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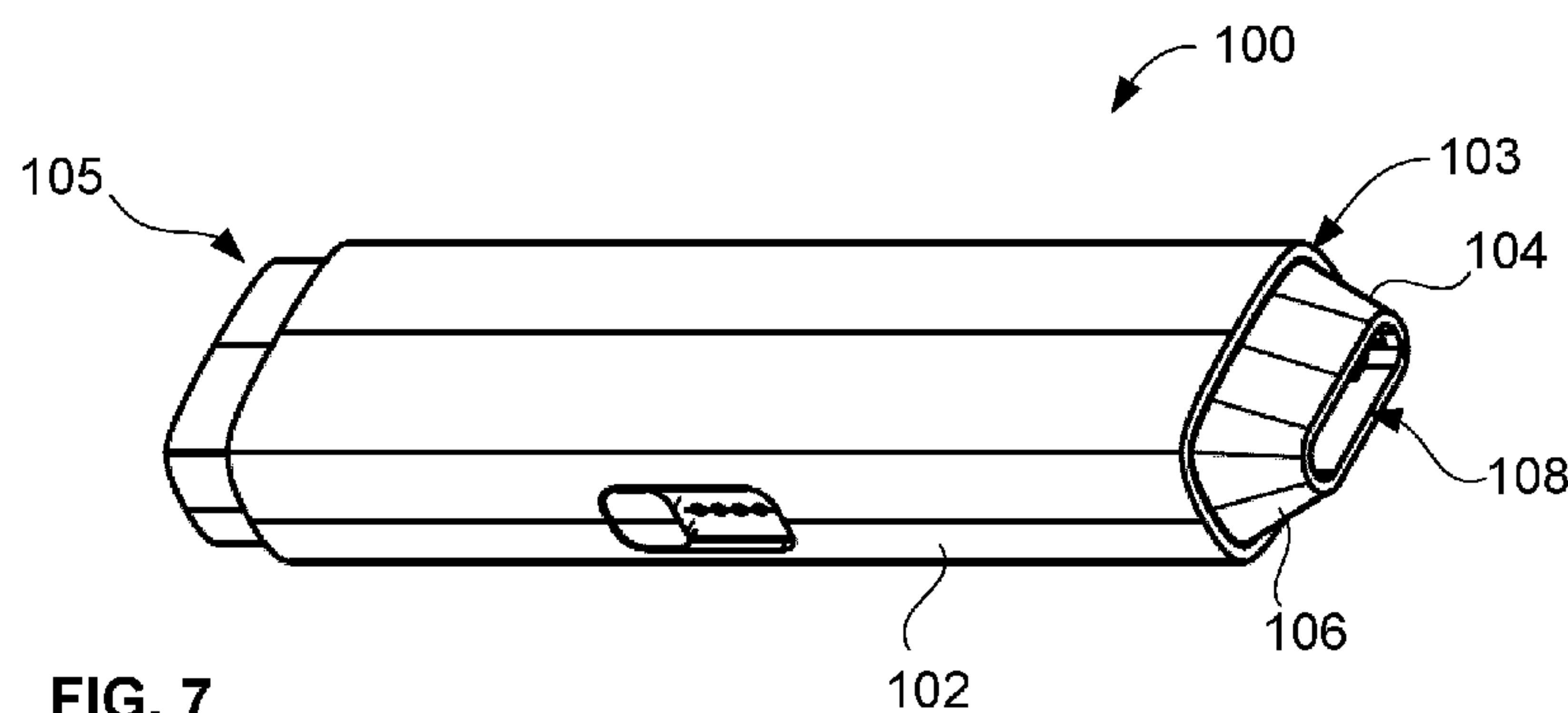


FIG. 7

(57) Abstract: The disclosure provides a vaporizer apparatus, comprising a head and a body. The body comprises a first electrical connector. The head comprises a second electrical connector and a mouthpiece portion with a suction opening. The head is attachable to the body in an operational position and is also attachable to the body in a non-operational position. In the second electrical connector engages the first electrical connector portion when the head is attached to the body in the operable position. The first electrical connector portion is at least partially received in the suction opening when the head is attached to the body in the non-operational position.

VAPORIZER APPARATUS HAVING REVERSIBLE HEAD AND RELATED METHODS

RELATED APPLICATION

[0001] This application claims priority to U.S. provisional Patent Application Serial No. 62/951,563 filed December 20, 2019, the entire contents of which are incorporated herein by reference.

FIELD OF THE DISCLOSURE

[0002] The present disclosure relates generally to equipment used for vaporizing materials to emit a vapor for inhalation, and, more particularly to portable vaporizers for personal use.

BACKGROUND

[0003] Vaporizer apparatuses may heat materials to create a vapor containing one or more desired extracted ingredients. Materials that may be vaporized include, but are not limited to, dried plant material such as herbs, liquid-based compositions such as oils, and wax-based compositions. Such materials may be referred to as "vaping materials" herein. The vapor generated from such materials can then be delivered to a user by inhalation during a "vaping" session.

[0004] Portable vaporizer apparatuses for personal use may be assembled from basic parts such as a mouthpiece, a vaporizing chamber for holding a material for vaporizing, a heater, a battery, etc. When the material for vaporizing is depleted, the vaporizer apparatus may be refilled. However, repeated refilling of the vaporizer apparatus may require that a user must assemble and disassemble these various parts over and over again, which can result in parts being lost. In addition, the mouthpiece may be exposed when the vaporizer apparatus is not in use between "vaping" sessions. This can be unhygienic for a user to position his or her mouth on the mouthpiece during a subsequent "vaping" session and can possibly lead to the unintentional inhalation of materials that may have fallen into the mouthpiece.

SUMMARY

[0005] According to an aspect, there is provided a vaporizer apparatus, comprising: a body comprising a first electrical connector; a head attachable to the body in an operational position and in a non-operational position, the head comprising a second electrical connector and a mouthpiece portion defining a suction opening; wherein the second electrical connector engages the first electrical connector in the operable position, and the first electrical connector is at least partially received in the suction opening in the non-operational position.

[0006] In some embodiments, the head further comprises at least one heater, each at least one heater defining a respective chamber for holding at least one material to be vaporized and comprising at least one heating element operable to vaporize the at least one material in the chamber.

[0007] In some embodiments, the head is operable to receive power from the base to vaporize the at least one material when the second electrical connector engages the first electrical connector in the operable position.

[0008] In some embodiments, the head comprises a cartridge, the cartridge comprising the at least one chamber and the at least one heating element.

[0009] In some embodiments, the cartridge is removable and replaceable.

[0010] In some embodiments, the at least one heater comprises at least one dry herb oven.

[0011] In some embodiments, the first electrical connector is a male connector projecting from the body, and the second electrical connector of the head is a female connector.

[0012] In some embodiments, the body comprises a docking bay, and the head docks in the docking bay in the operable and non-operable positions, the first electrical connector being positioned in the docking bay.

[0013] In some embodiments, the head has a first end and a second end opposite to the first end, the head comprising a core section, wherein the mouthpiece portion extending from the core section at the first end, and the second electrical connector is disposed at the second end.

[0014] In some embodiments, the head comprises a central vapor passage that extends into the head from the suction opening, and at least one side vapor passage that connects to the central vapor passage proximate the suction opening, the at least one side vapor passage providing fluid communication between the central passage and the at least one heater, the first electrical connector being received in the central passage when the head is attached in the non-operable position.

[0015] In some embodiments, the apparatus further comprises a processor configured to, when the head is in the operable position, obtain data indicating one or more characteristics of the head.

[0016] In some embodiments, the apparatus further comprises a processor configured to, when the head is in the operable position, obtain data indicating one or more characteristics of the head, wherein the one or more characteristics of the head comprise one or more characteristics of the at least one heater.

[0017] In some embodiments, the head comprises at least one reservoir for storing at least one material to be vaporized, and the one or more characteristics of the head comprise an identity of the one or more materials to be vaporized.

[0018] In some embodiments, the one or more characteristics of the head comprise a remaining amount of the one or more materials to be vaporized in the at least one reservoir.

[0019] In some embodiments, the at least one reservoir comprises a first reservoir and a second reservoir, and the at least one material comprises a first material stored in the first reservoir and a second material stored in the second reservoir.

[0020] In some embodiments, the one or more characteristics of the head comprise an orientation of the head, or a cartridge in the head, relative to the base.

[0021] In some embodiments, the first electrical connector comprises an electrical contact, the position of the electrical contact relative to the second electrical connector indicating the orientation of the cartridge.

[0022] In some embodiments, obtaining the one or more characteristics of the cartridge comprises determining that one of the at least one reservoir is empty or below a threshold.

[0023] In some embodiments, the body comprises the processor.

[0024] According to another aspect, there is provided a method for a vaporizer apparatus comprising a body and a head that is attachable to the body in an operational position and in a non-operational position, the method comprising: detecting that the head is attached to the body in the operational position; and while the head is in the operational position, obtaining data indicating one or more characteristics of the head.

[0025] In some embodiments, the one or more characteristics of the head comprise at least one of: an orientation of the head; and an identity of at least one material for vaporization in the head.

[0026] Other aspects and features of the present disclosure will become apparent, to those ordinarily skilled in the art, upon review of the following description of the specific embodiments of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The present disclosure will be better understood having regard to the drawings in which:

[0028] Figure 1 is an exploded perspective view of an example vaporizer apparatus according to some embodiments;

[0029] Figure 2 is a perspective view of a body of the vaporizer apparatus of Figure 1 in isolation;

[0030] Figure 3 is a perspective view of an inner body portion of the body of Figure 2 in isolation;

[0031] Figure 4 is a first side perspective view of a head of the vaporizer apparatus of Figure 1;

[0032] Figure 5 is a second side perspective view of a head of the vaporizer apparatus of Figure 1;

[0033] Figure 6A is an exploded perspective view of the head of Figures 4 and 5;

[0034] Figure 6B is a partial perspective view of the head of Figures 4 to 6A;

- [0035]** Figures 7 is a side perspective view of the vaporizer apparatus of Figure 1 with the head attached to the body in an operational position;
- [0036]** Figure 8 is a side view of the vaporizer apparatus of Figure 7;
- [0037]** Figure 9 is a front end view of the vaporizer apparatus of Figures 7 and 8;
- [0038]** Figure 10 is a rear end view of the vaporizer apparatus of Figures 7 to 9;
- [0039]** Figures 11 is a perspective view of the vaporizer apparatus of Figures 1 and 7 to 10 with the head attached to the body in a non-operational position;
- [0040]** Figure 12 is a front end view of the vaporizer apparatus of Figure 11;
- [0041]** Figure 13 is a perspective view of the vaporizer apparatus of Figures 1 and 7 to 12 with the head in the operational position and an outer housing removed;
- [0042]** Figure 14 is a perspective view of the vaporizer apparatus of Figure 13 with the head in a partially ejected position;
- [0043]** Figure 15 is a perspective view of the vaporizer apparatus of Figures 1 and 7 to 14 with the head in the non-operational position and an outer housing removed;
- [0044]** Figure 16 is a perspective view of the vaporizer apparatus of Figure 15 with the head in another partially ejected position;
- [0045]** Figure 17 is a functional block diagram of the example vaporizer apparatus of Figures 1 and 7 to 16;
- [0046]** Figure 18 is an enlarged partial side view of the vaporizer apparatus of Figures 1 and 7 to 17;
- [0047]** Figure 19 is a cross-sectional partial view of the vaporizer apparatus of Figures 1 and 7 to 18 with a cartridge removed and the head in the operational position;
- [0048]** Figure 20 is a cross-sectional partial view of the vaporizer apparatus of Figures 1 and 7 to 19 with the cartridge removed and showing the head in the non-operational position;

[0049] Figure 21 is a cross-sectional partial view of the vaporizer apparatus of Figures 1 and 7 to 20 showing the cartridge within the head and the head in the operational position;

[0050] Figure 22 is a cross-sectional partial view of the apparatus of Figure 21, but showing the head in the non-operational position;

[0051] Figure 23 is a cross-sectional partial view of the vaporizer apparatus of Figures 1 and 7 to 22 with the head in the operational position;

[0052] Figure 24 is a cross-sectional partial view of the apparatus of Figure 23, but with the head in a position reversed about a longitudinal axis;

[0053] Figure 25 is a perspective view of another example body for a vaporizer apparatus according to some embodiments;

[0054] Figures 26 is a perspective view of another inner body portion for a vaporizer apparatus according to some embodiments;

[0055] Figures 27 is a top view the inner body portion of Figure 26;

[0056] Figures 28 is a perspective view of another inner body portion for a vaporizer apparatus according to some embodiments;

[0057] Figures 29 is a top view the inner body portion of Figure 28;

[0058] Figure 30 is a bottom perspective view of a head for a vaporizer apparatus according to some embodiments;

[0059] Figure 31 is a functional block diagram of another example vaporizer apparatus according to some embodiments;

[0060] Figure 32 is a cross-sectional partial view of the vaporizer apparatus of Figure 31 showing the cartridge within the head and the head in the operational position;

[0061] Figure 33 is a cross-sectional partial view of the apparatus of Figure 32, but showing the head in the non-operational position;

[0062] Figure 34 is a functional block diagram of another example vaporizer apparatus according to some embodiments;

[0063] Figure 35 is a cross-sectional partial view of the vaporizer apparatus of Figure 34 showing the cartridge within the head and the head in the operational position;

[0064] Figure 36 is a cross-sectional partial view of the apparatus of Figure 37, but showing the head in the non-operational position;

[0065] Figure 37 is a flowchart of a method for a vaporizer apparatus according to some embodiments; and

[0066] Figure 38 is a flowchart of another method for a vaporizer apparatus according to some embodiments.

DETAILED DESCRIPTION

[0067] Aspects of the disclosure are not limited to the particular embodiments described herein. Terminology used herein is for the purpose of describing particular embodiments only and variations to the described embodiments may be made without departing from the scope of the claims.

[0068] As used herein the terms "a," "an," and "the" may include plural referents unless the context clearly dictates otherwise.

[0069] It is to be understood that directional or relative terms such as "forward", "front", "rearward", "back", "vertical", "horizontal", "side", "top", "bottom" and the like are used for ease of description and illustrative purposes, and such terms do not limit embodiments described herein to a particular orientation during use or normal operation.

[0070] The present disclosure relates to vaporizer apparatuses and related methods. The term "vaporizer apparatus" may refer to any device configured to vaporize a material to produce a vapor to be inhaled by a user. The term "portable vaporizer apparatus" may refer to any vaporizer apparatus that is able to be carried by a user for portable use, such as vaporizer pens, portable dry herb vaporizers, electronic cigarettes, etc. Portable vaporizer apparatuses may be configured for use with one or more vaping materials including dried plant material such as herbs, liquid-based compositions such as oils, wax-based compositions, etc.

[0071] Aspects of the disclosure may provide a closed-loop vaporizer comprising a cartridge or "pod" having one or more materials for vaporizing and a mouthpiece portion.

The cartridge may be removed and reversed to protect the mouthpiece portion of the vaporizer.

[0072] Figure 1 is an exploded view of an example vaporizer apparatus 100 according to some embodiments. The vaporizer apparatus 100 includes a body 102 and a head 104. The head 104 is removably attachable to the body 102 in an operational position and in a non-operational position. The head 104 comprises a mouthpiece portion 106 that defines a suction opening 108 therein. The term “operational position” refers to a position in which the vaporizer apparatus 100 is capable of operation for vaporizing and inhalation of a vapor from the suction opening 108. The operational position of the example vaporizer apparatus 100 is shown in Figures 7 to 10. The term “non-operational position” refers to a position in which the vaporizer apparatus 100 is not operable for vaporizing and inhalation of a vapor from the suction opening 108. The operational position of the example vaporizer apparatus 100 is shown in Figures 11 and 12. In this embodiment, the mouthpiece portion 106 is exposed in the operational position and covered in the non-operational position, as will be discussed in more detail below.

[0073] Referring again to Figure 1, the body 102 in this embodiment comprises a docking bay 107 configured to receive the head 104 such that the head 104 is docked in the docking bay 107 in the operational and non-operational positions. The body 102 includes a first electrical connector 113 and the head 104 includes a second electrical connector 115 (visible in Figures 6 and 7). The first electrical connector 113 engages the second electrical connector 115 (shown in Figure 5) when the head 104 is attached to the body 102 in the operational position. In the non-operational position, the first electrical connector 113 is at least partially received in the suction opening 108. The first and second electrical connectors 113 and 115, when engaged, allow for communication of electrical power from the body 102 to the head 104 for vaporizing the materials stored in the head 104. Data and/or control signaling may also be communicated through the first and second electrical connectors 113 and 115.

[0074] The body 102 optionally includes an inner body portion 111 and an outer housing 112. In the example embodiment of Figure 1, the outer housing 112 is generally tubular and the inner body portion 111 is slidably received in the outer housing 112 such that the outer housing at least partially covers the inner body portion 111. The inner body portion 111 is slidable for longitudinal movement relative to the outer housing 112.

[0075] The head 104 in this embodiment holds therein at least one material to be vaporized. The head 104 also includes at least one heater for vaporizing the material, as will

be discussed in more detail herein with reference to Figure 17. The term “heater” as used herein may refer to any device or means that transforms a vaping material into a vapor. For example, the heater may be an atomizer or oven. For dry herb oven embodiments, a heater may include a chamber for holding the material and a heating element that vaporizes the material held in the chamber. For liquid vaping material embodiments, a heater may include a vaporizing chamber that receives the liquid material from a storage reservoir and a heating element that vaporizes the material in the vaporizing chamber. The vaporizer apparatus 100 of Figure 1 is a liquid vaping material type apparatus, as will be explained in more detail below.

[0076] In the operational position, the head 104 may receive power from the body 102 to vaporize the at least one vaping material. The head 104 in this example optionally includes a cartridge 134 (shown in Figure 6A) for storing the at least one vaping material. The cartridge contains components for vaporizing the material to form at least one vapor, as will be described below. The cartridge 134 is removable and replaceable. In some embodiments, the vaporizer apparatus 100 may be provided without the cartridge 134 and the cartridge 134 may be provided separately.

[0077] The head 104 in this embodiment also includes an internal chamber 186 (shown in Figure 6B) that receives the cartridge 134 and closure member 136 that is removable to provide access to the chamber 186. The second electrical connector 115 (shown in Figure 5) is attached to the closure member 136 in this embodiment.

[0078] Figure 2 is a perspective view of the body 102 of the vaporizer apparatus 100 of Figure 1 in isolation. The body 102 in this embodiment is elongate having a front end 103 and an opposite rear end 105. The body 102 has a generally rectangular-prism shape in this embodiment, although embodiments are not limited to any particular shape of the body 102. For example, the body may be generally cylindrical, puck-shaped, or any other shape suitable for portable use.

[0079] The docking bay 107 is in the form of a recess in the front end 103. In this embodiment, the docking bay 107 has an inner surface 139 and defines an opening 110 at the front end 103 of the body 102 for receiving the head 104 (shown in Figure 1) therein. Embodiments are not limited to any particular shape or configuration of the docking bay 107. In other embodiments, the docking bay 107 may be omitted.

[0080] The first electrical connector 113 (shown in Figure 3) is disposed within the docking bay 107 in this example. In this example, the body 102 comprises the inner body

portion 111 and the outer housing 112 that at least partially covers the inner body portion 111. The outer housing 112 is tubular with the inner body portion 111 being slidably received therein. The outer housing 112 extends past a front end of the inner body portion 111, thereby forming the docking bay 107 at the front end 103 of the body 102.

[0081] The outer housing 112 has a side 116 that defines a slot 114 therein. The slot is positioned intermediate the front end 103 and the rear end 105. The inner body portion 111 in this example comprises a button 118 that is received in the slot 114 and is longitudinally movable therein. The sliding movement of the inner body portion 111 relative to the outer housing 112 may be limited by travel of the button 118 within the slot 114. However, other physical stops may be employed to restrict travel of the inner body portion 111 to less than the full length of the slot 114.

[0082] The body 102 also comprises a visual indicator 162 to convey information about a mode of operation of the vaporizer apparatus 100. The visual indicator 162 in the form of a plurality of LEDs on the inner body portion 111 adjacent the button 118. The LEDs 162 may be visible through slot 114.

[0083] The inner body portion 111 is longitudinally movable between a rearward position shown in Figure 2 and a forward position shown in Figures 14 and 16. In the rearward position, a rear end 120 of the inner body portion protrudes from the outer housing 112 at the rear end 105 of the body 102. To move the inner body portion 111 to the forward position, a user may hold the outer housing 112 and press on the rear end 120 of the inner body portion 111 to slide the inner body portion 111 forward relative to the outer housing 112.

[0084] Figure 3 is a perspective view of the inner body portion 111 in isolation and shows the first electrical connector 113. The first electrical connector 113 is in the form of a male-type connector that projects from a front end 126 of the inner body portion 111.

[0085] The button 118 may be depressed by a user to provide input to control the vaporizer device. The button 118 may receive input to activate the head 104 to vaporize the materials held therein. Thus, upon pressing the button 118, power to drive the vaporization may be provided from the body 102 to the head 104 when the head 104 is in the operational position. The visual indicator (LEDs) 162 are also visible in Figure 3 and are positioned on the inner body portion 111 near the button 118 in this embodiment. The inner body portion 111 may include a power source and other circuitry (such as components of the body 102 shown in Figure 17 and discussed below).

[0086] Figures 4 and 5 are first side and second side perspective views, respectively, of the head 104 of the vaporizer apparatus 100 of Figure 1. The head 104 in this embodiment comprises a core section 130, which is generally block-shaped having a first end 131 and a second end 133. The core section 130 is shaped to be at least partially received within the docking bay 107 of the body 102 shown in Figure 2. The mouthpiece portion 106 extends from the core section 130 at the first end 131. The closure member 136 is positioned at the second end 133. The mouthpiece portion 106 in this example tapers from the full width and height of the core section 130 to a size only slightly larger than the suction opening 108. However, embodiments are not limited to the particular shape or configuration of the head 104 shown in Figures 4 and 5.

[0087] The core section 130 of the head 104 optionally includes a first window 132a and a second window 132b. These windows 132a and 132b may allow a user to view an amount of remaining material (e.g. oil) in the head 104.

[0088] Figure 5 shows the second electrical connector 115. The second electrical connector 115 is in the form of a female-type connector that engages the first electrical connector 113 (Figure 3). The closure member 136 defines an opening 137 with the second electrical connector 115 positioned therein. The second electrical connector 115 and the suction opening 108 of the mouthpiece portion 106 are disposed at opposing ends of the head 104 and generally aligned with the central longitudinal axis 181 in this example. However, embodiments are not limited to any particular configuration of the head 104, including the second electrical connector 115 and the mouthpiece portion 106. The shape, size, or other configuration details of the head 104 may vary in other embodiments.

[0089] The head 104 may include one or more elements to releasably secure the head 104 in the docking bay 107 of the body 102 (shown in Figure 2). In this example, the head 104 includes two flexible raised protrusions 138a and 138b, one on each side (140, 142) of the head 104. The protrusions 138a and 138b function as “snaps” and may engage corresponding depressions within the inner surface 139 of the docking bay 107 (shown in Figure 2). Sufficient force on the head 104 (e.g. by pushing the rear end 120 of the inner body portion 111 shown in Figure 2) may disengage the protrusions 138. Other securing means, such as a catch mechanism or a friction fit, may alternatively be used to releasably secure the head 104 to the body 102.

[0090] Figure 6A is an exploded perspective view of the head 104 of Figures 4 and 5. The head 104 in this embodiment includes a removable cartridge 134 (or “pod”) that is held within the head 104. In other embodiments, the cartridge 134 may be partially exposed

when connected to the head 104. In still other embodiments, the cartridge 134 may be omitted and components of the cartridge 134 may instead be integral with the head 104 and not removable.

[0091] The cartridge 134 is configured to store at least one material to be vaporized. In this example, the cartridge 134 is also configured to vaporize the at least one material. The core section 130 of the head 104 defines the inner chamber 186 (shown in Figure 6B) that receives and holds the cartridge 134. The closure member 136 is an end cap in this embodiment that covers an opening 129 to the inner chamber 186 at the second end 133 of the core section 130. With the closure member 136 removed, the cartridge 134 may be inserted into, or removed from, the core section 130 through the opening 129 at the second end 133.

[0092] The cartridge 134 in this example is a “dual-cartridge” embodiment that separately stores first and second vaping materials for producing first and second vapors. The dual cartridge 134 includes first and second reservoirs 150a and 150b (shown in Figures 17, 21 and 22) that store the first and second materials. The reservoirs 150a and 150b store liquid materials (e.g. oil-based compositions) in this embodiment. However, other types of storage chambers other than reservoirs for liquid materials may be used in other embodiments. For example, rather than liquid storing reservoirs, the vaporizer apparatus may comprise a storage chamber for a dry material such as dried plant material.

[0093] The cartridge 134 also includes first and second vaporizing chambers 152a and 152b (also shown in Figures 17, 21 and 22) for vaporizing the first and second materials. First and second vapor flow passages 197a and 197b of the dual cartridge 134 are shown in Figure 17. The passages 197a and 197b extend to airflow outlets 146a and 146b of the cartridge 134. The first and second air flow passages 146a and 146b provide a pathway for vapor flow from the first and second vaporizing chambers 152a and 152b to the mouthpiece portion 106 when the cartridge 134 is received in the head 104. Thus, the suction opening 108 is in fluid communication with the vaporizing chambers 152a and 152b when the cartridge 134 is received in the head 104.

[0094] Though not illustrated in Figure 6A, an outer wall 145 of the cartridge 134 may be at least partially translucent or substantially transparent to allow a user to see the remaining volume of the first and second materials within the reservoirs 150a and 150b of the cartridge 134. Alternatively, one or more windows may be provided in the outer wall 145 to provide visibility of the reservoirs 150a and 150b.

[0095] The head 104 also includes a Printed Circuit Board Assembly (PCBA) 144 operably connected to the second electrical connector 115. The second electrical connector 115 is coupled to the PCBA 144 in this embodiment. The PCBA may attach to the closure member 136 and forms an interface between the second electrical connector 115 and the cartridge 134. The cartridge 134 may include electrical contacts (not shown) that operably couple to the PCBA 144 when the cartridge 134 is held in the head 104. The PCBA 144 may include circuitry to activate and/or control vaporization in the first and second vaporizing chambers 152a and 152b (Figure 17) responsive to power and/or signaling from the body 102. The PCBA 144 may also include memory or an electronic tag including information about the cartridge 134.

[0096] The closure member 136 has an inner face 147 with an upstanding ridge 149 thereon. The upstanding ridge 149 extends about the opening 137. The second electrical connector 115 is received in the opening 137. The closure member 136 also includes first and second cantilevers 148a and 148b that engage the core section 130 to secure the closure member 136 to the core section 130. Embodiments are not limited to this particular arrangement of the closure member 136, the PCBA 144 or the second electrical connector 115. Any suitable arrangement for coupling the cartridge 134 to receive power and/or signaling from the body 102 may be used.

[0097] The head 104 may also be configured to receive two separate cartridges (in place of the dual cartridge 134 shown), each having a respective reservoir storing a respective material for vaporizing. The two separate cartridges may each further include a respective vaporizing chamber and respective heating element for vaporizing material in the corresponding vaporizing chamber.

[0098] Figure 6B is a partial, enlarged, perspective view of the head 104 of Figures 4 to 6A. The cartridge 134 may include one or more alignment elements to help ensure that the cartridge is inserted in a desired orientation in the core section 130. This may assist with identification of what material is in which half of the cartridge 134 because the orientation of the cartridge 134 in the head 104 may be known. In this embodiment, the cartridge includes a raised tab 141 that is received in a recessed rail 143 in the surface 157 of the chamber 186

[0099] Figures 7 to 10 are perspective, side, front end and rear end views, respectively, of the vaporizer apparatus 100 of Figure 1 with the head 104 attached to the body 102 in the operational position. Figures 11 and 12 are perspective and front end views

of the vaporizer apparatus 100 with the head 104 attached to the body 102 in the non-operational position.

