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(54) **Title:** TAMPER-RESISTANT VAPORIZER CARTRIDGE

(57) **Abstract:** A tamper-resistant vaporizer cartridge with a mouthpiece can be actuated between a free position and a locked position is provided. The mouthpiece can comprise a central portion with a first interlocking component and a rotating portion with a second interlocking component. The central portion of the mouthpiece can be connected to a body of the cartridge via a connection such as threads. The first and second interlocking components can be configured such that, when the mouthpiece is actuated to a free position, the rotating portion can freely rotate about the central portion. When the mouthpiece is actuated to a locked position, the rotating portion and the central portion can be rotationally locked such that the mouthpiece may be manipulated to remove it from the body. The cartridge can also have a ceramic heating element to provide better absorption of vaporizing material and a greater temperature range.

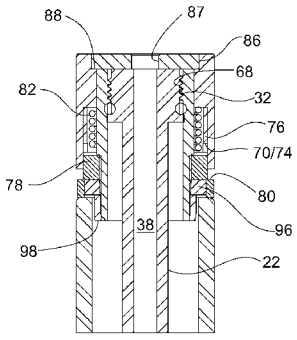


Fig. 3C

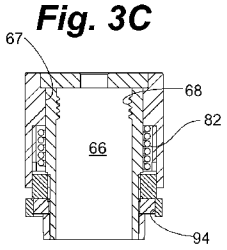


Fig. 3B

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TITLE: TAMPER-RESISTANT VAPORIZER CARTRIDGE

INVENTORS: Tyler Kibler, Ankit Sharma, and Mark Oppenheimer

FIELD OF THE DISCLOSURE:

[0001] The present disclosure relates to equipment used for vaporizing a material to emit a vapor for inhalation. More particularly, the present disclosure relates to tamper-resistant vaporizer cartridges.

BACKGROUND:

[0002] Vaporizers are used to heat a material, such as herbs, oils, waxes, and other beneficial materials, to create a vapor containing one or more desired extracted ingredients. Such materials may be referred to herein as "vaping materials." The vapor may then be delivered to a user by inhalation during a "vaping" session.

[0003] Portable vaporizers for personal use can comprise a cartridge configured to store a plant extract, such as an oil, liquid, or wax, in a materials chamber therein to be vaporized by the vaporizer to generate a vapor when activated by a user. A mouthpiece in communication with the cartridge directs the generated vapor into the user's mouth. A heating element for heating the plant extract is located in the materials chamber for vaporizing the material. A power source such as a battery is electrically connected to the heating element for providing power thereto.

[0004] Many conventional vaporizers have cartridges that are easily opened, such as by unscrewing the mouthpiece from the cartridge, to provide access to the materials chamber. However, users must be careful that the vaporizer and cartridge are not opened by a child or another unauthorized user, as the material stored in the materials chamber can be harmful if ingested. It is also undesirable for the cartridge to be inadvertently opened by the user during or between vaping sessions, which may result in the accidental spillage of the vaporizing material.

[0005] Additionally, the heating elements of conventional vaporizers typically comprise a heating coil for heating and vaporizing the vaporizing material, and a wicking material for drawing the vaporizing material from the materials chamber into contact with the heating coil. The heating coils of such conventional heating elements are usually made of metal, such as nickel-chromium, stainless steel, nickel, titanium, and the like, while wicking materials are typically made of ceramic, cotton or other absorbent material. A disadvantage of metal-and-cotton heating elements is their relatively poor absorption capability and uneven heating. A further risk of metal-and-cotton heating elements is the lack of a protective bonded coating on cotton wicks, which can result in failure of the metal coil due to oxidation of the alloy. The oxidation process is accelerated at elevated temperature, such as those present in vaporizers. The phenomenon is amplified in presence of aggressive mixtures of oils and over repeated heating and cooling cycles. This results in a layer of oxidized material being formed on the coil's surface, creating a risk of said layer of oxidized material peeling off and being released. Additionally, metal heating coils can be short-lived and are limited in how

much voltage can be run through the coil, which in turn limits the temperatures to which the coil can be heated.

[0006] Further, current vaporizer designs comprise a hollow body and a mouthpiece/vaporizing portion assembly coupled therewith, the vaporizing portion housed within the body to vaporize the vaporizing material therein when in use. In conventional designs, both the mouthpiece and vaporizing portion are removed when the mouthpiece is uncoupled and removed from the body. Such a design presents problems when filling the body with vaporizing material, as the insertion of the mouthpiece/vaporizing portion assembly into the body may cause some of the material to overflow if the body has been filled with too much vaporizing material.

[0007] There remains a need for a vaporizer cartridge that is tamper-resistant to prevent children or other unauthorized users from opening the cartridge and accessing the vaporizing material therein. Further, there is a need for a vaporizer cartridge having a heating element that is capable of better absorbing the vaporizing material and operating in a greater range of temperatures.

SUMMARY:

[0008] Embodiments of a tamper-resistant vaporizer cartridge for a vaporizer are described herein capable of preventing unauthorized users from accessing contents stored therein. The vaporizer cartridge can comprise a body having a materials storage chamber for storing material to be vaporized, and a heating element for vaporizing the material. A mouthpiece can be removably coupled with the body for permitting a user of the vaporizer to draw vaporized material from the body. The mouthpiece may be

coupled and decoupled with the body in a rotating fashion, such as via threads. The mouthpiece can comprise a central portion with a first interlocking component and a rotating portion rotatably secured about the central portion and having a second interlocking component. The rotating and central portions can be actuated between a freely rotating and a rotationally locked position. In the freely rotating position, the first and second interlocking components are not engaged with each other and the rotating portion can be rotated about the central portion without also rotating the central portion. In the locked position, the first and second interlocking components are engaged with each other to rotationally lock the central and rotating portions such that rotation of the rotating portion also rotates the central portion.

[0009] In a broad aspect, a vaporizer cartridge comprises: a vaporizing portion at least partially residing in an outer casing and defining a materials chamber therebetween, the vaporizing portion comprising a vaporizing chamber, a conduit in communication with the vaporizing chamber, and a heating element located within the vaporizing chamber and configured to be electrically connected to a power supply; a mouthpiece configured to be removably coupled with the vaporizing portion, the mouthpiece comprising a central portion and a rotating portion rotatably secured about the central portion, the central portion having an axial bore extending therethrough and a first interlocking component, and the rotating portion having a second interlocking component configured to selectably couple with the first interlocking component to rotationally lock the rotating portion with the central portion when the rotating portion is actuated from a freely rotating free position to a locked position; wherein the axial bore

of the mouthpiece and the central conduit of the vaporizing portion are in fluid communication when the mouthpiece and vaporizing portion are coupled together.

[0010] In an embodiment, the heating element comprises a metal coil embedded in a ceramic element.

[001 1] In an embodiment, the first interlocking component comprises one or more protrusions extending from the central portion, and the second interlocking component comprises one or more recesses defined in the rotating portion and corresponding with the one or more protrusions, and wherein the one or more protrusions extend substantially axially towards the one or more recesses.

[0012] In an embodiment, the first interlocking component comprises a first plurality of teeth extending axially from the central portion, and the second interlocking component comprises a second plurality of teeth extending axially from the rotating portion, the first and second pluralities of teeth extending axially toward each other.

[0013] In an embodiment, the vaporizer cartridge further comprises a resilient member positioned between the central portion and rotating portion and configured to bias the rotating portion to the free position.

[0014] In an embodiment, the resilient member is located in an annulus formed between the central portion and the rotating portion.

[0015] In an embodiment, the first interlocking component comprises one or more radial recesses defined in an outer wall of the central portion and the second interlocking component comprises one or more resilient tabs each having a radially inwardly extending protrusion corresponding with the one or more radial recesses.

[0016] In an embodiment, the one or more resilient tabs are configured to bias the protrusions away from the one or more radial recesses.

[0017] In an embodiment, the central portion further comprises a radially outwardly extending flange, and a retaining ring is configured to couple with the central portion to rotatably secure the rotating portion to the central portion by sandwiching the rotating portion between the flange and the retaining ring.

[0018] In an embodiment, the first interlocking component is located on the retaining ring.

[0019] In another broad aspect, a vaporizer mouthpiece comprises: a central portion comprising an axial bore extending therethrough and a first interlocking component; and a rotating portion rotatably secured about the central portion and comprising a second interlocking component configured to selectably couple with the first interlocking component to rotationally lock the rotating portion with the central portion when the rotating portion is actuated from a freely rotating free position to a locked position.

[0020] In an embodiment, the first interlocking component comprises one or more protrusions extending from the central portion, and the second interlocking component comprises one or more recesses defined in the rotating portion and corresponding with the one or more protrusions, and wherein the one or more protrusions extend substantially axially towards the one or more recesses.

[0021] In an embodiment, the first interlocking component comprises a first plurality of teeth extending axially from the central portion, and the second interlocking

component comprises a second plurality of teeth extending axially from the rotating portion, the first and second pluralities of teeth extending axially toward each other.

[0022] In an embodiment, the vaporizer mouthpiece comprises a resilient member positioned between the central portion and rotating portion and configured to bias the rotating portion to the free position.

[0023] In an embodiment, the resilient member is located in an annulus formed between the central portion and the rotating portion.

[0024] In an embodiment, the first interlocking component comprises one or more radial recesses defined in an outer wall of the central portion and the second interlocking component comprises one or more resilient tabs each having a radially inwardly extending protrusion corresponding with the one or more radial recesses.

[0025] In an embodiment, the one or more resilient tabs are configured to bias the protrusions away from the one or more radial recesses.

[0026] In an embodiment, the central portion further comprises a radially outwardly extending flange, and a retaining ring is configured to couple with the central portion to rotatably secure the rotating portion to the central portion by sandwiching the rotating portion between the flange and the retaining ring.

[0027] In an embodiment, the first interlocking component is located on the retaining ring.

[0028] In a broad aspect, a vaporizer comprises: a vaporizing portion at least partially residing in an outer casing and defining a materials chamber therebetween, the vaporizing portion comprising a vaporizing chamber, a conduit in communication with

the vaporizing chamber, and a heating element located within the vaporizing chamber; and a power supply electrically connected to the heating element.

