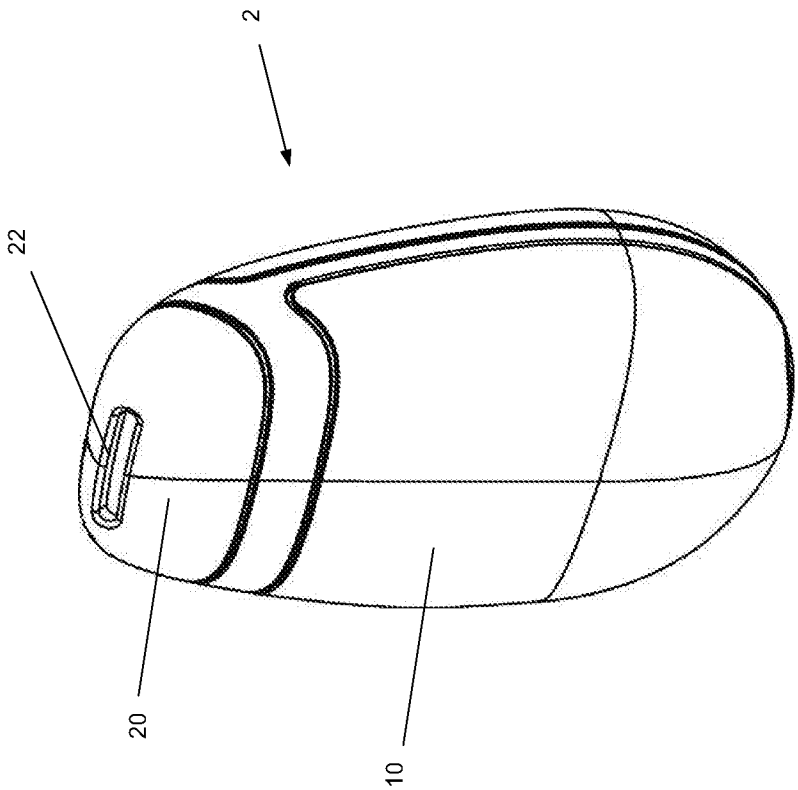


FIG. 1

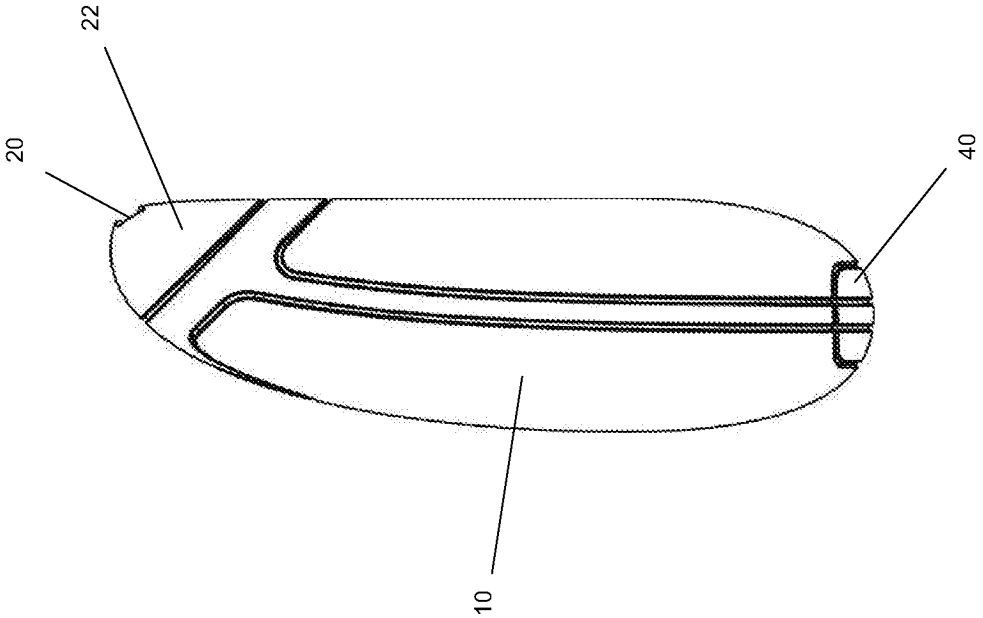


FIG. 4

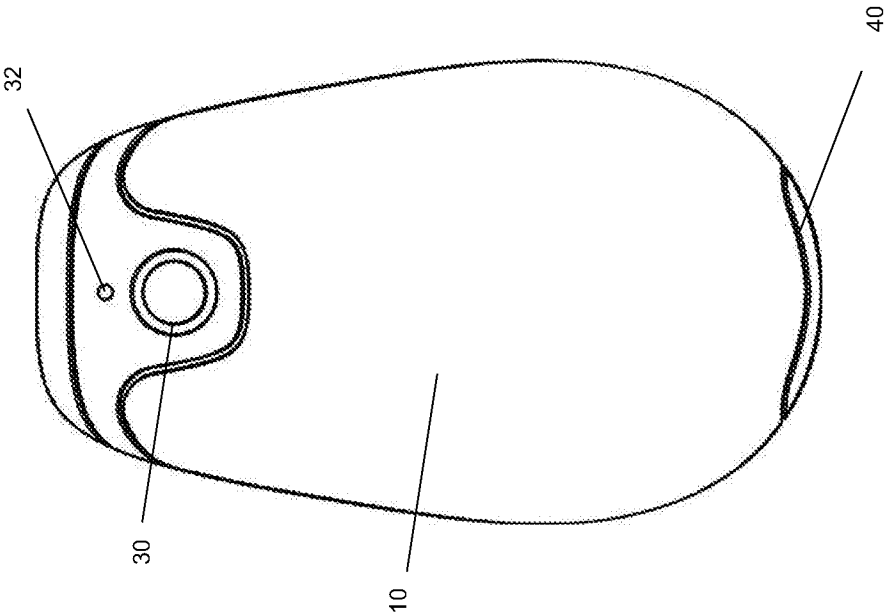


FIG. 3

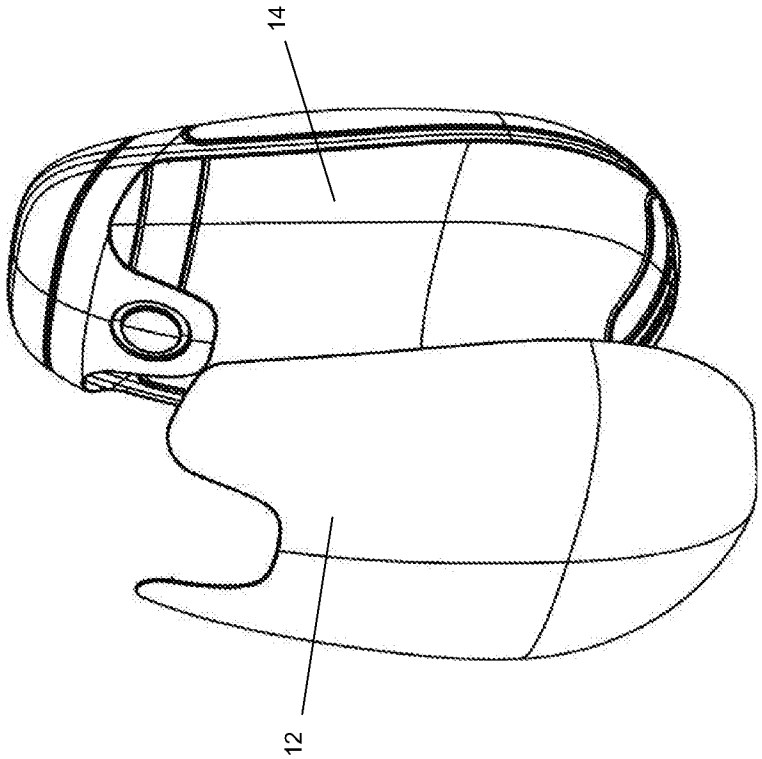


FIG. 6

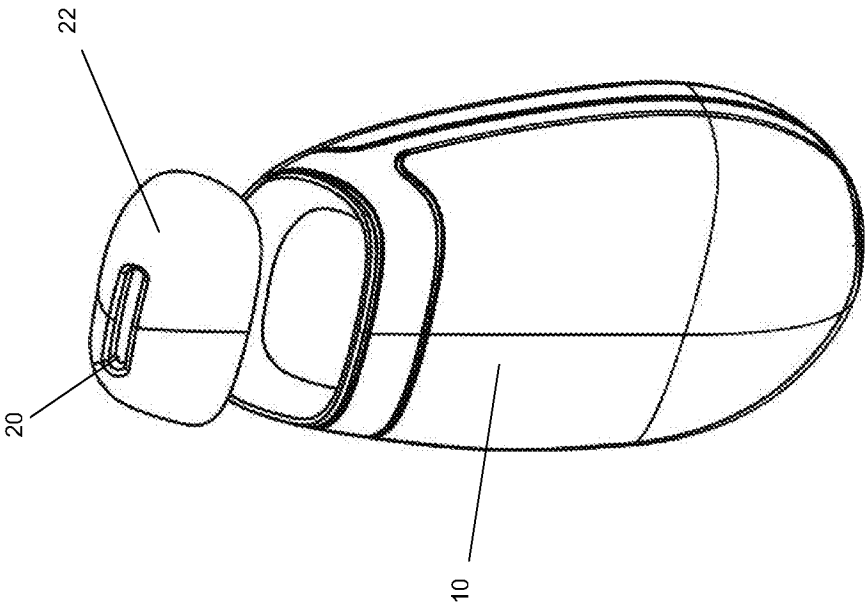


FIG. 5

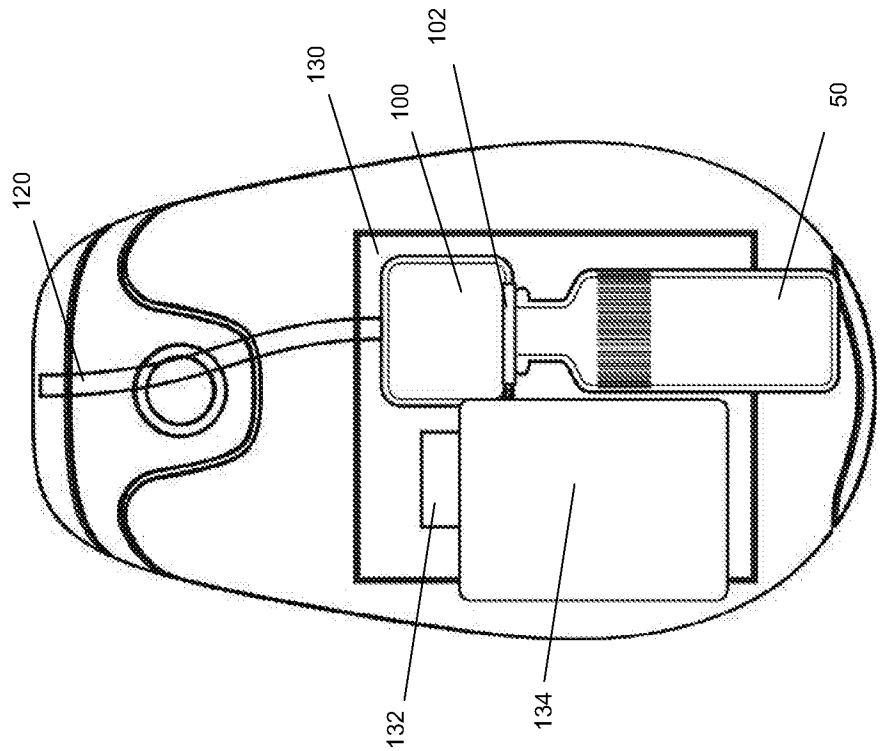


FIG. 8

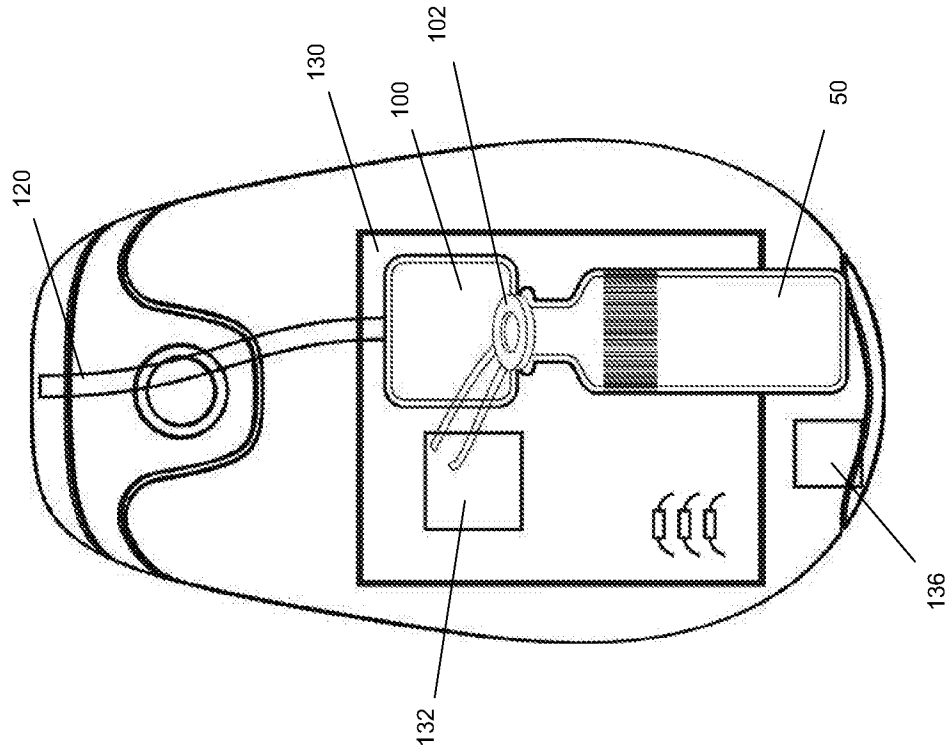


FIG. 7

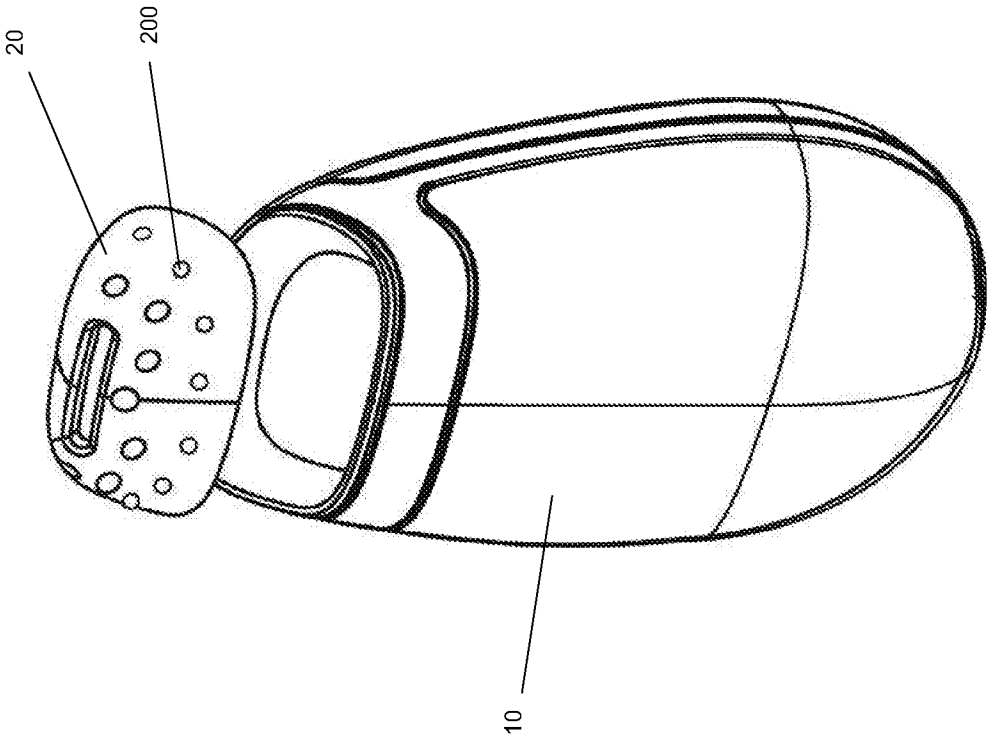


FIG. 10

