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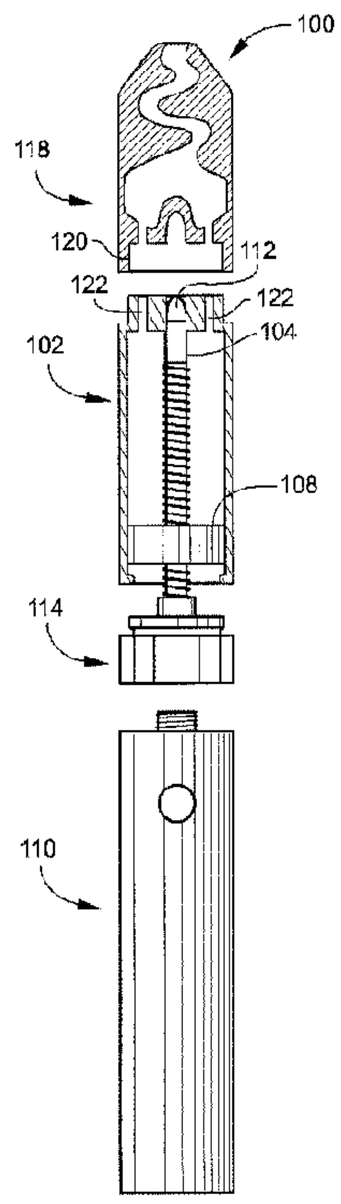
(54) Titre : DISPOSITIFS DE VAPORISATION ET METHODES ASSOCIEES DESTINES A CONTROLER UNE QUANTITE D'UNE SUBSTANCE VAPORISEE EN VUE DE SA CONSOMMATION PAR UN UTILISATEUR

(54) Title: VAPORIZING DEVICES AND RELATED METHODS FOR CONTROLLING AN AMOUNT OF SUBSTANCE BEING VAPORIZED FOR CONSUMPTION BY A USER



(57) Abrégé/Abstract:
Vaporizing devices and related methods for controlling an amount of substance being vaporized for consumption by a user are disclosed herein. According to an aspect, a vaporizing device includes a casing configured to hold a substance for vaporizing. The vaporizing device also includes a plunger comprising a heating element inserted within the casing. The vaporizing device also includes a mechanism configured to advance the substance within the casing. Further, the vaporizing device includes a mouthpiece comprising an atomized configured to vaporize the material using the heating element.

ABSTRACT

Vaporizing devices and related methods for controlling an amount of substance being vaporized for consumption by a user are disclosed herein. According to an aspect, a vaporizing device includes a casing configured to hold a substance for vaporizing. The vaporizing device also includes a plunger comprising a heating element inserted within the casing. The vaporizing device also includes a mechanism configured to advance the substance within the casing. Further, the vaporizing device includes a mouthpiece comprising an atomized configured to vaporize the material using the heating element.

DESCRIPTION

VAPORIZING DEVICES AND RELATED METHODS FOR CONTROLLING AN AMOUNT OF SUBSTANCE BEING VAPORIZED FOR CONSUMPTION BY A USER

TECHNICAL FIELD

[0001] The presently disclosed subject matter relates to vaporizing devices. More particularly, the presently disclosed subject matter relates to vaporizing devices for controlling an amount of substance being vaporized for consumption by a user.

BACKGROUND

[0002] A popular alternative to smoking tobacco based products, such as cigarettes, is inhaling vapors from a pen-sized vaporizing device, also known as electronic cigarettes. Some of these devices vaporize a substance, such as a liquid or oil, using a metal heating element that is in constant contact with the substance. Unfortunately, in these devices the substance of which a user is consuming may also be in constant contact with welds, glues, or by-products of vaporization. This increases the chance the user may consume potentially toxic vapors in addition to the vaporized substance. Thus, there is a need for a vaporizing device that can safely vaporize a substance without exposing user to toxic vapors.

[0003] Additionally, many known vaporizing devices fail to inform a user of an amount of substance either consumed or left for consumption in the vaporizing device. In some instances, a user may consume too much of the substance too quickly. In other instances, if too much of a substance is

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placed within the vaporizing device, the heating element may not vaporize the substance quickly enough. In such cases, the vaporized substance may take on a bitter taste to the user and waste the substance as it may no longer be desirable for consumption by the user. Therefore, in view of these difficulties, there is a need for improved vaporizing devices and techniques.

SUMMARY

[0004] This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used to limit the scope of the claimed subject matter.

[0005] Disclosed herein are vaporizing devices configured to control an amount of substance being vaporized for consumption by a user. According to an aspect, a vaporizing device includes a casing configured to hold a substance for vaporizing. The vaporizing device also includes a plunger comprising a heating element inserted within the casing. The vaporizing device also includes a mechanism configured to advance the substance within the casing. Further, the vaporizing device includes a mouthpiece comprising an atomized configured to vaporize the material using the heating element.

[0006] According to another aspect, a vaporizing device comprises a chamber configured to hold a substance for vaporizing. The vaporizing device also includes a heating chamber configured to couple to the chamber and vaporize the substance. The vaporizing device also includes a casing configured to receive the chamber and the heating element. The vaporizing device also includes a mechanism coupled to the casing and configured to advance the material within the chamber. Further, the vaporizing device includes a mouthpiece configured to receive the vaporized material from the mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The foregoing summary, as well as the following detailed description of various

embodiments, is better understood when read in conjunction with the drawings provided herein. For the purposes of illustration, there is shown in the drawings exemplary embodiments; however, the presently disclosed subject matter is not limited to the specific methods and instrumentalities disclosed.

[0008] FIG. 1 is cross-sectional, side view of an example vaporizing device in accordance with embodiments of the present disclosure;

[0009] FIG. 2 is a cross-sectional, side view of an example plunger including a heating element of a vaporizing device in accordance with embodiments of the present disclosure;

[0010] FIG. 3 is a side view of an example ceramic tip configured to receive a heating element of the plunger in accordance with embodiments of the present disclosure;

[0011] FIG. 4A is a cross-sectional, top view of an example mechanism configured to advance a material within a casing of the vaporizing device in accordance with embodiments of the present disclosure;

[0012] FIG. 4B is a cross-sectional, side view of the mechanism shown in FIG. 4A;

[0013] FIG. 5 is a cross-sectional, side view of a mouthpiece of the vaporizing device in accordance with embodiments of the present disclosure;

[0014] FIG. 6 is a cross-sectional, side view of another example vaporizing device in accordance with embodiments of the present disclosure;

[0015] FIG. 7 is an internal view of the vaporizing device in accordance with embodiments of the present disclosure;

[0016] FIG. 8 is alternate design of the vaporizing device in accordance with embodiments of the present disclosure;

[0017] FIG. 9 is perspective top view of the vaporizing device in accordance with embodiments of the present disclosure;

[0018] FIG. 10 is perspective top view of the vaporizing device in accordance with embodiments of the present disclosure;

[0019] FIG. 11 is perspective top view of an alternate internal design of the vaporizing

device in accordance with embodiments of the present disclosure;

[0020] FIG. 12 is bottom view the alternate internal design of FIG. 11 in accordance with embodiments of the present disclosure; and

[0021] FIG. 13 is a perspective top exploded view of the internal design of FIG. 11 in accordance with embodiments of the present disclosure.

[0022] FIG. 14 is perspective exploded top view of an alternate design of the vaporizer in a device in accordance with embodiments of the present disclosure.

DETAILED DESCRIPTION

[0023] The presently disclosed subject matter is described with specificity to meet statutory requirements. However, the description itself is not intended to limit the scope of this patent. Rather, the inventors have contemplated that the claimed subject matter might also be embodied in other ways, to include different steps or elements similar to the ones described in this document, in conjunction with other present or future technologies. Moreover, although the term "step" may be used herein to connote different aspects of methods employed, the term should not be interpreted as implying any particular order among or between various steps herein disclosed unless and except when the order of individual steps is explicitly described.

[0024] Articles "a" and "an" are used herein to refer to one or to more than one (i.e. at least one) of the grammatical object of the article. By way of example, "an element" means at least one element and can include more than one element.

[0025] In this disclosure, "comprises," "comprising," "containing" and "having" and the like can mean "includes," "including," and the like; "consisting essentially of" or "consists essentially" is open-ended, allowing for the presence of more than that which is recited so long as basic or novel characteristics of that which is recited is not changed by the presence of more than that which is recited, but excludes prior art embodiments.

[0026] Unless otherwise defined, all technical terms used herein have the same meaning as

commonly understood by one of ordinary skill in the art to which this disclosure belongs.

[0027] The present disclosure describes vaporizing devices that can control an amount of substance being vaporized for consumption by a user. An example, vaporizing device of the present disclosure may include a casing configured to hold a substance for vaporizing. As an example, FIG. 1 illustrates a vaporizing device **100** including a casing **102** configured to hold a substance for vaporizing. In accordance with embodiments, the substance may include an oil or other suitable liquid. For example, the substance may be a mixture of vegetable glycerin, propylene glycol, nicotine, the like, or combinations thereof. In another example, the substance may include one or more terpenes or terpenoids. In a further example, the substance may include one or more plant waxes, plant shatters, pure plant molecules, the like, or combinations thereof.

[0028] In accordance with embodiments, the casing may include one or more indicators that can measure the amount of the substance contained within the casing. In an example, the casing **102** may include a glass casing with one or more indicators etched on the glass casing. The indicator(s) can measurE the amount of substance left in the casing. In another example, the casing **102** may include a window with one or more indicators positioned on the window for measuring the amount of substance within the casing. Thus, a user of the vaporizing device **100** may visually confirm the amount of substance either consumed or available to consume by observing the indicator(s) on the casing. In accordance with embodiments, the casing may be about 1 3/8 inches tall and about ¾ inches in diameter, or any other suitable size. Also, in accordance with embodiments, the casing may include a metallic connector for coupling to a mechanism of the vaporizing device as described herein below. The connector may be about 1/8 inches and about ¾ inches in diameter, or any other suitable size. In accordance with embodiments, the casing may vary in size from 1 inch to about 2 inches in length, or any other suitable size.

[0029] The vaporizing device of the present disclosure may include a plunger having a heating element inserted within the casing. For example, FIG. 1 shows that the vaporizing device **100** includes a plunger assembly **104** having a heating element **106** inserted within the casing **102**. In accordance with embodiments, the plunger assembly **104** can include a threaded rod. For example, FIG. 1 shows that the plunger assembly **104** includes a threaded rod **106** within casing **102**. Also in accordance with embodiments, the plunger may include a stopper configured to traverse the threaded

rod. Continuing the previous example, FIG. 1 also shows that the plunger assembly **104** includes a plunger stopper **108** configured to traverse the threaded rod **106**. In accordance with embodiments, the plunger may be about 1 ¾ inches in length, or any other suitable length. It should be noted that the length of the plunger may vary in accordance with the size of the casing. For example, if the size of the casing increases by 1/8 of an inch, the plunger must also increase by about 1/8 of an inch. Also in accordance with embodiments, the stopper may be substantially ¼ inches in length and slightly less than ¾ inches in diameter to fit within the casing. It should be noted the width of the stopper may vary in accordance with the width of the casing.