[0029] In an embodiment, the vaporizer further comprises: a mouthpiece configured to be removably coupled with the vaporizing portion, the mouthpiece comprising a central portion and a rotating portion rotatably secured about the central portion, the central portion having an axial bore extending therethrough and a first interlocking component, and the rotating portion having a second interlocking component configured to selectably couple with the first interlocking component to rotationally lock the rotating portion with the central portion when the rotating portion is actuated from a freely rotating free position to a locked position; wherein the axial bore of the mouthpiece and the central conduit of the vaporizing portion are in fluid communication when the mouthpiece and vaporizing portion are coupled together.

[0030] In an embodiment, the vaporizer further comprises a cap configured to be removably coupled with the mouthpiece or vaporizing portion to cover the mouthpiece.

[0031] In an embodiment, the heating element comprises a metal coil embedded in a ceramic element.

[0032] In an embodiment, the first interlocking component comprises one or more protrusions extending from the central portion, and the second interlocking component comprises one or more recesses defined in the rotating portion and corresponding with the one or more protrusions, and wherein the one or more protrusions extend substantially axially towards the one or more recesses.

[0033] In an embodiment, the first interlocking component comprises a first plurality of teeth extending axially from the central portion, and the second interlocking

component comprises a second plurality of teeth extending axially from the rotating portion, the first and second pluralities of teeth extending axially toward each other.

[0034] In an embodiment, the vaporizer further comprises a resilient member positioned between the central portion and rotating portion and configured to bias the rotating portion to the free position.

[0035] In an embodiment, the resilient member is located in an annulus formed between the central portion and the rotating portion.

[0036] In an embodiment, the first interlocking component comprises one or more radial recesses defined in an outer wall of the central portion and the second interlocking component comprises one or more resilient tabs each having a radially inwardly extending protrusion corresponding with the one or more radial recesses.

[0037] In an embodiment, the one or more resilient tabs are configured to bias the protrusions away from the one or more radial recesses.

[0038] In an embodiment, the central portion further comprises a radially outwardly extending flange, and a retaining ring is configured to couple with the central portion to rotatably secure the rotating portion to the central portion by sandwiching the rotating portion between the flange and the retaining ring.

[0039] In an embodiment, the first interlocking component is located on the retaining ring.

BRIEF DESCRIPTION OF THE DRAWINGS:

[0040] Vaporizers, mouthpieces, and cartridges according to the present disclosure will now be described by way of exemplary embodiments with reference to the accompanying drawings. In the drawings:

[0041] Figure 1 is an isometric view of an embodiment of a vaporizer cartridge according to the present disclosure showing a mouthpiece coupled with a body;

[0042] Figure 2A is an isometric view of another embodiment of a vaporizer cartridge;

[0043] Figure 2B is a cross-sectional elevation view of the vaporizer cartridge of Figure 2A;

[0044] Figure 2C is a cross-sectional elevation view of the vaporizer cartridge of Figure 2A showing the body with the mouthpiece removed;

[0045] Figure 3A is a magnified isometric view of a mouthpiece embodiment;

[0046] Figure 3B is a cross-sectional elevation view of the mouthpiece of Figure 3A;

[0047] Figure 3C is a cross-sectional elevation view of the mouthpiece of Figure 3A coupled to the vaporization portion of the vaporizer cartridge;

[0048] Figure 4A is an exploded isometric view of an embodiment the mouthpiece the vaporizer cartridge showing its various components;

[0049] Figure 4B is an exploded isometric view of another embodiment of the mouthpiece of the vaporizer cartridge showing its various components;

[0050] Figure 5A is an exploded isometric view of a vaporizer comprising a vaporizer cartridge, a cap, and a power supply unit;

[0051] Figure 5B is an isometric view of the vaporizer of Figure 5A in an assembled state;

[0052] Figure 6A is an isometric view of an embodiment of the central portion of the mouthpiece having radial recesses;

[0053] Figure 6B is an isometric view of an embodiment of the rotating portion of the mouthpiece having tabs;

[0054] Figure 6C is a side cross-sectional view of the rotating portion of Figure 6B;

[0055] Figure 7A is an isometric view of an embodiment of a vaporizer cartridge having a mouthpiece rotating portion without a notch;

[0056] Figure 7B is a cross-sectional elevation view of the vaporizer cartridge of Figure 7A;

[0057] Figure 8A is an isometric view of an embodiment of a vaporizer cartridge having a flat mouthpiece;

[0058] Figure 8B is a cross-sectional elevation view of the vaporizer cartridge of Figure 8A;

[0059] Figure 9A is an isometric view of an embodiment of a vaporizer cartridge having a round mouthpiece;

[0060] Figure 9B is a cross-sectional elevation view of the vaporizer cartridge of Figure 9A;

[0061] Figure 10A is an isometric view of an embodiment of a vaporizer cartridge having a tapered mouthpiece; and

[0062] Figure 10B is a cross-sectional elevation view of the vaporizer cartridge of Figure 10A.

DETAILED DESCRIPTION OF THE EMBODIMENTS:

[0063] Generally, the present disclosure provides an improved vaporizer cartridge. In embodiments, the vaporizer cartridge comprises one or more locking components that operate to render the cartridge tamper-resistant. As used herein, the term “tamper-resistant” may refer to any feature that is designed to help prevent a child or other unauthorized user from accessing the contents of the vaporizer cartridge, such as the vaporizing material.

[0064] Exemplary embodiments of an improved vaporizer cartridge 10 will be described herein with reference to Fig. 1 to Fig. 5B. Turning to Fig. 1 to Fig. 2C, vaporizer cartridge 10 can comprise a body 20 and a mouthpiece 60 configured to removably couple with body 20. Cartridge 10 can further comprise one or more safety features that operate to prevent an unauthorized user from coupling the mouthpiece 60 to the body 20 or removing the mouthpiece 60 therefrom. While mouthpiece 60 and body 20 are depicted in the figures as being generally tubular, in other embodiments mouthpiece 60 and body 20 may be of any suitable size and shape.

[0065] In an embodiment, as shown in Fig. 2C, body 20 can comprise a vaporizing portion 22 having a connection end 24 and a tail end 26 opposite thereof. An outer casing 50 can at least partly enclose the vaporizing portion 22 to form a vaporizing material chamber 52 therebetween for storing vaporizing material. In the depicted

embodiment, the casing 50 can be secured and sealed to the tail end 26 of the vaporizing portion 22 while being open adjacent the connection end 24 such that vaporizing material can be received into the material chamber 52 when the mouthpiece 60 is decoupled from the body 20. In some embodiments, the tail end 26 can have a connection means 28 such as threads, clips, and the like for connecting to a power supply unit such as a battery housing, as shown in Fig. 5A and Fig. 5B or to another component of the vaporizer. In some embodiments, the vaporizing portion 22 can be made of stainless steel or another suitable material, and casing 50 can be made of glass, plastic, metal, or another suitable material. In embodiments, as shown in Fig. 2A to Fig. 2C, casing 50 can be made of a transparent material such that a user can easily ascertain how much vaporizing material, and what type of material, is in the material chamber 52.

[0066] As shown in Fig. 2B and Fig. 2C, the vaporizing portion 22 can comprise a head 30 adjacent the first connection end 24, a generally hollow vaporizing chamber 34 adjacent the tail end 26, and an intermediate portion or stem 36 connecting therebetween. A conduit 38 extends from the vaporizing chamber 34 through the stem 36 and head 30 to the connection end 24, such that vapor generated in the vaporizing chamber 34 can be drawn out of the cartridge 10 through the head 30 by a user during a vaporizing session. The vaporizing chamber 34 can further define one or more ports 40 to permit vaporizing material to enter the vaporizing chamber 34 from the material chamber 52. The head 30 has connection means 32, such as threads, for coupling the body 20 to the mouthpiece 60.

[0067] In the depicted embodiments, because the stem 36 can remain in the casing 50 when the mouthpiece 60 is removed therefrom, the vaporizing material chamber 52 can be filled more accurately, with less spilling and overflow. Such a design also permits the cartridge 10 to be more compact when assembled relative to cartridges with traditional designs wherein the stem 36 is removed with the mouthpiece.

[0068] A heating element 42 can be located within the vaporizing chamber 34 and configured to heat vaporizing material and generate a vapor therefrom that can then be drawn by the user through the central conduit 38 and out of the head 30. In embodiments, heating element 42 can be a ceramic element, such as a ceramic coil having a metal heating coil 44 embedded therein. Ceramic coils are coils that make use of ceramics to improve longevity and protect against issues like oxidation of the metal. The ceramic coils can be made of any inorganic, non-metallic material, such as a crystalline oxide, nitride, or carbide material. The ceramic element 48 provides for better atomization, absorption and heating of vaporizing material when the vaporizer cartridge 10 is in use, and reduces the likelihood of oxidized material being released. The coil 44 can be electrically connected to electrical contacts 46, for example located at the tail end 26, such that power can be provided by a power supply (shown in Fig. 5A and Fig. 5B as a removable battery housing) to the coil 44 to heat it. In other embodiments, the heating element 42 can be a metal element with a wicking material, such as cotton, or a quartz element.

[0069] Turning now to Fig. 3A to Fig. 4A and Fig. 4B, mouthpiece 60 can comprise a generally tubular central portion 62 and a generally tubular rotating portion 64. The central portion 62 can have a first axial bore 66 extending therethrough having

connection means 68, such as threads, for engaging with the connection means 32 of the head 30 to couple the mouthpiece 60 with the body 20. The rotating portion 64 can be rotatably secured to the central portion 62 and can be actuable between a free position and a locked position relative to the central portion 62. When in the free position, the rotating portion 64 can be rotated freely about the central portion 62 without also rotating the central portion 62. In the locked position, the rotating portion 64 is rotationally locked with the central portion 62 such that rotation of the rotating portion 64 will also rotate the central portion 62. In this manner, a two-step process is required to couple or decouple the mouthpiece 60 and body 20, the process comprising manipulating the rotating portion 64 to the locked position and rotating the rotating portion 64 while maintaining it in the locked position. In embodiments, the central and rotating portions 62,64 can be made of stainless steel or another suitable material.