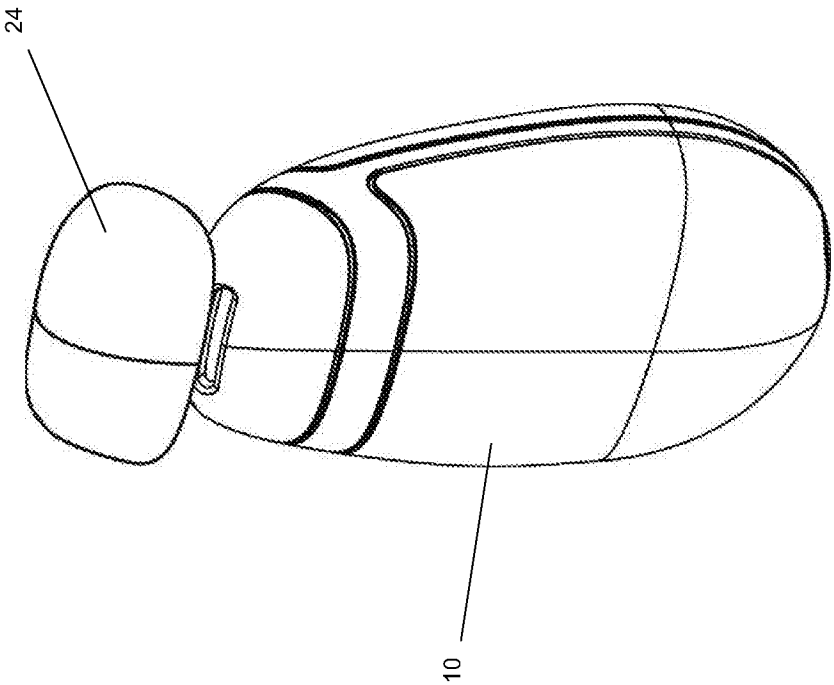


FIG. 9

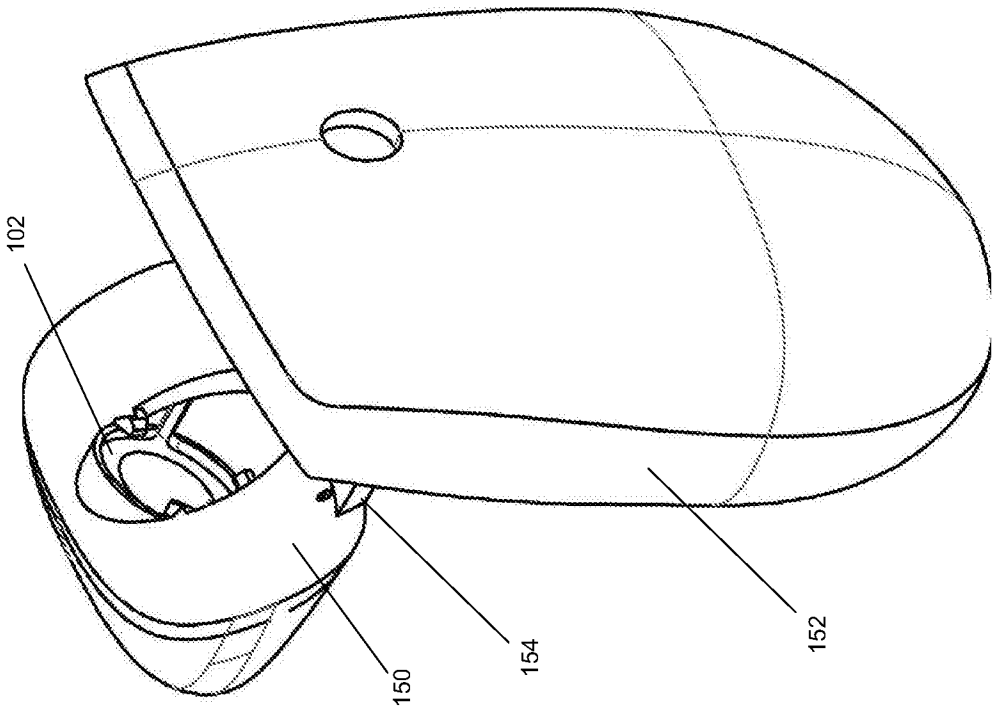


FIG. 12

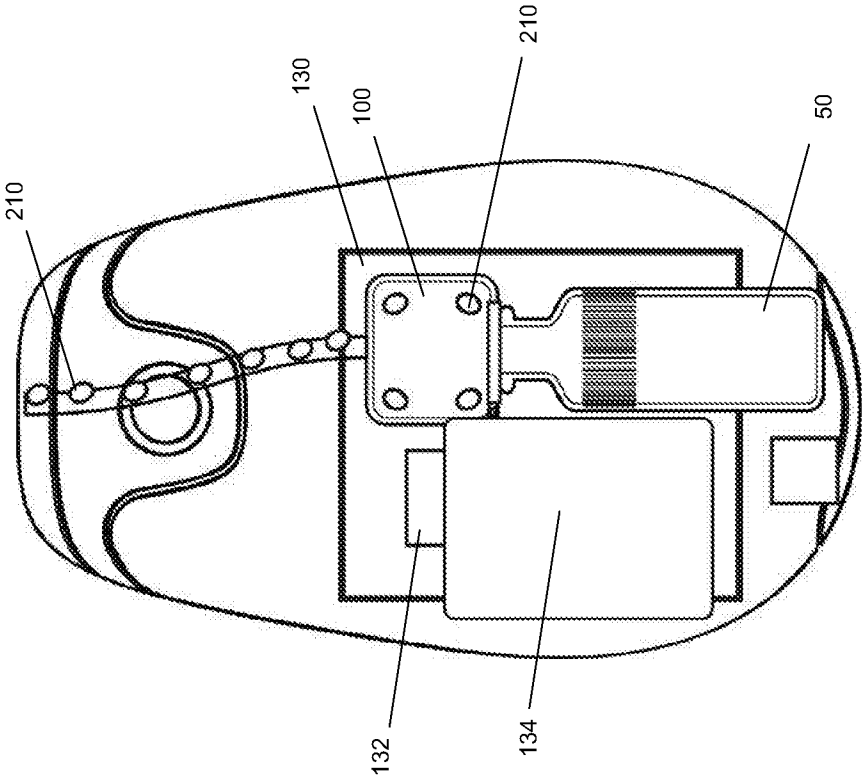


FIG. 11

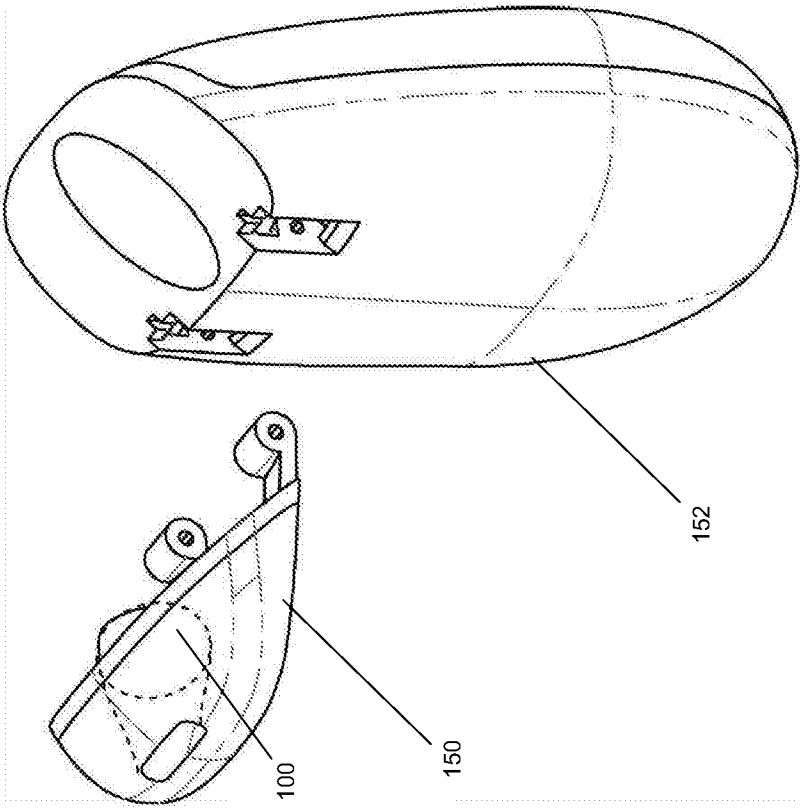


FIG. 14

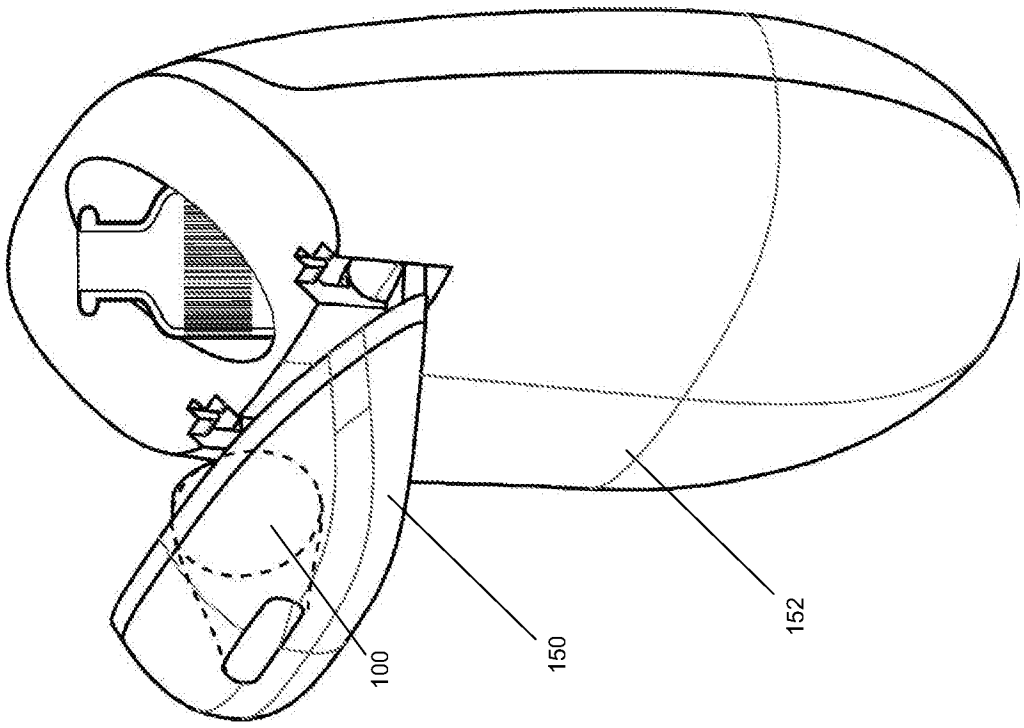


FIG. 13

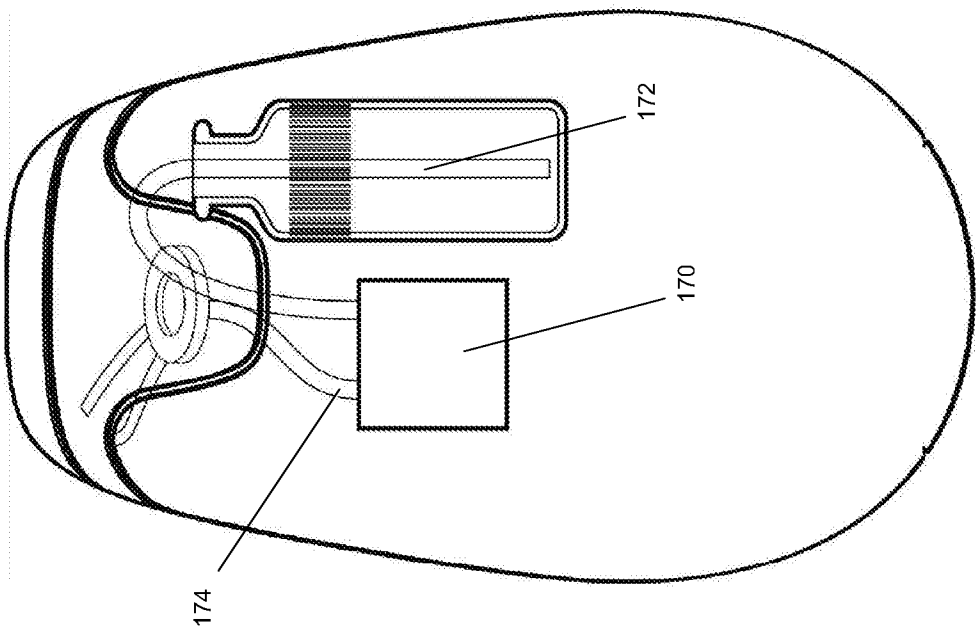


FIG. 16

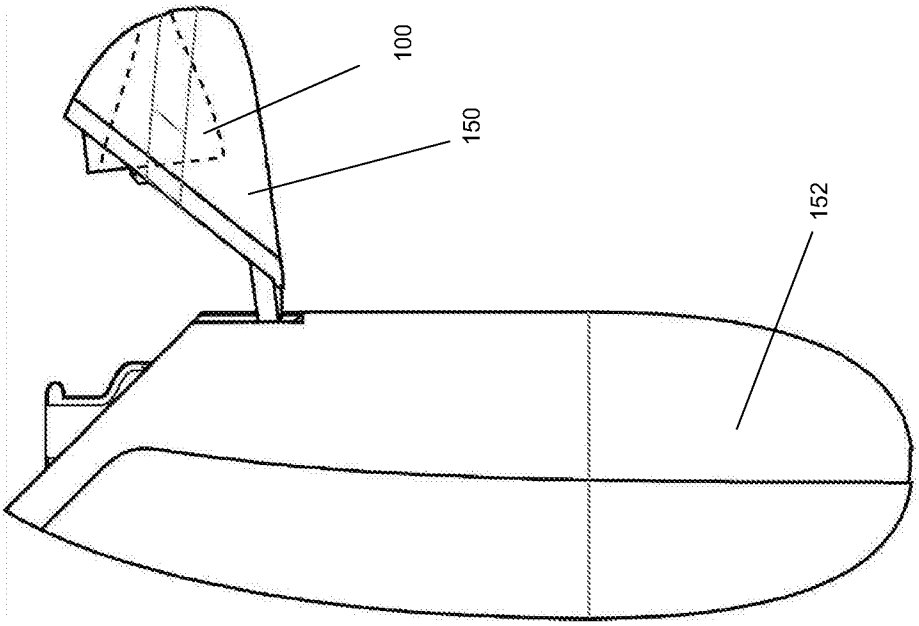


FIG. 15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 16/37898