[0030] In accordance with embodiments, the heating element **106** comprises a metallic heating coil configured to conduct heat within the interior of the threaded rod. For example, FIG. 3 illustrates threaded rod **106** includes a metallic heating coil **200** configured to conduct heat within the interior of threaded rod **106**. In accordance with embodiments, the metallic heating coil **200** is located vertically within the center of the rod. In accordance with embodiments, the plunger is configured to couple to a battery of the vaporizing device. In embodiment embodiments, the battery may couple to the plunger via a two-wire connector. For example, FIG. 2 shows that the plunger assembly **104** is coupled to battery **110** of vaporizing device **100**. In accordance with embodiments, the metallic heating coil **200** can conduct heat using energy from the battery of the vaporizing device. Continuing the previous example, the metallic heating coil **200** of FIG. 2 can conduct heat using energy from battery **110** of vaporizing device **100**. In accordance with embodiments, the threaded rod may include an insulating material within the interior of the threaded rod for insulating the metallic heating coil **200**. For example, threaded rod **106** of FIG. 2 may include an insulating material (not shown) within the interior of the threaded rod **106** for insulating metallic heating coil **200**. In this example, the insulating material may be placed between metallic heating coil **200** and an exterior wall **202** of threaded rod **106**.

[0031] The vaporizing device of the present disclosure may include a ceramic tip. In accordance with embodiments, the threaded rod may receive the ceramic tip. As an example, FIG. 1 illustrates vaporizing device **100** includes a ceramic tip **112**. Continuing the previous example, FIG. 2 illustrates threaded rod **106** may receive ceramic tip **112**. In accordance with embodiments, the ceramic tip comprises threading to fasten the ceramic tip to the threaded rod. For example, FIG. 3 illustrates ceramic tip **112** comprising threading **302** to fasten the ceramic tip **112** to threaded rod **106**. Also, in

accordance with embodiments, the ceramic tip comprises a heat sink configured to receive the metallic heating coil. Continuing the previous example, FIG. 3 illustrates ceramic tip **112** comprises a heat sink **302** configured to receive metallic heating coil **202** as shown in FIG. 2. In accordance with embodiments, the ceramic tip also comprises an element with a parabolic shape. For example, FIG. 3 illustrates ceramic tip **112** comprises an element **304** with a parabolic shape.

[0032] In accordance with embodiments, the vaporizing device of the present disclosure may include a mechanism configured to advance the substance within the casing. As an example, FIG. 1 shows the vaporizing device **100 as** including a mechanism **114** configured to advance the substance within the casing. In accordance with embodiments, the mechanism **114** is configured to rotate the plunger to advance the substance in the casing. For example, FIG. 4A illustrates a cross-sectional view of a mechanism **114** configured to rotate plunger assembly **104** to advance a substance in casing **102** (not shown). In accordance with embodiments, the mechanism **114** comprises one or more ball bearings configured to rotate the plunger. Continuing the above example, FIG. 4A illustrates mechanism **114** comprises one or more ball bearings **400** configured to rotate plunger assembly **104**. In accordance with embodiments, the mechanism comprises one or more grooves configured to receive the one or more ball bearings to lock the one or more ball bearings in place. Continuing the previous example, FIG. 4A illustrates mechanism **114** including grooves **402** configured to receive corresponding ball bearings **400** to lock the ball bearings **400** in place. In accordance with embodiments, the mechanism can operatively twist as the ball bearings **400** traverse a surface in between the grooves **402** in response to an applied twisting force. For example, FIG. 4A illustrates mechanism **114** operatively twists as the ball bearings **400** traverse a surface **404** in between the grooves **402** in response to an applied twisting force **406** applied at the outer surface **408** of mechanism **114**.

[0033] In accordance with embodiments, the mechanism is substantially 5/16 inches tall and ¾ inches in diameter, or any suitable size. Also in accordance with embodiments, the mechanism comprises a connector atop the mechanism for coupling to the casing. The connector is about 1/8 inches tall and 11/16 inches in diameter. Also in accordance with embodiments, the mechanism comprises a rubber seal atop the connector configured to abut the stopper. The rubber seal can be substantially ¼ inches in diameter and 1/8 inches in length.

[0034] In an embodiment, the stopper can traverse the plunger during rotation of the plunger. Returning to FIG. 1, plunger stopper **108** can traverse the plunger assembly **104** during rotation of the plunger assembly **104**. In one embodiment, the stopper can traverse the plunger to advance a substance within the casing. In another embodiment, the stopper can traverse the plunger to return the plunger to an initial position within the casing.

[0035] In accordance with embodiments, the mechanism can operatively couple to the casing and a battery of the vaporizing device. For example, FIG. 1 illustrates mechanism **114** operatively coupled to casing **102** and battery **110** of vaporizing device **100**. In accordance with embodiments, the casing can include an element configured to operatively couple the casing to the mechanism. In embodiments, the element may comprise a medical grade stainless steel connection is configured to fasten to the mechanism using one of a snap-on or screw-on configuration. In accordance with embodiments, the battery may include a threaded portion configured to operatively fasten to the mechanism. For example, FIG. 1 illustrates the battery **110** with a threaded portion **116** for fastening to mechanism **114**.

[0036] In accordance with embodiments, the mechanism is configured to connect the battery to the heating element of the plunger. For example, FIG. 4 illustrates a cross-sectional view of mechanism **114** configured to connect battery **110** to the heating element **200** (not shown in this view). In accordance with embodiments, the mechanism comprises a two-wire connector configured connect the metallic heating coil of the heating element to the battery. For example, FIG. 4 illustrates that mechanism **114** includes a two-wire connector **412** configured to connect heating element **200** to battery **110**.

[0037] In accordance with embodiments, the battery is substantially 3 inches tall and ¾ inches in diameter. Also in accordance with embodiments, the battery comprises a connector configured to couple the battery to the mechanism as described above. The connector may be about 3/16 inches tall and ¼ inches in diameter. It should be noted that the dimensions of the connector may be set to allow standard size batteries to couple to the connector. For example, the dimensions of the connector may be set to allow a standard AA battery to couple to the connector.

[0038] The vaporizing device of the present disclosure includes a mouthpiece comprising an atomizer configured to vaporize the substance using the heating element. Returning to FIG. 1,

vaporizing device **100** comprises a mouthpiece **118** comprising an atomizer **120** configured to vaporize the substance using plunger assembly **104**. In accordance with embodiments, the atomizer defines a receptacle for receiving the plunger. For example, FIG. 5 illustrates mouthpiece **118** comprising atomizer **120** defines a receptacle **500** for receiving plunger assembly **104** (not shown). In accordance with embodiments, the receptacle is defined to receive a ceramic tip of the plunger. For example, receptacle **500** of FIG. 5 is defined to receive ceramic tip **112** (not shown).

[0039] In accordance with embodiments, the mouthpiece can couple to the casing of the vaporing device. FIG. 1 illustrates, as an example, mouthpiece **118** can couple to casing **102** of vaporing device **100**. In accordance with embodiments, the mouthpiece may include a connector configured to connect the mouthpiece to the casing. In one example, the connector is a metallic component configured to fasten to the casing. In one embodiment, the connector may include one or more rubber gaskets for coupling to the casing. In another embodiment, the connector may include one or more threaded sections for coupling to the casing. In accordance with embodiments, the mouthpiece may be about 1.5 inches tall and ¾ inches in diameter at its widest point. In accordance with embodiments, the metallic component is substantially 3/16 inches tall 3/4 inches in diameter. In accordance with embodiments, the mouthpiece lengths may typically vary from about 1.5 inches tall to 2.5 inches tall. However, it should be noted the mouthpiece may be constructed to larger lengths. In accordance with embodiments, the mouthpiece may include a curved piece of glass.

[0040] In accordance with embodiments, the atomizer defines two or more channels for receiving the substance for vaporizing from the casing. Also in accordance with embodiments, the casing comprises two or more channels aligning with the two or more channels of the atomizer. For example, FIG. 5 illustrates atomizer **120** can define two or more channels **502** for receiving the substance for vaporizing from the casing **102** of FIG. 1. As shown in FIG. 1, casing **102** comprises two or more channels **122** aligning with the two or more channels of atomizer **120**. In accordance with embodiments, the two or more channels of the casing rides in a connector of the casing can couple the casing to the mouthpiece. Also in accordance with embodiments, the connector of the casing is 3/16 inches tall and 11/16 inches in diameter.

[0041] The mouthpiece of the vaporizing device can also define a channel with two or more curvatures between the atomizer and an opening of the mouthpiece. For example, FIG. 5 illustrates

mouthpiece **118** defines a channel **506** with two or more curvatures between the atomizer **120** and opening of the mouthpiece **508**. An example advantage of a channel with two or more curvatures is the vaporized substance cools as it traverses through the curvatures of the channel to the opening of the mouthpiece.

[0042] According to another aspect, a vaporizing device of the present disclosure includes a chamber configured to hold a substance for vaporizing. For example, FIG. 6 illustrates a vaporizing device **600** including a chamber **602** configured to hold a substance for vaporizing. In accordance with embodiments, the substance comprises one of a liquid and an oil. Also in accordance with embodiments, the chamber may comprise one or more indicators measuring the amount of substance within the casing. For example, the chamber **602** may include one or more indicators **604** measuring the amount of substance in the casing. In one embodiment, the chamber may comprise a glass chamber with the one or more indicators etched on the glass casing measuring the amount of substance in the chamber. In an alternative embodiment, the chamber may comprise a window with one or more indicators on the window measuring the amount of substance within the chamber. Thus, a user of the vaporizing device could visually confirm the amount of substance either consumed or available to consume by observing the one or more indicators on the chamber. In accordance with embodiments, the chamber is substantially 1 inch tall and 1/4 inches in diameter. It should be noted that the chamber size may vary in accordance with the size of the casing.

[0043] The vaporizing device may also include an atomizer configured to couple to the chamber and vaporize the substance. For example, FIG. 6 illustrates vaporizing device **600** includes an atomizer **606** configured to couple to the chamber and vaporize the substance. In accordance with embodiments, the chamber comprises a nozzle configured to deliver the substance to the atomizer. For example, FIG. 6 illustrates chamber **602** comprises a nozzle **608** configured to deliver the substance to atomizer **606**. In accordance with embodiments, the nozzle may comprise one or more radial holes for delivering the substance to the atomizer. Also in accordance with embodiments, the vaporizing device may include a cap configured to fasten to the nozzle. Such a cap can prevent the substance from leaving the chamber when the vaporizing device is not in use. In accordance with embodiments, the atomizer is substantially 1.5 inches in diameter and $6/10^{th}$ cm tall.

[0044] In accordance with embodiments, the atomizer may include a dish configured to

receive the substance from the chamber. For example, FIG. 6 shows an atomizer **606** including a dish **610** for receiving the substance from chamber **602**. In accordance with embodiments, the atomizer **606** can include a heating element **612** positioned under the dish for heating the dish **610**. By placing the heating element **612** under the dish **610**, the heating element **612** can evenly heat the substance at a precise temperature. In accordance with embodiments, the heating element **612** can be a triple spiral flat metallic heating coil **200**. In embodiments, the metallic heating coil **200** can be a platinum heating coil. During operation, the heating element **612** can operate between about 2.4 ohms and about 3.0 ohms, or another high resistance depending upon the voltage of the batter. For example, FIG. 6 shows atomizer **606** as including a heating element **612** situated under dish **610** for heating the dish **610**. In accordance with embodiments, the dish is about 1 centimeters in diameter and 0.5 centimeters tall.