[0070] With reference to Fig. 3B to Fig. 4B, in an embodiment, the rotating portion 64 can have a first interlocking component 70 configured to couple with a second interlocking component 72 of the central portion 62 in such a manner so as to rotationally lock the portions together when the mouthpiece 60 is in the locked position. When the mouthpiece 60 is in the free position, the first and second interlocking components 70,72 are not coupled to permit the rotating portion 64 to freely rotate about the central portion 62. As best seen in Fig. 3B to Fig. 4B, in an exemplary embodiment, the first interlocking component 70 can comprise one or more detents or recesses 74. As shown in Fig. 4A, the detents/recesses 74 can be formed integrally in the rotating portion 64. In other embodiments, as shown in Fig. 3B, Fig. 3C, and Fig. 4B, the detents/recesses 74 are formed in a sleeve 76 configured to be coupled and/or fixed

to the rotating portion 64, for example in a frictional or interference fit, such that the sleeve 76 and rotating portion 64 are rotationally locked.

[0071] The second interlocking component 72 can comprise one or more protrusions 78 rotationally fixed to the central portion 62, corresponding with the one or more detents/recesses 74, and extending axially and/or radially theretowards. As shown in Fig. 3B to Fig. 4B, the one or more protrusions 78 can extend from a retaining ring 80 configured to be coupled with and/or fixed to the central portion 62, for example in a frictional or interference fit, so as to rotationally lock the ring 80 with the central portion 62. In alternative embodiments, the protrusions 78 can be integrally formed with the central portion 62.

[0072] One or more biasing members 82, such as a spring, can be positioned in relation to the central and rotating portions 62,64 so as to bias them towards the free position. For example, in the embodiment depicted in Fig. 3Bto Fig. 4B, an annulus 84 can be formed between the central and rotating portions 62,64 when the two portions are coupled together. A coil spring 82 can be located within the annulus 84 to bias the portions 62,64 axially away from each other and towards the free position. In this manner, the likelihood that the mouthpiece 20 is accidentally actuated to the locked position is reduced. In other embodiments, the biasing member can be a leaf spring located between the central and rotating portions 62,64, or another device suitable for biasing the portions 62,64 to the free position.

[0073] In the example embodiments depicted in Fig. 3A to Fig. 4B, and as best shown in Fig. 4A and Fig. 5B, the central portion 62 of the mouthpiece 60 can have a radially outwardly extending annular flange or lip 86 adjacent an output end 90 of the

mouthpiece 60 and configured to abut an inner annular shoulder 88 of the rotating portion 64 when the central and rotating portions 62,64 are coupled together. The central portion 62 can further comprise an inner flange or lip 87 configured to abut the head 30 of the vaporizing portion 22 when the mouthpiece is coupled thereto.

[0074] The rotating portion 64 can comprise a second bore 67 sized to receive the central portion 62 therethrough. Rotating portion 64 can also comprise a skirt portion 65 depending towards a body end 92 of the mouthpiece 60 having a greater inner diameter than the rest of the rotating portion 64 such that annulus 84 is formed between the central and rotating portions 62,64 for receiving biasing member 82 therein when the portions 62,64 are coupled together. If present, sleeve 76, having first interlocking component 70 comprising the plurality of recesses 74, can also be located in the annulus 84 and secured to the rotating portion 64.

[0075] Retaining ring 80, having second interlocking component 72 comprising the plurality of protrusions 78 corresponding to the plurality of recesses 74, can be secured to the central portion 62 such that the rotating portion 64 and biasing member 82 are retained therebetween, sandwiched between the flange 86 and ring 80.

[0076] As shown in Fig. 3B, the example embodiment can further comprise an annular sealing member 96 disposed about the central portion 62 adjacent the retaining ring 80 for sealing with the outer casing 50 of the body 20 when the mouthpiece 60 is secured thereto. As shown in Fig. 3B and Fig. 3C, the retaining ring 80 can have an annular recess 94 for receiving the sealing member 96 and assisting in energizing the sealing member 96 when it is compressed between the retaining ring 80 and body 20. In embodiments, as shown in Fig. 3B to Fig. 4, a guide ring 98 can also be disposed

about, and secured to, the central portion 62 towards the body end 92 of the mouthpiece 60, the guide ring 98 having a radially tapering shape so as to assist in centering the body end 92 of the central portion 92 in the casing 50 and preventing undesirable lateral movement thereof. The guide ring 98 can also assist in retaining the sealing member 96 on the central portion 62.

[0077] The components of the mouthpiece 60 described above can be secured together via a friction fit, interference fit, adhesive, threads, or any other suitable means or a combination thereof.

[0078] To assemble the embodiment of mouthpiece 60 shown in Fig. 3A to Fig. 3C, sleeve 76 (if present) can be inserted into the rotating portion 64 such that the recesses 74 face the body end 92. The central portion 62 can then be inserted into the rotating portion 64 until the outer flange 86 abuts the shoulder 88 of the rotating portion 64. Thereafter, biasing member 82 can be inserted into the annulus 84, and retaining ring 80 can be secured to the central portion 62 to retain the biasing member 82 in the annulus 84. Sealing member 96 can then be seated in the annular recess 94 of the retaining ring 80, and the guide ring 98 secured to the central portion 62.

[0079] With reference to Fig. 3C, the mouthpiece 60 can then be coupled to the vaporizing portion 22 by aligning the threads 32,68 of the vaporizing portion and mouthpiece, respectively, pressing down on the mouthpiece 60 to actuate the rotating portion 64 to the locked position, and rotating the now rotationally locked central and rotating portions 62,64 to engage the threads 32,68. The rotationally locked mouthpiece 60 can be rotated until the head 30 of the vaporizing portion 22 abuts the inner flange

87 of the central portion 62 or until the mouthpiece 60 is otherwise coupled to the body 20.

[0080] The cartridge 10 can be further coupled with a power supply unit 12. As shown in Fig. 5A and Fig. 5B, power supply unit 12 can be connected to the tail end 26 of the vaporizing portion 22, such as by threading the unit 12 onto the threads 28 thereof such that electrical contacts of the power supply unit 12 connect with contacts 46 of the vaporizing portion 22. In some embodiments, a cap 14 can also be provided to cover the mouthpiece 60 when the vaporizer is not in use. Said cap 14 can be made of plastic or another suitable material, and configured to secure to the mouthpiece 60 such as via an interference fit, threading, or by other connecting means known in the art. Cap 14 can be further provided with a clip such that the assembled vaporizer can be securely transported in the pocket of a user without being accidentally displaced or lost.

[0081] While Fig. 3B to Fig. 4B show that the first interlocking component 70 can comprise a plurality of recesses 74 defined in the sleeve 76 or rotating portion 64, and the second interlocking component 72 comprises a plurality of protrusions 78 formed on the retaining ring 80, other implementations of the first and second interlocking components 70,72 are possible. For example, in an embodiment, the plurality of protrusions 78 could be located on the rotating portion 64 and the plurality of recesses could be formed in the central portion 62 or retaining ring 80.

[0082] Fig. 2A and Fig. 3A depict a mouthpiece 60 having a notch or window 61 that permits a user to verify whether the first and second interlocking components 70,72 are engaged with each other. In other embodiments, as shown in Fig. 7A and Fig. 7B, the notch or window 61 can be omitted, for example to reduce the chances of debris

becoming stuck in the recesses 74 and preventing the first and second interlocking components 70,72 from engaging.

[0083] In another embodiment, with reference to Fig. 6A to Fig. 6C, first interlocking component 70 can comprise radial protrusions 100 extending radially inwardly from resilient tabs 102 formed in the wall of the rotating portion 64. As shown in Fig. 6A, corresponding radial recesses 104 can be formed in the outer wall of the central portion 62 such that, when a user presses the flexible tabs 102 towards the central portion 62 to drive the protrusions 100 into the recesses 104, the central and rotating portions 62,64 are rotationally locked and the mouthpiece 60 may be removed from the body 20 by twisting. The resilient tabs 102 can be configured to bias the protrusions 100 away from the radial recesses 104 of the central portion 62 to reduce the likelihood that they will be inadvertently actuated to the locked position.

[0084] In another embodiment, the first interlocking component 70 can comprise a first plurality of teeth extending from the rotating portion 64 towards the body end 92, and the second interlocking component 72 can comprise a second plurality of teeth complementary to the first plurality of teeth and extending from the central portion 62 towards the output end 90 and configured to engage with the first plurality of teeth to rotationally lock the central and rotating portions 62,64. The first and second interlocking components 70,72 can be biased away from each other by biasing member 82 as described above to reduce the likelihood that they will be inadvertently actuated to the locked position. The first and second pluralities of teeth can be pointed, castellated, or another suitable shape.

[0085] In yet another embodiment, the rotating portion 64 can be configured to be actuated to the locked position by pulling it away from the central portion 62, and biasing member 82 can be configured to bias the portions 62,64 toward one another to the free rotating position.

[0086] In embodiments, the shape of the mouthpiece 60 is not necessarily cylindrical, but can be any suitable shape such as a duckbill shape (Fig. 8A & Fig. 8B), a rounded shape (Fig. 9A & Fig. 9B), or a tapered shape (Fig. 10A & Fig. 10B). In the embodiments shown in Fig. 8A to Fig. 10B, the rotating portion 64 encompasses the central portion 62 and a bore 67 of the rotating portion 64 is in communication with the axial bore 66 of the central portion to direct vaporized material to the user.

[0087] In use, the user can remove the mouthpiece from a fully assembled vaporizer device described above by actuating the rotating portion to the locked position and rotating the mouthpiece in a first direction to decouple the central portion from the vaporizing portion. The user can then fill the materials chamber with a vaporizing material and recouple the mouthpiece to the vaporizing portion by again actuating the rotating portion to the locked position and rotating the mouthpiece in a second direction opposite the first direction. The user can then electrically connect the power supply unit 12 to the heating element 42 to heat the vaporizing material in the vaporizing chamber 34 to produce a vapor. The power supply unit 12 can be electrically connected to the heating element 42 by actuating a switch to close an electrical circuit connecting therebetween. Once the heating element 42 has heated the vaporizing material sufficiently to produce a vapor, the user can inhale the vapor by inhaling through the

axial bore 66 of the mouthpiece to draw vapor produced in the vaporizing chamber 34 through the conduit 38 to the user.