[00100] The head 104 releasably engages the front end 103 of the body 102 for both the “operational” and “non-operational” positions. The head 104 is reversible such that the “operational” position of the head 104 is axially reversed relative to the “non-operational” position, where the term “axially” refers to a longitudinal axis of the vaporizer apparatus 100. In the operational position (Figures 7 to 10), the mouthpiece portion 106 is exposed and a user may draw vapor through the suction opening 108. In the non-operational position (Figures 11 and 12), the mouthpiece portion 106 of the head is received in the docking bay 107 (shown in Figure 2) of the body 102 and is not accessible. The mouthpiece portion 106 may be at least partially protected from debris and contaminants from the outside environment when the head 104 is in the non-operational position.

[00101] For a “vaping” session, a user can position the head 104 in the “operational position” shown in Figures 7 to 10. To do so, the user may insert the core section 130 (shown in Figures 4 to 6B) of the head 104 into the docking bay 107 (shown in Figure 2), with the head 104 oriented such that the mouthpiece portion 106 faces away from the body 102 and the first electrical connector 113 is engaged with the second electrical connector 115.

[00102] When the head 104 is in the operational position, in this embodiment, the vaporizer apparatus 100 is activatable to vaporize the material within the cartridge 134 (shown in Figures 6A and 6B). This engagement of the first and second electrical connectors 113 and 115 allows power and/or signalling (e.g. control signals) to be communicated between the body 102 and the head 104. For example, the body 102 may include a power source (e.g. battery) and power from the power source may be provided to one or more heating elements 154a and 154b (shown in Figure 17) in the cartridge 134 to vaporize the material(s) in the vaporizing chambers 152a and 152b (shown in Figure 17) of the cartridge 134 of the head 104 to generate vapor. Conversely, removing the head 104 from the docking bay 107 disengages the first and second electrical connectors 113 and 115 such that the heating elements 154a and 154b cannot be activated.

[00103] Figure 13 is a perspective view of the vaporizer apparatus 100 with the head 104 in the operational position, but with the outer housing 112 removed so that the inner body portion 111 and first electrical connector 113 are visible. The head 104 is attached to the first electrical connector 113 via the second electrical connector 115 (visible in Figure 15). The button 118 and LEDs 162 are also visible.

[00104] Figure 14 is a perspective view of the vaporizer apparatus 100 with the head 104 in the operational position and the inner body portion 111 (shown in Figure 13) pushed to the forward position relative to the outer housing 112. To remove the head 104, a user may push on the rear end 120 of the inner body portion 111 (visible in Figure 13) to move the inner body portion 111 to the forward position relative to the outer housing 112. This movement reduces the depth of the docking bay 107 (visible in Figures 1 and 2) and pushes the head 104 forward relative to the outer housing 112. Thus, sliding movement of the inner body portion 111 may move the head 104 from a fully docked position shown in Figures 7 to 10 to a partially ejected position shown in Figure 14. In this partially ejected position may enable a user to more easily grip and remove the head 104.

[00105] The forward position of the inner body portion 111 may be a temporary position used for removing the head 104. The vaporizer apparatus 100 may comprise one or more biasing elements that bias the inner body portion 111 toward the rearward position. The one or more biasing elements may include one or more springs and/or magnets. For example, one or more magnets may be positioned in the inner body portion 111 and one or more metal pieces may be positioned in the outer housing 112 (or vice versa). The one or more magnets and the one or more metal pieces may be positioned to magnetically attract and be aligned when the inner body portion 111 is in the rearward position.

[00106] Once the head 104 is removed from the body 102, the head 104 may be axially reversed to be reinserted into the docking bay 107 (Figure 2) in the non-operational position shown in Figures 11 and 12.

[00107] Figure 15 is a perspective view of the vaporizer apparatus 100 with the head 104 in the non-operational position, but with the outer housing 112 removed so that the inner body portion 111 is visible. The first electrical connector 113 (shown in Figure 13) is received in the suction opening 108 of the mouthpiece portion 106.

[00108] Figure 16 is a perspective view of the vaporizer apparatus 100 with the head 104 in the non-operational position with the inner body portion 111 (shown in Figure 15) pushed to the forward position relative to the outer housing 112. To remove the head 104, the user may first push on the rear end 120 of the inner body portion 111 (visible in Figure 15) to move the inner body portion 111 to the forward position relative to the outer housing 112. The forward sliding movement of the inner body portion 111 may move the head 104 from a fully docked position shown in Figures 11 and 12 to a partially ejected position shown in Figure 16. The head 104 may then be removed, axially reversed, and re-inserted into the bay 107 to dock with the body 102 in the operational position.

[00109] Figure 17 is a functional block diagram of the example vaporizer apparatus 100 of Figures 1 and 7 to 16. Figure 17 illustrates the head 104 attached to the body 102 in the operational position with first and second electrical connectors 113 and 115 engaged.

[00110] As noted above, the cartridge 134 in this example is a dual-cartridge that includes a first reservoir 150a and a second reservoir 150b. The first reservoir 150a may hold a first material to be vaporized to form a first vapor. The second reservoir 150b may hold a second material to be vaporized to form a second vapor. The first and second reservoirs 150a and 150b are configured to hold liquid materials such as first and second oil-based compositions in this example. However, the reservoirs 150a and 150b are shown by way of example, and the disclosure is not limited to any particular type of vaping material or material storage method.

[00111] The first and second reservoirs 150a and 150b may each, for example, have capacity to store at least 0.25 ml of oil or other fluid for vaporizing. In some embodiments, each of the first and second reservoirs may have a storage capacity of 0.5 ml or more. In some embodiments, the capacity of each reservoir may be 1 ml or more. Embodiments are not limited to any particular capacity.

[00112] The first and second materials held in the first and second reservoirs 150a and 150b may be two different materials have different compositions and properties. For example, the first material in the first reservoir 150a may be a first oil-based composition and the second material in the second reservoir 150b may be a second, different oil-based composition. For example, the first oil-based composition may contain a first one or more psychoactive compounds, while the second oil-based composition may be substantially or completely non-psychoactive. The first and second reservoirs 150a and 150b may become depleted and may be refilled with the same or different materials.

[00113] The cartridge 134 further includes a first vaporizing chamber 152a for vaporizing the first material from the first reservoir 150a and a second vaporizing chamber 152b for vaporizing the second material from the second reservoir 150b. Each vaporizing chamber 152a and 152b receives the respective material from the corresponding reservoir 150a or 150b.

[00114] The materials may be communicated to the vaporizing chamber 152a and 152b by a wick or any other suitable method. In other embodiments, such as dry herb ovens, the material storage reservoir or compartment may also function as the vaporizing chamber.

[00115] The cartridge 134 further comprises first and second heating elements 154a and 154b operational to heat and vaporize the materials in the first and second vaporizing chambers 152a and 152b respectively. In this embodiment, the first material in the first reservoir 150a flows to the first vaporizing chamber 152a via fluid path 166a. The fluid path 166a may, for example, comprise a wick (not shown) that transports the material to the heating element 154a. However, embodiments are not limited to the use of wicks, and other mechanisms may be used to transport the first material. The first heating element 154a is operable to vaporize the first material to produce the first vapor. The second material in the second reservoir 150b flows to the second vaporizing chamber 152b via fluid path 166b. The fluid path 166b may, for example, comprise a wick (not shown). The second heating element 154b is operable to vaporize the first material to produce the second vapor.

[00116] In other embodiments, rather than two sets of vaporizing chambers, heating elements and reservoirs, the cartridge 134 may instead include a single reservoir, a single vaporizing chamber, and/or a single heating element. More than two sets of vaporizing chambers, heating elements and reservoirs may also be used. In still other embodiments, a single vaporizing chamber and/or a single heating element may be used to vaporize a mix of two or more materials received from two or more reservoirs. In still other embodiments, the cartridge 134 may contain the reservoirs 150a and 150b with one or more vaporizing chambers and heating elements being within the head 104 but external to the cartridge 134.

[00117] The vaporizer apparatus 100 further includes an airflow system 155 comprising at least one airflow path to carry the first and second vapors generated in the first and second vaporizing chambers 152a and 152b to the mouthpiece portion 106. The airflow system 155 comprises first vapor airflow path 168a, second vapor airflow path 168b, and mixed airflow path 170. The first vapor flows out from the first vaporizing chamber 152a into the first vapor airflow path 168a. The second vapor flows out from the second vaporizing chamber 152b into the second vapor airflow path 168b. The first and second airflow paths 168a and 168b extend from the cartridge 134, into the mouthpiece portion 106 where they converge into the mixed airflow path 170. The mixed airflow path 170 exits from the suction opening 108 such that a mix of the first and second vapors may be inhaled by a user through the mouthpiece portion 106. In other embodiments, the first and second airflow paths 168a and 168b may not converge, but may rather extend to separate suction openings in the mouthpiece.

[00118] For each airflow path 168a and 168b, an air flow outlet 146a or 146b of the cartridge 134 may align with a corresponding airflow inlet 172a or 172b of the mouthpiece

portion 106 when the cartridge 134 is received in the head 104. It will be appreciated that various structures may be used to provide such airflow paths.

[00119] The vaporizer apparatus 100 in this example further includes airflow intake paths 174a and 174b that are in fluid communication with the outside environment and the vaporizing chambers 152a and 152b. The airflow intake paths 174a and 174b supply air from the outside environment to the vaporizing chambers 152a and 152b when a user inhales. The air mixes with and carries the corresponding first and second vapors. The airflow intake paths 174a and 174b extend from the vaporizing chambers 152a and 152b, and through a portion of the body 102. Air inlets 175a and 175b, such as air holes, in the body allow for air to enter the airflow intake paths 174a and 174b.

[00120] In this example, the vaporizer apparatus 100 comprises a processor 156 and a memory 158 operably connected to the processor 156. The memory 158 stores processor-executable instructions thereon that, when executed by the processor 156, cause the processor 156 to implement the various control functionality described herein. The vaporizer apparatus 100 in this embodiment may include a user interface 160 comprising one or more input and/or output elements (e.g. button 118). Optionally, the vaporizer apparatus 100 further comprises a clock 176 and/or a location module 178. The location module 178 obtains current location information and may be a GPS module, for example. In some embodiments, the location information may be retrieved via a wireless or wired connection to a smart phone (not shown). The smart phone may include the GPS module or other means of retrieving location information over a network. The processor 156, memory 158, user interface 160, clock 176 and location module 178 are optionally located within the body 102.

[00121] The vaporizer apparatus 100 optionally controls the flow of the first and second vapors. For example, the processor 156 may activate flow of the first vapor, but stop flow of the second vapor. The processor 156 may activate flow of both the first and second vapors and/or control a ratio of the first vapor to the second vapor. For example, the processor 156 may control the vapor flows such that the first vapor is between 0% and 100% of the total vapor flowing through the mouthpiece. Optionally, the percentage of the first vapor may be set at 25%, 50% or 75% (or other intermediate values). Thus, a user may customize the balance of the first and second vapors depending on their current wants, the current environment, etc.

[00122] The head 104 optionally includes the PCBA 144 that is operatively connected to the body 102 when the head 104 is in the operational position. The PCBA 144 may

receive power, data, and/or control signals from the body 102, and the PCBA 144 may provide data and/or data to the body 102. The PCBA 144 may, for example, direct power to the heating elements 154a and 154b in accordance with control signalling received from the processor 156 of the body 102. The electrical power provided to the heating elements 154a and 154b may have a current, voltage, pulse rate, and/or duration as a function of the control signalling received from the processor 156. The temperatures of the first and second vaporizing chambers 152a and 152b may independently controlled.

[00123] In some embodiments, the PCBA 144 may comprise a second processor and/or a second memory. In other embodiments, the PCBA 144 may be in the body 102 rather than the head 104. In still other embodiments, the PCBA 144 may be omitted and the functionality of the PCBA 144 described above may be performed by the processor 156 in the body 102. The PCBA 144 is only an example physical implementation of circuitry or logic that may perform the functions described above.

[00124] The user interface 160 may comprise one or more buttons (such as the button 118 in Figures 13 to 16) and/or one or more visual indicators (such as the visual indicator 162 in Figures 13 and 15). The one or more buttons may be operable to receive input that switches or cycles between different vapor ratio settings. For example, one button may be provided for each mix ratio. In other embodiments, multiple user inputs (e.g. multiple buttons) may be used. The visual indicator 162 may provide a visual indication of the current vapor ratio setting. In Figures 13 and 15, the visual indicators 162 are a series of LEDs. Embodiments are not limited to buttons for receiving user input or any particular type of visual indicator. Any suitable user interface elements may be used (e.g. touchscreen, buttons, display, lights, etc.).

[00125] Figure 18 is an enlarged partial side view of the vaporizer apparatus 100 of Figures 1 and 7 to 17 showing the visual indicator 162 of this embodiment. The visual indicator 162 is a set of five Light Emitting Diodes (LEDs) 163a to 163e. One or more of the LEDs 163a to 163e may be activated and one or more of the LEDs 163a to 163e may be deactivated, with the combination of activated and deactivated LEDs indicating a particular mix ratio. Table 1 below illustrates an example usage of the LEDs 163a to 163e, where the “mix ratio” is the percentage of the first vapor in the combined output of first and second vapors.

Mix Ratio	LED Activated
0%	163a
25%	163b
50%	163c
75%	163d
100%	163e

Table 1

[00126] The LEDs 163a to 163e are positioned on the inner body portion 111 such that they are visible through the slot 114 in the outer housing 112 when the inner body portion 111 is in the rearward position.

[00127] Turning again to Figure 17, the body 102 of the vaporizer apparatus 100 may further include a power source 164. The power source 164 may, for example, comprise a battery. The power source 164 powers the various components of the body 102 including the processor 156. The power source 164 also powers the first and second heating elements 154a and 154b. The processor 156 and PCBA 144 are operable to control the power provided to the first and second heating elements 154a and 154b from the power source 164. For example, the processor 156 and PCBA 144 may control the power such that the first and second heating elements 154a and 154b are pulsed at particular rates and wattage levels.

[00128] The first reservoir 150a, the first vaporizing chamber 152a and the first heating element 154a may collectively be considered a first cartridge portion 135a or “pod” of the dual cartridge 134. The second reservoir 150b, the second vaporizing chamber 152b and the second heating element 154b may collectively be considered a second cartridge portion 135b or “pod” of the dual cartridge 134. As also noted above, in other embodiments, rather than a single dual-cartridge structure, two separate cartridges, each comprising a respective reservoir, vaporizing chamber and/or heating element, may be received in the head 104.

[00129] A user may select a desired mode of operation using the user interface 160. The mode of operation may be a vapor mix ratio. For example, a user may press a button (e.g. button 118 shown in Figures 13 to 15) to cycle through available modes until the visual

indicator 162 (Figure 1) indicates the desired mix ratio. The processor, upon receiving user input, via the user interface 160 controls the flow of the first and second vapors through the first and second vapor airflow paths 168a and 168b as a function of the selected mix ratio. Optionally, the vaporizer apparatus may further include one or more airflow sensors that measure airflow through the body 102 and/or head 104. The sensor output may be provided to the processor 156. Example methods for controlling the mix ratio will now be discussed, although embodiments are not limited to these specific examples.

[00130] In some embodiments, the power level provided to the heating elements 154a and 154b may vary as a function of the selected mix ratio. For example, for a 50/50 mix ratio, the wattage provided to each of the heating elements 154a and 154b may be the same (e.g. high power for both, or medium power for both). For a 75/25 mix ratio, the wattage may be high for the first heating element 154a and low for the second heating element 154b. In this context, high may be 100% max power and low may be 50% max power. However, the exact relative powers and power ratios may vary and may depend on the materials being vaporized in the first and second vaporizing chambers 152a and 152b. For a 100/0 mix ratio, the output wattage may be 100% wattage for the first heating element 154a and 0% for the second heating element 154b.

[00131] As yet another option, timing of the activation of the heating elements 154a and 154b may be a function of the desired mix ratio. The duration for which the heating elements 154a and 154b are activated to vaporize material may be referred to as a “burn time”. The burn time duration may, for example, be based on an expected (e.g. typical) inhale time of a user. For example, it may be assumed that the user will typically inhale for two seconds. For a 50/50 mix ratio (i.e. 50%), the burn times for both vaporizing chambers 152a and 152b may be the same. For example, both vaporizing chambers 152a and 152b may burn for approximately two seconds. For a 75/25 mix ratio (i.e. 75%), the burn time of the second vaporizing chamber 152b may be reduced. As an example, the first vaporizing chamber may burn for approximately two seconds and the second vaporizing chamber may burn for approximately 0.5 seconds. For a 100/0 mix ratio (i.e. 100%), the burn time for the first vaporizing chamber 152a may be approximately two seconds, and the burn time for the second vaporizing chamber 152b may be zero. The burn times described above are only examples, and other different relative burn times may be used in other implementations.

[00132] As another option, the heating elements 154a and 154b may be controlled to individually and selectively generate vapor at variable rates to provide the selected vapor mix. The heating elements 154a and 154b may be controlled by the processor 156 to vary

the rate of vapor production. For example, power to each of the heating elements 154a and 154b may be “pulsed” at variable rates. For each heating element 154a and 154b, the respective “pulse” rate may determine the rate of vapor production. For example, a faster pulse rate may produce a higher flow of vapor than a slower pulse rate. The total airflow through the paths 168a and 168b may be approximately the same (or similar), but the density of vapor in the air that flows through such paths may vary by this method.

[00133] For example, if the selected ratio is 100% the first vapor and 0% the second vapor, the heating element 154a may be pulsed to generate vapor while the second heating element 154b is not pulsed at all. For a 50/50 mix ratio (i.e. 50%), each of the heating elements 154a and 154b may be pulsed at the same rate(s). For a ratio that is 25% the first vapor and 75% the second vapor, the first heating element 154a may be pulsed at a slower rate than the second heating element 154b.

[00134] The specific pulse rate(s) of the heating elements 154a and 154b may also vary dependent on other factors, such as vaporizing chamber temperature, airflow rate (e.g. when a user is currently inhaling vs. when a user is not currently inhaling), and/or other factors. Thus, the pulse rate(s) for selected mix ratios may not be limited to a single pulse rate for each heating element 154a and 154b. In other embodiments, power levels supplied to the heating elements 154a and 154b may be controlled to control the mix ratio.

[00135] The vaporizer apparatus 100 may further include a respective temperature sensor (not shown) for each of the vaporizing chambers 152a and 152b. The temperature sensors may be located within or near the vaporizing chambers 152a and 152b to measure the temperatures therein. Temperature feedback may be received by the processor 156 and used to dynamically control the pulse rate(s) of the heating elements 154a to 154b to maintain the respective temperatures within a set range.

[00136] As yet another example, the vapor flow control system may comprise first and second electromagnetic switch elements. The magnetically controlled elements may each open and close an airflow path for a different vapor at variable and selective rates to achieve the desired vapour ratio. For example, the first and second airflow paths (e.g. paths 168a and 168b) for the first and second vapours may each have a respective electromagnetically controlled switch that can be rapidly opened or closed to block or allow airflow therethrough. Each of the first and second electromagnetically controlled switches may be controlled rapidly at relative rates necessary for the vapor ratio. Thus, in this example, rather than controlling a pulse rate of the heater, a pulse rate of the electromagnetically controlled gate or switch is used to control vapor flow.

[00137] The first and second electromagnetic switches may be controlled so that one of the first and second vapour paths is always open at any given time. For example, the first and second first and second electromagnetic switches may be activated in an alternating manner (between the first and second vapour paths). In order to achieve a 50/50 ratio, the open and closed cycle for each switch may be equal. For a 25/75 ratio, the first path may have a shorter “open” portion of the open/close cycle, while the second path has a longer “open” portion of the open/close cycle. For a 100% to 0% ratio, the desired vapor path may be left open, and the other closed.

[00138] For each electromagnetic switch, a spring or other biasing element may be used to close the respective path, and an electromagnet, when activated, could open the path (similar to a solenoid switch, for example). In other words, the default position of the switch may be closed. In such embodiments, rather than activating the vaporizer in response to sensing a user trying to draw vapor through the mouthpiece, a button may be used to control usage. As another option, a separate sensor configured to sense if someone is using the mouthpiece may be used. For example, the sensor may be a touch sensor on the mouthpiece. The sensor may be an air pressure sensor that senses suction and/or an airflow sensor.

[00139] In some embodiments, the currently selected mode of operation (e.g. mix ratio) may be determined on factors other than, or in addition to user input. The mix ratio may be selected based on current time and/or location information, as determined by the optional clock 176 and/or location module 178, for example. For example, at certain times of day (e.g. work hours) and/or locations (e.g. workplace) one of the first and second vapors may be restricted to 0%. For example, a vapor including one or more psychoactive components may be restricted to use during certain times of day such as non-work or after-work hours. The vapor including one or more psychoactive components may be restricted to use in certain locations, such as non-work locations, or certain geographic regions. Restricting the flow of one of the vapors may comprise deactivating or disabling (not allowing) activation of the corresponding heating element 154a or 154b.

[00140] As yet another option, the vaporizer apparatus 100 may include one or more controllable airflow restriction mechanisms. For example, the vaporizer apparatus 100 may include optional first and second airflow baffles 180a and 180b, which are positioned and configured to regulate airflow through the first and second vapor airflow paths 168a and 168b respectively. The baffles 180a and 180b are one of multiple options for controlling the

vapor mix ratio. The first and second airflow baffles 180a and 180b are controlled by the processor 156 in this embodiment.

[00141] The first and second airflow baffles 180a and 180b may be controlled by the processor 156 to provide the selected mix ratio. For example, if the selected ratio is 100% the first vapor and 0% the second vapor, the first baffle 180a may be fully opened and the second baffle 180b may be fully closed. For a 50/50 mix ratio, each of the baffles 180a and 180b may be fully open, or both may be partially open to the same degree, such that the vapor flow in each of the first and second vapor airflow paths 168a and 168b is substantially similar. For a ratio that is 25% the first vapor and 75% the second vapor, the first baffle 180a may be only slightly open, while the second baffle 180b is mostly open, where the difference in baffle positions is designed to give the proper mix. While a vapor is set to 0%, the heat element may be inactive for the corresponding vaporizing chamber so that vapor is not produced.

[00142] Embodiments are not limited to baffles, and any other suitable mechanism controllable to modify airflow resistance may be used rather than baffles. Embodiments are also not limited to physical airflow resistance mechanisms for controlling vapor mix ratios.

[00143] In some embodiments, the first and second materials may both contain one or more psychoactive components, or may be substantially free of psychoactive components. The first and second materials may have different flavors, or other different characteristics, and the mix ratio may be set according to the desired vaping experience.

[00144] Figure 19 is a cross-sectional partial view of the vaporizer apparatus 100 of Figures 1 and 7 to 18, with the cartridge 134 removed from the head 104. The head 104 is shown in the operational position in Figure 19. The head 104 comprises a chamber 186 for holding the cartridge 134 within its core section 130 that is sized to receive the cartridge 134. The chamber 186 in this embodiment is positioned between the PCBA 144 and the mouthpiece portion 106. Closure member 136 is shown engaged with the core section 130 of the head 104.

[00145] The first electrical connector 113 of the body 102 is a male connector including projecting from the body 102 and comprising a plurality of pins 182. Airflow from the body 102 to the head 104 is also facilitated by the first and second electrical connectors 113 and 115 in this embodiment. Specifically, the first electrical connector 113 comprises an insulating block 187 (in the form of a projection from the body 102) with the pins 182 embedded therein, and the insulating block 187 also defines two holes 188a and 188b

therethrough to permit airflow. The holes 188a and 188b are spaced apart and positioned on either side of the pins 182.

[00146] The second electrical connector 115 is a female connector and comprises an insulator block 189 with the electrical contacts 184 therein for contacting the pins 182 of the first electrical connector 113. The block 189 also defines first and second holes 190a and 190b therethrough that are axially aligned with the holes 188a and 188b, respectively, of the first electrical connector 113. The PCBA 144 also define a set of holes 192a and 192b therethrough that are axially aligned with corresponding holes 188a and 118b, and holes 190a and 190b.

[00147] The holes 188a, 190a and 192a function as a portion of the airflow intake path 174a shown in Figure 17. The holes 188b, 190b and 192b form part of the airflow intake path 174b shown in Figure 17. Air may flow from the body 102 into the head through the holes 188a, 190a and 192a and through the holes 188b, 190b and 192b as illustrated by arrows A1 and A2. Air exits from the holes 192a and 192b in the PCBA 144 and enters the cartridge 134 (shown in Figures 6 and 17) positioned in the chamber 186 as illustrated by arrows B1 and B2.

[00148] The mouthpiece portion 106 includes a central passage 194 that extends from the suction opening 108 to an inner end where the central passage 194 terminates. The mouthpiece portion 106 further includes first and second side vapor passages 196a and 196b in communication with the chamber 186 and positioned on either side of the central passage 194. The first and second side vapor passages 196a and 196b form the first and second vapor airflow paths 168a and 168b in Figure 17 in this embodiment. The first and second side vapor passages 196a and 196b receive the first and second vapors (via inlets 172a and 172b) from the cartridge 134 positioned in the chamber 186 as illustrated by arrows C1 and C2. The central passage 194 forms the combined vapor airflow path 170 shown in Figure 17. The combined first and second vapors may be drawn through the suction opening 108 as illustrated by arrow D.

[00149] The first and second side vapor passages 196a and 196b connect to the central passage 194 near the suction opening 108 and away from an inner end 193 of the central passage 194 in this embodiment. In the non-operational position, the central passage 194 receives the first electrical connector 113 of the body 102 with the pins 182 extending toward the inner end 193 of the central passage 194. By flowing vapor from the first and second side vapor passages 196a and 196b into the central passage 194 at positions away from the inner end 193 of the central passage 194, residue build up

deposited over time from the first and second vapors may be kept away from the position of the pins 182 when the head is in the non-operational position. This may help prevent or reduce accumulation of residue on the pins 182 over time. Embodiments are not limited to the particular arrangement of the first and second side vapor passages 196a and 196b connect to the central passage 194 shown. Any suitable system of one or more airflow passages to carry at least one vapor to the suction opening 108 may be used.

[00150] Figure 20 is another cross-sectional partial view of the vaporizer apparatus 100 similar to Figure 19, but with the head 104 in the non-operational position. As shown, the first electrical connector 113 is at least partially received through the suction opening 108 and into the central passage 194 of the mouthpiece portion 106. In this position, the pins 182 of the first electrical connector 113 may be protected from damage and/or contaminants such as dirt and dust while being carried. The mouthpiece portion 106 including the suction opening 108 may also be protected from dirt and other contaminants in this position, which may result in a more pleasant taste and overall vaping experience. Covering the mouthpiece portion 106 during non-operation may also be more sanitary. Thus, the non-operational position may provide some protection for the mouthpiece portion 106 and the first electrical connector 113 of the vaporizer apparatus 100 when the vaporizer apparatus 100 is stored, carried (e.g. in a user's pocket) or otherwise not in use.

[00151] The first electrical connector 113 may be sized to form a seal or partial seal with the suction opening 108. In other embodiments, the first electrical connector 113 may fit loosely through the suction opening 108. In some embodiments, a gap may be provided between the first electrical connector 113 and the suction opening 108. The gap may, for example, be approximately in the range of 0.1 mm to 0.5 mm. In some embodiments, the gap may be 0.3 mm.