[0045] The vaporizing device can also include a casing configured to receive the chamber and the atomizer. For example, FIG. 6 shows a casing **614** that receives or holds chamber **602** and atomizer **606**. In accordance with embodiments, the atomizer comprises two or more radial gaps for releasing the vaporized substance into the casing. As an example, FIG. 6 shows atomizer **606** comprises two or more radial gaps **616** for releasing the vaporizing substance into casing **614**. In accordance with embodiments, the casing may be about 2 inches in length and about 3/4 inches in diameter. It should be noted that the casing length may vary from about 1.5 to 3 inches in length. It is also noted that the casing or any other structure described herein may be any suitable size, shape, or configuration.

[0046] In accordance with embodiments, the chamber can include a threaded plunger. For example, FIG. 6 illustrates chamber **602** including a threaded plunger **618**. In embodiments, the plunger **618** includes a stopper attached to a distal end of the plunger. For example, FIG. 6 illustrates plunger **618** comprises a stopper **620** attached to a distal end of the plunger **618**. In accordance with embodiments, the threaded plunger is about 1 inch long, or any other suitable length. The stopper is about 1 centimeter in diameter, and 2/10ths centimeters thick. In accordance with embodiments, the stopper can be one of a rigid rubber, a medical grade plastic, or any other suitable material. It should be noted that the stopper size may suitably vary in accordance with the dimensions of the chamber.

[0047] The vaporizing device can also include a mechanism coupled to the casing and configured to advance the substance within the chamber. For example, FIG. 6 illustrates a mechanism

622 coupled to casing **614** to advance the substance within chamber **602**. In accordance with embodiments, the mechanism can receive a portion of the threaded plunger. Continuing the previous example, FIG. 6 illustrates mechanism **622** configured to receive a portion of threaded plunger **618**. In accordance with embodiments, the mechanism is configured to rotate the threaded plunger to advance the material within the chamber. For example, mechanism **622** can rotate the threaded plunger **618** to advance the material within chamber **602**. It should be noted that the mechanism **622** of FIG. 6 can rotate plunger **618** similarly as to mechanism **114** of FIG. 1 and FIG. 4. In accordance with embodiments, the mechanism may define two or more channels for receiving the vaporized material from the casing. For example, FIG. 5 illustrates mechanism **622** comprises channels **624** for receiving the vaporized material from casing **614**. In accordance with embodiments, the mechanism is about 1 centimeter in height and about 1.5 inches in diameter.

[0048] The vaporizing device can also include a mouthpiece for receiving the vaporized material from the mechanism. For example, FIG. 6 shows a vaporizing device **600** including a mouthpiece **626** for receiving the vaporized material from mechanism **622**. In accordance with embodiments, the mouthpiece can define two or more intake gaps that align with the two or more channels for receiving the vaporized material from the mechanism. For example, FIG. 6 illustrates mouthpiece **626** can have intake gaps **628** that align with the channels **624** of mechanism **622**.

[0049] In accordance with embodiments, the mouthpiece can include multiple layers of radial gaps arranged between the two or more intake gaps and an opening of the mouthpiece for cooling the vaporized material. For example, FIG. 6 shows a mouthpiece **626** having multiple layers **630** of radial gaps **632**. The mouthpiece **626** also has an opening **634** for cooling the vaporized material from mechanism **622**. Also in accordance with embodiments, the mouthpiece can receive a portion of the threaded plunger for securing the mouthpiece to the casing. In embodiments, the mouthpiece includes a receptacle for receiving the portion of plunger. For example, FIG. 6 shows a mouthpiece **626** that can receive a portion of threaded plunger **618** via receptacle **636** for securing mouthpiece **626** to casing **614**. In accordance with embodiments, the mouthpiece is about 1 inch and 1 centimeter in height and about 1.5 inches in diameter. It should be noted that the mouthpiece length may be between about 1 inch and about 3 inches.

[0050] Now referring to FIG. 7 of the present disclosure. FIG. 7 illustrates an upper half of

an outer shell casing **702** of the vaporizing device **100.** As mentioned above, the outer shell casing **702** may be made of aluminum or similar material. The lower half of the outer shell casing **704** is also shown in FIG. 7. The lower half of the outer shell casing **704** may also be referred to as a lower housing. The lower half of the outer shell casing **704** can contain additional structural and electrical components of the vaporizing device **100** which will be described in detail. Attached or suitably associated to the lower half of the outer shell casing **704** is an oil cartridge **706**, an oil vapor chamber **708**, a vapor chamber assembly **709**, battery **110** (which corresponds to battery **110** as shown in FIG. 1), vapor path mouthpiece **710**, vapor path mouthpiece hole **711**, linear actuators **714**, **716**, and **718**, and **720**, heating coil **715** which corresponds to heating coil **200**), display **722**, and an internal bottom casing **724** of the lower half of the outer shell casing **724**. The internal bottom casing **724** may have space suitable enough to hold a circuit board or associated circuitry.

[0051] In accordance with these embodiments, the oil cartridge **706** may be made up of a cap, including a silicon cap which may hold oil and cap the plunger maintaining sterility and cleanliness, vapor chamber, and a cartridge. The oil cartridge may be interchangeable with a loose-leaf or dry herb cartridge which can be placed inside the vapor chamber housing. The oil cartridge **706** may contain the desired concentrate. In an alternate embodiment, the oil cartridge **706** may be a glass tube. The glass tube **706** may have a plunger in its bottom that fits over a piston. It may come with a removable silicon cap on the top to contain the concentrate within when not in use. The oil cartridge **706 may** attach to the oil vapor chamber **708**. Further, the oil vapor chamber **708** may attach to the oil cartridge **706**. The oil may be pushed inside the oil vapor chamber **708** where it is vaporized. The chamber **708** may be made out of a thermally conductive material to ensure full vaporization. The chamber **708** may have a cap on the top which allows air to enter and exit the chamber through air ports. This allows the user to draw the vapor out of the chamber and through the cap. The cap can be removed to make the chamber easier to clean. As further shown in FIG. 7, the vapor chamber assembly **709** may be made up by both the oil cartridge **706** and the oil vapor chamber **708**. It may include a silicone gasket that may seal the connection between the oil cartridge **706** and the oil vapor chamber **708**. Once the two are connected they can easily be slid inside the housing of the heating element **106**. The battery **110** as shown in FIG. 7 can additionally provides the highest output and safety standards according to current industry standards. The battery may be an 18650 size battery and may also be affixed to the internal bottom casing of the lower half of the outer shell casing **724.** The

vapor path mouthpiece **710**, as shown in FIG. 7, may allow the user of the device to acquire the vapor emitted from the device. A vapor path mouthpiece aperture **711** may receive oil such that the oil can pass into the vapor chamber assembly **709**. Also illustrated are linear actuators **714**, **716**, and **718**, and **720**. The linear actuators convert the motors rotation into forward and backward movement. The linear actuators may also move the piston in and out of the oil cartridge **706**. The piston is attached to the lead screw using an anti-rotation collar (to be discussed in detail below). This changes the rotation into forward power for the piston to slide inside the plunger which resides in the bottom of the cartridge. As the piston moves the plunger through the cartridge, the oil is pushed into the oil vaporization chamber. As further shown, the heating coil **200** can be wrapped around rod **106** in a straight tubular manner. This design provides independent heat to the oil cartridge **706** and vapor chamber **708.** It also allows a more robust and efficient heat up and cool down time for the oil cartridge **706** while also isolating the vapor chamber **708** for oils and turning both the oil cartridge **706** and vapor chamber **708** up for loose leaf. The display **722** displays a user interface which includes indicators pertaining to temperature, whether the device is on or off, various display modes, such as quick mode or advanced mode and the like. The display **722** may be any display such as, organic light emitting diode (OLED), light emitting diode (LED), liquid crystal display (LCD), plasma display panel (PDP), or the like.

[0052] Now turning to FIG. 8 of the present disclosure which illustrates a perspective view of the vaporizing device according to FIG. 7. A vapor path mouthpiece hole **802** is shown to be apart of the vapor chamber assembly **709** and may allow oil to pass into the vapor chamber assembly **709**. The vapor chamber assembly **709** further includes a vapor chamber air path **804** which leads into the vapor chamber assembly **709.** The heating coil **200** is also illustrated in FIG. 8 being attached within the vapor chamber assembly **709.** The heating coil **200** may also correspond to or be interchangeable with a heating foil. Also, a connection component **806** is attached between the oil cartridge **706** and the oil vapor chamber **708**.

[0053] As further shown in FIG. 8, the "plunger cap" 810 may be attached inside **806** of the oil cartridge **706.** The linear actuator **714**, **716**, **718**, and **720** may include an outer screw **812**, a lead screw guide turn stop **814** which may function to drive the outer screw **812**, a lead screw guide inner housing **816** which may be attached to the inner housing to stop rotation of the drive, and outer screw bearings **818**. The linear actuator **714**, **716**, **718**, and **720** may further include an outer housing **820.**

The outer screw **812** may be attached to a motor **822**. The motor **822** illustrated in FIG. 8 may correspond to a pololu motor **822**. The motor **822** is connected to the motor shaft **824**. The motor shaft **824** may also be a pololu motor shaft.

[0054] FIG. 9 is alternate design illustrating a perspective view of the vaporizing device in accordance with embodiments of the present disclosure. Side buttons **902** are located on each side of the vaporizing device. The side buttons **902** are used to activate and deactivate the vaporizing device. The side buttons **902** may also be used to toggle between various settings programmed within the device. Also shown is the display **900** which is located at the center of the vaporizing device. FIG. 10 also illustrates a side perspective view of the right (or left) side of the vaporizing device. Side buttons **1002** can function to activate and deactivate the vaporizing device. Both the side buttons **902** and **1002** may be pressed simultaneously with the side buttons **902** in order to activate, deactivate, or toggle between options presented on the device. A mouthpiece **1004** is shown which may be configured to receive the vaporized material from the mechanism. Also shown is the display **1000** which is located at the center of the vaporizing device.

[0055] The embodiments of the vaporizing device as disclosed above can be incorporated into a variety of uses. For instance, users of the vaporizing device may operate the device in a Quick Mode setting or an Advanced Mode setting. For instance, in a Quick Mode setting, the user may activate the vaporizing device by pushing both side buttons **902** located on the sides of the device 3 times in a repetitious manner. The same can be done in order to deactivate the device. It is noted that when the device is deactivated, the lead screw **814** may automatically retract. Once the device is activated, a welcome screen may appear on the display **722** and displays which type of cartridge is within the device, e.g. loose leaf or oil. Once this occurs, the device can display two options for the user to select from: (1) Quick Mode; or (2) Advanced Mode. The user may be able to toggle between devices by pushing the buttons located closest to the display of the option. For instance, if the display shows Quick Mode on the left side of the screen, then the button corresponding to the left side of the screen should be selected. As such, if the display shows Advanced Mode on the right side of the screen, then the button corresponding to the right side of the screen should be selected.