[0088] Various modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the scope of the disclosure. Moreover, in interpreting the disclosure, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms "comprises" and "comprising" should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly reference.

[0089] Although particular embodiments have been shown and described, it will be appreciated by those skilled in the art that various changes and modifications might be made without departing from the scope of the disclosure. The terms and expressions used in the preceding specification have been used herein as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding equivalents of the features shown and described or portions thereof.

CLAIMS:

1. A vaporizer cartridge comprising:

a vaporizing portion at least partially residing in an outer casing and defining a materials chamber therebetween, the vaporizing portion comprising a vaporizing chamber, a conduit in communication with the vaporizing chamber, and a heating element located within the vaporizing chamber and configured to be electrically connected to a power supply;

a mouthpiece configured to be removably coupled with the vaporizing portion, the mouthpiece comprising a central portion and a rotating portion rotatably secured about the central portion, the central portion having an axial bore extending therethrough and a first interlocking component, and the rotating portion having a second interlocking component configured to selectably couple with the first interlocking component to rotationally lock the rotating portion with the central portion when the rotating portion is actuated from a freely rotating free position to a locked position;

wherein the axial bore of the mouthpiece and the central conduit of the vaporizing portion are in fluid communication when the mouthpiece and vaporizing portion are coupled together.

2. The vaporizer cartridge of claim 1, wherein the heating element comprises a metal coil embedded in a ceramic element.

3. The vaporizer of claim 1 or 2, wherein the first interlocking component comprises one or more protrusions extending from the central portion, and the second interlocking

component comprises one or more recesses defined in the rotating portion and corresponding with the one or more protrusions, and wherein the one or more protrusions extend substantially axially towards the one or more recesses.

4. The vaporizer cartridge of claim 1 or 2, wherein the first interlocking component comprises a first plurality of teeth extending axially from the central portion, and the second interlocking component comprises a second plurality of teeth extending axially from the rotating portion, the first and second pluralities of teeth extending axially toward each other.

5. The vaporizer cartridge of any one of claims 1 to 4, further comprising a resilient member positioned between the central portion and rotating portion and configured to bias the rotating portion to the free position.

6. The vaporizer cartridge of claim 5, wherein the resilient member is located in an annulus formed between the central portion and the rotating portion.

7. The vaporizer cartridge of claim 1 or 2, wherein the first interlocking component comprises one or more radial recesses defined in an outer wall of the central portion and the second interlocking component comprises one or more resilient tabs each having a radially inwardly extending protrusion corresponding with the one or more radial recesses.

8. The vaporizer cartridge of claim 7, wherein the one or more resilient tabs are configured to bias the protrusions away from the one or more radial recesses.

9. The vaporizer cartridge of any one of claims 1 to 8, wherein the central portion further comprises a radially outwardly extending flange, and a retaining ring is configured to couple with the central portion to rotatably secure the rotating portion to the central portion by sandwiching the rotating portion between the flange and the retaining ring.

10. The vaporizer cartridge of claim 9, wherein the first interlocking component is located on the retaining ring.

11. A vaporizer mouthpiece, comprising:

a central portion comprising an axial bore extending therethrough and a first interlocking component; and

a rotating portion rotatably secured about the central portion and comprising a second interlocking component configured to selectably couple with the first interlocking component to rotationally lock the rotating portion with the central portion when the rotating portion is actuated from a freely rotating free position to a locked position.

12. The mouthpiece of claim 11, wherein the first interlocking component comprises one or more protrusions extending from the central portion, and the second interlocking component comprises one or more recesses defined in the rotating portion and corresponding with the one or more protrusions, and wherein the one or more protrusions extend substantially axially towards the one or more recesses.

13. The mouthpiece of claim 11, wherein the first interlocking component comprises a first plurality of teeth extending axially from the central portion, and the second interlocking component comprises a second plurality of teeth extending axially from the rotating portion, the first and second pluralities of teeth extending axially toward each other.

14. The mouthpiece of any one of claims 11 to 13, further comprising a resilient member positioned between the central portion and rotating portion and configured to bias the rotating portion to the free position.

15. The mouthpiece of claim 14, wherein the resilient member is located in an annulus formed between the central portion and the rotating portion.

16. The mouthpiece of claim 11, wherein the first interlocking component comprises one or more radial recesses defined in an outer wall of the central portion and the second interlocking component comprises one or more resilient tabs each having a radially inwardly extending protrusion corresponding with the one or more radial recesses.

17. The mouthpiece of claim 16, wherein the one or more resilient tabs are configured to bias the protrusions away from the one or more radial recesses.

18. The mouthpiece of any one of claims 11 to 17, wherein the central portion further comprises a radially outwardly extending flange, and a retaining ring is configured to couple with the central portion to rotatably secure the rotating portion to the central portion by sandwiching the rotating portion between the flange and the retaining ring.

19. The mouthpiece of claim 18, wherein the first interlocking component is located on the retaining ring.

20. A vaporizer comprising:

a vaporizing portion at least partially residing in an outer casing and defining a materials chamber therebetween, the vaporizing portion comprising a vaporizing chamber, a conduit in communication with the vaporizing chamber, and a heating element located within the vaporizing chamber; and

a power supply electrically connected to the heating element.

21. The vaporizer of claim 20, further comprising:

a mouthpiece configured to be removably coupled with the vaporizing portion, the mouthpiece comprising a central portion and a rotating portion rotatably secured about the central portion, the central portion having an axial bore extending therethrough and a first interlocking component, and the rotating portion having a second interlocking component configured to selectably couple with the first interlocking component to rotationally lock the rotating portion with the central portion when the rotating portion is actuated from a freely rotating free position to a locked position;

wherein the axial bore of the mouthpiece and the central conduit of the vaporizing portion are in fluid communication when the mouthpiece and vaporizing portion are coupled together.

22. The vaporizer of claim 20 or 21, further comprising a cap configured to be removably coupled with the mouthpiece or vaporizing portion to cover the mouthpiece.

23. The vaporizer of any one of claims 20 to 22, wherein the heating element comprises a metal coil embedded in a ceramic element.

24. The vaporizer of any one of claims 21 to 23, wherein the first interlocking component comprises one or more protrusions extending from the central portion, and the second interlocking component comprises one or more recesses defined in the rotating portion and corresponding with the one or more protrusions, and wherein the one or more protrusions extend substantially axially towards the one or more recesses.

25. The vaporizer of any one of claims 21 to 23, wherein the first interlocking component comprises a first plurality of teeth extending axially from the central portion, and the second interlocking component comprises a second plurality of teeth extending axially from the rotating portion, the first and second pluralities of teeth extending axially toward each other.

26. The vaporizer of any one of claims 21 to 25, further comprising a resilient member positioned between the central portion and rotating portion and configured to bias the rotating portion to the free position.

27. The vaporizer of claim 26, wherein the resilient member is located in an annulus formed between the central portion and the rotating portion.

28. The vaporizer of any one of claims 21 to 23, wherein the first interlocking component comprises one or more radial recesses defined in an outer wall of the central portion and the second interlocking component comprises one or more resilient

tabs each having a radially inwardly extending protrusion corresponding with the one or more radial recesses.

29. The vaporizer of claim 28, wherein the one or more resilient tabs are configured to bias the protrusions away from the one or more radial recesses.

30. The vaporizer of any one of claims 21 to 29, wherein the central portion further comprises a radially outwardly extending flange, and a retaining ring is configured to couple with the central portion to rotatably secure the rotating portion to the central portion by sandwiching the rotating portion between the flange and the retaining ring.