[00152] Figures 21 and 22 are cross-sectional partial views of the vaporizer apparatus 100 similar to Figure 19 and 20, but also showing an example interior structure of the cartridge 134. Figure 21 shows the head 104 in the operational position, and Figure 22 shows the head 104 in the non-operational position. The cartridge 134 includes the first and second reservoirs 150a and 150b and the first and second vaporizing chambers 152a and 152b. The first and second vaporizing chambers 152a and 152b are ceramic ovens in this embodiment with the first and second heating elements 154a and 154b (shown in Figure 17) contained therein and not visible. The first and second reservoirs may hold first and second oils, respectively, for vaporizing as discussed above.

[00153] The first oil is vaporized in the first vaporizing chamber 152a and the second oil is vaporized in the second vaporizing chamber 152b. The first and second vaporizing chambers 152a and 152b are ceramic ovens in this example. The cartridge 134 further includes first and second air intake passages 195a and 195b that receive airflow therethrough to mix with the vaporized oil to form the first and second vapors in the first and second vaporizing chambers 152a and 152b. First and second vapor paths 197a and 197b carry the first and second vapors from the first and second vaporizing chambers 152a and 152b, respectively, to first and second front passage areas 199a and 199b in the head, which in turn guide the vapors to the first and second side vapor passages 196a and 196b, respectively, of the mouthpiece portion 106.

[00154] The example electrical connection between the body 102 and the head 104 will now be described in greater detail with reference to Figures 23 and 24.

[00155] Figure 23 is an enlarged partial cross-sectional view of the vaporizer apparatus 100 of Figures 1 and 7 to 22 with the head 104 in the operational position. The dual cartridge 134 is illustrated as a simple functional block using stippled lines in Figure 23, showing the first and second cartridge portions 135a and 135b. The block illustrating the dual cartridge 134 does not include structural details. In Figure 23, the first electrical connector 113 of the body 102 is engaged with the second electrical connector 115 of the head 104.

[00156] The first electrical connector 113 and the second electrical connector 115 may be in the form of a Universal Serial Bus (USB) connection. For example, the first electrical connector 113 and the second electrical connector 115 may be similar to a USB-C connector, which is reversible in that the male connector may mate with the female connector in a first position and in a second position that is rotated 180 degrees with respect to the first position. The first electrical connector 113 and the second electrical connector 115 may not double contacts, with each contact being assigned a different function.

[00157] In this example, the first electrical connector 113 comprises a plurality of electrical contacts in the form of a plurality of conductive pins 182. The plurality of pins 182 include first pin 182a, second pin 182b, third pin 182c, fourth pin 182d and fifth pin 182e in this example. The second electrical connector 115 comprises five conductive contacts 184a to 184e positioned to engage the pins 182a to 182e. The pins 182a to 182e may, for example, be pogo pins.

[00158] In this example, the electrical connectors 113 and 115 may be configured to allow the head 104 to be rotationally reversible about the longitudinal axis. That is, the head 104 may be docked with the body 102 in a position rotated 180 degrees about the longitudinal axis 181, relative to the position shown in Figure 23, and still be operational. The electrical connectors 113 and 115 may be suitable to provide power to a dual pod comprising first and second cartridge portions 135a and 135b. Table 2 below shows an example functional designation of pins 182a to 182e. In the table, Power1 (pin 182a) is a first pin for providing power from a power source. Power2 (pin 182e) is a second pin for providing power from a power source. ID1 (pin 182b) is a first 'identification' pin that may be used for retrieving data from the head indicating one or more characteristics of the head. ID2 (pin 182d) is a second 'identification' pin that may be used for retrieving data from the head indicating one or more characteristics of the head. GROUND is a ground pin (pin 182c). Since the ID1 and ID2 pins (pins 182b and 182b) are offset from the center (pin 182c), they may be used to detect an orientation of the head 104 (or the cartridge 134 in the head 104) as discussed below.

PIN	FUNCTION
182a	Power1
182b	ID1
182c	Ground
182d	ID2
182e	Power2

Table 2

[00159] By way of example, with the dual cartridge 134 received in the head 104, the first and second conductive contacts 184a and 184b may connect with the first cartridge portion 135a (including the first reservoir 150a, the first vaporizing chamber 152a and the first heating element 154a shown in Figure 17). The fourth and fifth conductive contacts 184d and 184e connect with the second cartridge portion 135b (including the second reservoir 150a, the second vaporizing chamber 152b and the second heating element 154b shown in Figure 17). The third conductive contact 184c may function as ground for both the first and second cartridge portions 135a and 135b.

[00160] With the head 104 received in the position shown in Figure 23, the first pin 182a provides power to the first cartridge portion 135a, and the fifth pin 182e provides

power to the second cartridge portion 135b. One or both of the second and fourth pins 182b and 182d may be used by the processor 156 (Figure 17) to determine one or more characteristics of the first cartridge portion 135a and/or the second cartridge portion 135b. The characteristics may be one or more of: the type of heating element, the type of material used in the first cartridge portion, an amount of remaining material in the first and/or second cartridge portions, and other characteristics.

[00161] Alternatively, the head may be docked with the body 102 in a position reversed about longitudinal axis 181 (i.e. rotated about the longitudinal axis 181 by approximately 180 degrees) relative to the position shown in Figure 23. Figure 24 illustrates this reversed position. In this position, the first pin 182a provides power to the second cartridge portion 135b, and the fifth pin 182e provides power to the first cartridge portion 135a. One or both of the second and fourth pins 182b and 182d may be used by the processor 156 (Figure 17) to determine one or more characteristics of the first cartridge portion 135a and/or the second cartridge portion 135b. Similarly, if the cartridge 134 is receivable in the head 102 in multiple positions (rotated about the longitudinal axis 181), then the orientation of the cartridge 134 rather than the head 104 may be determined using the same method.

[00162] With reference again to Figure 17, according to an aspect, the processor 156 of the vaporizer apparatus 100 may determine one or more characteristics of the head 104. For example, the one or more characteristics may be determined via the electrical connection (connectors 113 and 115) between the head 104 and the body 102. The one or more characteristics may be one or more characteristics of the cartridge 134. The one or more characteristics of the cartridge may include an identity of one or more materials for vaporization stored in the cartridge 134. For example, the processor 156 may receive an identity of the first and second materials stored in the first and second reservoirs 150a and 150b. The processor may also determine an identity of the cartridge 134. For example, the head 104 and/or the cartridge 134 may comprise an electronic tag or other electronically readable element that includes identification information for the cartridge 134.

[00163] The processor 156 may change one or more operational parameters based on the one or more determined characteristics. The operational parameters may include: heating temperatures; heating pulse frequencies and/or durations; and/or other parameters of the vaporization process. One or more child safety or security parameters may also be activated or deactivated responsive to the determined identification of the one or more

materials. For example, if a psychoactive material is identified, one or more child safety protocols may be activated.

[00164] In some embodiments, the one or more characteristics comprise a remaining amount of the first and/or second materials in the first and/or second reservoirs 150a and 150b. For example, the head 104 may include one or more sensors that generate an output indicative of the amount of material remaining in the first and second reservoirs 150a and 150b, and the output may be received by the processor 156.

[00165] The one or more characteristics of the cartridge 134 may comprise an orientation of the cartridge relative to the base. For example, the first electrical connector 113 may include an electrical contact (e.g. second pin 182b shown in Figure 23), and the position of the electrical contact relative to the second electrical connector 115 may be used to determine the orientation of the head 104 and/or cartridge 134 therein. For example, if the second pin 182b engages the second contact 184b of the head 104, this indicates the orientation shown in Figure 23. On the other hand, if the second pin 182b engages the fourth contact 184d of the head 104 this indicates the reversed orientation shown in Figure 24. The same second pin 182b may also receive and communicate to the processor 156 electrical signals indicating one or more other characteristics (e.g. identification information for the cartridge 134). In this case, the fourth pin 182d and/or the fourth conductive contact 184d may not be used and/or may be omitted. Alternatively, the fourth pin 182d and/or the fourth conductive contact 184d may be used to communicate different information.

[00166] Embodiments are not limited to electrical contacts such as pins to determine orientation, identification information or other characteristics. For example, one or more wireless communication techniques, sensors, bar code reader and/or any other suitable means may be used to determine such orientation, identification information or other characteristics.

[00167] Information retrieved from the head 104 and/or cartridge 134 may be used to verify the source and/or content of the cartridge 134. For example, an identification or verification code may be retrieved from the cartridge 134 and verified by the processor 156. A plurality of cartridges may be provided, each having a unique identification or verification code associated therewith. Upon successful verification, operation of the vaporizer apparatus for vaping may be enabled. If verification is unsuccessful, operation of the vaporizer apparatus for vaping may be disabled. Use of counterfeit cartridges may, thereby, be prevented.

[00168] In some embodiments, the processor 156 may determine that one or both of the reservoirs 150a and 150b is empty or below a threshold, and a notification may be provided to the user to refill one or both of the reservoirs 150a and 150b accordingly. The notification may include one or more visual indications, such as one or more of the LEDs flashing. Any suitable notification method may be used. In some embodiments, the notification may be provided to a remote device, such as a remote device running an application that interfaces with the vaporizer apparatus 100.

[00169] The processor 156 may disable the corresponding heating element 154a or 154b responsive to determining that the reservoir 150a or 150b is empty or below a threshold. The processor 156 may alternatively change the mix ratio setting of the vaporizer apparatus 100 responsive to determining that the reservoir 150a or 150b is empty or below a threshold. For example, if the first material in the first reservoir 150a is below a threshold, then the ratio may be set to 100% vapor from the second material in the second reservoir 150b (or vice versa).

[00170] The determination that one or more reservoirs 150a and 150b are empty or below a threshold may be based on a timer. For example, a given material (e.g. oil strain) may be known to vaporize at an approximate rate, and a time to vaporize a substantial amount of the material may be predetermined. The processor may then determine that the total vaporization time for the cartridge 134 has approached or passed that predetermined time. For example, the predetermined vaporization time to substantially use up a given material may be approximately 30 minutes.

[00171] The determination that one or more reservoirs 150a and 150b are empty or below a threshold may be based on a measured resistance or current of the heating element 154a or 154b. The resistance or current may be dependent on the amount of the material in the reservoir, and the dependence may be known or approximated based on empirical measurements. For example, a resistance measured at the heating element may be approximately: 400 Ohm when the corresponding reservoir is approximately full; 350 Ohm when the corresponding reservoir is approximately half full; and 193 Ohm when the corresponding reservoir is approximately empty.

[00172] The determination that one or more reservoirs 150a and 150b are empty or below a threshold may be based on an airflow characteristic (e.g. airflow pressure) measured by a sensor. For example, an airflow sensor reading may be: relatively high when the corresponding reservoir is approximately full; medium or medium-high when the

corresponding reservoir is approximately half full; and low when the corresponding reservoir is approximately empty.

[00173] In some embodiments, the processor 156 may determine whether the cartridge is a single pod cartridge (i.e. single reservoir and vaporizing chamber) or dual pod cartridge such as the example cartridge 134 in Figure 17.

[00174] The vaporizer apparatus described herein may include a wireless communication module that may communicate with a remote device. The remote device may be a mobile phone or other portable electronic device. The wireless communication module may operable for communication over a wireless network such as a Bluetooth or Wi-Fi network. The portable electronic device may run an application that retrieves and displays information about the vaporizer apparatus and/or the cartridge thereof. The information may include one or more of: one or more materials stored in the cartridge; the current levels of the one or more materials in one or more reservoirs in the cartridge; the current vapor mix ration setting of the vaporizer apparatus.

[00175] Figure 25 is a perspective view of a vaporizer apparatus 200 according to another embodiment. The vaporizer apparatus 200 includes a body 202 and a head 204 that are similar in structure and function to body 102 and head 104 of the vaporizer apparatus 100 described above with reference to Figures 1 to 24. In Figure 25, the head 204 is shown received in the bay 207 of the body 202 in the non-operational position. As shown, the head 204 is fully received and slightly recessed in the bay 207 in this embodiment.

[00176] Figures 26 and 27 are perspective and top views, respectively, of an inner body portion 311 for a vaporizer apparatus according to another embodiment. The inner body portion 311 and electrical connector 313 are similar in structure and function to the inner body portion 111 and first electrical connector 113 of the vaporizer apparatus 100 described above with reference to Figures 1 to 24. However, projection 324 of the electrical connector 313 in this embodiment includes a collar portion 327 adjacent the front face 326 that has a larger circumference than the remainder of the projection 324. The collar portion 327 may be sized to snugly fit in a suction opening of a head of a vaporizer apparatus (such as the head 104 of the vaporizer apparatus 100 described above with reference to Figures 1 to 24). The collar portion 327 may for at least a partial seal in the suction opening. In this embodiment, the collar portion 327 is located adjacent the front face 326. Pins 382 of the electrical connector are also shown in Figures 26 and 27.

[00177] Figures 28 and 29 are perspective and top views, respectively, of an inner body portion 411 for a vaporizer apparatus according to another embodiment. The inner body portion 411 and electrical connector 413 are similar in structure and function to the inner body portion 111 and first electrical connector 113 of the vaporizer apparatus 100 described above with reference to Figures 1 to 24. However, projection 424 of the electrical connector 413 in this embodiment includes a collar portion 427 located at the distal end 428 of the projection 424. Pins 482 of the electrical connector are also shown in Figures 28 and 29.

[00178] Figure 30 is a bottom perspective view of a head 504 for a vaporizer apparatus. The head 504 is similar in structure and function to the head 104 of the vaporizer apparatus 100 described with reference to Figures 1 to 24. The head 504 includes optional magnets 506a and 506b to bias the head 504 to remain engaged with a body of the vaporizer apparatus. Other biasing or securing elements may be used in addition to or instead of the magnets 506a and 506b. In this embodiment, the electrical connector 515 of the head 504 only includes a single hole 590 for airflow therethrough. The hole 590 is spaced apart from electrical contacts 584a to 584e, which are similar to the electrical contacts 184a to 184e of the head 104 shown in Figures 23 and 24.

[00179] Figure 31 is a functional block diagram of another example vaporizer apparatus 600 including a body 102 and a head 604 with a mouthpiece portion 106. The vaporizer apparatus 600 is similar to the example shown in Figures 1 to 24, and like reference numbers in the drawings indicate like elements. However, rather than oil-based vaporizing chambers and reservoirs, the head 604 comprises first and second dry herb ovens 651a and 651b. The ovens 651a and 651b each comprise a respective vaporizing chamber (652a, 651b), which also function as a storage chambers for holding the vaping materials therein, and a respective heating element (654a, 654b). In other embodiments, a head of a vaporizer apparatus may include a combination of one or more dry herb oven and one or more oil (or other liquid) based vaporizer chamber and reservoir.

[00180] The body 102 and head 604 may have a similar shape as the vaporizer apparatus 100 of Figures 1 to 24, with the head 604 having similar operational and non-operational positions. Figure 31 illustrates the head 604 attached to the body 102 in an operational position with first and second electrical connectors 113 and 115 engaged.

[00181] The first and second vaporizing materials held in the first and second ovens 651a and 651b may be two different materials having different compositions and properties. For example, the first material in the first oven 651a may be a first dry herb composition and

the second material in the second oven 651b may be a second, different dry herb composition. The ovens heating elements 654a and 654b are each operable to heat and vaporize material stored in the corresponding vaporizing chamber (652a or 652b). The head 604 may comprise one or more closure member (e.g. door, hatch, or cover member, etc.) that provides access to the vaporizing chambers 652a and 652b for adding or removing vaporizing material.

[00182] The ovens 651a and 651b are formed as part of a removable cartridge 634 in this embodiment. The cartridge 634 (including ovens 651a and 651b) may be removed from the head 604 and replaced. In other embodiments, the ovens 651a and 651b may be integral with the head 604 rather than contained in a removable cartridge.

[00183] In this example, the vaporizer apparatus 100 comprises a processor 156 and a memory 158 operably connected to the processor 156. The memory 158 stores processor-executable instructions thereon that, when executed by the processor 156, cause the processor 156 to individually and selectively control the ovens 651a and 651b. The vaporizer apparatus 600 in this embodiment may further include a user interface 160, a power source 164, one or more visual indicator (not shown), a clock 176, and/or location module 178 similar to those of the embodiment shown in Figure 17. The processor 156, the memory 158, the user interface 160, the power source 164, the clock 176, and the location module 178 are shown as components of the body 102 in Figure 31. However, one or more of these components may instead be part of the head 604 in other embodiments.

[00184] The processor 156 may control operation of the first and second ovens 651a and 651b via PCBA 144. In other embodiments, the PCBA 144 may be omitted. The processor 156 may disable or enable one or both of the 652a and 652b at certain times of day or certain locations (as determined by the location module 178 and/or clock 176. A user may provide input, via user interface 160, to control or configure the apparatus 600.

[00185] The vaporizer apparatus 600 further includes an airflow system 155 comprising at least one airflow path to carry the first and second vapors generated in the first and second vaporizing ovens 651a and 651b to the mouthpiece portion 106. The airflow system 155 is similar to the airflow system 155 in Figure 17. The airflow system 155 comprises first vapor airflow path 168a, second vapor airflow path 168b, and mixed airflow path 170. The first vapor flows out from the first vaporizing chamber 652a into the first vapor airflow path 168a. The second vapor flows out from the second vaporizing chamber 652b into the second vapor airflow path 168b. The first and second airflow paths 168a and 168b extend from the cartridge 634, into the mouthpiece portion 106 where they converge into the

mixed airflow path 170. Physical vapor restriction/control mechanisms such as baffles (not shown) may also be used to control the flow of first and second vapors in from the ovens 652a and 652b.

[00186] The vaporizer apparatus 100 in this example further includes airflow intake paths 174a and 174b. Each airflow intake path 174a and 174b is in fluid communication with the outside environment and a respective one of the ovens 651a and 651b. In this example, airflow intake paths 174a and 174b extend from the head 604 into the body 102 to inlets 175a and 175b respectively. In other embodiments, the inlets 175a and 175b may instead be in the head 604.

[00187] Figures 32 and 33 are enlarged partial cross-sectional views of the vaporizer apparatus 600. This embodiment is similar to the embodiment shown in Figures 21 and 22 (with like reference characters indicating like elements) but having the first and second dry herb ovens 651a and 651b rather than oil-based reservoirs and vaporizing chambers. Figure 32 shows the head 604 of the apparatus 600 in the operational position, and Figure 33 shows the head 604 in the non-operational position.

[00188] The head 604 comprises removable cartridge 634 held therein, which in turn holds the first and second ovens 651a and 651b. The electrical and airflow connections between the head 604 and the body 102 via electrical connectors 113 and 115 are also similar to the vaporizer apparatus 100 shown in Figures 1 to 24, and these details are not repeated here for brevity.

[00189] The cartridge 634 comprises the first and second ovens 651a and 651b, including the first and second heating elements 654a and 654b (shown in Figure 31). The first and second ovens 651a and 651b may, for example, be ceramic ovens in this embodiment with the first and second heating elements 654a and 654b (shown in Figure 31) contained therein.

[00190] The mouthpiece portion 106 includes a central passage 194 that extends from the suction opening 108 to an inner end where the central passage 194 terminates. The mouthpiece portion 106 further includes the first and second side vapor passages 196a and 196b in fluid communication with the ovens 652a and 652b respectively and positioned on either side of the central passage 194. The first and second side vapor passages 196a and 196b receive the first and second vapors from the ovens 652a and 652b respectively. The first and second side vapor passages 196a and 196b form the first and second airflow paths 168a and 168b in Figure 31, and the central passage 194 forms the combined vapor

airflow path 170 shown in Figure 31. The combined first and second vapors may be drawn through the suction opening 108. Embodiments are not limited to this airflow implementation and any suitable system of one or more airflow passages to carry at least one vapor to the suction opening 108 may be used.

[00191] In the non-operational position shown in Figure 33, the first electrical connector 113 is at least partially received through the suction opening 108 and into the central passage 194 of the mouthpiece portion 106. In this position, the pins 182 of the first electrical connector 113 may be protected.

[00192] Figure 34 is a functional block diagram of another example vaporizer apparatus 700 including a body 102 and a head 704 with a mouthpiece portion 106. The vaporizer apparatus 700 is similar to the examples shown in Figures 31 to 34, but having only a single dry herb oven 751 in the head 704 (rather than dual ovens). The oven 751 comprises vaporizing chamber 752 and heating element 754 operatively coupled to the chamber 752.

[00193] The processor 156 connected to memory 158 may control operation of the single oven 751 via PCBA 144. For example, the processor 156 may disable the oven 751 oven at certain times of day or certain locations (as determined by the location module 178 and/or clock 176). A user may provide input, via user interface 160, to control or configure the apparatus 700.

[00194] Figures 35 and 36 are enlarged partial cross-sectional views of the vaporizer apparatus 700. This embodiment is similar to the embodiment shown in Figures 33 and 34 (with like reference characters indicating like elements) but having only the single dry herb oven 751 rather than dual ovens. Figure 35 shows the head 704 of the apparatus 600 engaged with the body 102 in the operational position, and Figure 36 shows the head 604 engaged with the body 102 in the non-operational position. The electrical connectors 113 and 115 may include fewer pins 182 and contacts 184 (or other electrical connection means) compared to the dual-oven embodiment since a single oven 751 is powered by the body 102. However, the connectors 113 and 115 may be provided with the same basic structure for both single and dual oven embodiments (so that different connection types are not required for dual and single oven configurations).

[00195] In this single-oven embodiment, the head 704 includes first and second side vapor passages 196a and 196b in communication central passage 194 (which in turn extends to the suction opening 108) for delivering vapor from the oven 751 to the suction

opening 108. However, in other embodiments, the side vapor passages 196a and 196b may be omitted and the central passage 194 may instead extend to the oven for flow of vapor straight from the oven 751 to the suction opening 108. Other configurations may also be used to direct vapor from the oven 751 to the suction opening 108.

[00196] Figure 37 is a flowchart of a method for a portable vaporizer apparatus having a head and body as described herein, such as the vaporizer apparatuses 100, 200, 600 or 700 of Figures 1 to 24 or 33 to 38. The method may likewise be performed by the other vaporizer apparatuses. For example, the processor 156 (Figure 17, 31 or 34) may implement the method of Figure 37.

[00197] At block 3702, the head (e.g. head 104, 604 or 704) is detected to be attached to the body (e.g. body 102 or 202) in the operational position. This detection may comprise detecting that a first electrical connector of the body engages the second electrical connector of the head. Alternatively, one or more sensors (not shown) in the body and/or the head may detect the head is attached to the body 102. For example, a proximity sensor in the head or body may be positioned to detect that the head is proximate the body in the operational position.

[00198] Optionally, at block 3704, while the head is in the operational position, data indicating one or more characteristics of the head is obtained. The one or more characteristics of the head may, for example, comprise at least one of: an orientation of the head; and an identify of at least one material for vaporization in the head. Any other one or more characteristics, such the examples described above, may be obtained using any of the methods discussed herein, or any other suitable method.

[00199] Optionally, at block 3706, current time and/or location information is obtained. For example, time information may be provided by a clock, and location information may be provided by a location module.

[00200] Optionally, at block, 3708, user input is received via a user interface (e.g. button 118). The user input may select a vapor mix ratio, for example.

[00201] At block 3710, with the head in the operational position, operation of one or more vaporizer chambers (152a, 152b, 652a, 652b and/or 752) is enabled. Enabling operation of the one or more vaporizer chambers may comprise enabling operation of one or more heating elements (154a, 154b, 654a, 654b and/or 754) operatively coupled to the vaporizer chambers. The one or more vaporizer chambers may be individually and

selectively enabled based on at least one of: the one or more characteristics of the head; the user input; the time information; and the location information. One or more of the steps shown in Figure 37 may be omitted and/or performed in a different order.

[00202] Figure 38 is a flowchart of a method for a portable vaporizer apparatus having a head and body as described herein, such as the vaporizer apparatuses 100, 200, 600 or 700 of Figures 1 to 24 or 33 to 38. The method may likewise be performed by the other vaporizer apparatuses. For example, the processor 156 (Figure 17, 31 or 34) may implement the method of Figure 38.

[00203] At block 3802, a head is detected to be attached to a body in the operational position. This detection may comprise detecting that the first electrical connector of the body engages the second electrical connector of the head.

[00204] At block 3804, data indicating the content of at least one reservoir or oven is obtained from the head. The data may indicate one or more characteristics including: the type of heating element, the type of material used in the first cartridge portion, an amount of remaining material in the first and/or second cartridge portions, and other characteristics. The data may be stored in a memory device, chip, or other means in the head and may be retrieved by a processor in the body when the head engages the body in the operational position.

[00205] At block 3806, an orientation of the head is determined as a function of signals received via at least one pin of the first or second electrical connector. For example, the first electrical connector may comprise at least one pin offset from a central longitudinal axis, and the position of the pin when engaged to the second electrical connector may, thus, be indicative of the orientation of the head. The method may further comprise selectively and individually controlling at least one vaporizing chamber as a function of the orientation of the head.

[00206] A method according to some embodiments comprises making the vaporizer apparatus of any of the embodiments described herein. The head and the body may be provided separately. The head may be provided with or without the removable cartridge. In this context, the term “providing” may include making, manufacturing, purchasing, or otherwise obtaining or producing.

[00207] It is to be understood that a combination of elements from two or more of the different embodiments described above may be implemented. Embodiments are not limited

to any particular one or more of the methods, apparatuses or elements thereof disclosed herein. One skilled in the art will appreciate that variations, alterations of the embodiments described herein may be made in without departing from the scope of the claims.

CLAIMS

What is claimed is:

1. A vaporizer apparatus, comprising:

a body comprising a first electrical connector;

a head attachable to the body in an operational position and in a non-operational position, the head comprising a second electrical connector and a mouthpiece portion defining a suction opening;

wherein the second electrical connector engages the first electrical connector in the operable position, and

the first electrical connector is at least partially received in the suction opening in the non-operational position.
2. The vaporizer apparatus of claim 1, wherein the head further comprises at least one heater, each at least one heater defining a respective chamber for holding a at least one material to be vaporized and comprising at least one heating element operable to vaporize the at least one material in the chamber.
3. The vaporizer apparatus of claim 2, wherein the head is operable to receive power from the base to vaporize the at least one material when the second electrical connector engages the first electrical connector in the operable position.
4. The vaporizer apparatus of claim 2 or 3, wherein the head comprises a cartridge, the cartridge comprising the at least one chamber and the at least one heating element.
5. The vaporizer apparatus of claim 4, wherein the cartridge is removable and replaceable.
6. The vaporizer apparatus of any one of claims 2 to 5, wherein the at least one heater comprises at least one dry herb oven.
7. The vaporizer apparatus of any one of claims 1 to 6, wherein the first electrical connector is a male connector projecting from the body, and the second electrical connector of the head is a female connector.

8. The vaporizer apparatus of any one of claims 1 to 7, wherein the body comprises a docking bay, and the head docks in the docking bay in the operable and non-operable positions, the first electrical connector being positioned in the docking bay.
9. The vaporizer apparatus of any one of claims 1 to 8, wherein the head has a first end and a second end opposite to the first end, the head comprising a core section, wherein the mouthpiece portion extending from the core section at the first end, and the second electrical connector is disposed at the second end.
10. The vaporizer apparatus of any one of claims 1 to 9, wherein the head comprises a central vapor passage that extends into the head from the suction opening, and at least one side vapor passage that connects to the central vapor passage proximate the suction opening, the at least one side vapor passage providing fluid communication between the central passage and the at least one heater, the first electrical connector being received in the central passage when the head is attached in the non-operable position.
11. The vaporizer apparatus of any one of claims 1 to 10, further comprising a processor configured to, when the head is in the operable position, obtain data indicating one or more characteristics of the head.
12. The vaporizer apparatus of any one of claims 2 to 6, further comprising a processor configured to, when the head is in the operable position, obtain data indicating one or more characteristics of the head, wherein the one or more characteristics of the head comprise one or more characteristics of the at least one heater.
13. The vaporizer apparatus of claim 12, wherein the head comprises at least one reservoir for storing at least one material to be vaporized, and the one or more characteristics of the head comprise an identity of the one or more materials to be vaporized.
14. The vaporizer apparatus of claim 13, wherein the one or more characteristics of the head comprise a remaining amount of the one or more materials to be vaporized in the at least one reservoir.
15. The vaporizer apparatus of claim 13, wherein the at least one reservoir comprises a first reservoir and a second reservoir, and the at least one material comprises a first material stored in the first reservoir and a second material stored in the second reservoir.