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A61M 11/00, A61M 15/00 (2016.01)
CPC - A61M 15/0085, A61M 11/005, A61M 11/042, A61M 15/0021, A61M 15/00, A61M 11/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - A61M 11/00, A61M 15/00 (2016.01)
CPC - A61M 15/0085, A61M 11/005, A61M 11/042, A61M 15/0021, A61M 15/00, A61M 11/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
(UPC) 131/329 (CPC) A61M 11/*, 2011/*, A61M 15/*, 2015/*
(Search term limited; see below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWest (PGPB, USPT, EPAB, JPAB); Google; PatBase (All);
Search Terms: Atomiz* nebuliz*, aeresol*, vaporiz*, ultraso*, piezoel*, peizoel*, ampoule, ampule, cartridge, chamber, zone, channel, conduit, tube, pipe, line, mouth, outlet, port, pocket, portable, remov*, replac*, dispos*, housing, case, casing, shell, clamshell, body, pivot

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US 5,435,282 A (HABER et al.) 25 July 1995 (25.07.1995) Entire document, especially Abstract, col 3, ln 9-26, col 7, ln 36-62 and FIGS. 1-5.	1-3, 17-18 ---------- 4, 19
X -- Y	US 2008/0245362 A1 (MOESSIS et al.) 09 October 2008 (09.10.2008) Entire document, especially Abstract, para[0143]- para[0147], para[0165] and FIGS. 1-3.	1, 6-7, 13 ---------- 5, 8-12, 14-16