31. The vaporizer of claim 30, wherein the first interlocking component is located on the retaining ring.

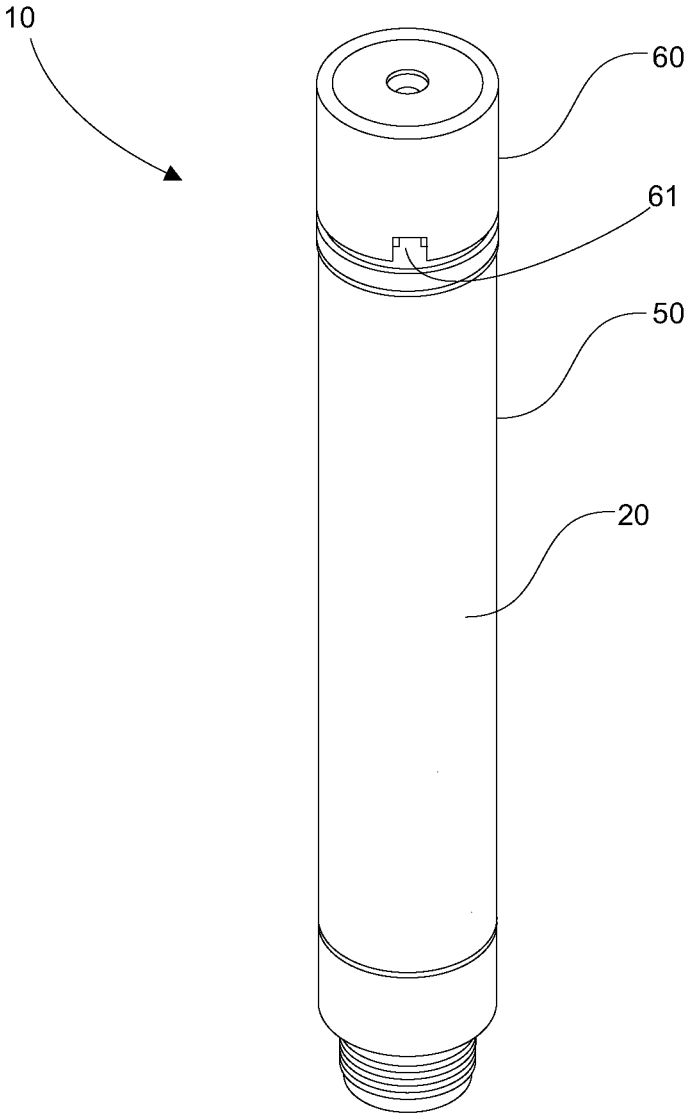


Fig. 1

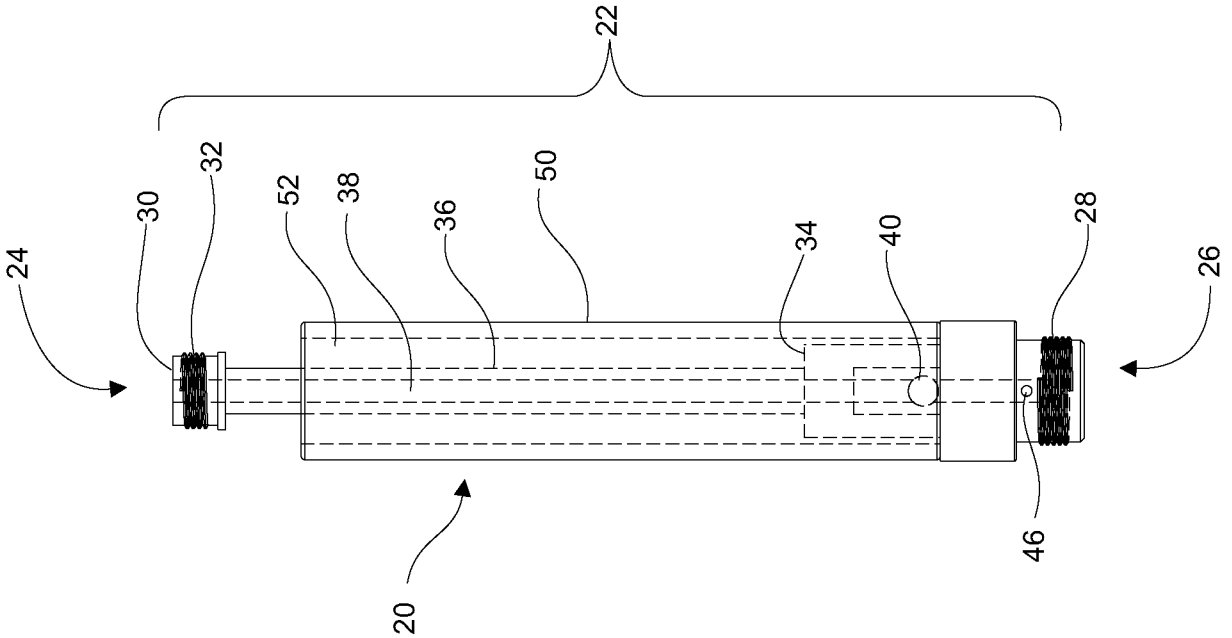


Fig. 2C

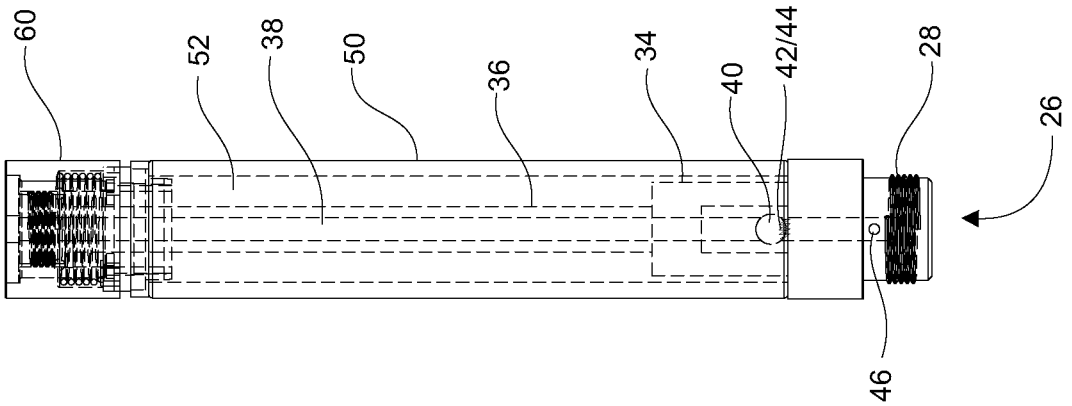


Fig. 2B

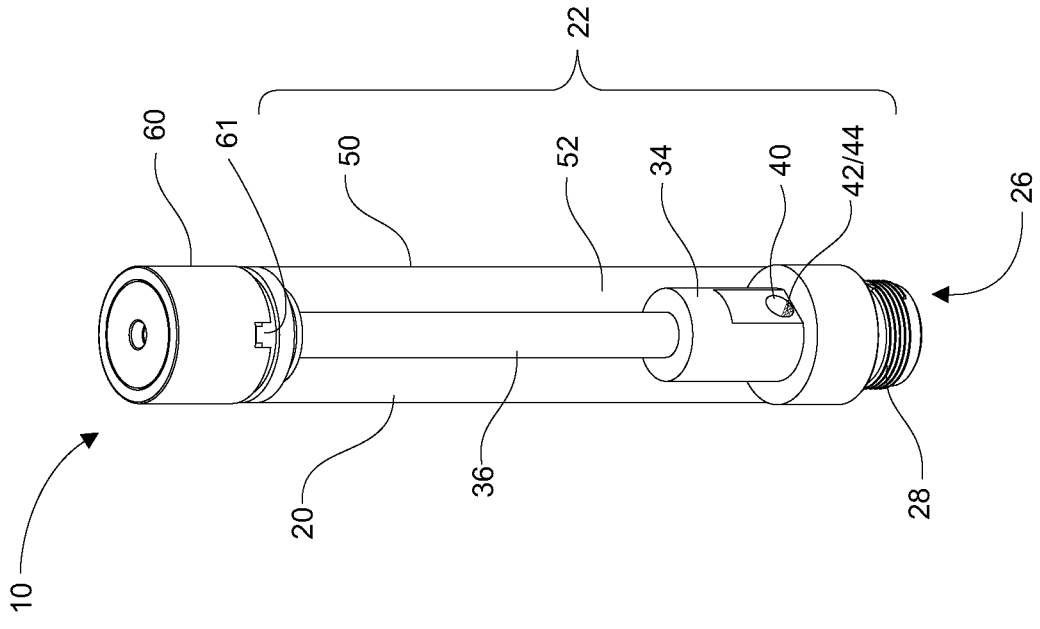


Fig. 2A

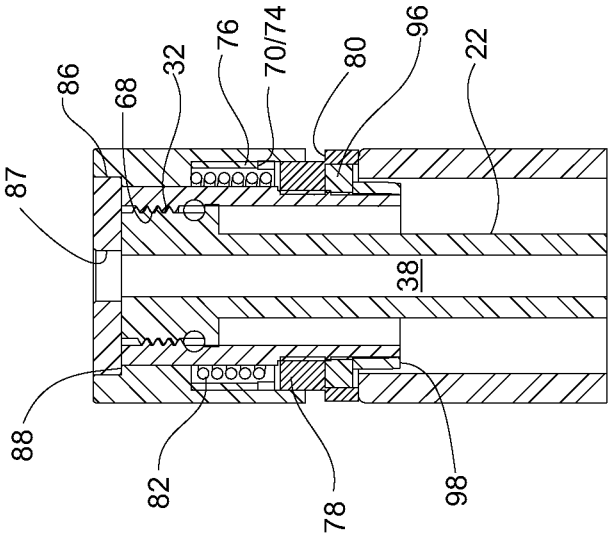


Fig. 3C

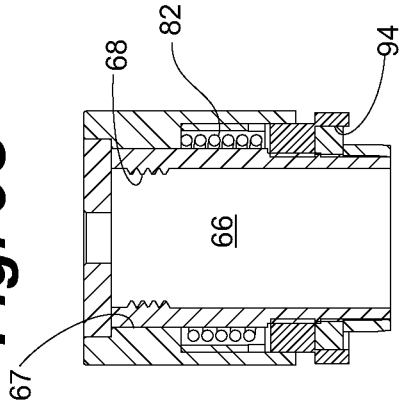


Fig. 3B

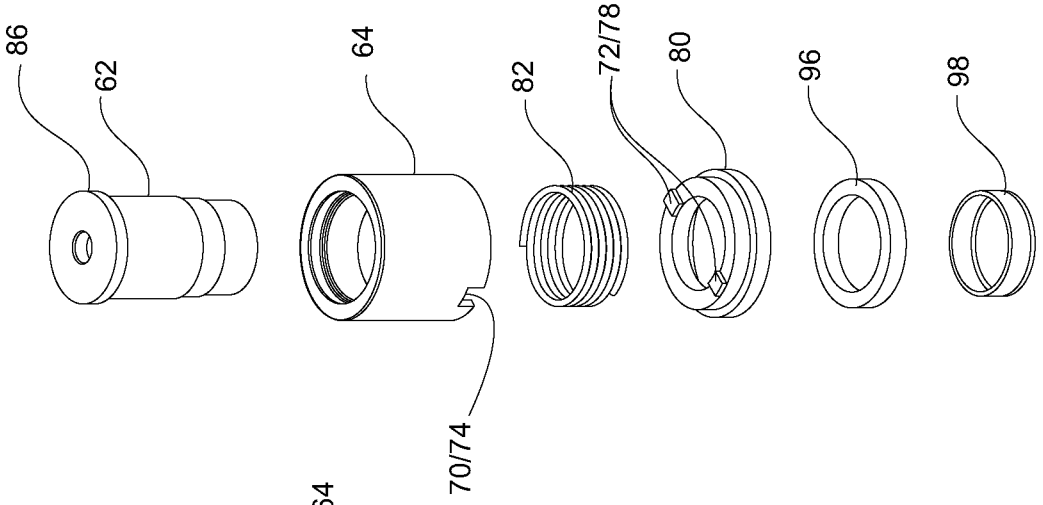


Fig. 4A

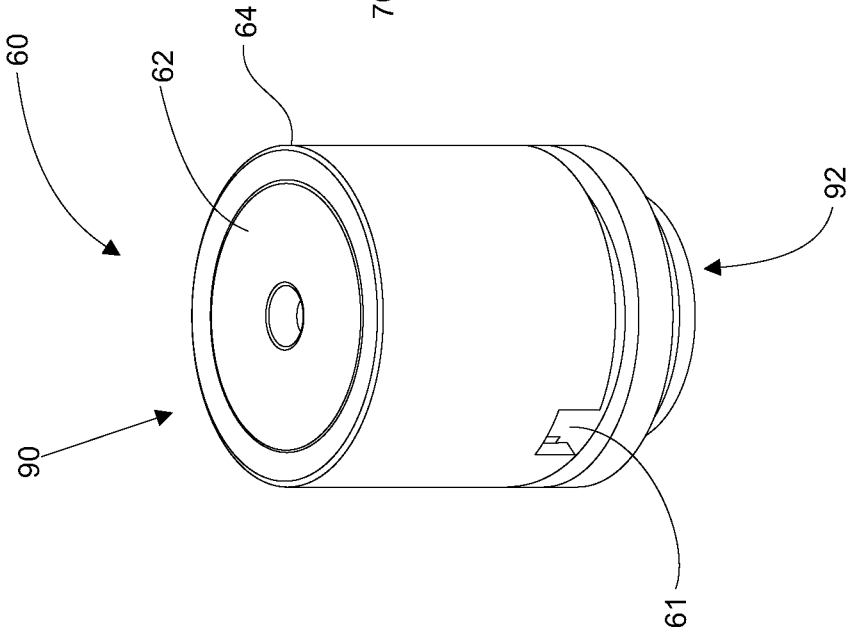


Fig. 3A

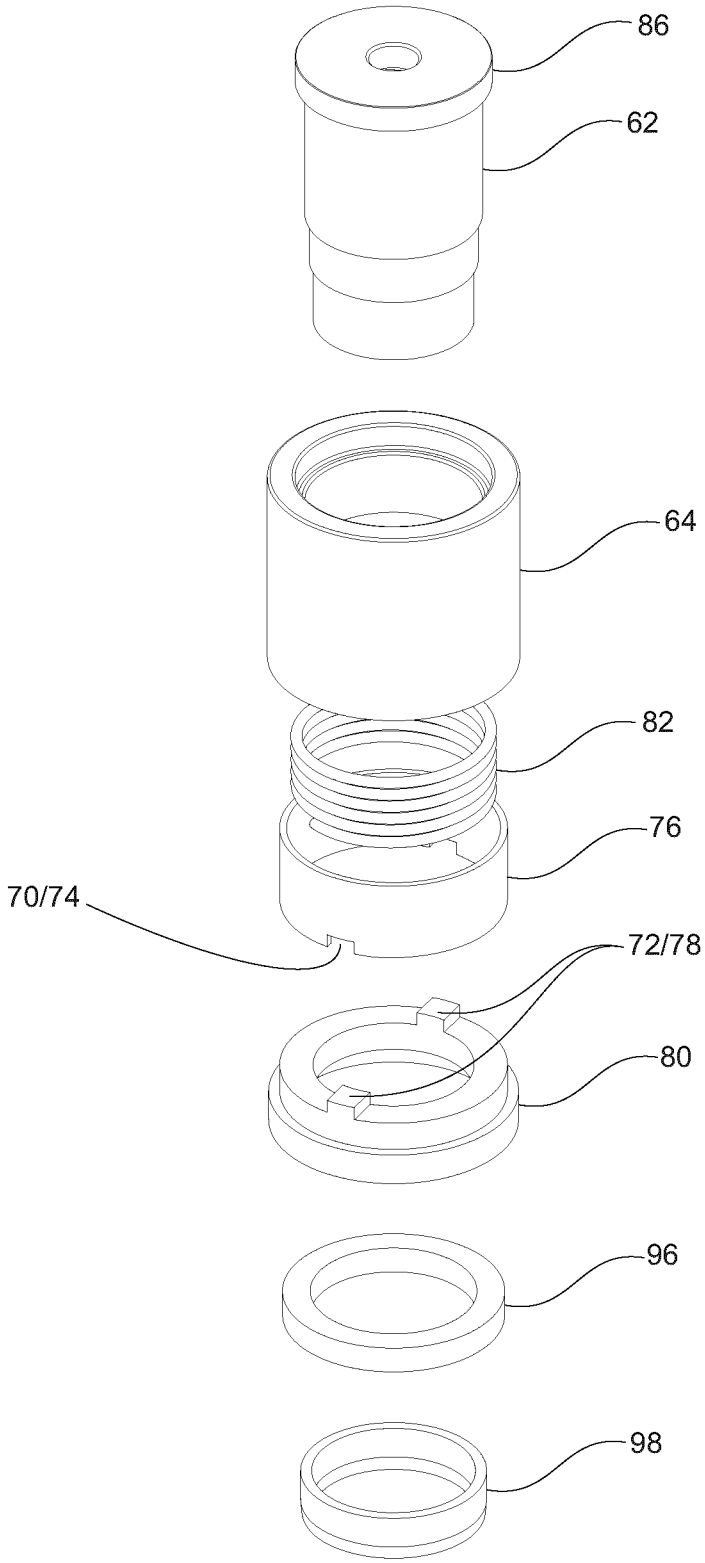


Fig. 4B

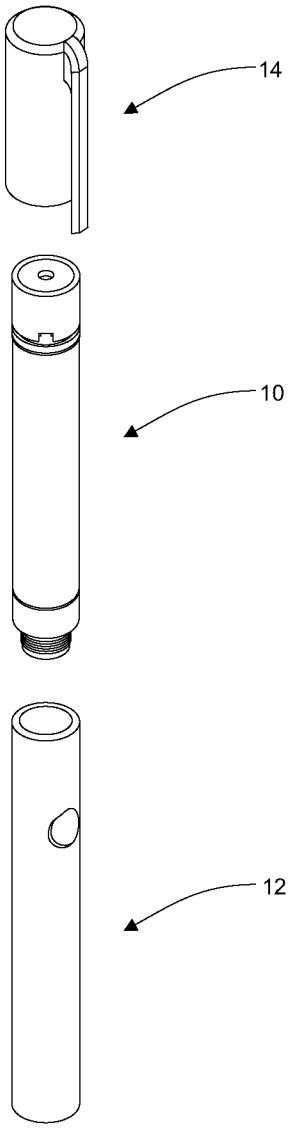


Fig. 5A

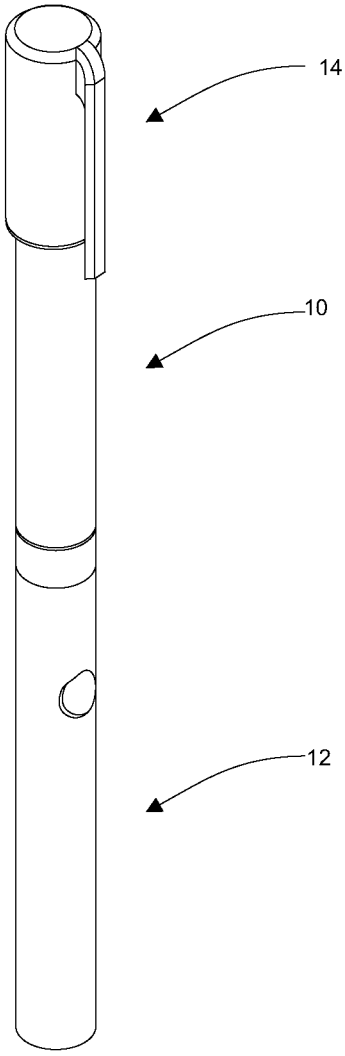


Fig. 5B

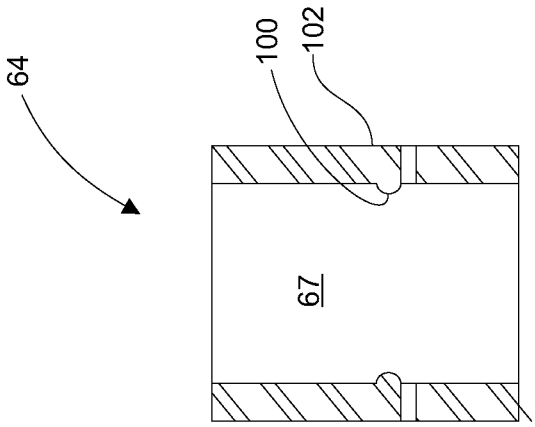


Fig. 6C

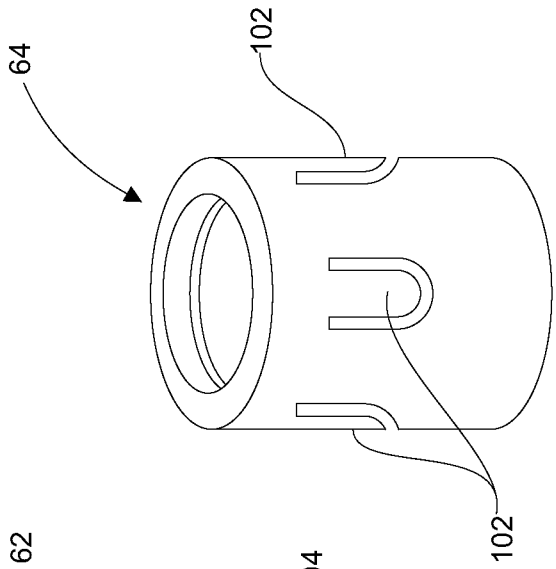


Fig. 6B

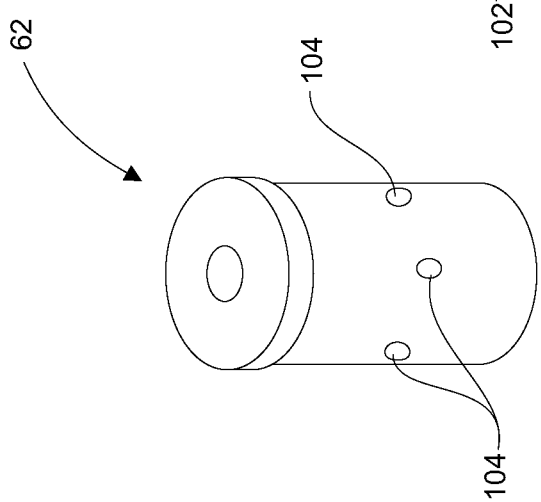


Fig. 6A

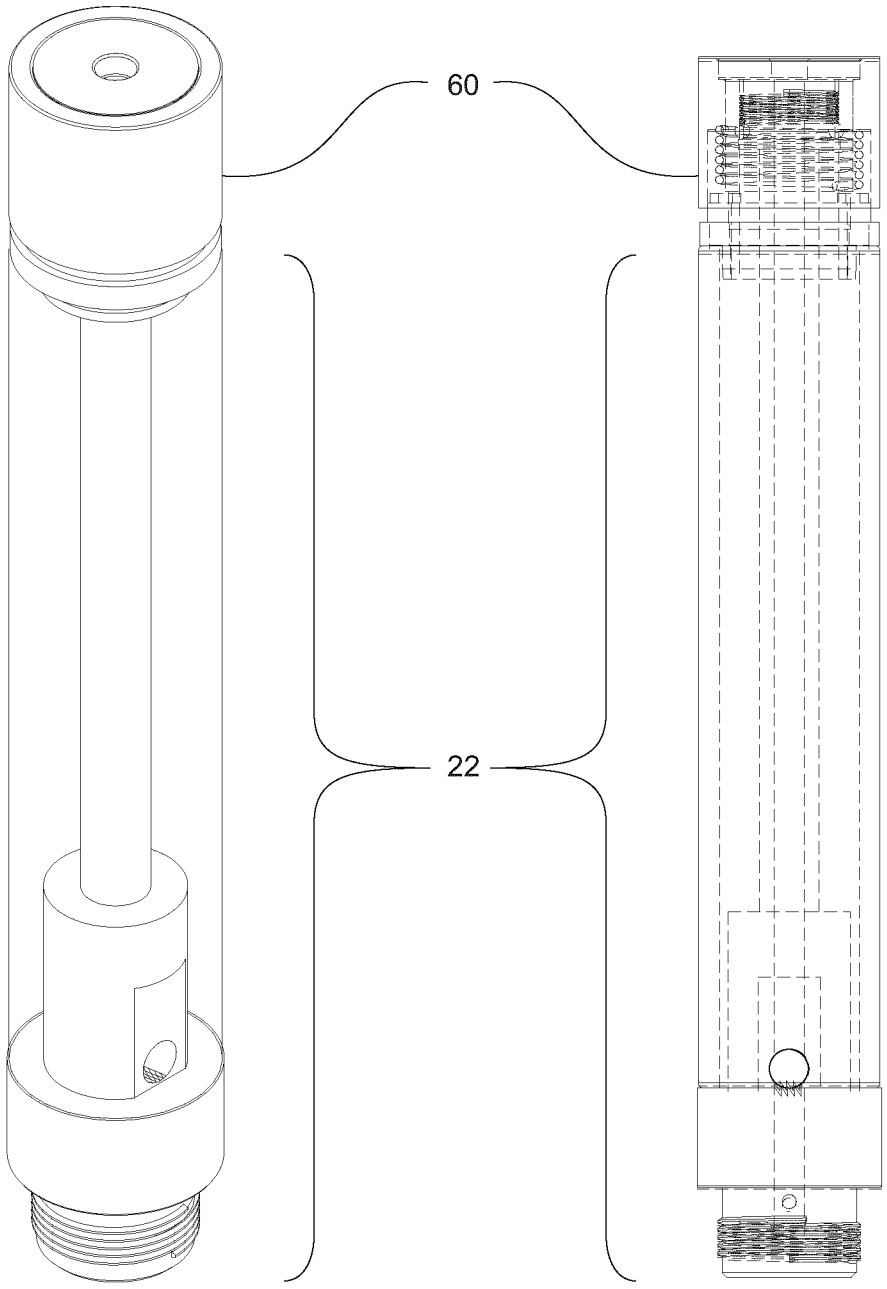


Fig. 7A *Fig. 7B*

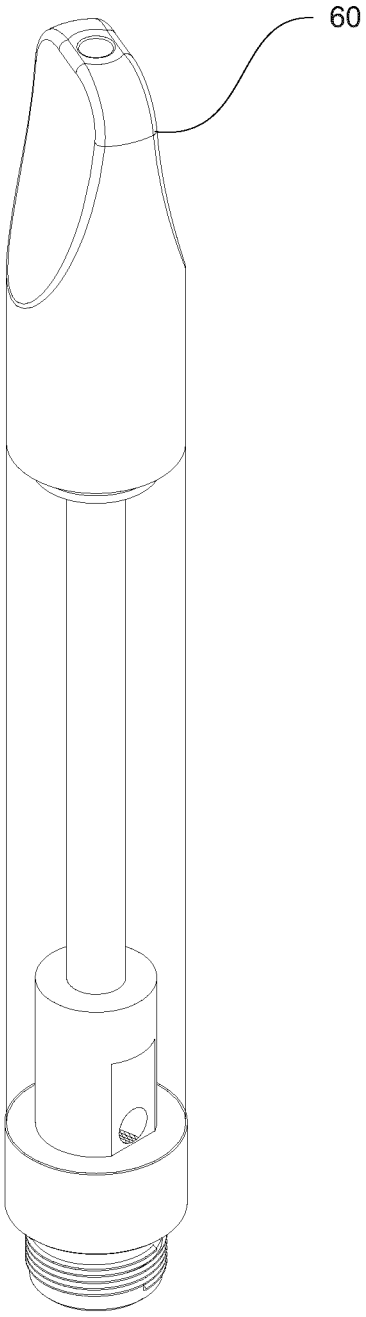


Fig. 8A

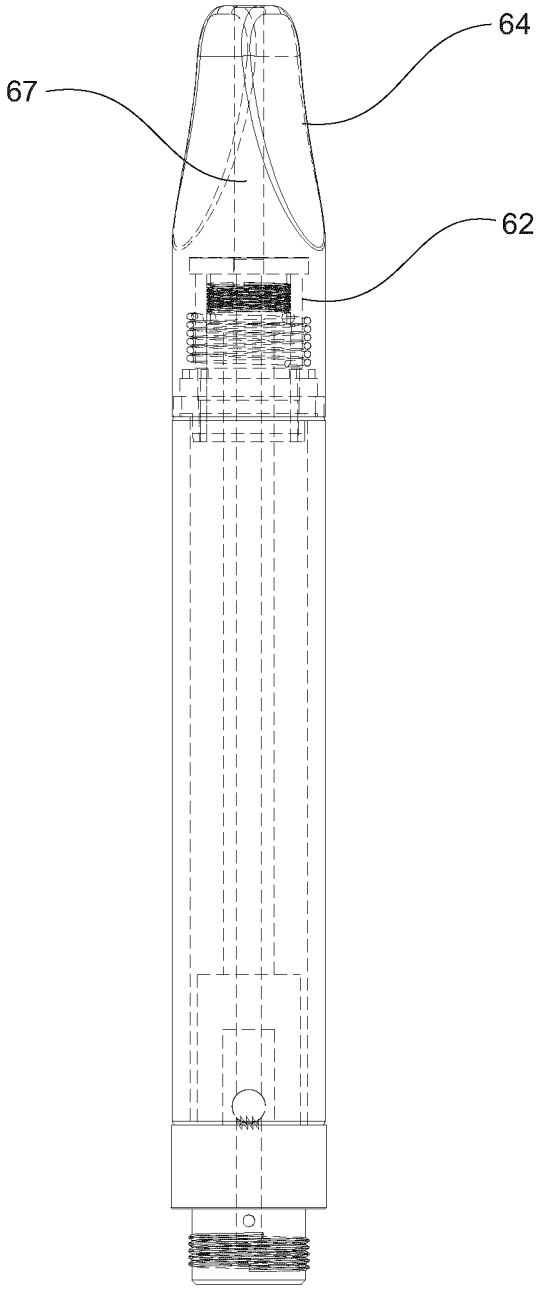


Fig. 8B

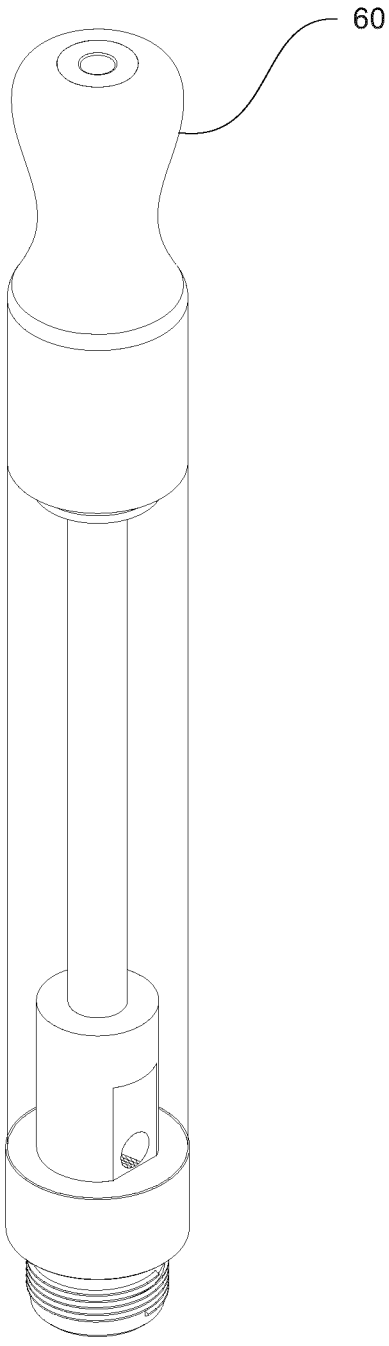


Fig. 9A

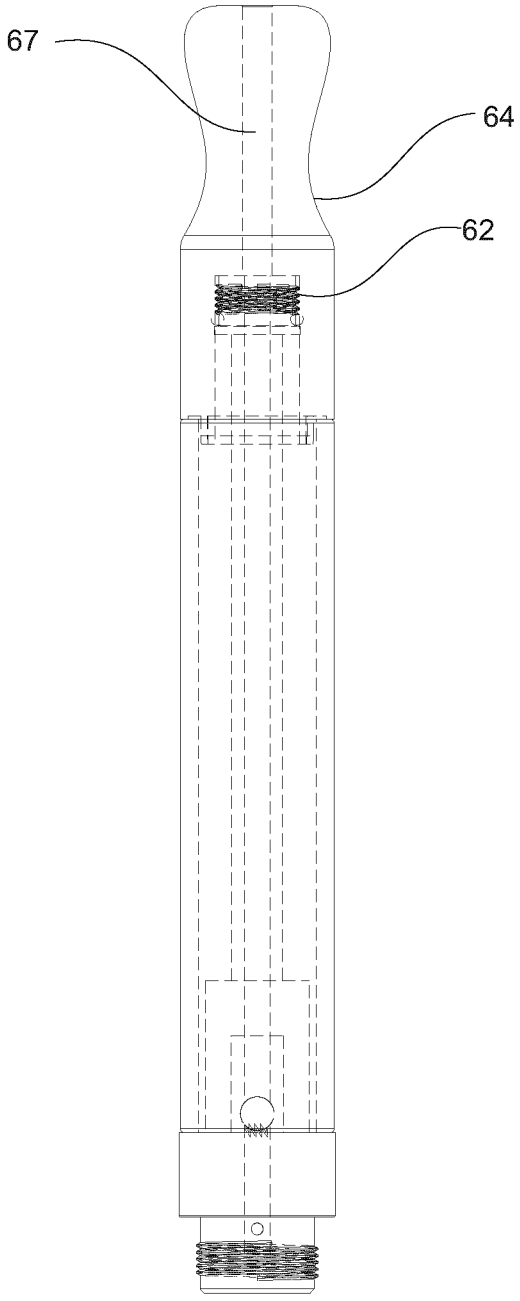


Fig. 9B

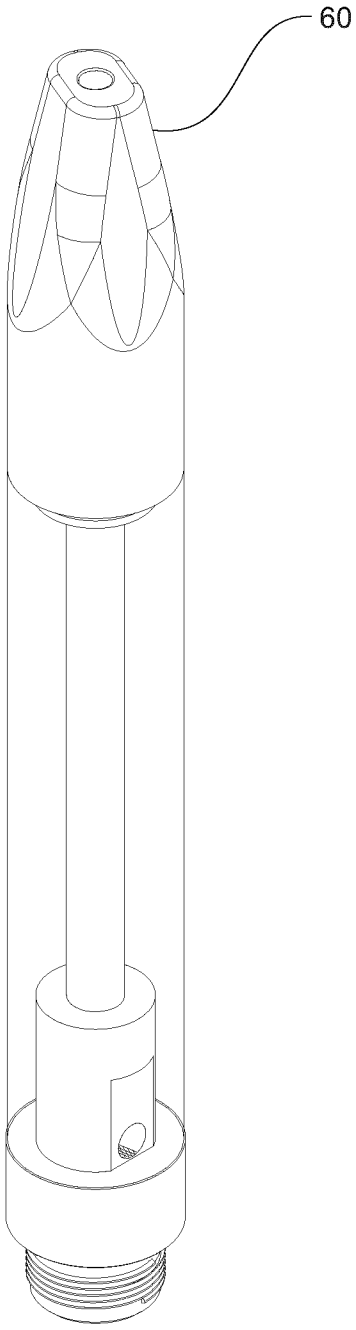


Fig. 10A

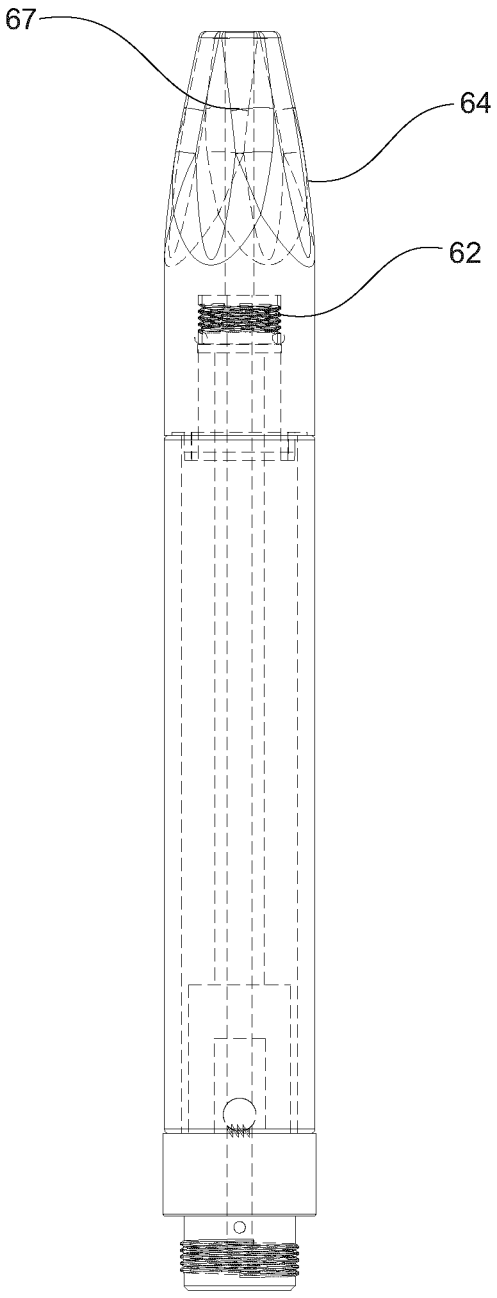


Fig. 10B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2020/050422

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***A24F 40/42*** (2020.01) , ***A24F 40/40*** (2020.01) , ***A24F 7/00*** (2006.01) , ***A24F 7/02*** (2006.01)

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: ***A24F 40/42*** (2020.01) , ***A24F 40/40*** (2020.01) , ***A24F 7/00*** (2006.01) , ***A24F 7/02*** (2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)

Canadian Patents Database, Questel-Orbit (FamPat)