16. The vaporizer apparatus of any one of claims 13 to 15, wherein the one or more characteristics of the head comprise an orientation of the head, or a cartridge in the head, relative to the base.

17. The vaporizer apparatus of claim 16, wherein the first electrical connector comprises an electrical contact, the position of the electrical contact relative to the second electrical connector indicating the orientation of the cartridge.

18. The vaporizer apparatus of any one of claims 13 to 17, wherein obtaining the one or more characteristics of the cartridge comprises determining that one of the at least one reservoir is empty or below a threshold.

19. The vaporizer apparatus of any one of claims 11 to 17, wherein the body comprises the processor.

20. A method for a vaporizer apparatus comprising a body and a head that is attachable to the body in an operational position and in a non-operational position, the method comprising:

detecting that the head is attached to the body in the operational position;

and

while the head is in the operational position, obtaining data indicating one or more characteristics of the head.

21. The method of claim 20, wherein the one or more characteristics of the head comprise at least one of: an orientation of the head; and an identity of at least one material for vaporization in the head.

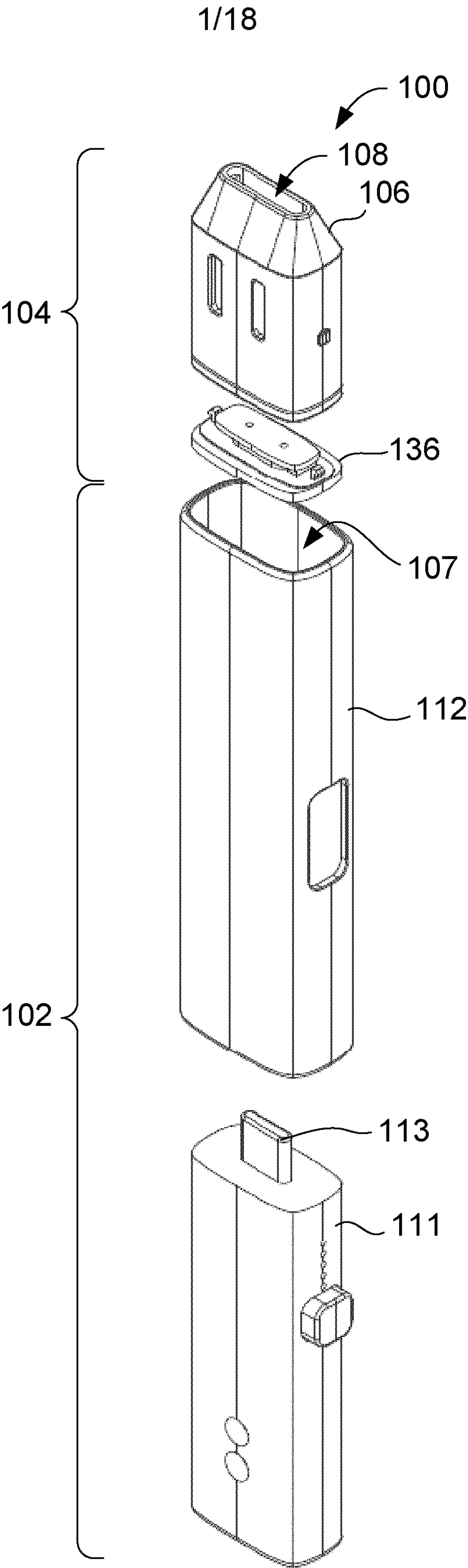


FIG. 1

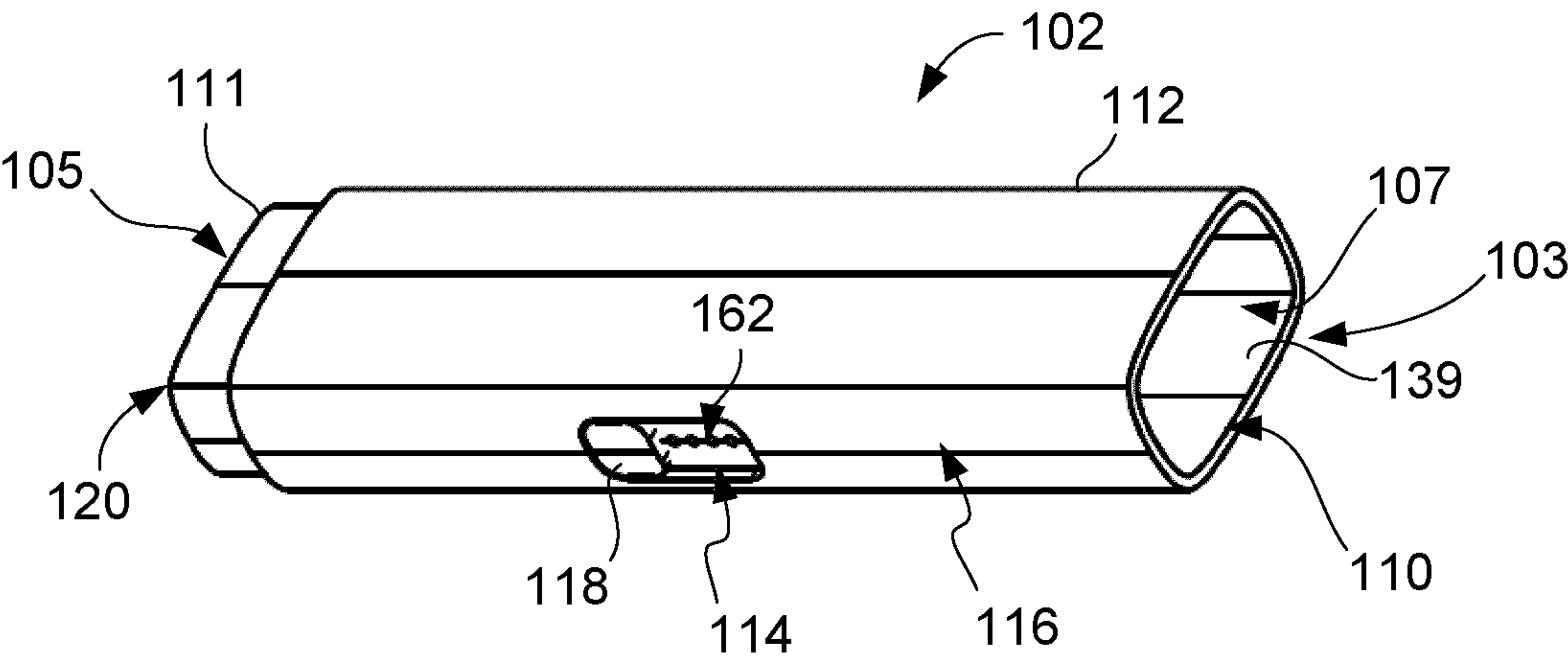


FIG. 2

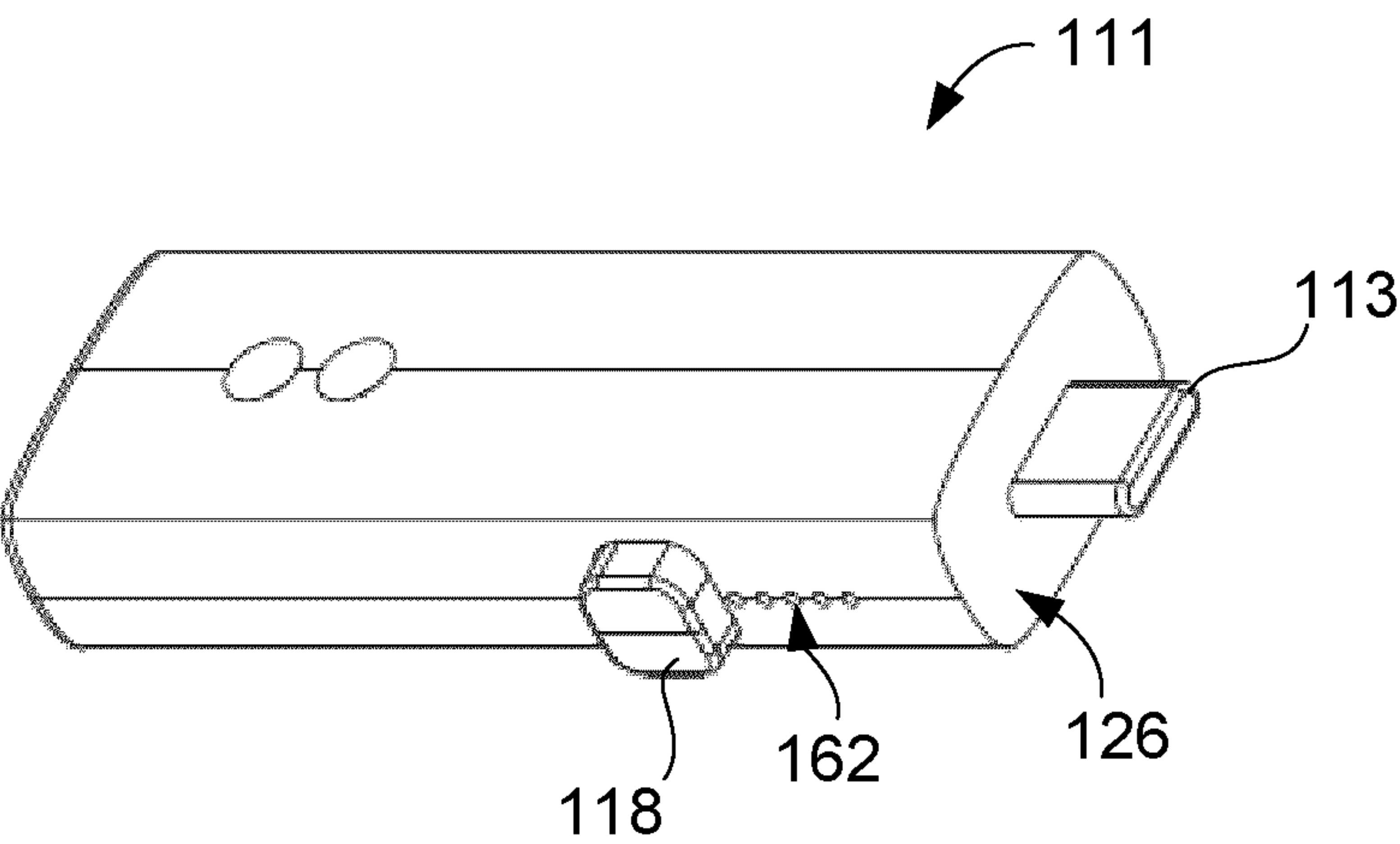


FIG. 3

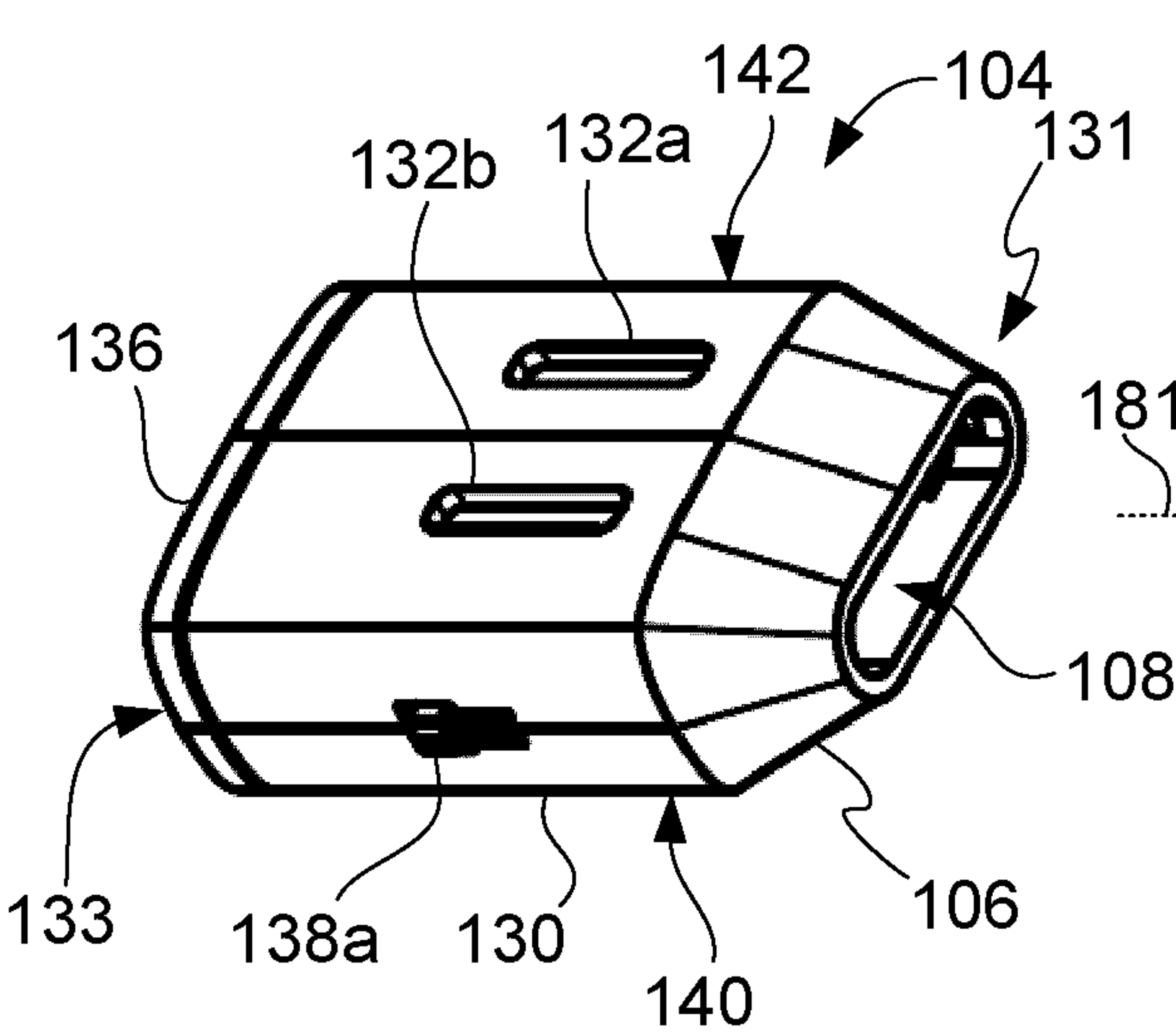


FIG. 4

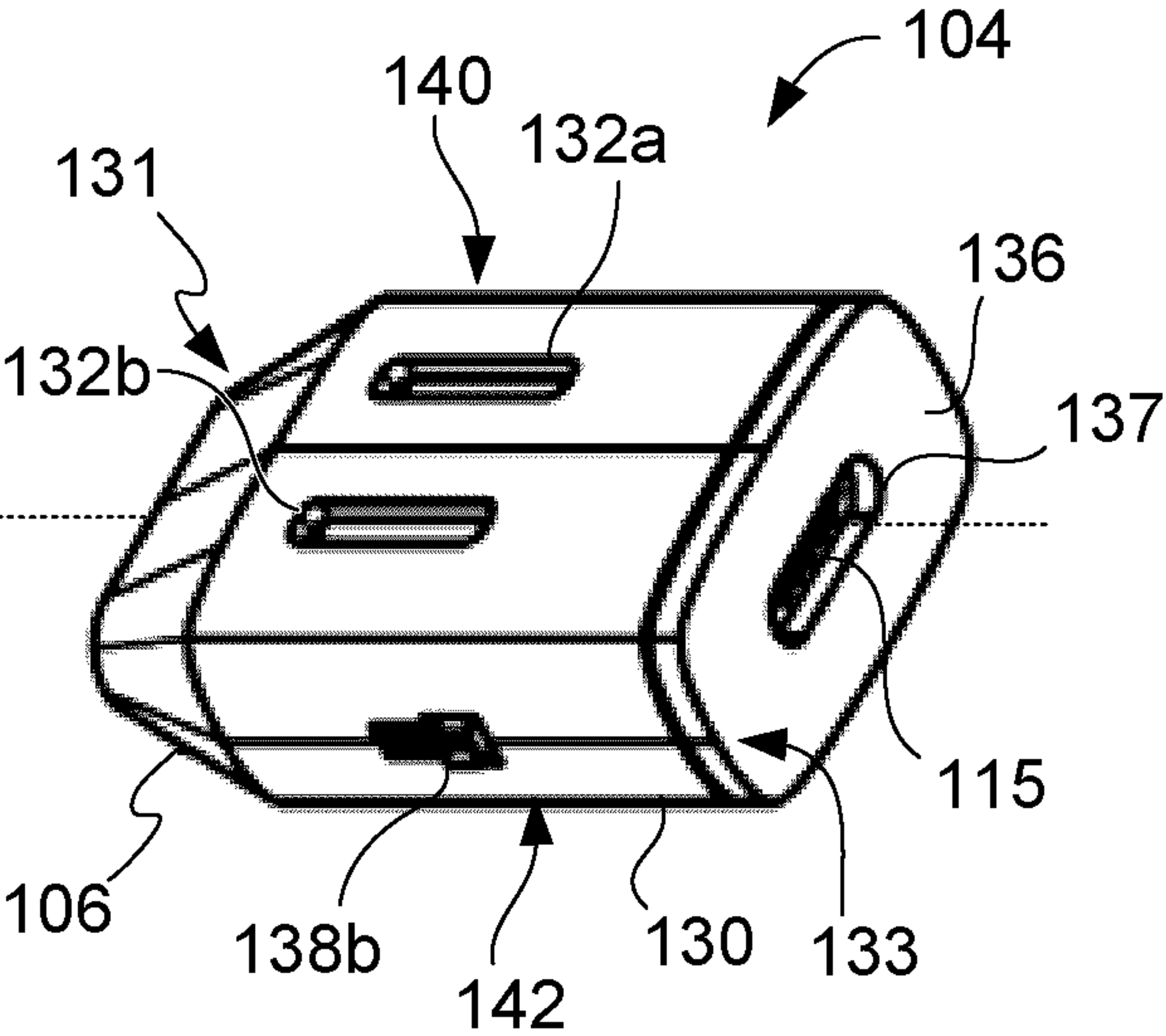


FIG. 5

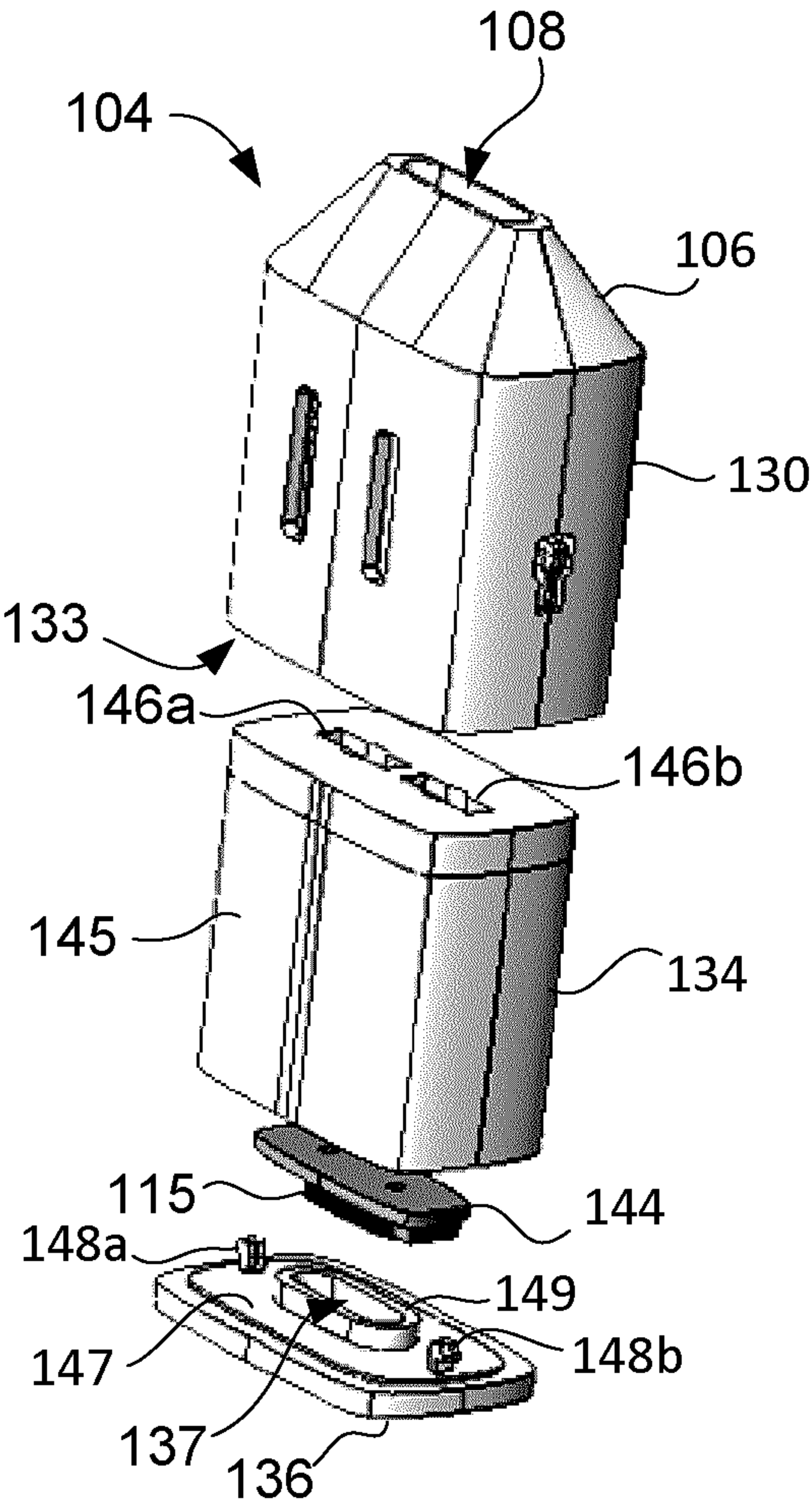


FIG. 6A

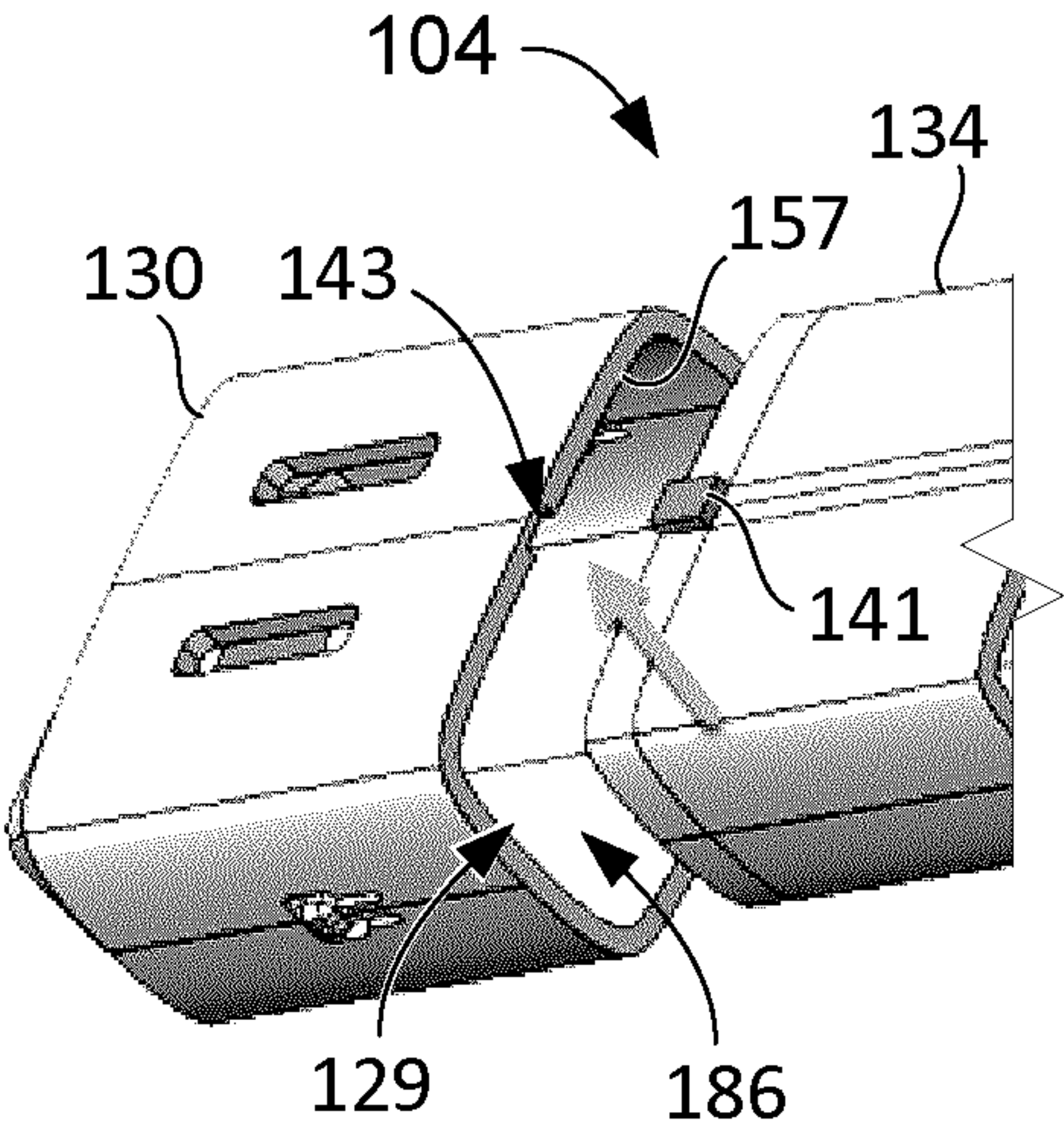


FIG. 6B

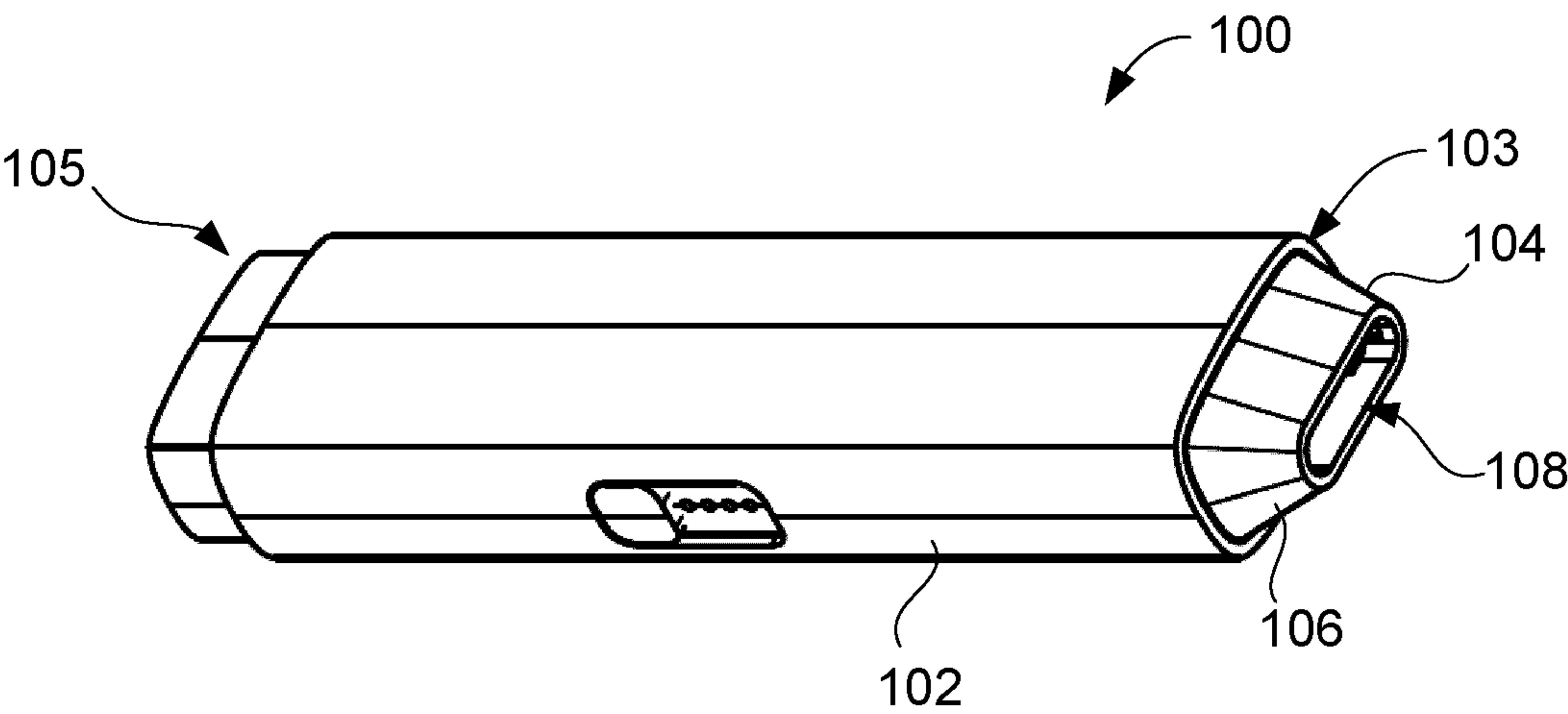


FIG. 7

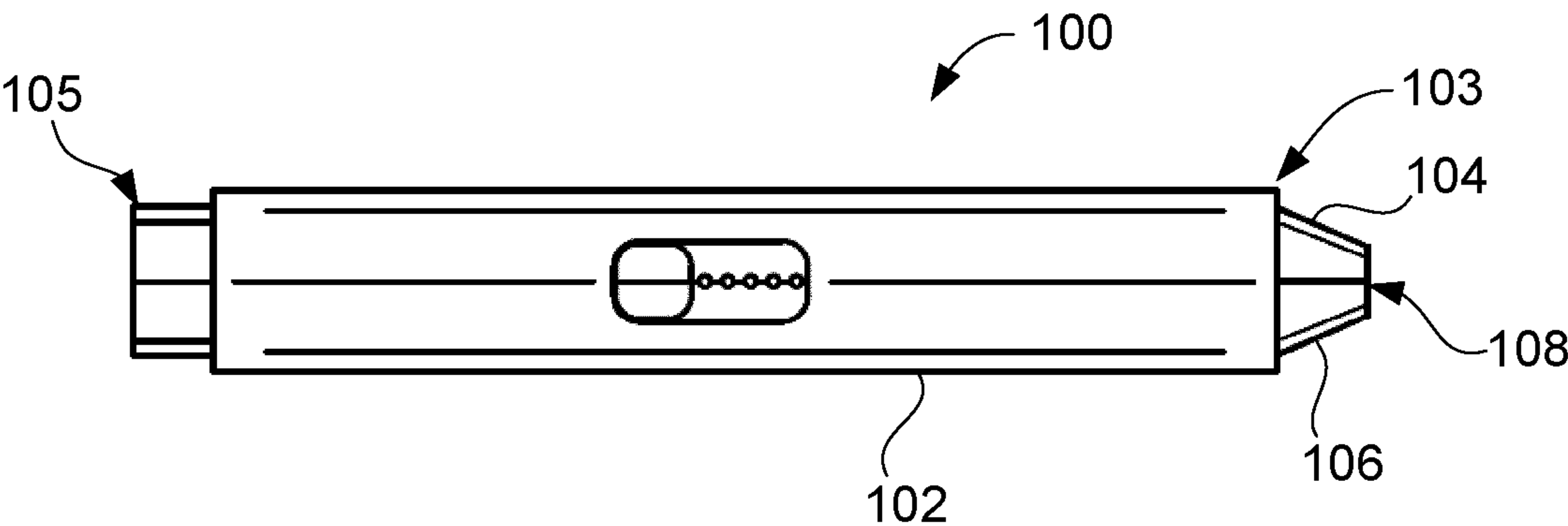


FIG. 8

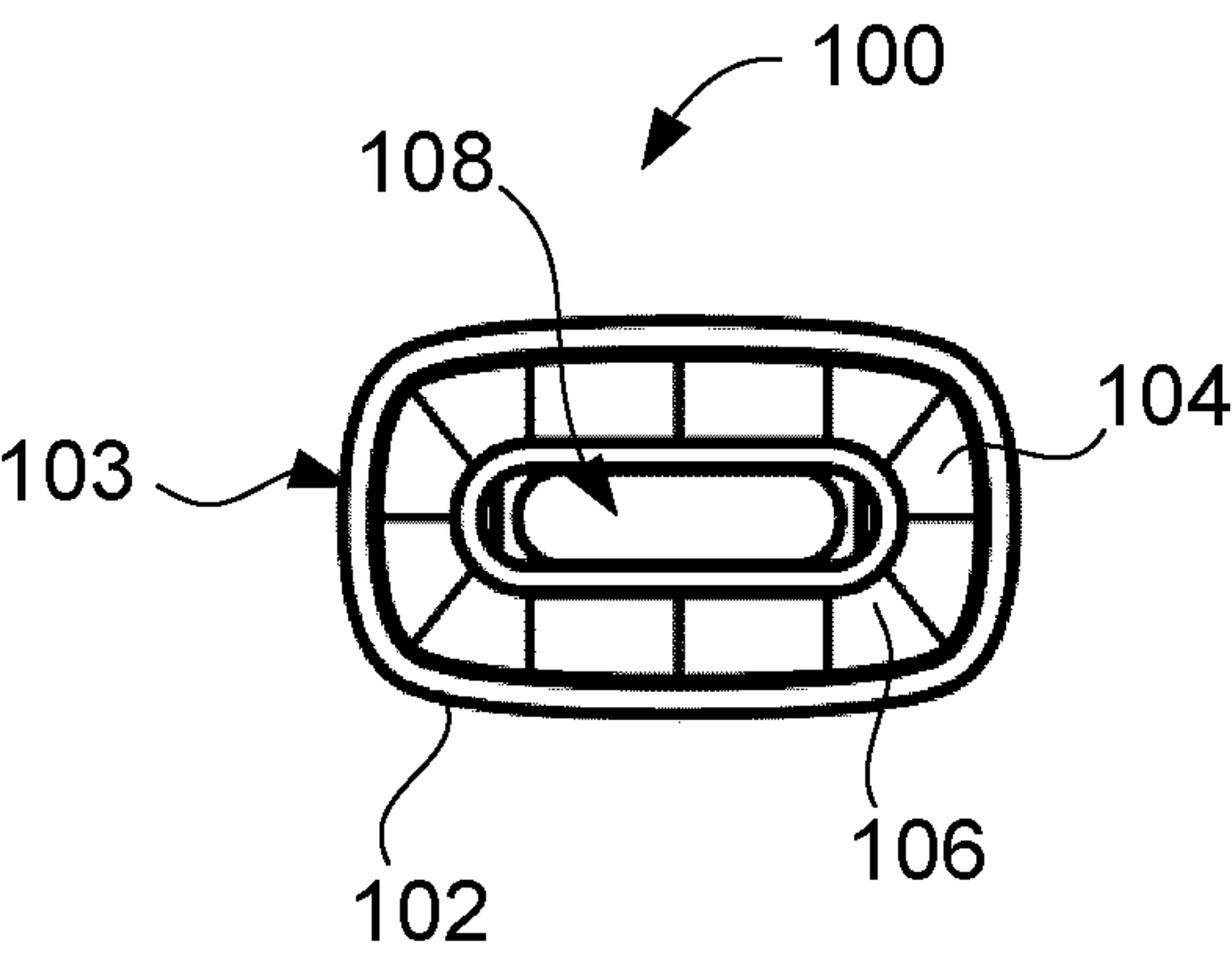


FIG. 9

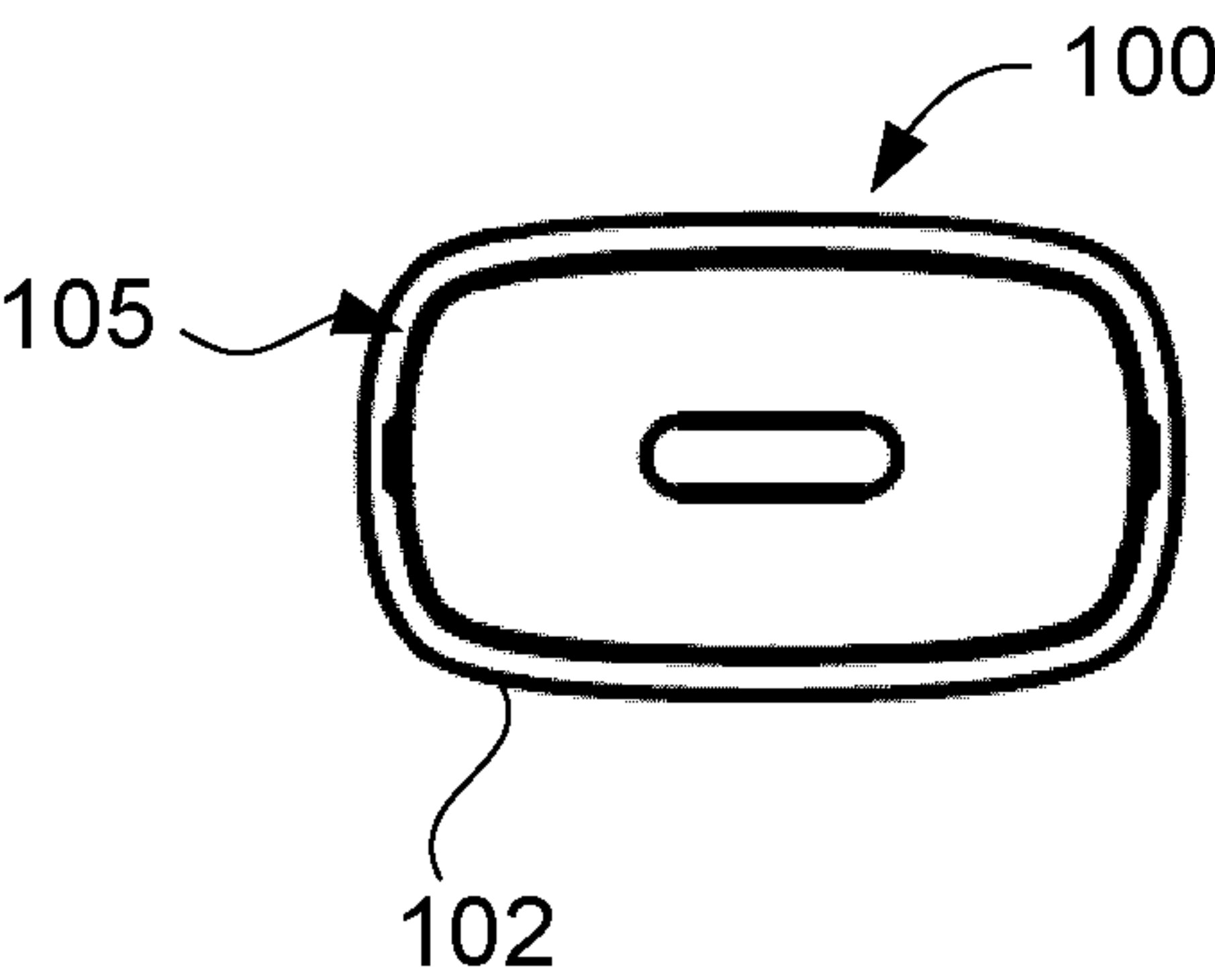


FIG. 10

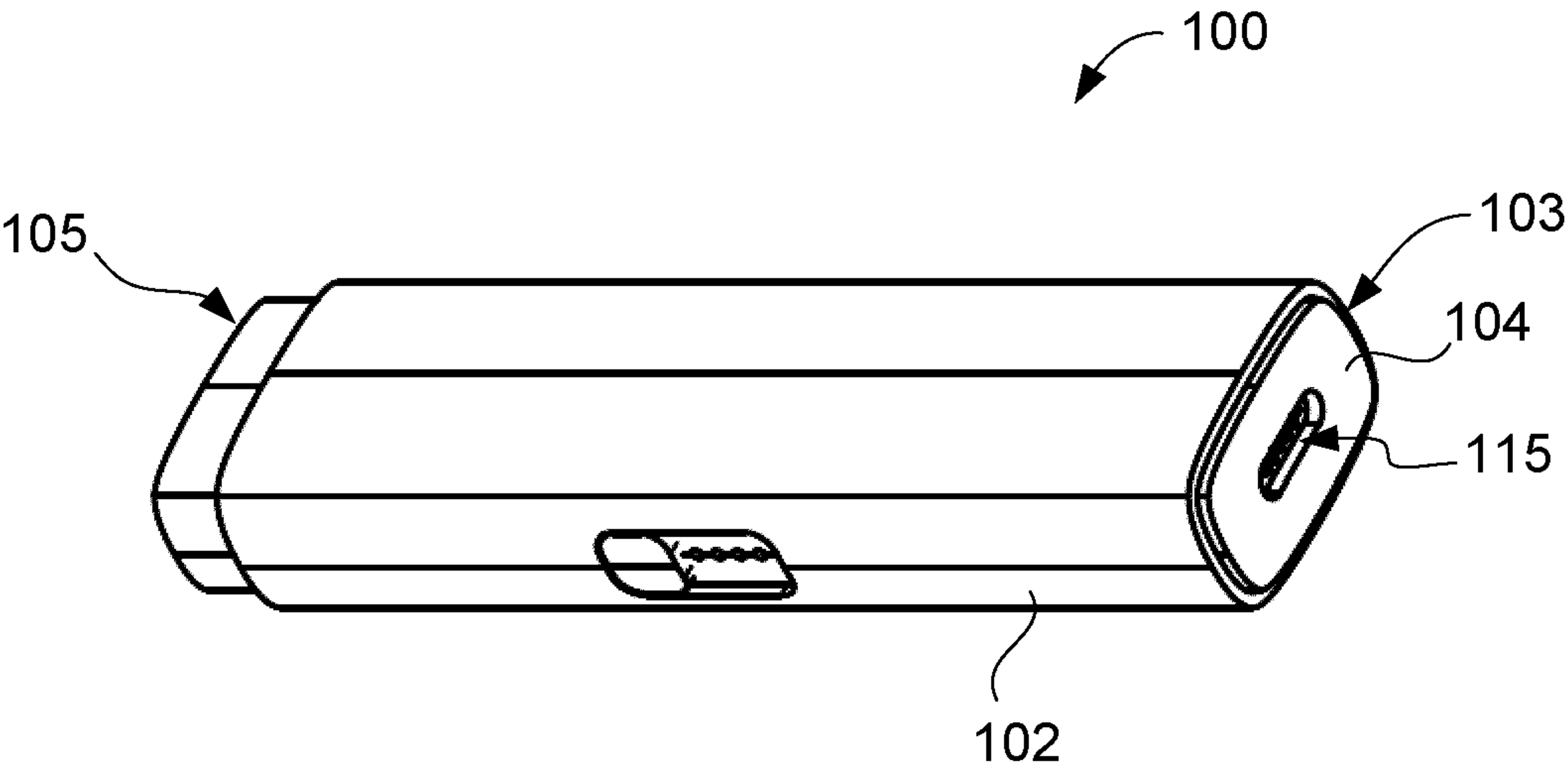


FIG. 11

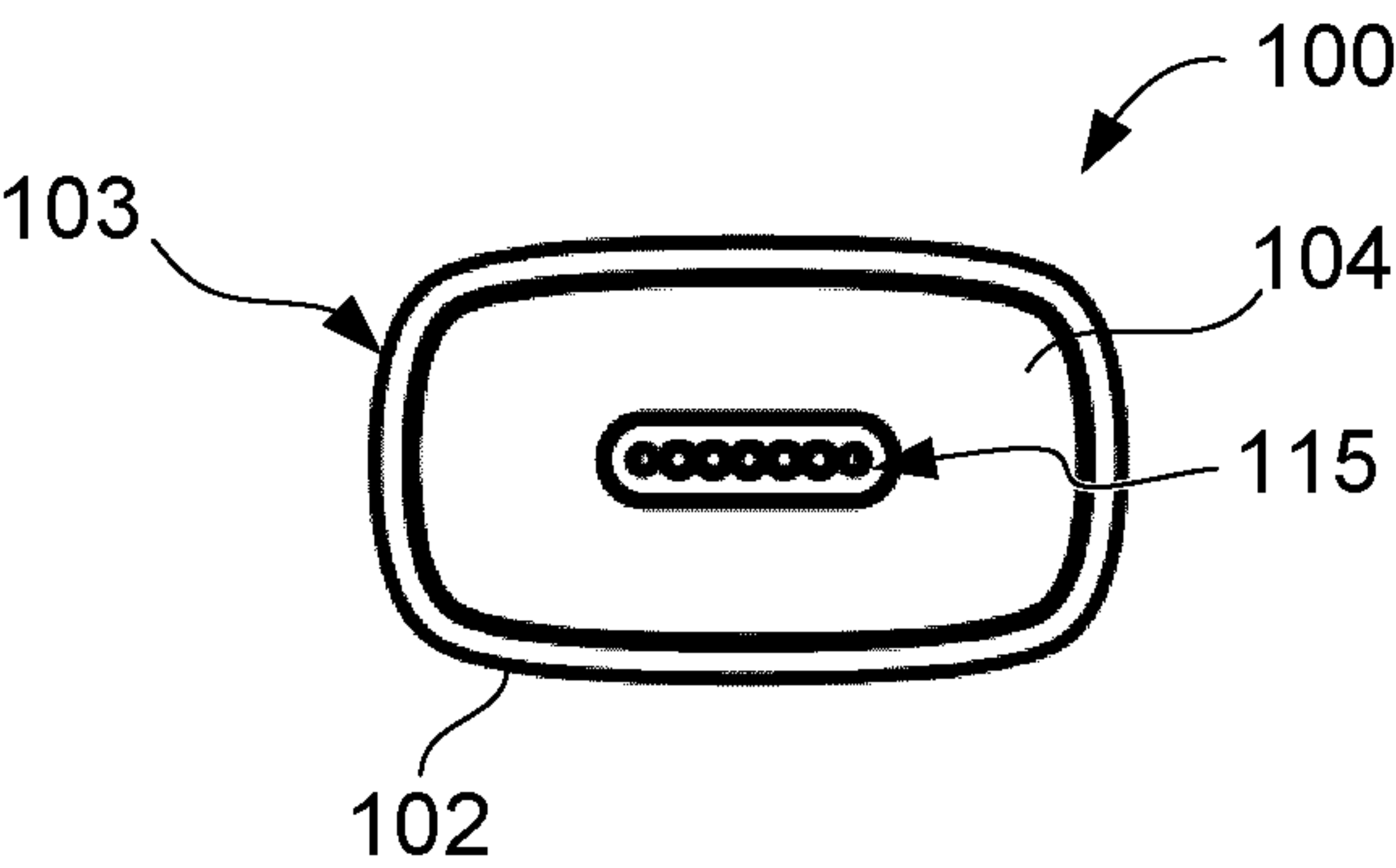
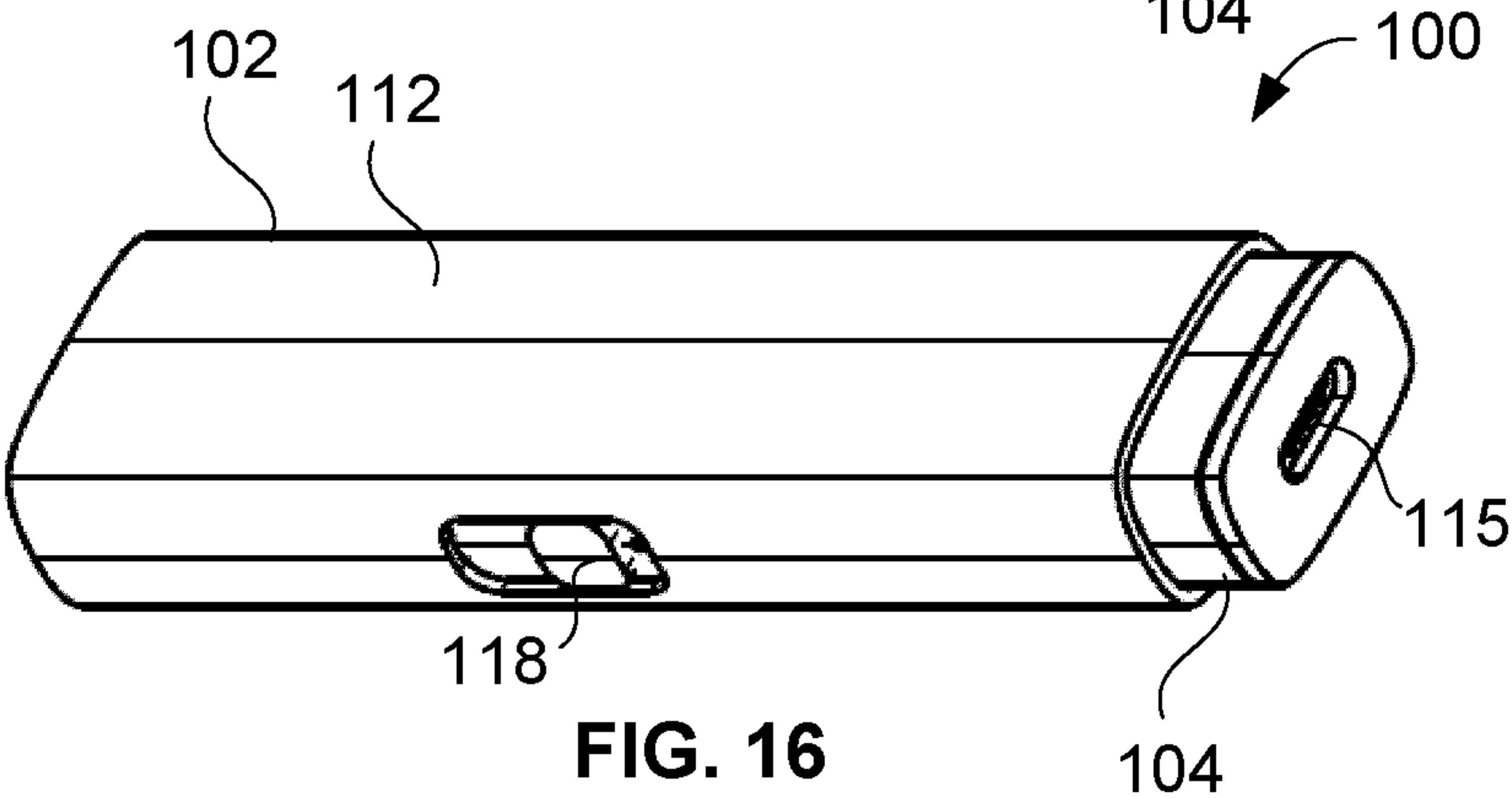
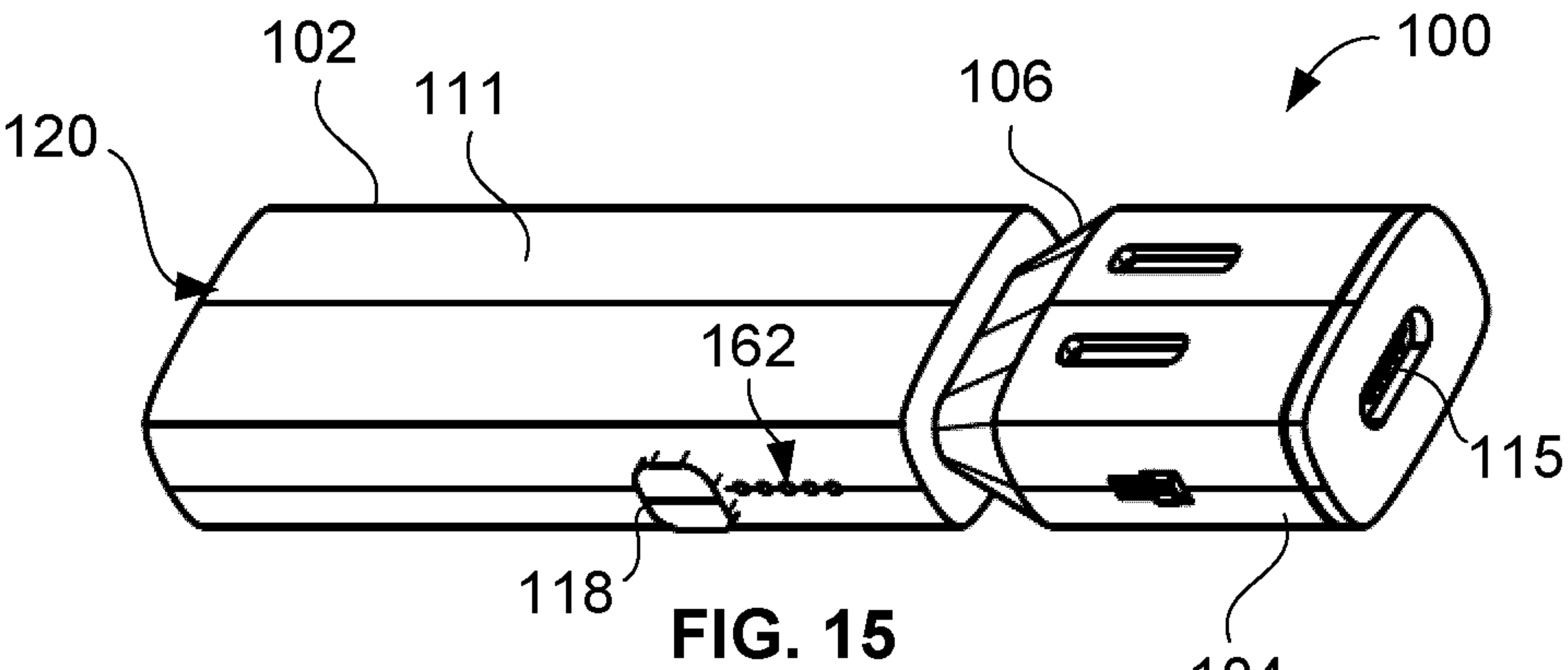
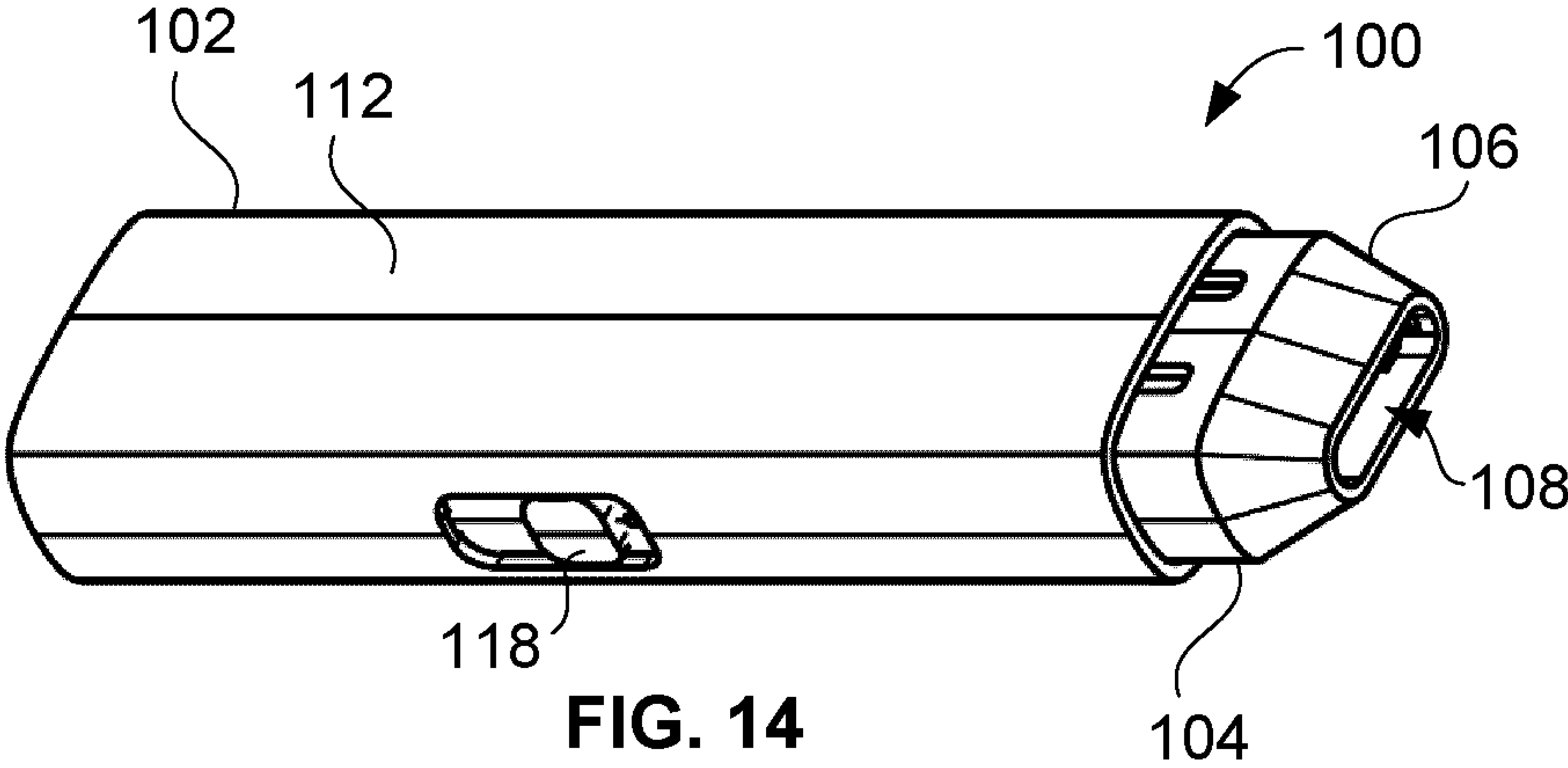
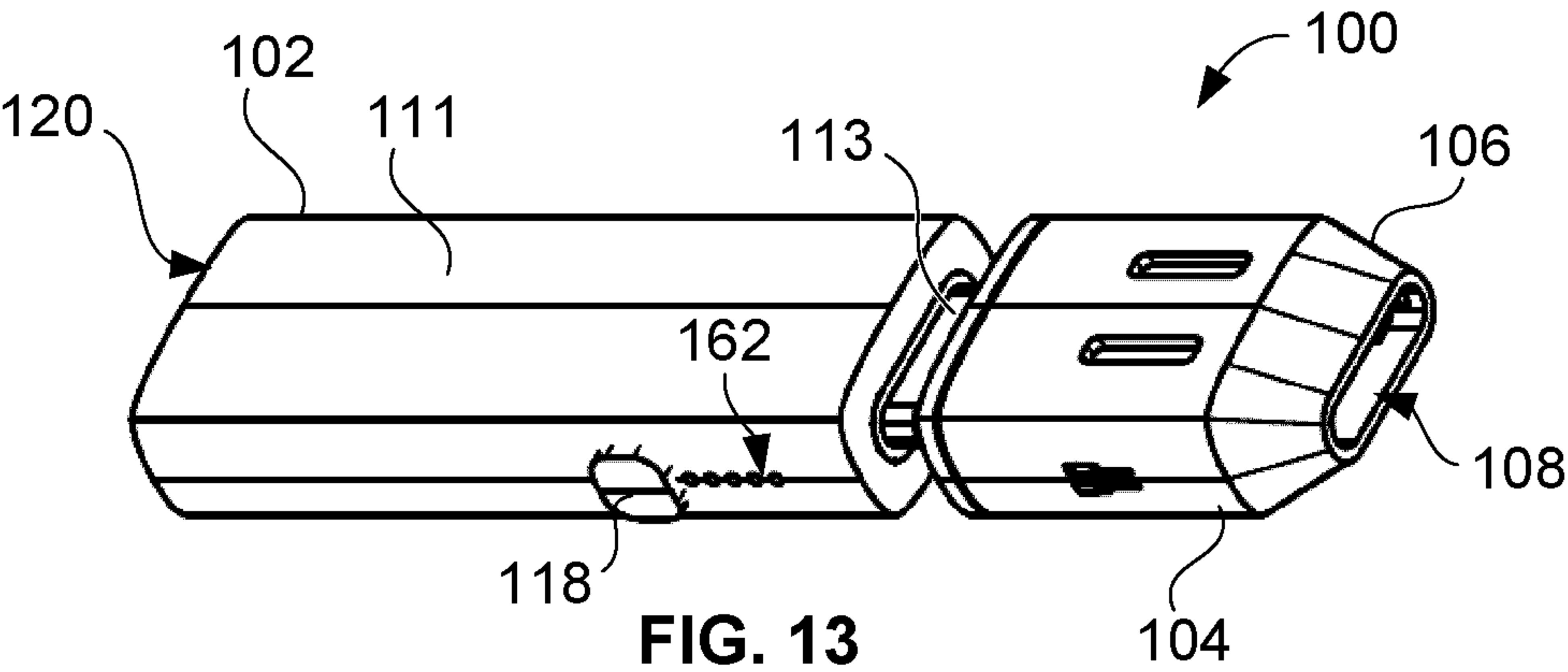