[0056] In Quick mode, if selected, and the oil cartridge is installed, the device will use the preset temperature and dosage size that is preset within the device. The device may also be preset

using the advanced mode operation of the application. Once the device reaches the preset temperature, it may instruct the user to push one of the side buttons of the device to initiate the motor **822** which will allow the user to use the device via vapor path mouthpiece **710**. When the user utilizes the oil cartridge, the user may push the button again for the same size dosage. The device will remain heated for up to 15 seconds after each iteration in which the motor is engage. The device includes an automatic shut-off inactive status feature where the device may automatically shut-off after 15 seconds if the motor is not engaged via pressing the side button to activate the motor. The user may change the automatic shut-off inactive status feature of the motor to extend up to 30 seconds.

[0057] In Quick mode, if selected, and the loose-leaf cartridge is installed, the device will use the preset temperature and dose size that is preset within the device. The device may also be preset using the advanced mode operation of the application. Once the device reaches the preset temperature, the display may show "ready" and the device will remain heated for 5 minutes. The device's automatic shut-off inactive status feature will not execute until after 5 minutes of inactivity by the motor or if the motor is not engaged via pressing the side button to activate the motor. However, the user may extend the session for 10 minutes by pressing the side buttons of the device.

[0058] If the user selects Advance Mode, and an oil cartridge is installed, the device will first request the dosage size of the substance. Using the dial located on the device, the user may select from half dose, whole dosage, 1.5 times dose, and 2 times a dose. The dosage metrics may also include 0.5, 1.0, 1.5, 2.0. Once the desired dosage is selected, the temperature dial will display the selected temperature. The user may toggle through the various temperature settings and further select a desired setting using the side buttons. The side buttons on the device may be used to scroll and push both side buttons at the same time in order to make a selection.

[0059] Once selected, the device can activate once more, begin the heating process and display an indication that the device is ready for use. As a side note, users may use the associated application downloaded on a remote mobile computing device, such as an IPHONE®, to adjust the settings of the vaporizing device **100**. For instance, the user may activate their application and select advance settings in order to calculate dosage amounts using the percentage of active ingredient of the tested product substance. The application may provide the user with an estimation of how much of a percentage of substance is actually in each dosage size selected.

[0060] If the user selects Advance Mode, and loose-leaf cartridge is installed, the device will first request the dosage size of the substance. Using the dial located on the device, the user may select from half dose, whole dosage, 1.5 times dose, and 2 times a dose. The dosage metrics may also include 0.5, 1.0, 1.5, 2.0. Once the desired dosage is selected, the temperature dial will display the selected temperature. The user may toggle through the various temperature settings and further select a desired setting using the side buttons. The side buttons on the device may be used to scroll and push both side buttons at the same time in order to make a selection. Once selected, the device will activate once more, begin the heating process and display an indication that the device is ready for use.

[0061] FIG. 11 is perspective top view of an alternate internal design of the vaporizing device in accordance with embodiments of the present disclosure. FIG. 11 includes battery **1100** which can be affixed to the lower housing of the device and can include a rechargeable 18650 ion battery. The display **1102** and circuit board **1106** may be positioned adjacent from each other. The circuit board **1106** may be any type of circuit board known in the art including a protected or printed circuit board. Side buttons **1002** are further illustrated as appearing on the sides of the device. Ceramic cooling plates **1108** are shown behind the attached circuit board **1106**. The ceramic cooling plates **1106** may include an inner path and contain two-parts which may be separated apart. A mouthpiece cooling chamber **1110** is further illustrated at the back of the device boarding the side buttons **1002.** The housing **1114** that the heating element **612** is wrapped around can be filled with either loose leaf or oil within the oil vapor chamber **708**. The plunger **1116** which is explained in greater detail above, is further illustrated in the alternate design of FIG. 11. The plunger **1116** is attached to an anti-rotation collar assembly **1118**, which in turns is attached to an encoder **1120**. The anti-rotation collar assembly **1118** may also attach to the lead screw **814**. The encoder **1120** controls the speed and position of the motor **1122**. The encoder **1120** may also be known as an encoder motor **1120.**

[0062] FIG. 12 illustrates a bottom view of the alternate internal design of FIG. 11. In addition, FIG. 12 illustrates a gear box **1214** and encoder rod **1216.** FIG. 13 is a perspective top exploded view of the internal components of FIG. 11 in accordance with embodiments of the present disclosure. In addition, a loose-leaf vapor chamber **1308**, anti-rotation collar plunger assembly **1310,** lower housing **1318,** and motor **1312** (which may correspond to the motor **822)** are illustrated. The loose-leaf vapor chamber **1308** may be interchanged with the oil vapor chamber **708**. The anti-rotation

collar plunger assembly **1310** connects the plunger **1116** to lead screw **816**. The anti-rotation collar plunger assembly **1310** may also prevent the plunger **1116** and lead screw **816** from turning so as to inhibit the functionality of the vaporizer. The anti-rotation collar plunger assembly **1310** may also connect to the anti-rotation collar assembly **1118**. FIG. 14 is perspective exploded top view of the structural components of the vaporizer as shown in FIG. 11 in accordance with embodiments of the present disclosure. The perspective exploded top view for FIG. 14 includes all the components disclosed in FIG. 11, as well as additional components from FIG. 11. For instance, FIG. 14 discloses a miniature precision threaded rod **1402.** The miniature precision threaded rod **1402** or lead screw may be attached to the gears which are being rotated by the motor. The rotation of the lead screw may be configured to move the piston forwards and backwards. It is threaded into the anti-rotation collar that may convert its rotation into forward or backward force. FIG. 14 further discloses a cap **1404,** an oil cartridge housing **1408, and** a gasket interface **1410.** The gasket interface **1410** seals the Oil Cartridge connection to the oil chamber. This may prevent oil from being pushed into the gap when the piston is pushing the plunger and also force the oil to take the path of least resistance into the oil vaporization chamber. FIG 14 also discloses a vapor chamber housing **1414** and an oil heating chamber **1412.** The oil heating chamber is made of a thermally conductive material and is heated up by the heaters **106**. The chamber is heated to the vaporization temperature of the oil. Converting it into a gas which is then inhaled by the user. The cap **1404** may hold oil and also cap or close the plunger, thus, maintaining sterility and cleanliness. The cap **1404** may also be attached to the oil cartridge **704**. The dry herb or loose-leaf cartridge may be placed inside the vapor chamber housing **1414** instead of the oil vapor chamber housing. One cartridge (e.g. loose-leaf or oil) may be stored in one chamber, such as the oil heating chamber, vapor chamber, or loose-leaf chamber, and the other cartridge may be placed inside of the oil heating chamber housing.

[0063] While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the presently disclosed subject matter. Indeed, the novel methods, devices, and systems described herein may be embodied in a variety of other forms. Furthermore, various omissions, substitutions, and changes in the form of the methods, devices, and systems described herein may be made without departing from the spirit of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the presently disclosed subject matter.

Claims

1. A vaporizing device comprising:
a casing comprising a chamber configured to hold a substance for vaporizing;
a plunger comprising a heating element inserted within the casing;
a mechanism configured to advance the substance within the chamber; and
a mouthpiece comprising an atomizer that couples to the chamber, configured to vaporize the substance using the heating element and receive the vaporized substance from the mechanism.

2. The vaporizing device of claim 1, wherein the substance for vaporizing comprises one of a liquid and an oil.

3. The vaporizing device of claim 1, wherein the plunger comprises a threaded rod inserted within the casing.

4. The vaporizing device of claim 3, wherein the plunger comprises a stopper configured to traverse the threaded rod.

5. The vaporizing device of claim 3, wherein the heating element comprises a metallic heating coil configured to conduct heat within an interior of the threaded rod.

6. The vaporizing device of claim 5, wherein the threaded rod comprises an insulating material within the interior of the threaded rod for insulating the metallic heating coil.

7. The vaporizing device of claim 5, further comprising a ceramic tip, and
wherein the threaded rod is configured to receive the ceramic tip.

8. The vaporizing device of claim 7, wherein the ceramic tip comprises a heat sink configured to receive the metallic heating coil.

9. The vaporizing device of claim 1, wherein the mechanism is configured to rotate the plunger to advance the substance in the syringe casing.

10. The vaporizing device of claim 1, wherein the mechanism operatively couples to the casing and a battery of the vaporizing device.

11. The vaporizing device of claim 10, wherein the mechanism is configured to connect the battery to the heating element of the plunger.

12. The vaporizing device of claim 1, wherein the mouthpiece is configured to couple to the casing.

13. The vaporizing device of claim 1, wherein the atomizer defines two or more channels for receiving the substance for vaporizing from the casing.

14. The vaporizing device of claim 1, wherein the atomizer defines a receptacle for receiving the plunger.

15. The vaporizing device of claim 1, wherein the mouthpiece defines a channel with two or more curvatures between the atomizer and an opening of the mouthpiece.

16. The vaporizing device of claim 1 further comprising:
an anti-rotation collar assembly, wherein the anti-rotation collar is configured to connect a motor encoder; and
an anti-rotational collar plunger assembly, wherein the anti-rotation collar plunger assembly is configured to connect to the plunger.

17. A vaporizing device comprising:
a chamber that holds a substance for vaporizing;
an atomizer that couples to the chamber and vaporizes the substance;
a dish that receives the substance from the chamber;

a casing that receives the chamber and the dish;

a mechanism coupled to the casing, wherein the mechanism advances the substance within the chamber; and

a mouthpiece that receives the vaporized substance from the mechanism.

18. The vaporizing device of claim 17, wherein the substance comprises one of a liquid and an oil.

19. The vaporizing device of claim 17, wherein the chamber comprises a nozzle that delivers the substance to the atomizer.

20. The vaporizing device of claim 17, wherein the atomizer comprises:

a heating element situated under the dish that heats the dish.

21. The vaporizing device of claim 20, wherein the atomizer comprises two or more radial gaps for releasing the vaporized substance into the casing.

22. The vaporizing device of claim 17, wherein the chamber comprises a threaded plunger.

23. The vaporizing device of claim 22, wherein the mechanism :

receives a portion of the threaded plunger; and

rotates the threaded plunger to advance the substance within the chamber.

24. The vaporizing device of claim 23, wherein the mechanism further defines two or more channels that receive the vaporized substance from the casing.

25. The vaporizing device of claim 24, wherein the mouthpiece comprises two or more intake gaps that align with the two or more channels for receiving the vaporized substance from the mechanism and multiple layers of radial gaps arranged between the two or more intake gaps and an opening of the mouthpiece for cooling the vaporized substance.

26. The vaporizing device of claim 17, wherein the mouthpiece receives a portion of the threaded plunger to secure the mouthpiece to the casing.