Keywords : vap+, cartridge, casing, chamber, conduit, tube, heating, power, mouthpiece, rotat+, lock, interlock+, acutat+ , bias+, spring

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO2018109696A1 (BLESS, A.C. et al.) 21 June 2018 (21-06-2018) *Abstract; Fig. 1; Page 11, lines 25-30, Page 12, line 20-22, Page 18, lines 6-11*	20, 23 1-19, 22, 24-31
X Y	US3212508A (FASSBENDER, F.A.) 19 October 1965 (19-10-1965) *Figs. 7, 8, 9, 15, 16; Col. 2, lines 47-63, Col. 3, lines 15-49; Col. 4, lines 6-9*	11-19 1-10, 21, 22, 24-31
A	CA3034168A1 (FRASER, R. et al.) 01 March 2018 (01-03-2018) *Abstract*	1, 11, 20
A	US2018352866A1 (TUCKER, C.S. et al.) 13 December 2018 (13-12-2018) *Abstract*	1, 11, 20

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

☑ See patent family annex.

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

Date of the actual completion of the international search
11 May 2020 (11-05-2020)

Date of mailing of the international search report
17 June 2020 (17-06-2020)

Name and mailing address of the ISA/CA
Canadian Intellectual Property Office
Place du Portage I, C114 - 1st Floor, Box PCT
50 Victoria Street
Gatineau, Quebec K1A 0C9
Facsimile No.: 819-953-2476

Authorized officer
William Tse (819) 639-7914

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2020/050422

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

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

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

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

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

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