FIG. 12



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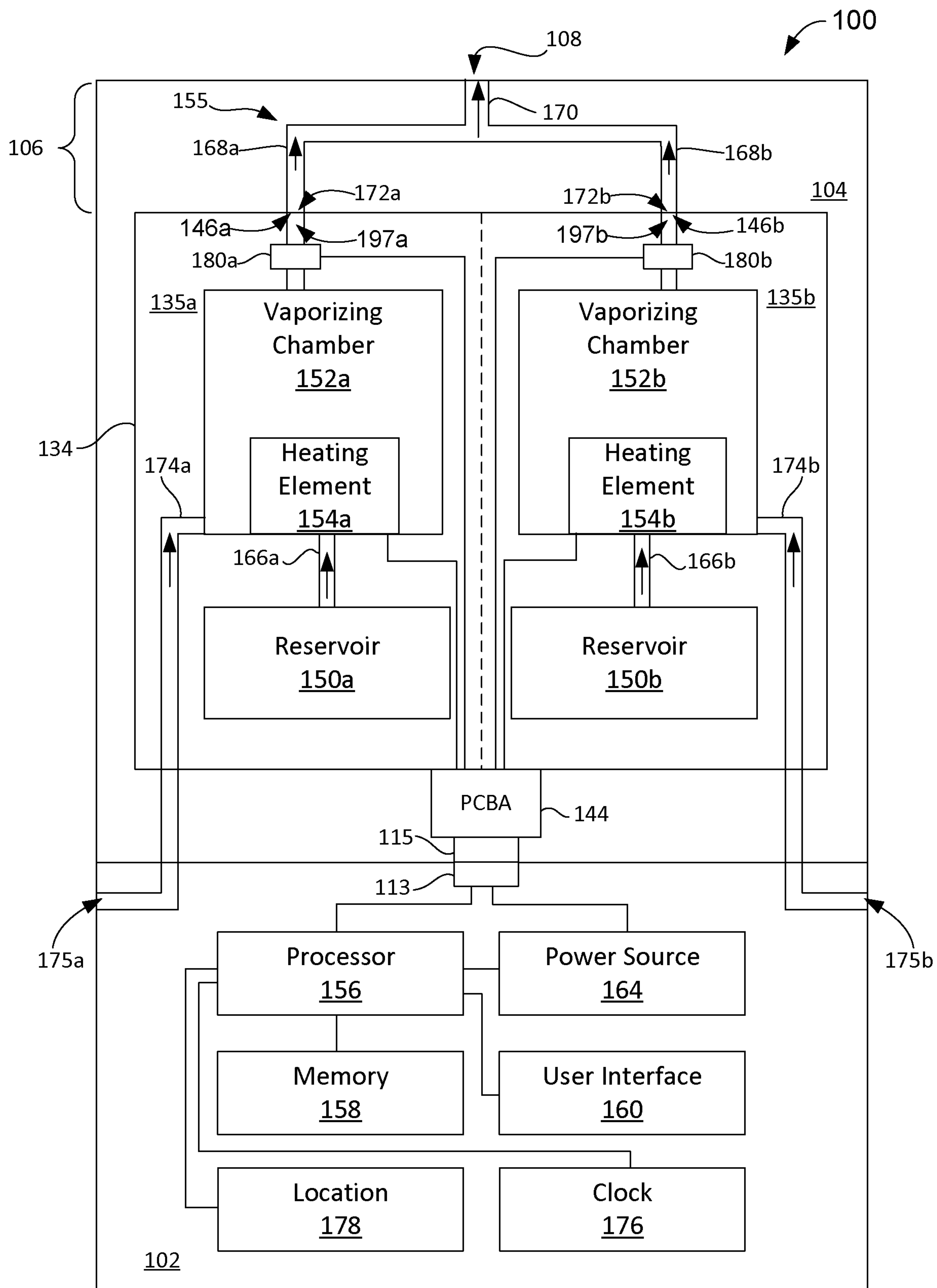
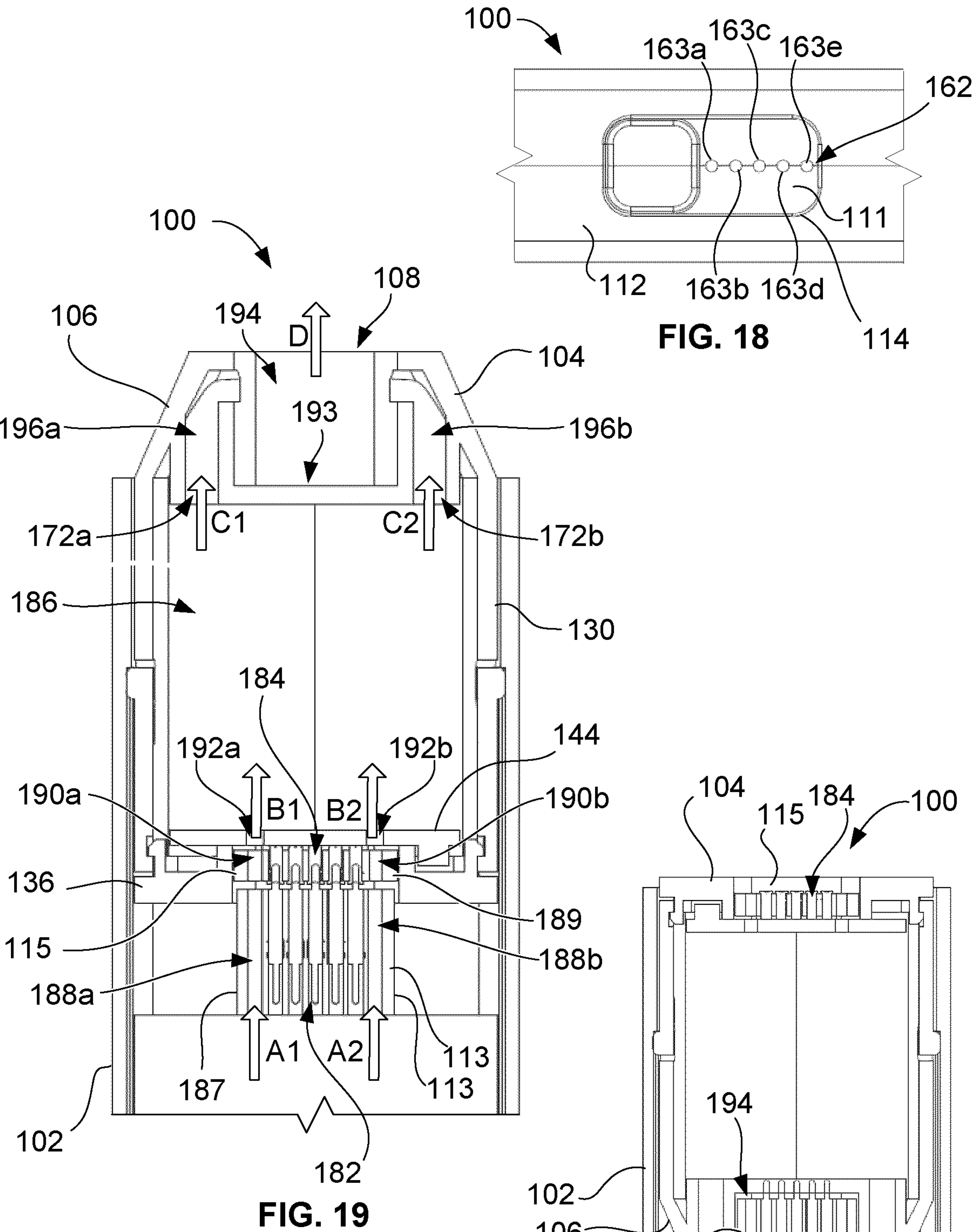


FIG. 17



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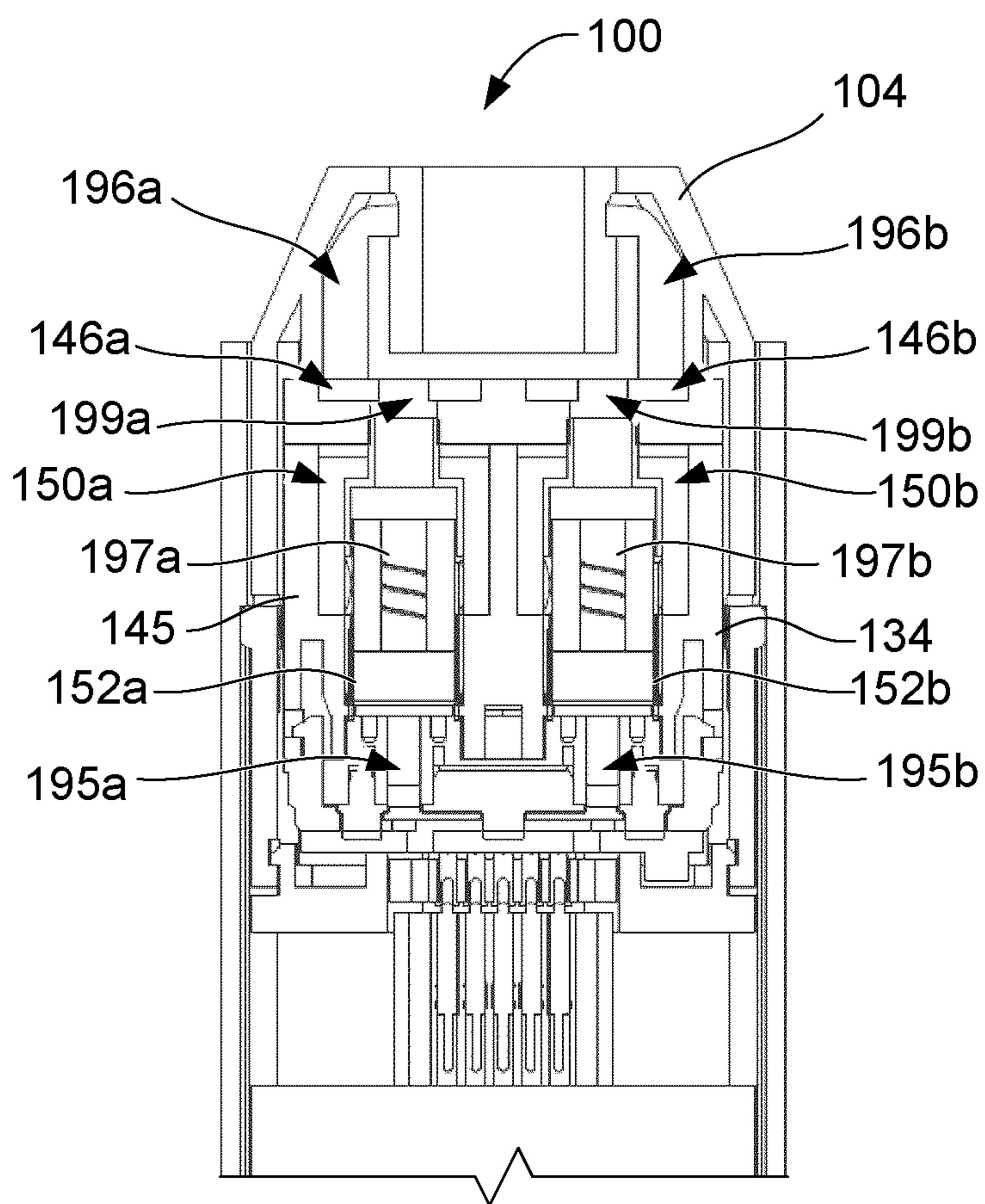