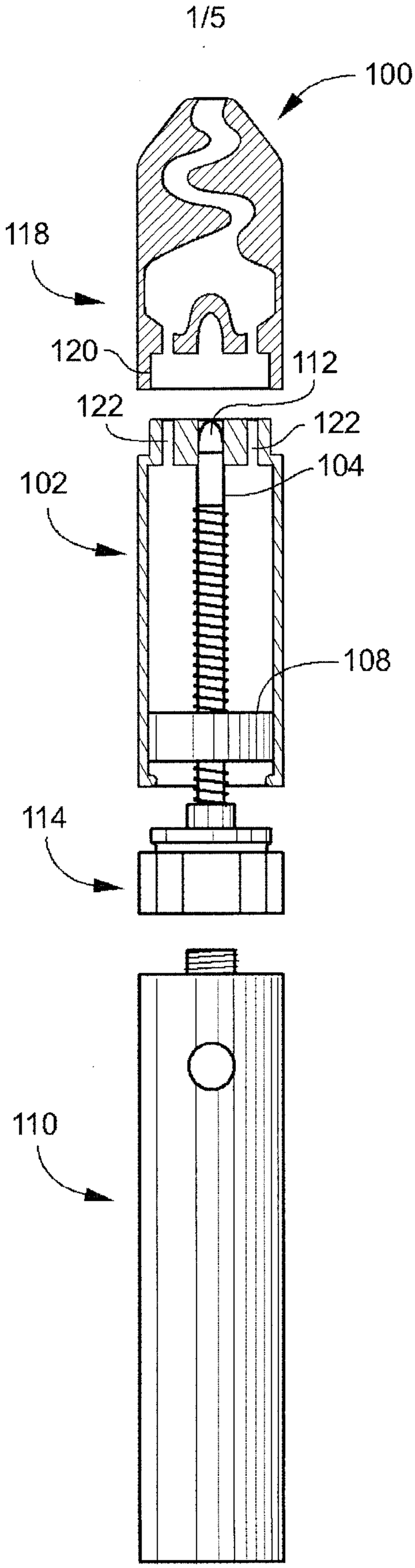
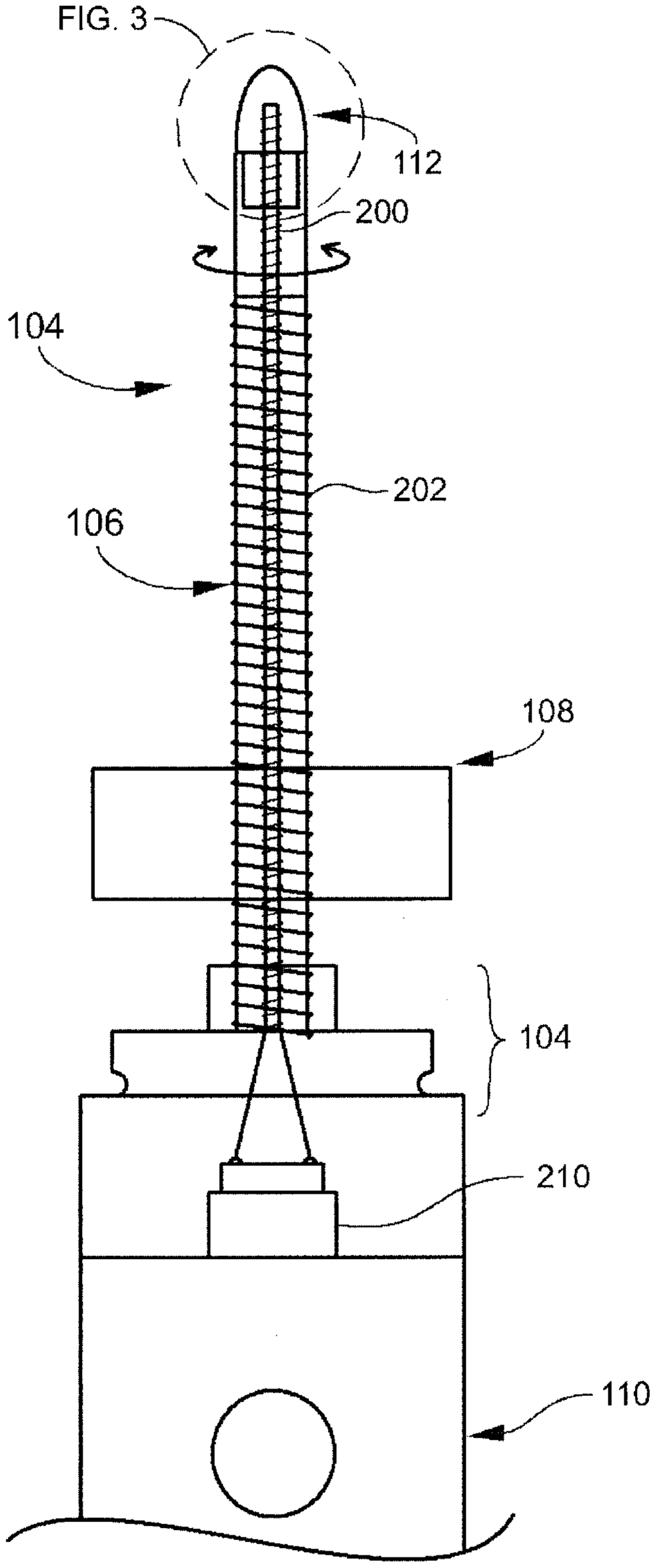