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

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under **Rule 13.1 of the Regulations under the PCT** :

Group A - Claims 1-10, 12; 14, 15, 18, 19 (when claims 14, 18 depend on claim 12); and 21, 22-31 (when claims 23-26, 28, 30 depend on claim 22) are directed a vaporizer cartridge comprising: a vaporizing portion residing in an outer casing and defining a materials chamber, the vaporizing portion comprising a vaporizing chamber, a conduit in communication with the vaporizing chamber, and a heating element located within the vaporizing chamber and configured to be electrically connected to a power supply; **AND** a mouthpiece comprising a central portion and a rotating portion rotatably secured about the central portion, the central portion having an axial bore extending therethrough and a first interlocking component, and the rotating portion having a second interlocking component;

Group B - Claims 11, 13 and 14-19 (when claims 14, 18 dependent claim 11) are directed to a mouthpiece comprising a central portion and a rotating portion rotatably secured about the central portion, the central portion having an axial bore extending therethrough and a first interlocking component, and the rotating portion having a second interlocking component;

Group C – Claims 20, 22 and 23-31 (when claims 22, 23 depend on claim 20) are directed to a vaporizer comprising: a vaporizing portion at least partially residing in an outer casing and defining a materials chamber therebetween, the vaporizing portion comprising a vaporizing chamber, a conduit in communication with the vaporizing chamber, and a heating element located within the vaporizing chamber; and a power supply electrically connected to the heating element.