FIG. 21

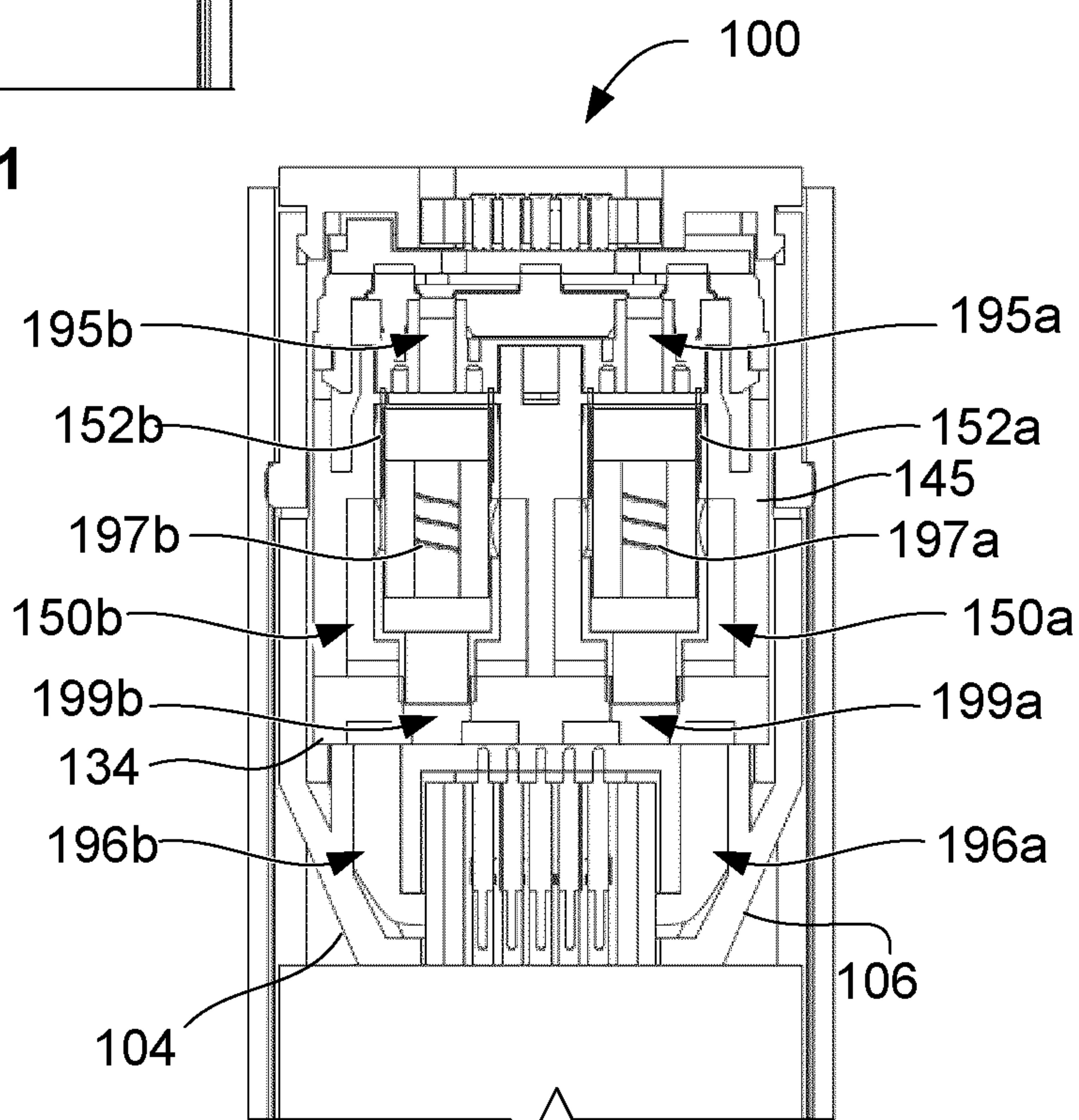


FIG. 22

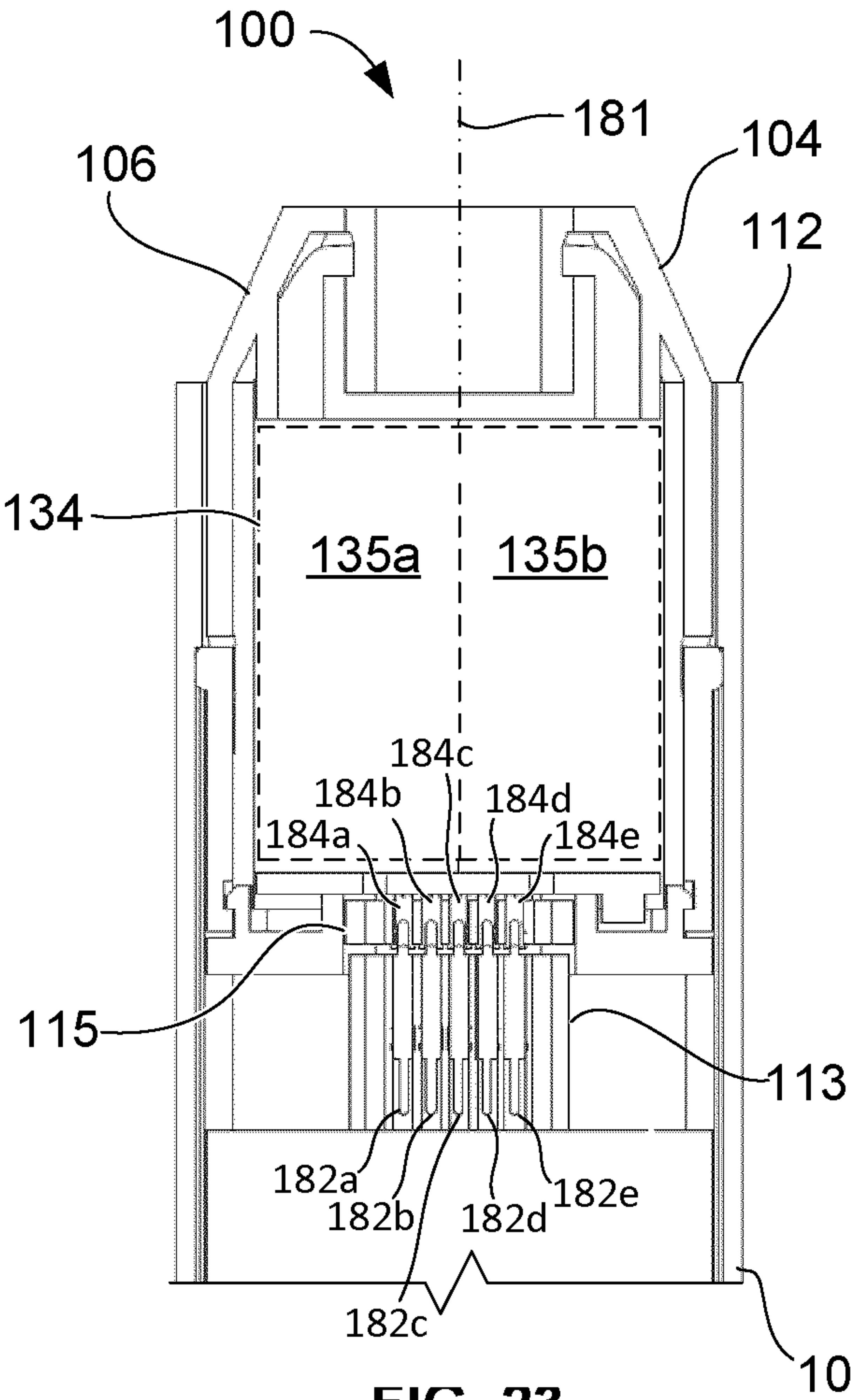


FIG. 23

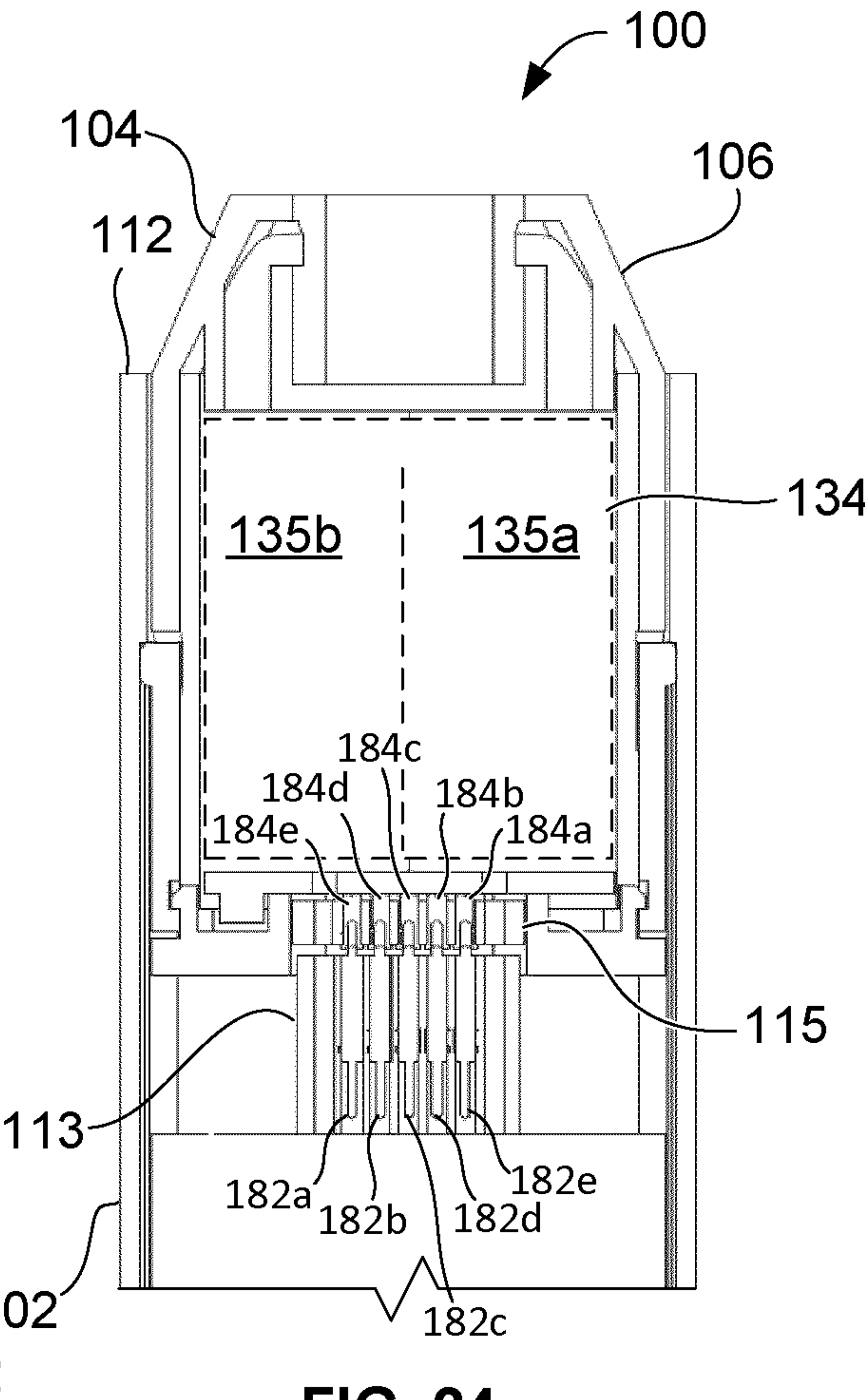


FIG. 24

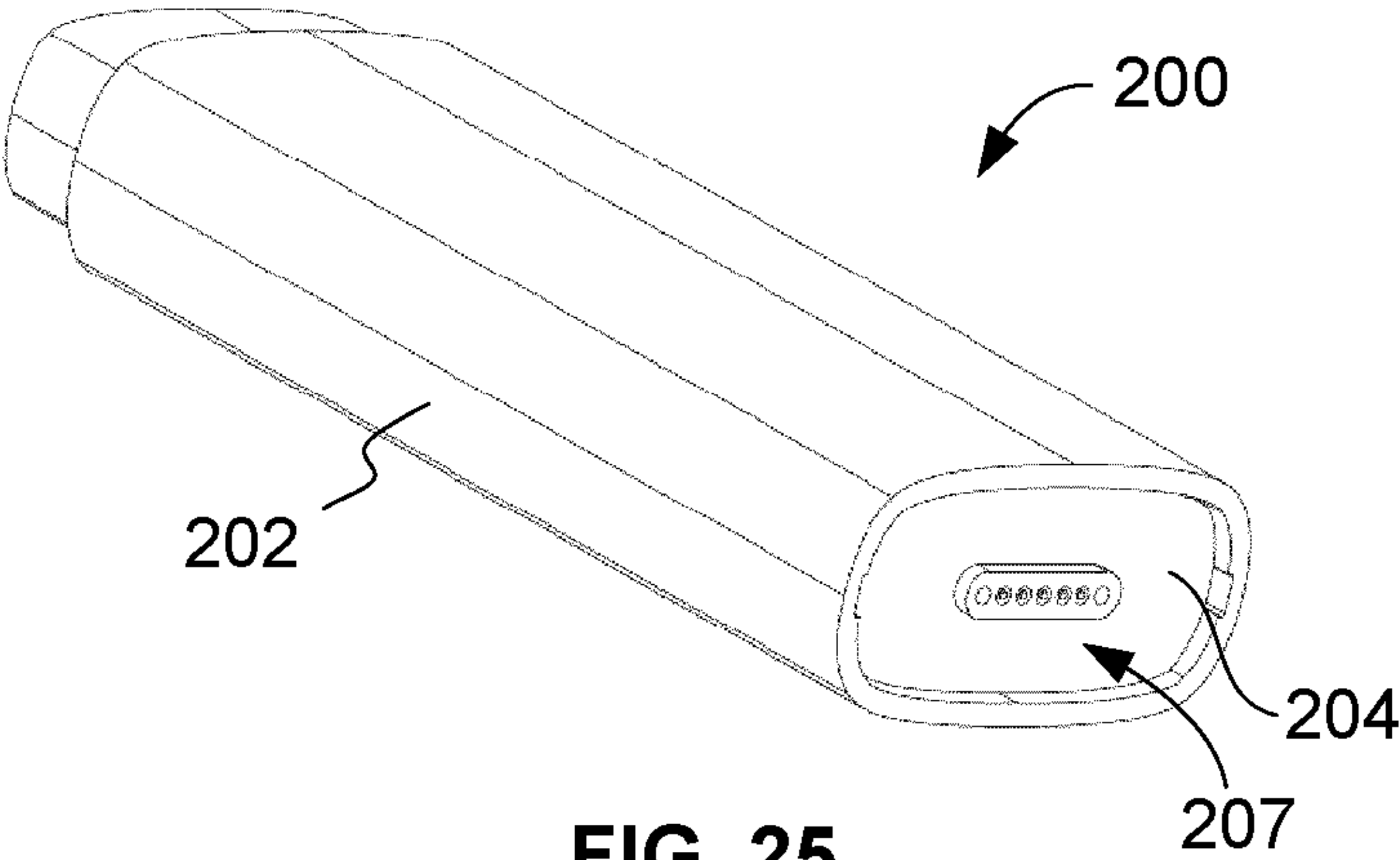


FIG. 25

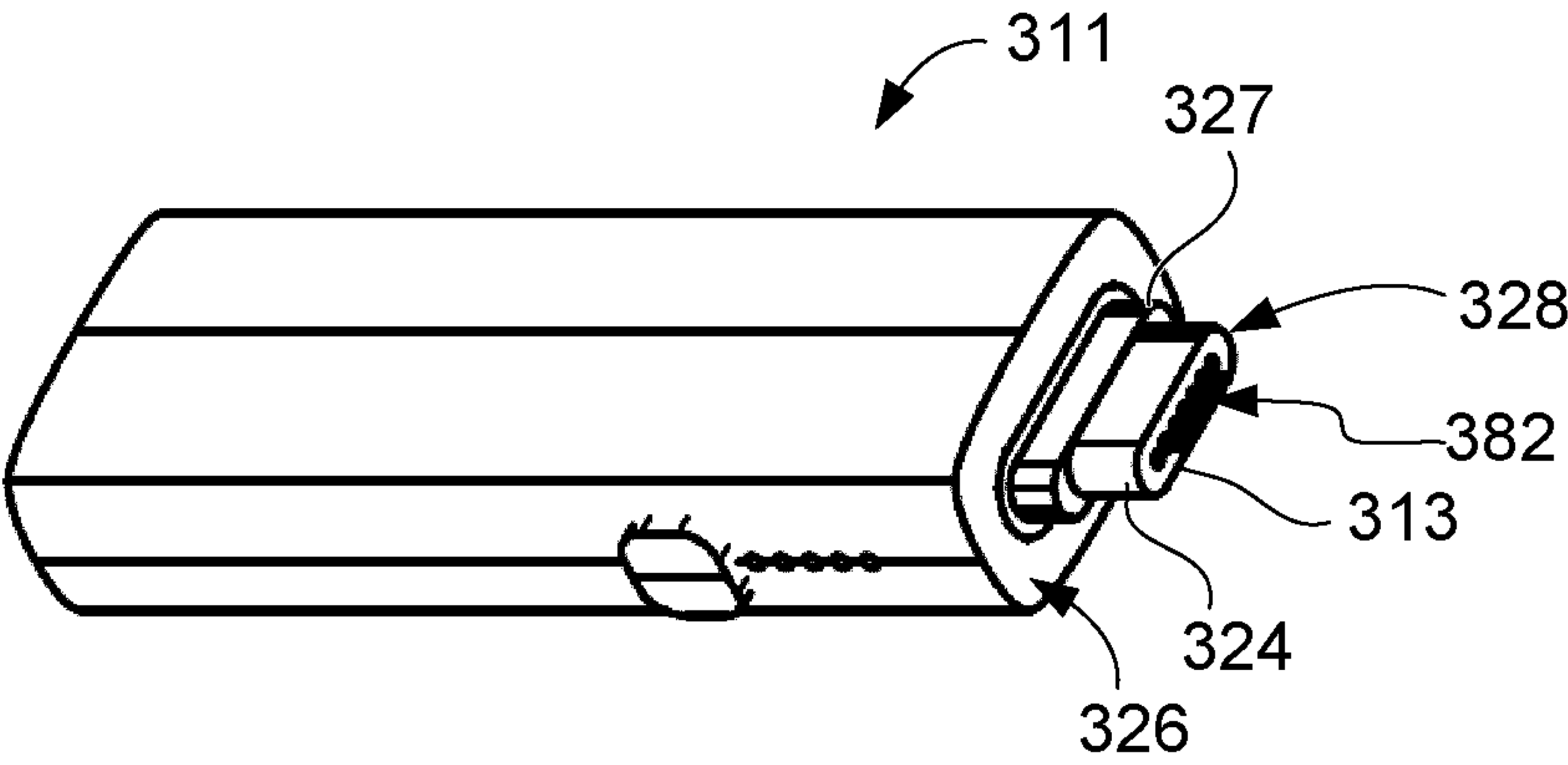


FIG. 26

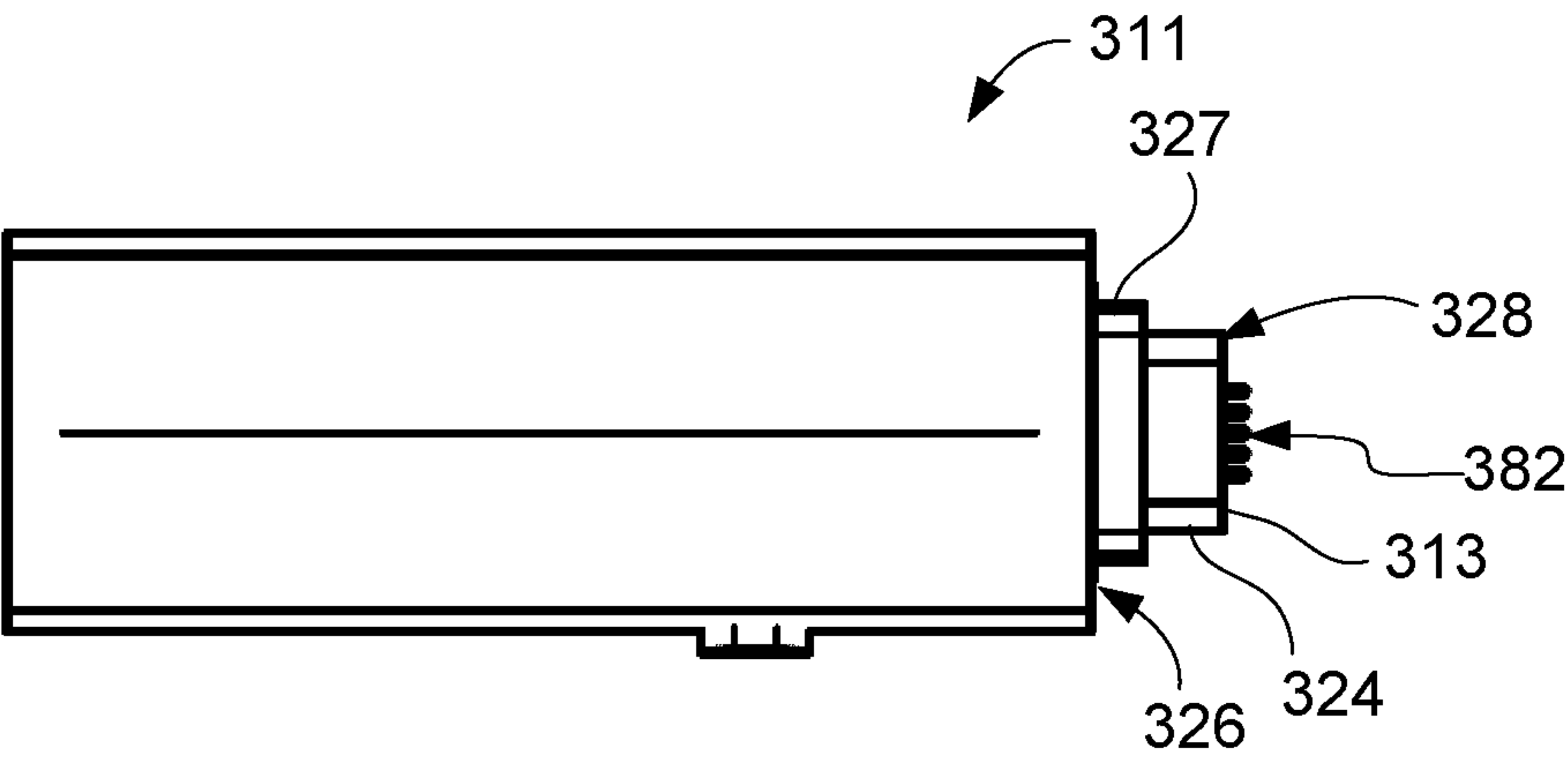


FIG. 27

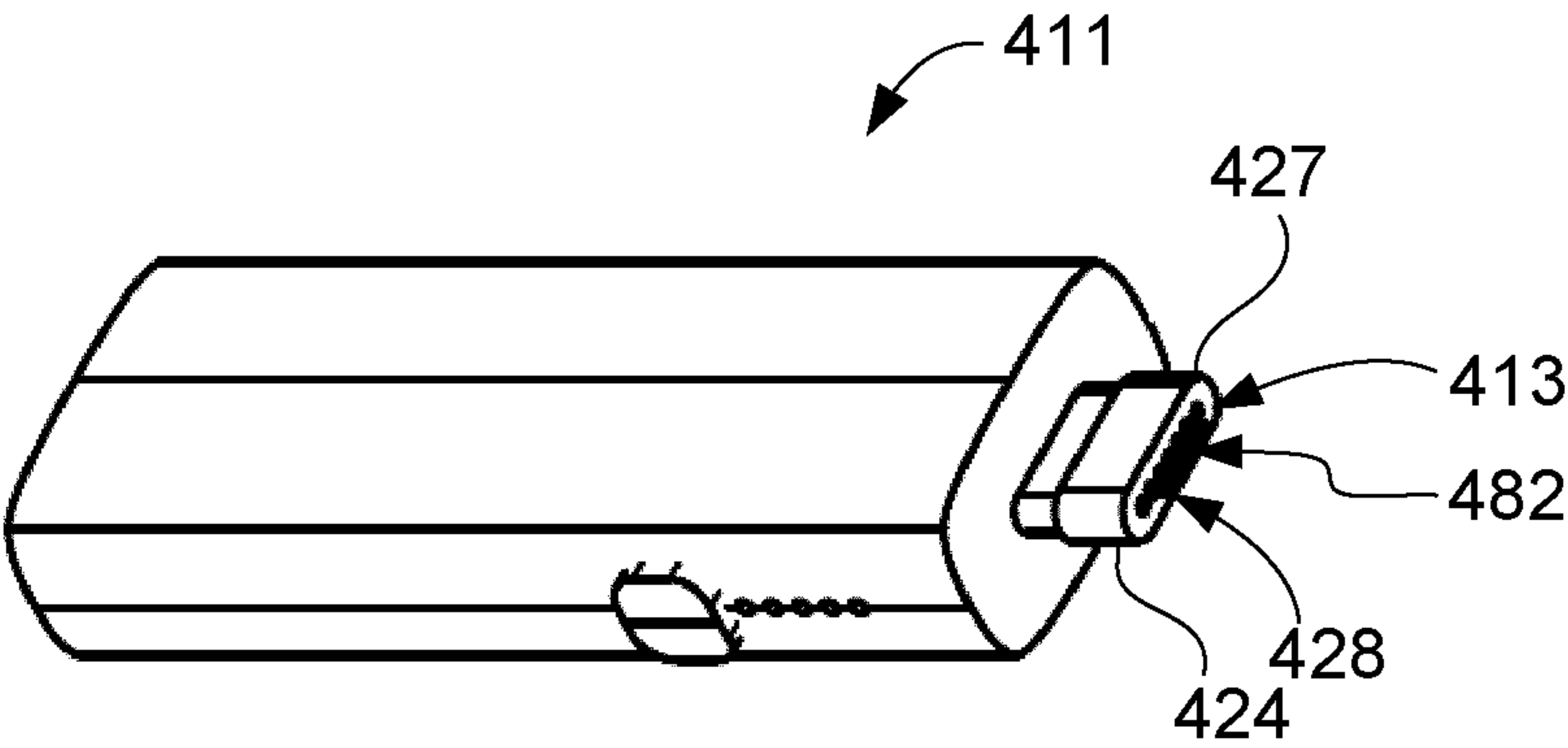


FIG. 28

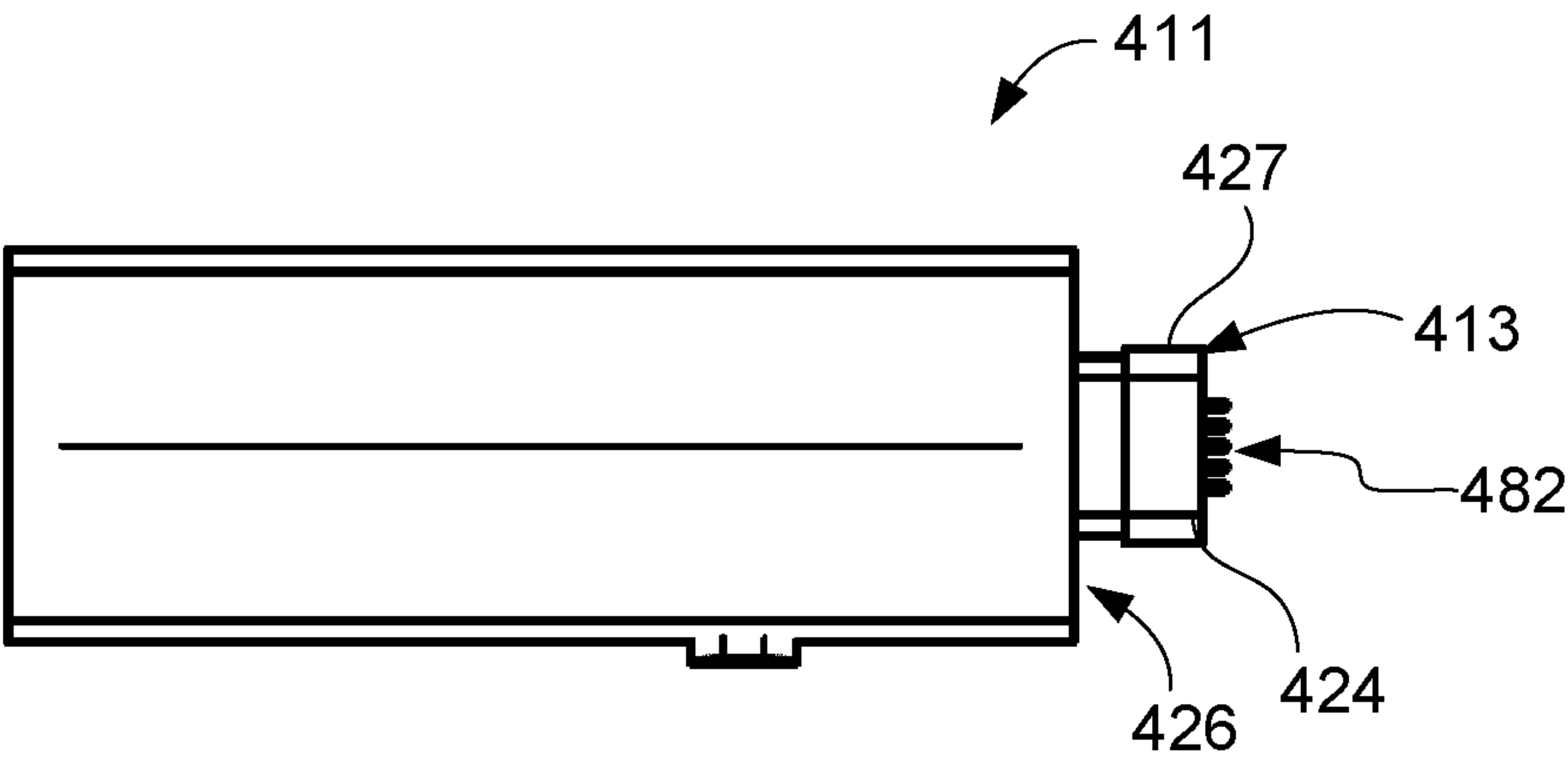


FIG. 29

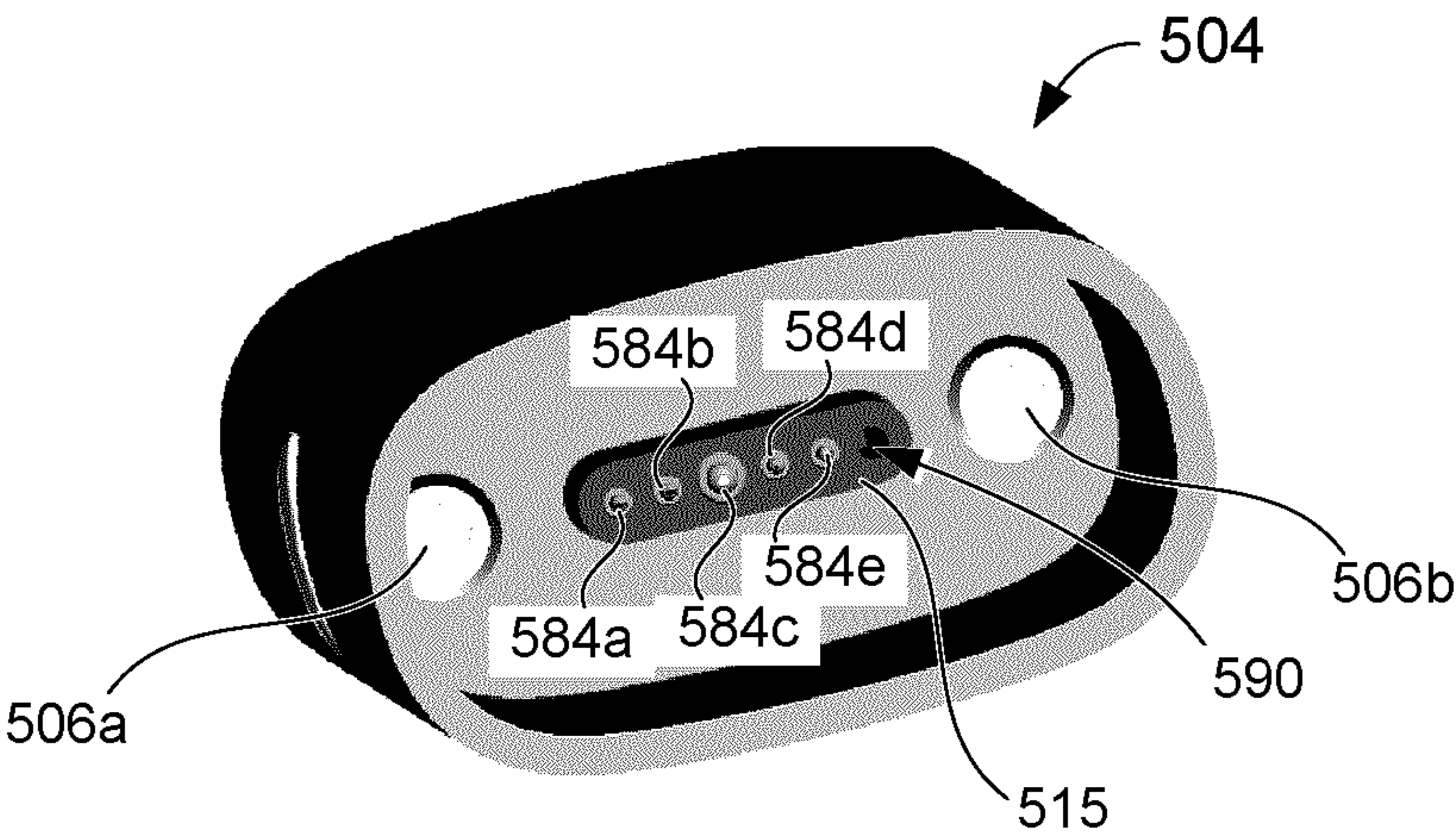


FIG. 30

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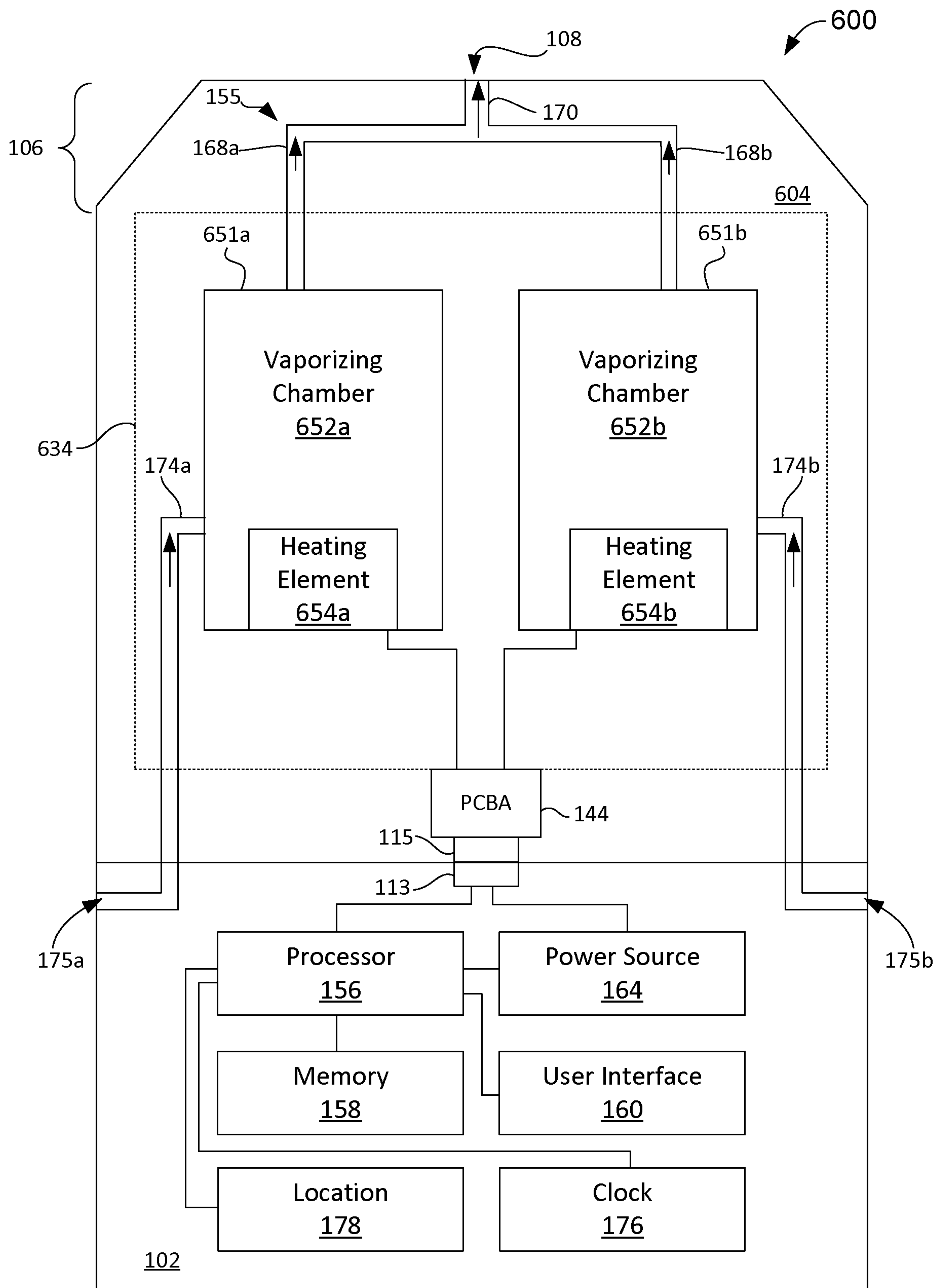