FIG. 1

FIG. 3



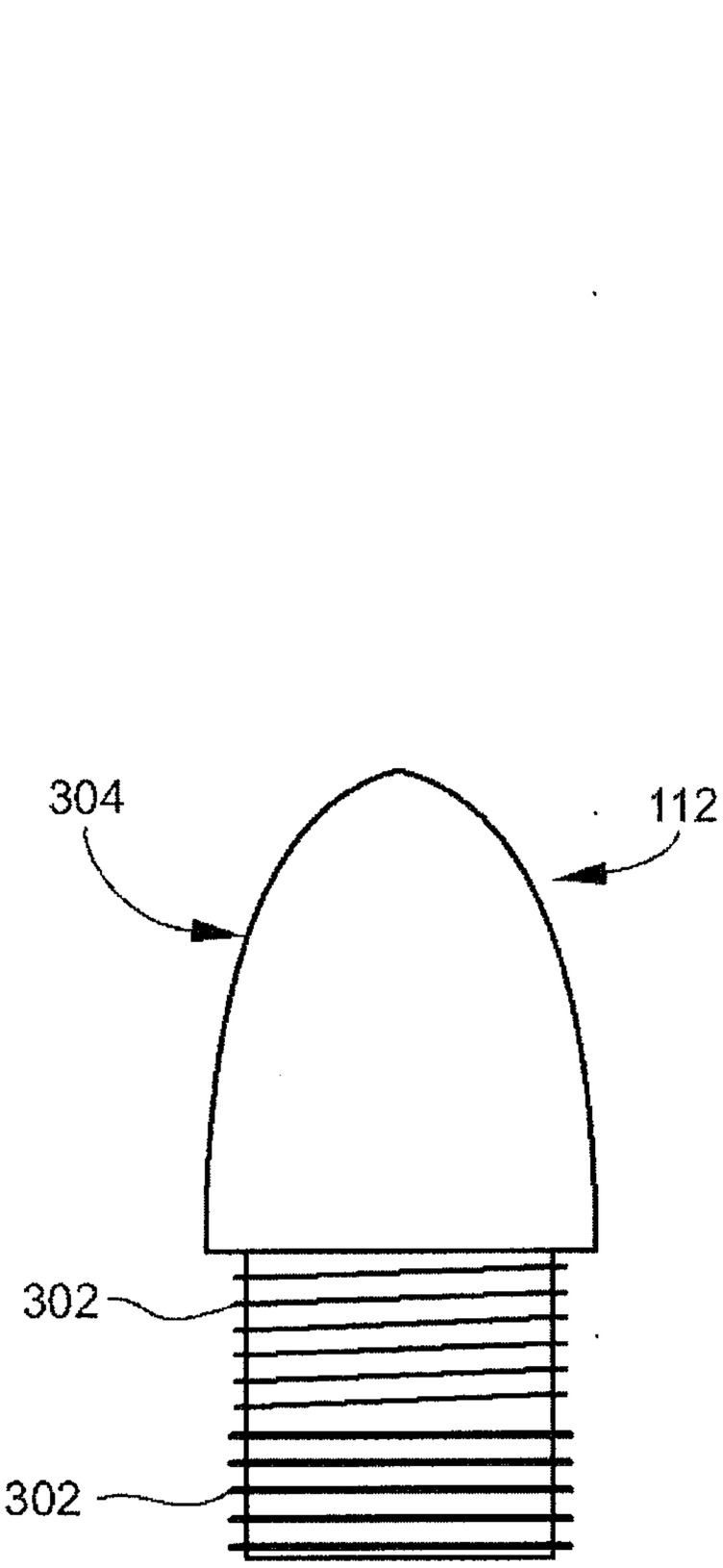


FIG. 3

FIG. 2

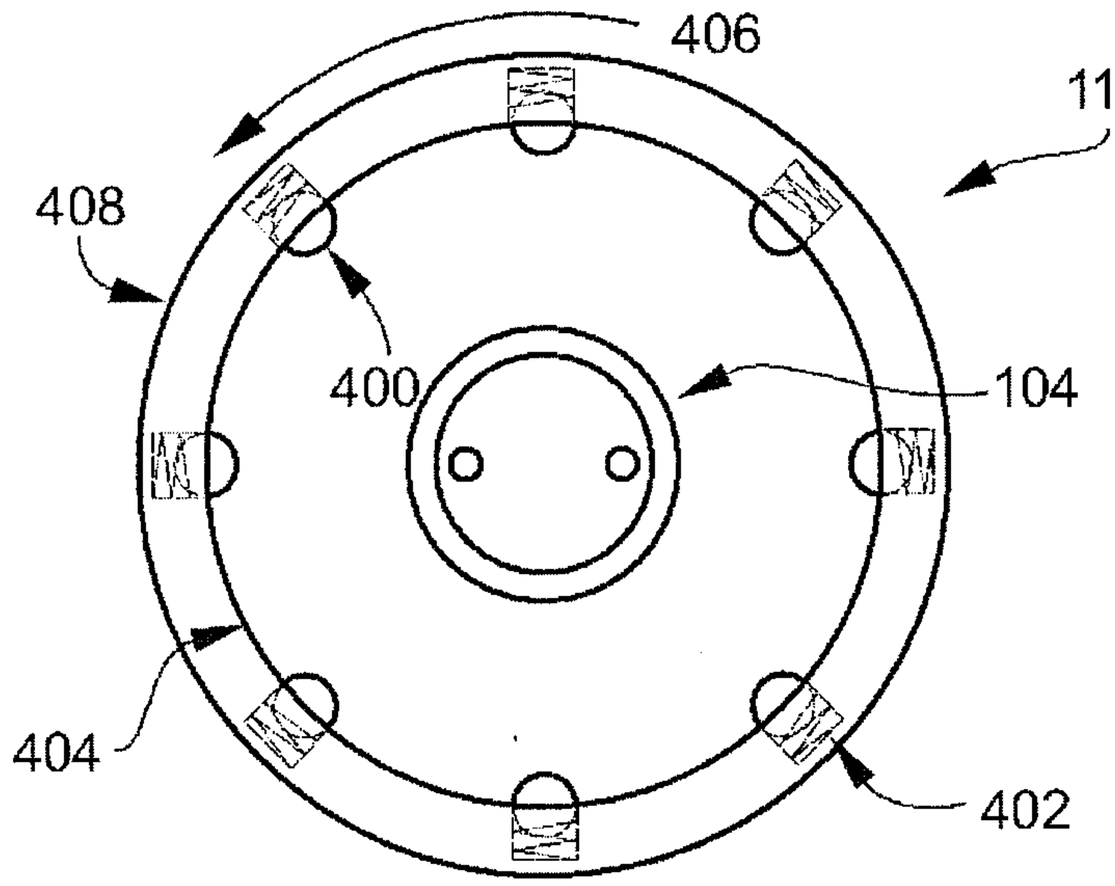


FIG. 4A

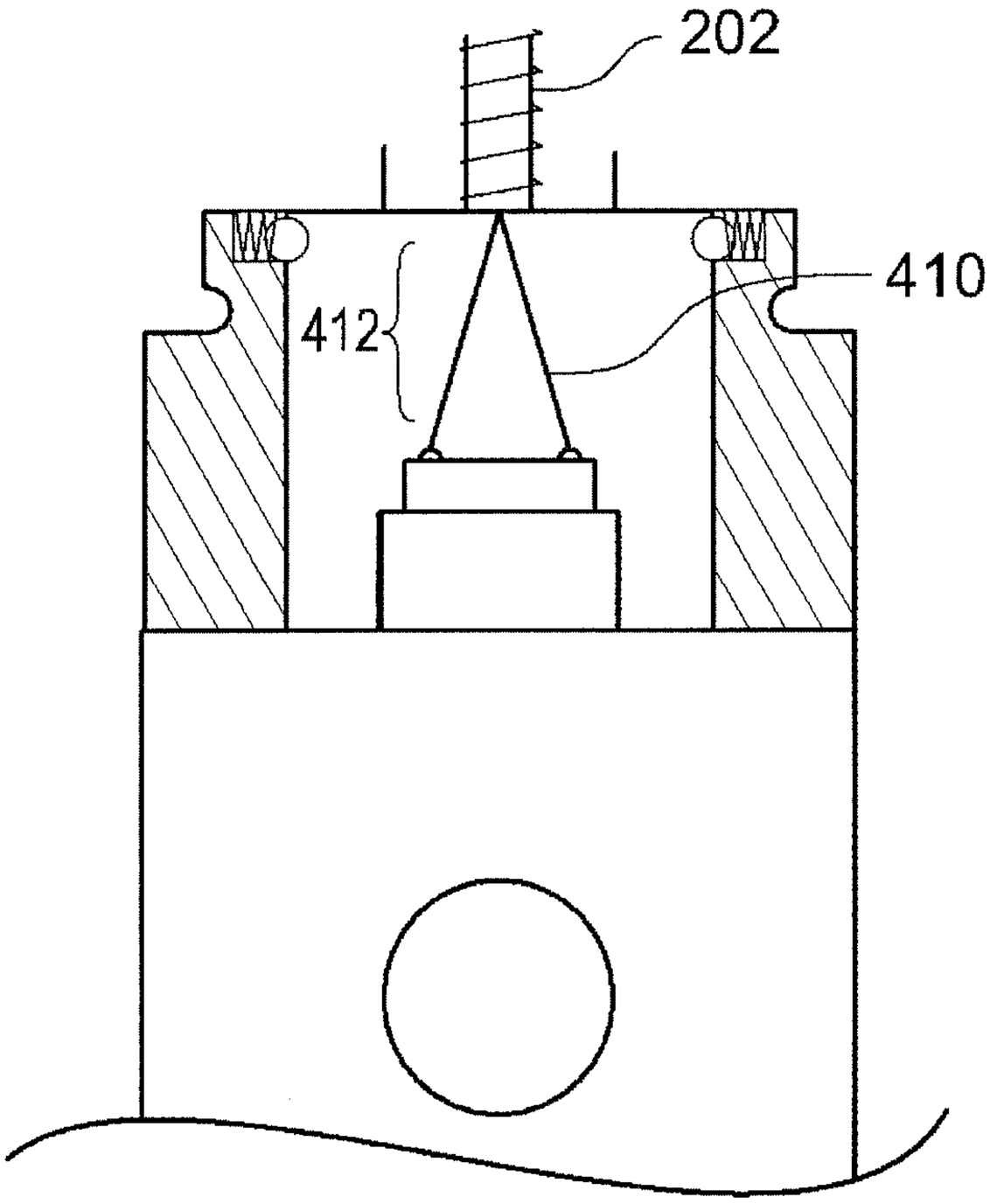


FIG. 4B

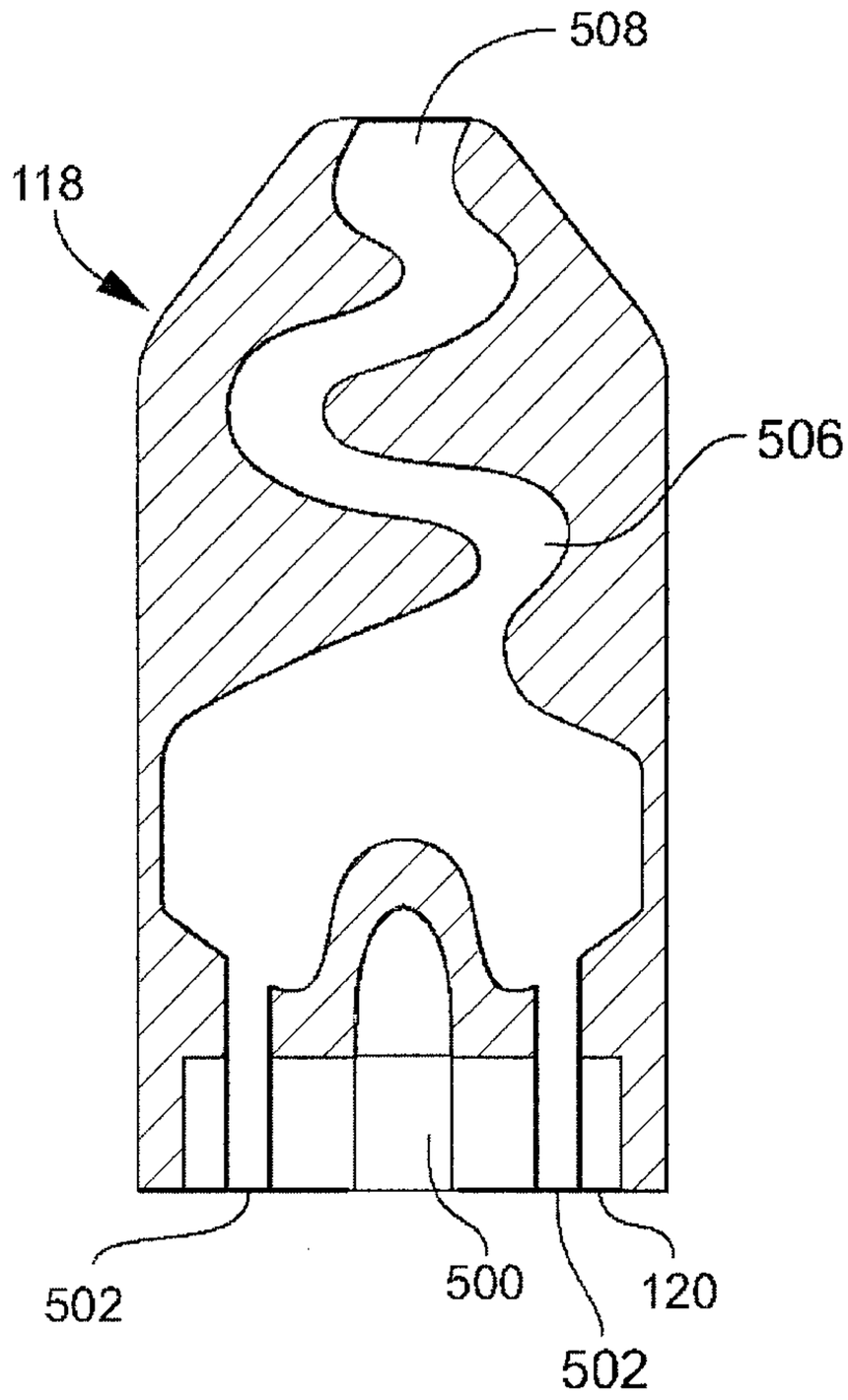