It is held that the claims presently in the application are not so linked as to form a single general inventive concept. This inventive concept must find expression in common technical features which define the inventive contribution that the claimed invention makes over the prior art.

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

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

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

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

Remark on Protest

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

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

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2020/050422

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
WO2018109696A1	21 June 2018 (21-06-2018)	WO2018109696A1	21 June 2018 (21-06-2018)
		CN110325059A	11 October 2019 (11-10-2019)
		EP3554295A1	23 October 2019 (23-10-2019)
		JP2020501557A	23 January 2020 (23-01-2020)
		KR20190087638A	24 July 2019 (24-07-2019)
		US2018160732A1	14 June 2018 (14-06-2018)
		US10092039B2	09 October 2018 (09-10-2018)
		US2018352869A1	13 December 2018 (13-12-2018)
		US10285451B2	14 May 2019 (14-05-2019)
		US2019230994A1	01 August 2019 (01-08-2019)
		US10512287B2	24 December 2019 (24-12-2019)
		US2020113232A1	16 April 2020 (16-04-2020)
US3212508A	19 October 1965 (19-10-1965)	None	
CA3034168A1	01 March 2018 (01-03-2018)	CA3034168A1	01 March 2018 (01-03-2018)
		AR109316A1	21 November 2018 (21-11-2018)
		AU2017315219A1	14 February 2019 (14-02-2019)
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