Y	US 2007/0240712 A1 (FLEMING et al.) 18 October 2007 (18.10.2007) Entire document, especially Abstract, para[0049] and FIG. 2	4
Y	US 2008/0233053 A1 (GROSS et al.) 25 September 2008 (25.09.2008) Entire document, especially Abstract, para[0284], para[0335], para[0341]- para[0347] and FIG. 5.	5, 14-16
Y	US 2013/0269694 A1 (PATTON et al.) 17 October 2013 (17.10.2013) Entire document, especially Abstract, para[0019], para[0023] and FIG. 1.	8-9
Y	US 2008/0060641 A1 (SMITH et al.) 13 March 2008 (13.03.2008) Entire document, especially Abstract, para[0017]- para[0018], para[0050]- para[0052], para[0076]- para[0077] and FIG. 1.	10-12
Y	WO 2015/022436 A1 (VECTURA GMBH) 19 February 2015 (19.02.2015) Entire document, especially Abstract, FIGS. 2,	19

☒ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 September 2016 (19.09.2016)	06 OCT 2016

Name and mailing address of the ISA/US	Authorized officer:
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 16/37898

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2012/0285446 A1 (VAN DER MARK) 15 November 2012 (15.11.2012) Entire document.	1-19
A	US 2012/0255546 A1 (GOETZ et al.) 11 October 2012 (11.10.2012) Entire document.	1-19
A	US 2003/0127538 A1 (PATEL et al.) 10 July 2003 (10.07.2003) Entire document.	1-19