FIG. 5

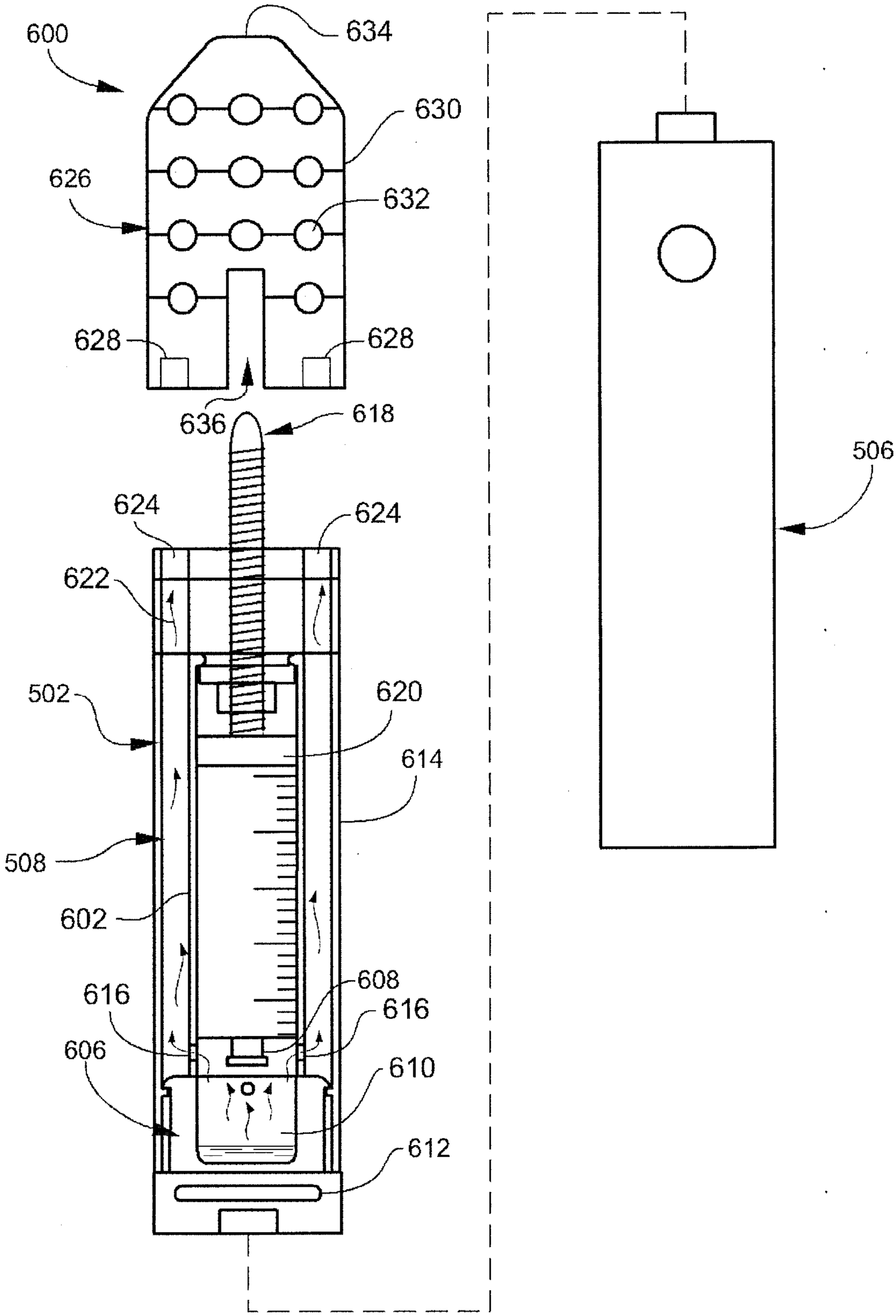

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FIG. 6

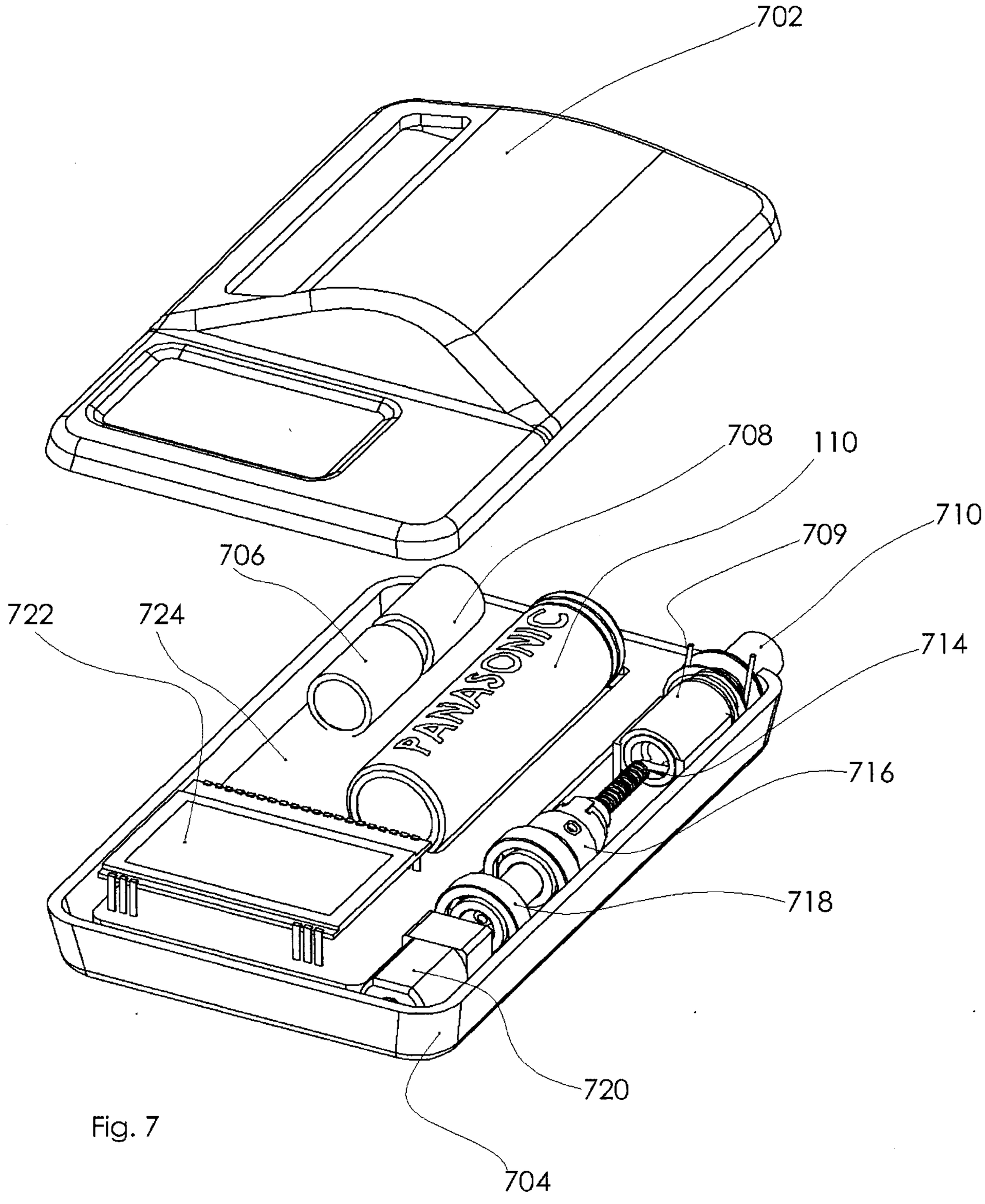

Fig. 7

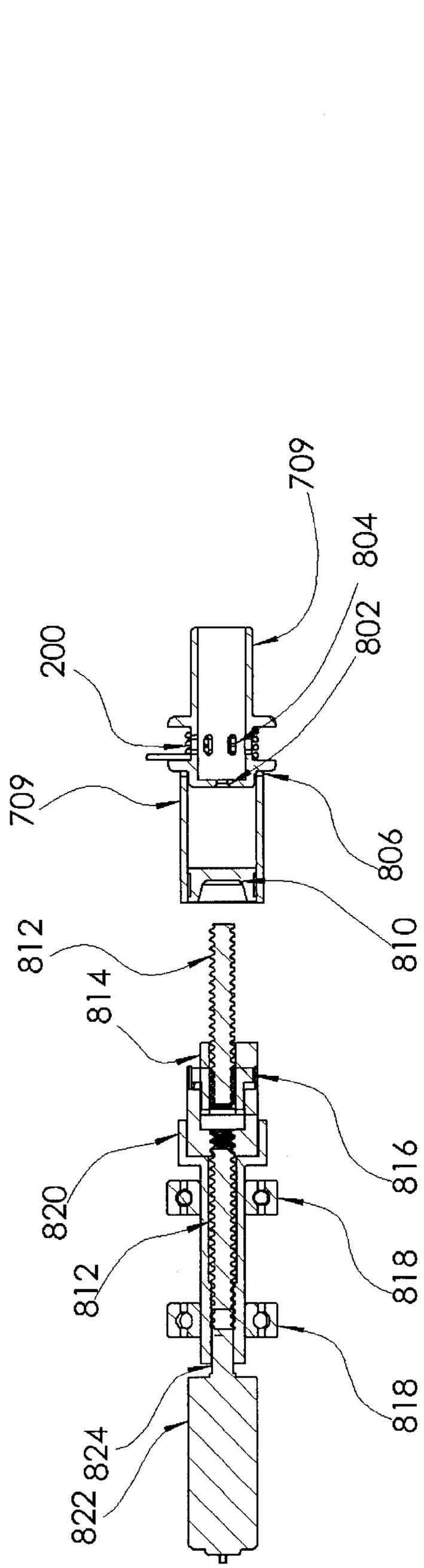