FIG. 31

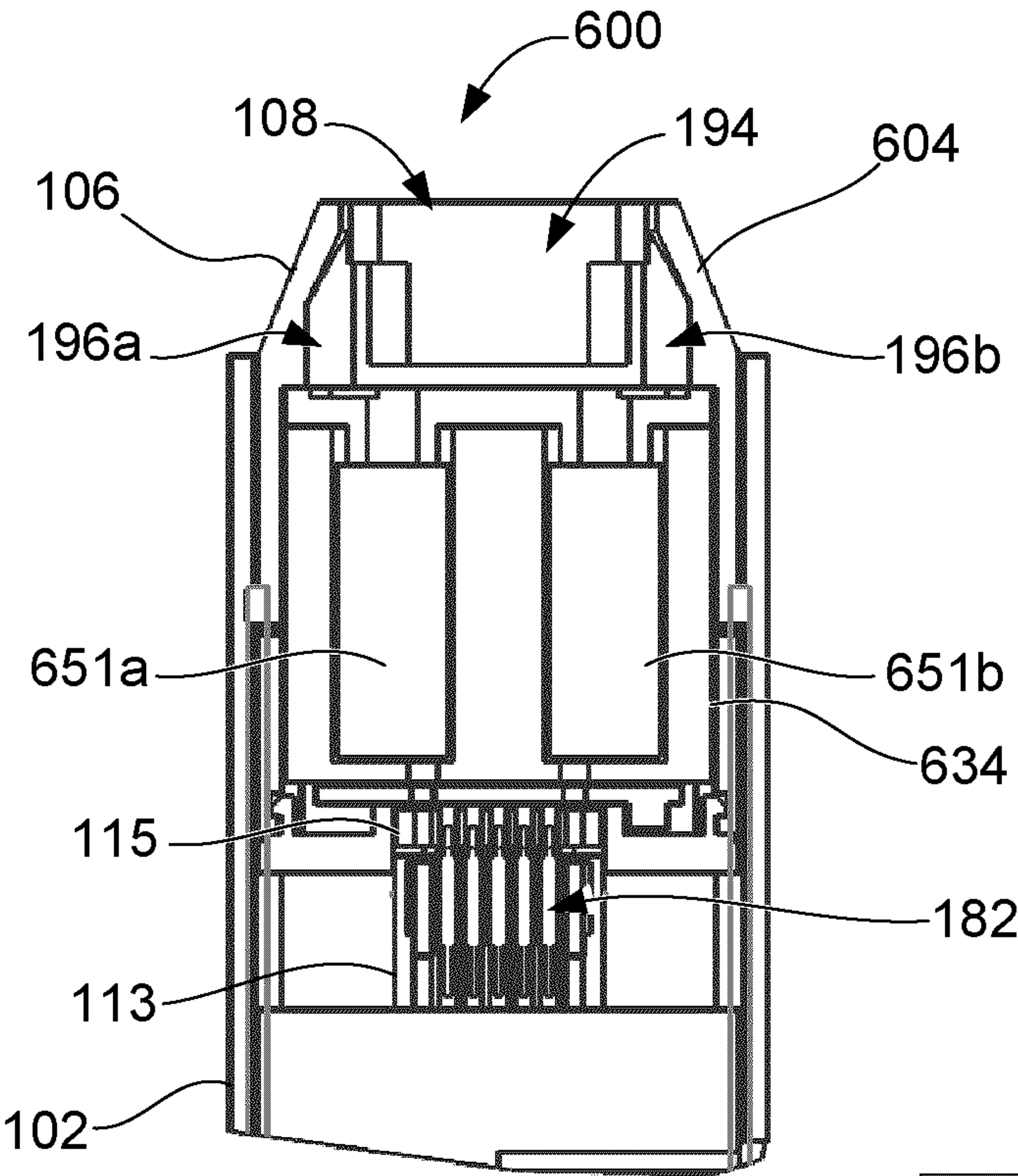


FIG. 32

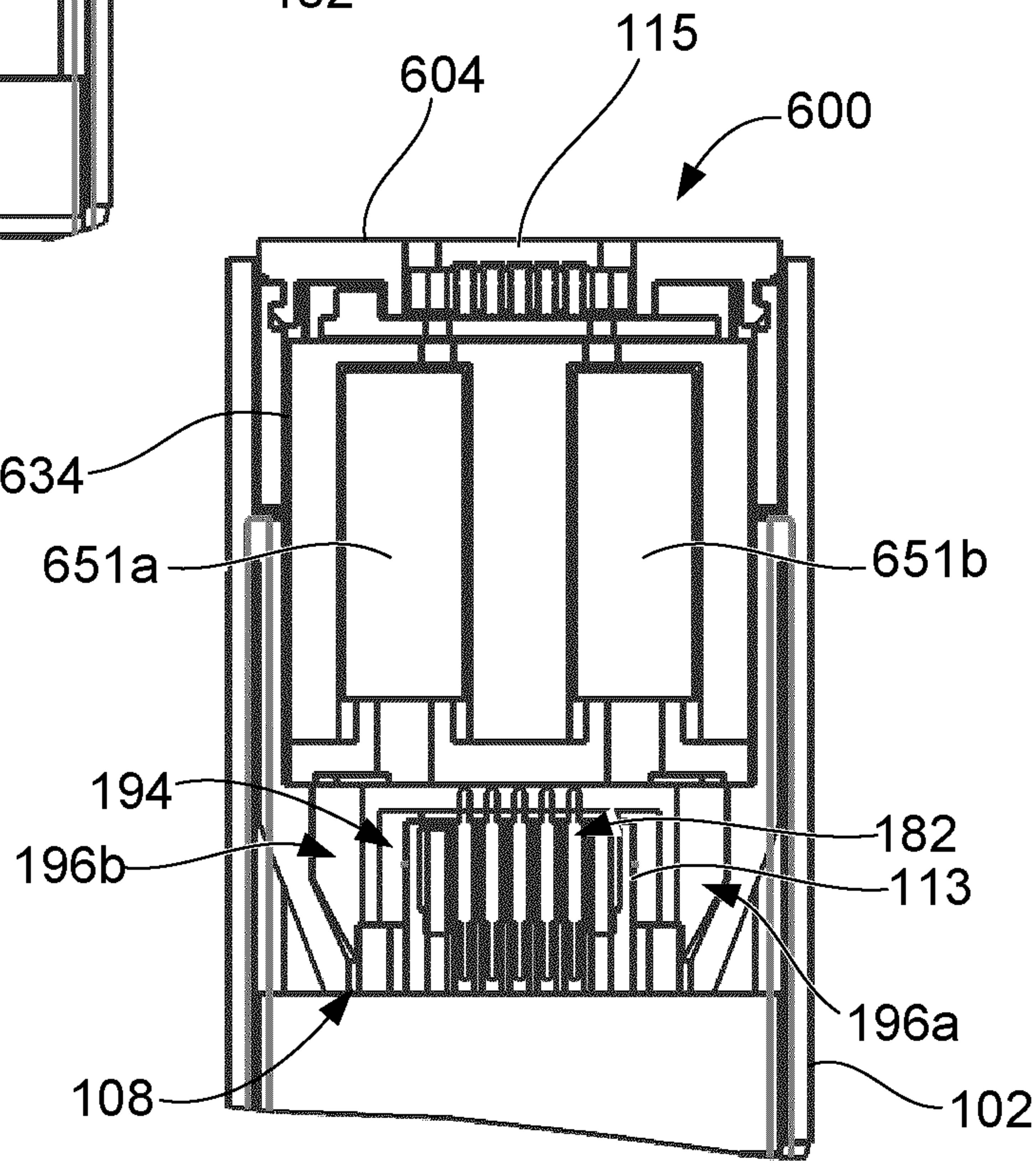


FIG. 33

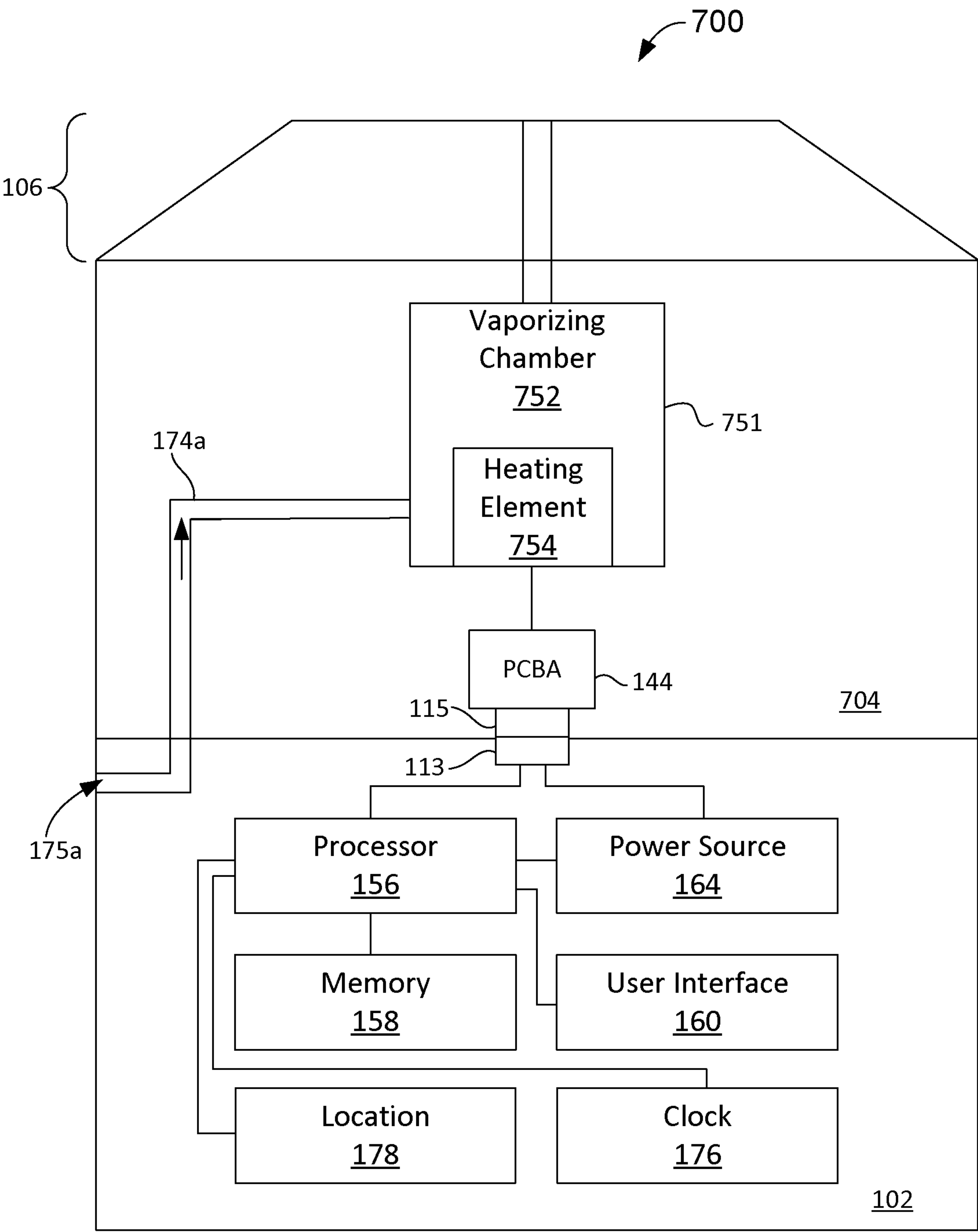


FIG. 34

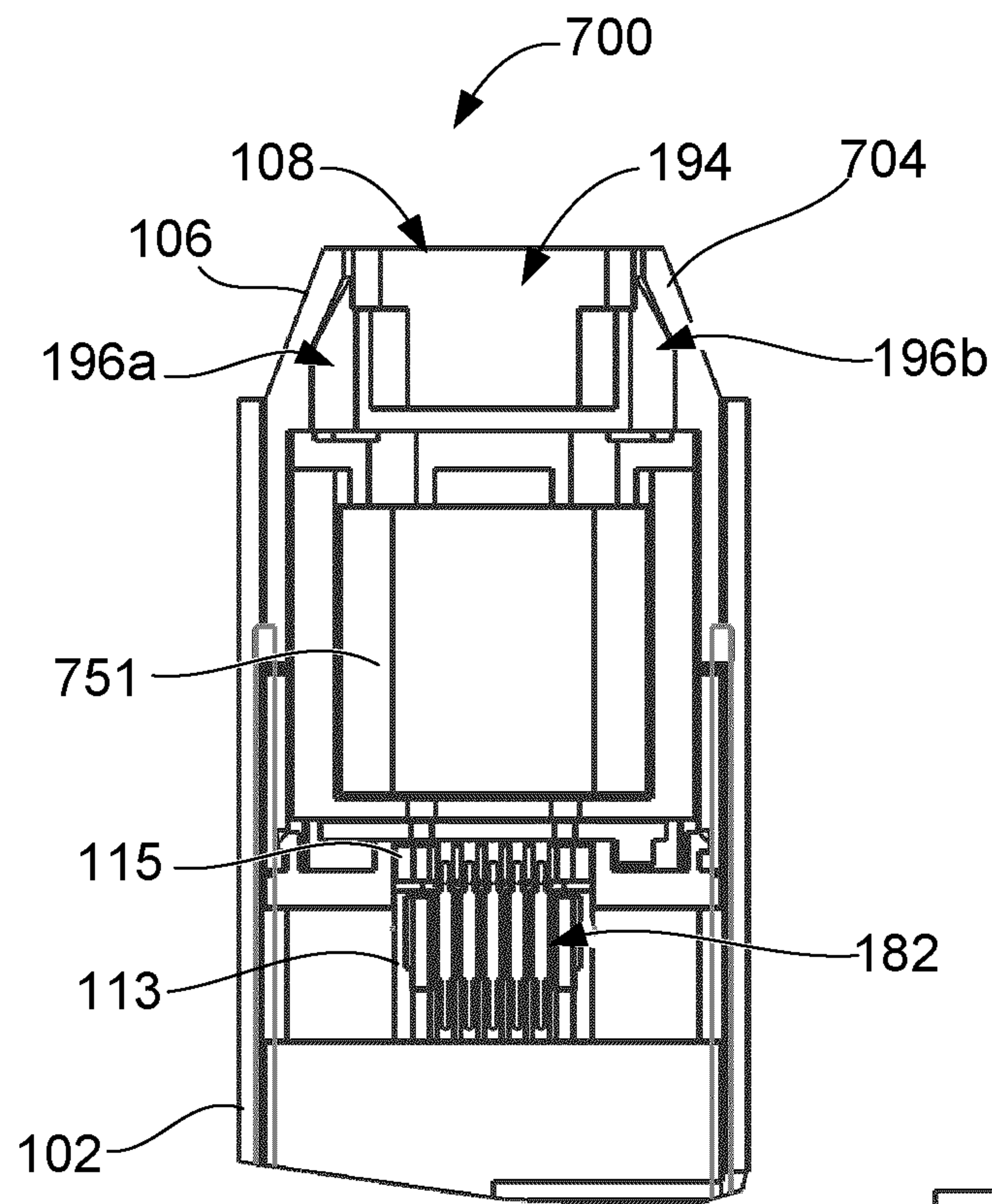


FIG. 35

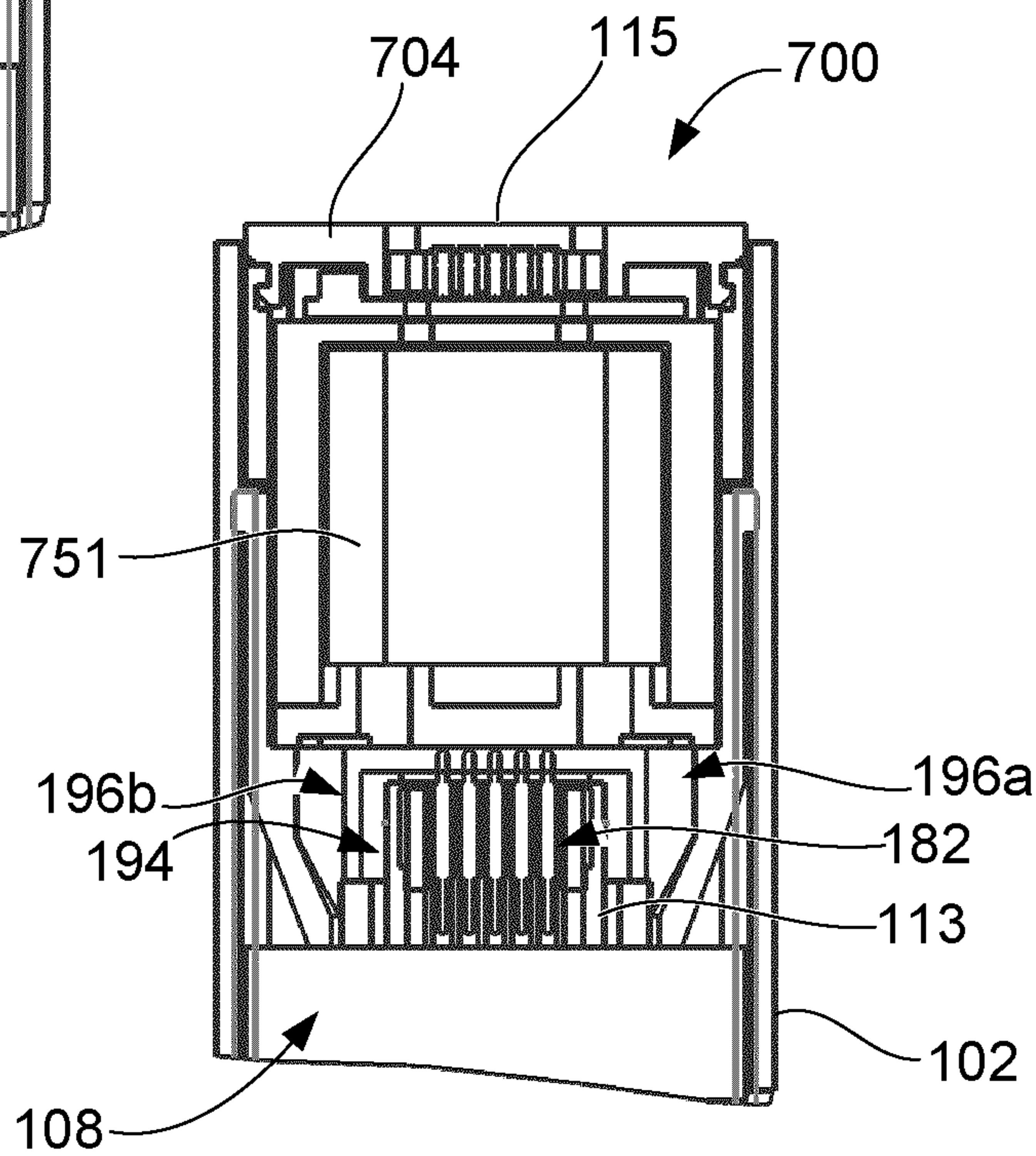
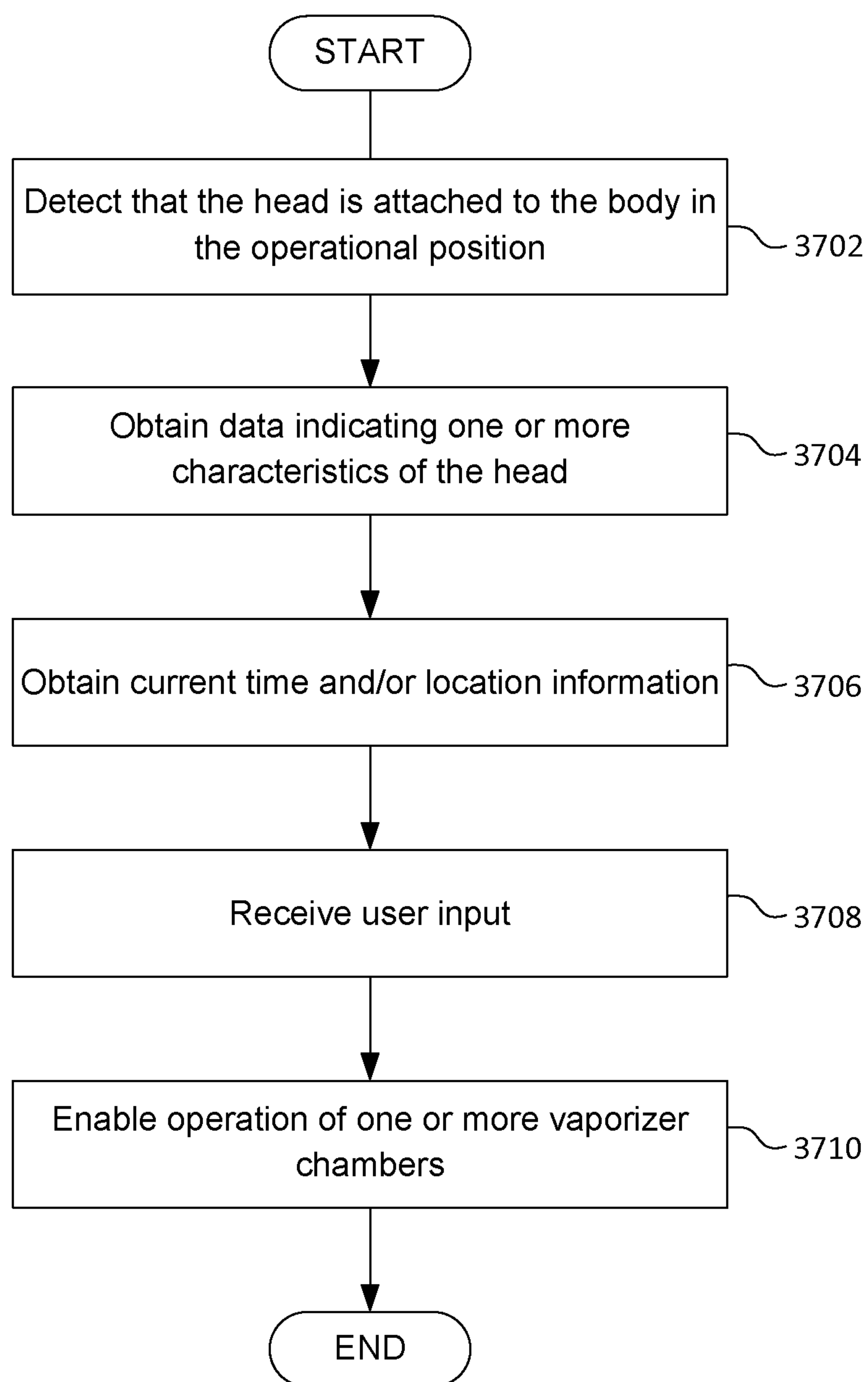
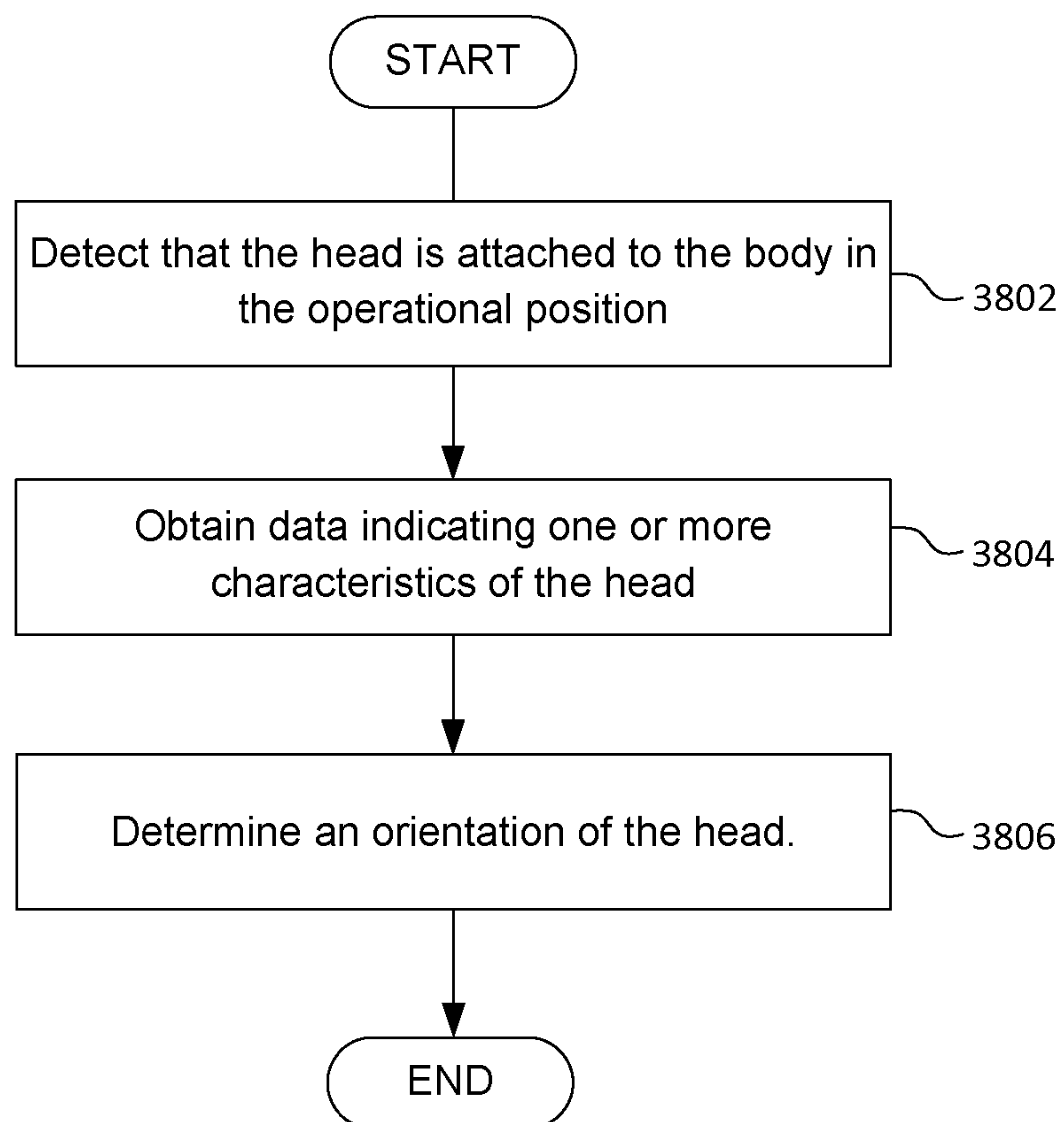


FIG. 36

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**FIG. 37**

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**FIG. 38**

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2020/051738

A. CLASSIFICATION OF SUBJECT MATTER
IPC: **A24F 40/40** (2020.01) , *A24F 40/53* (2020.01)

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 (2020.01): A24F 40/40; A24F 40/53

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)

Database: Canadian Patent Database; Questel™ Orbit™

Keywords: mouthpiece, connector, detect, operational, non-operational, reverse, storage, inoperable, vaporizer, cartridge

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 9,877,520 B2 (RASTOGI, N.) 30 January 2018 (30-01-2018) * fig. 1, 2 and 5; col. 4, line 56; col. 7, lines 39-63; col. 8, lines 10-46*	20 and 21

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* “A” “D” “E” “L” “O” “P”	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance document cited by the applicant in the international application earlier application or patent but published on or after the international filing date 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) document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed	“T” “X” “Y” “&”	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 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 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
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Date of the actual completion of the international search
2 February 2021 (02-02-2021)

Date of mailing of the international search report
16 March 2021 (16-03-2021)

Name and mailing address of the ISA/CA
Canadian Intellectual Property Office
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50 Victoria Street
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Authorized officer

Jeffrey Butler (819) 934-0087

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/CA2020/051738

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
US9877520B2	30 January 2018 (30-01-2018)	US2017027228A1 WO2017019123A1	02 February 2017 (02-02-2017) 02 February 2017 (02-02-2017)