Fig. 8

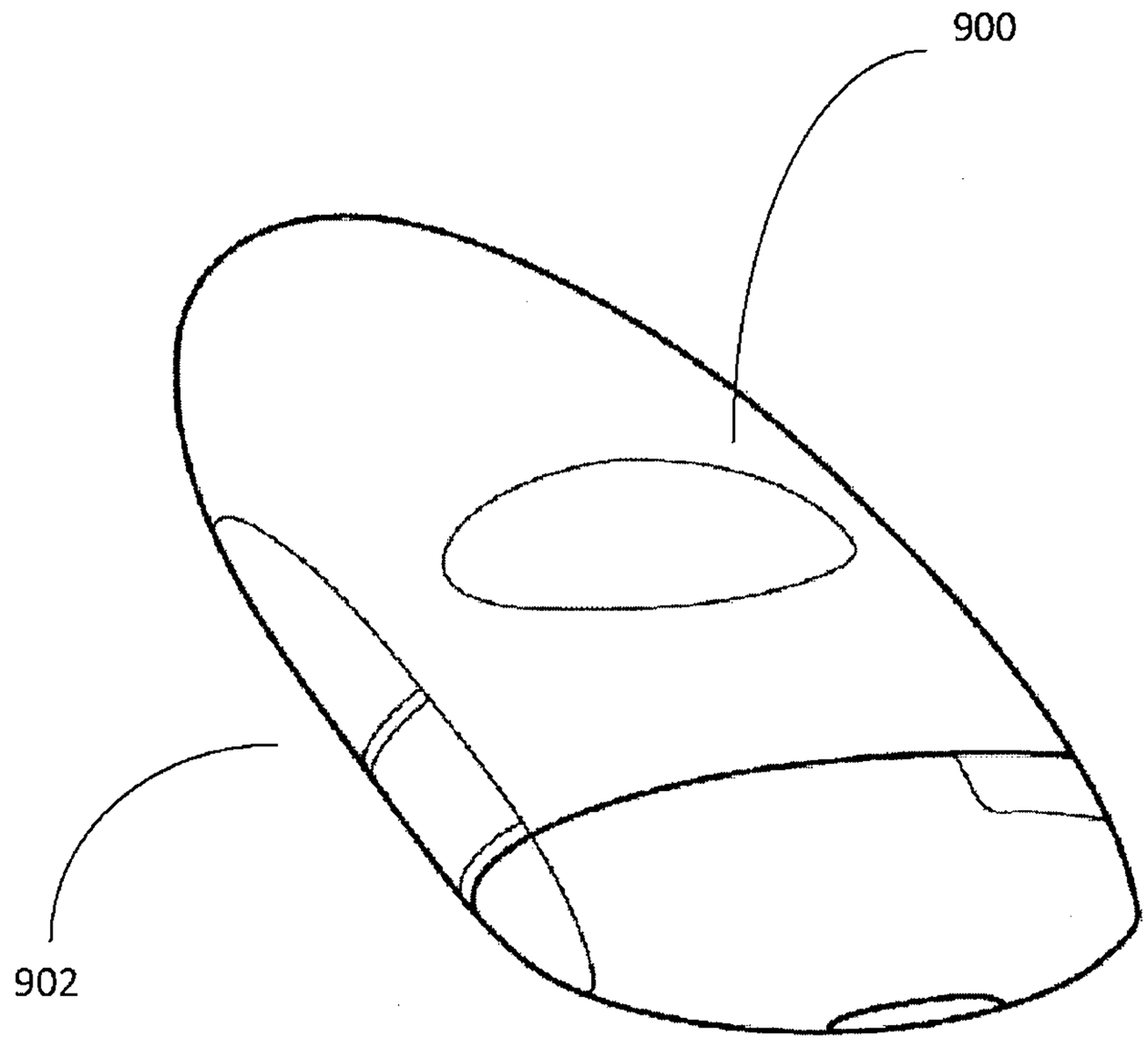

FIG. 9

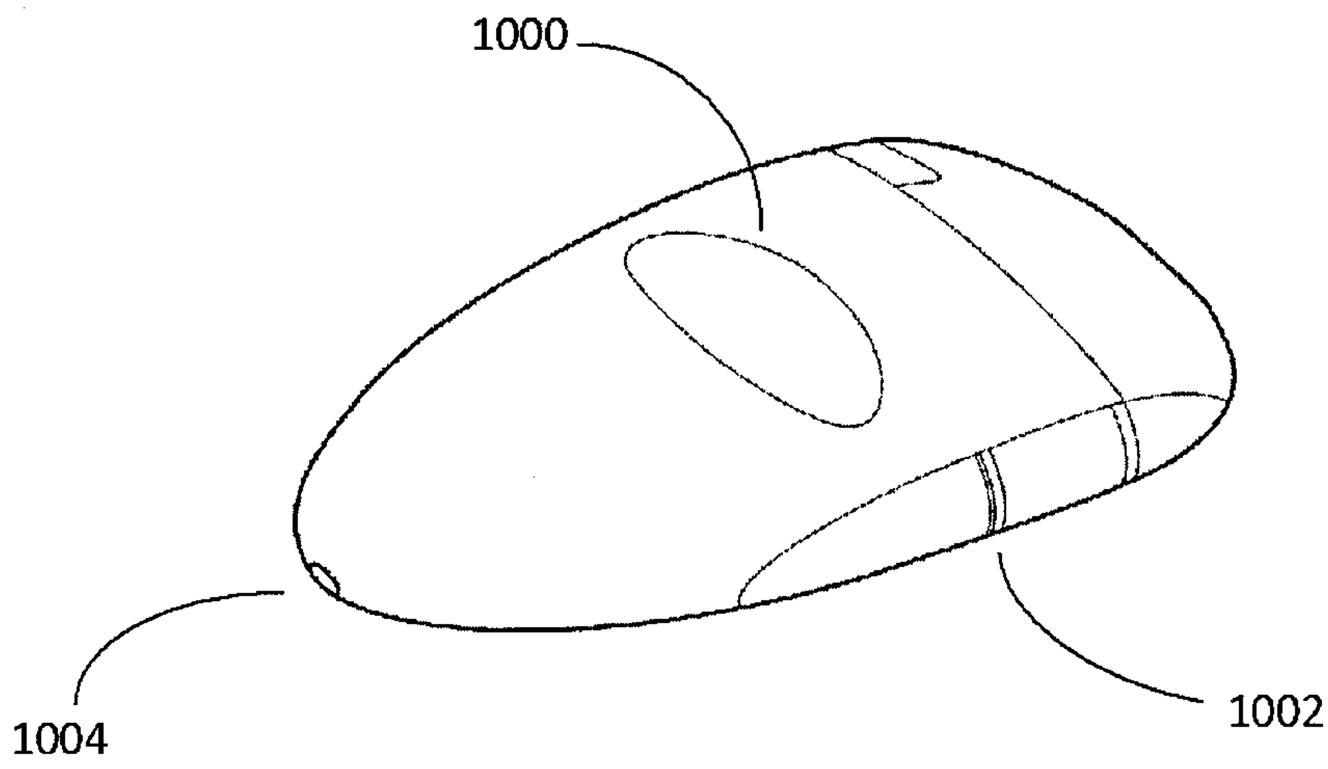

FIG. 10

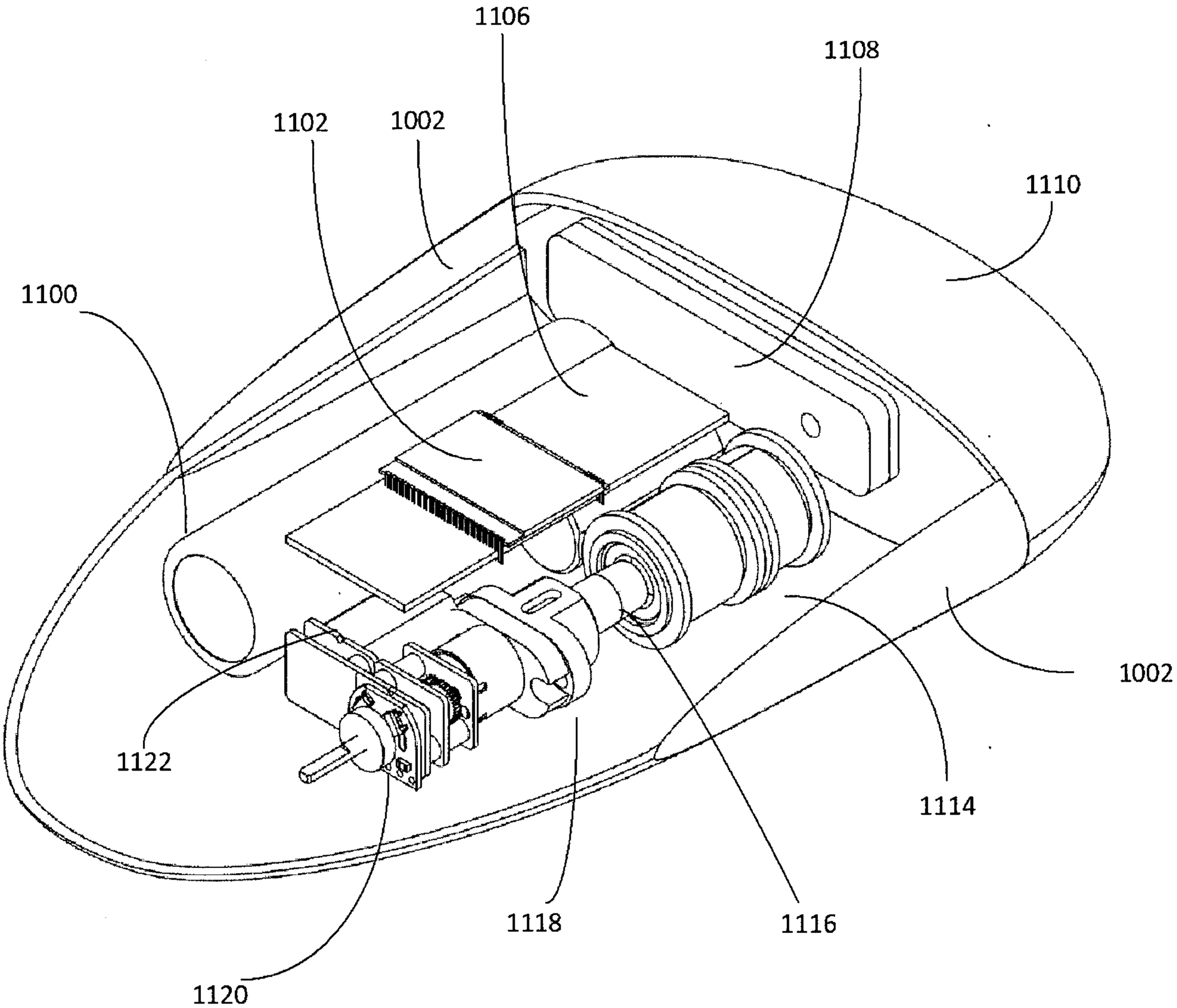

FIG. 11

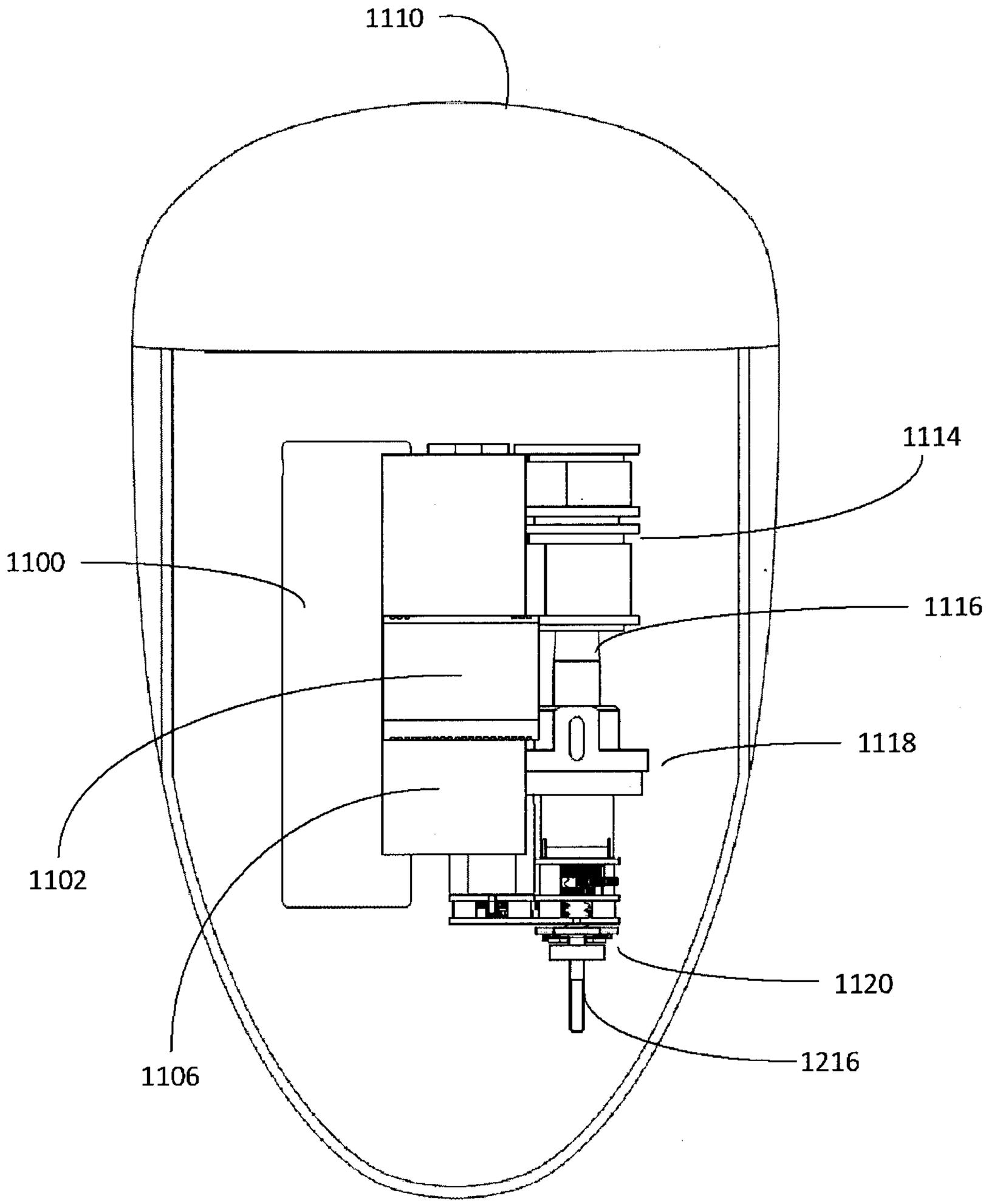

FIG. 12

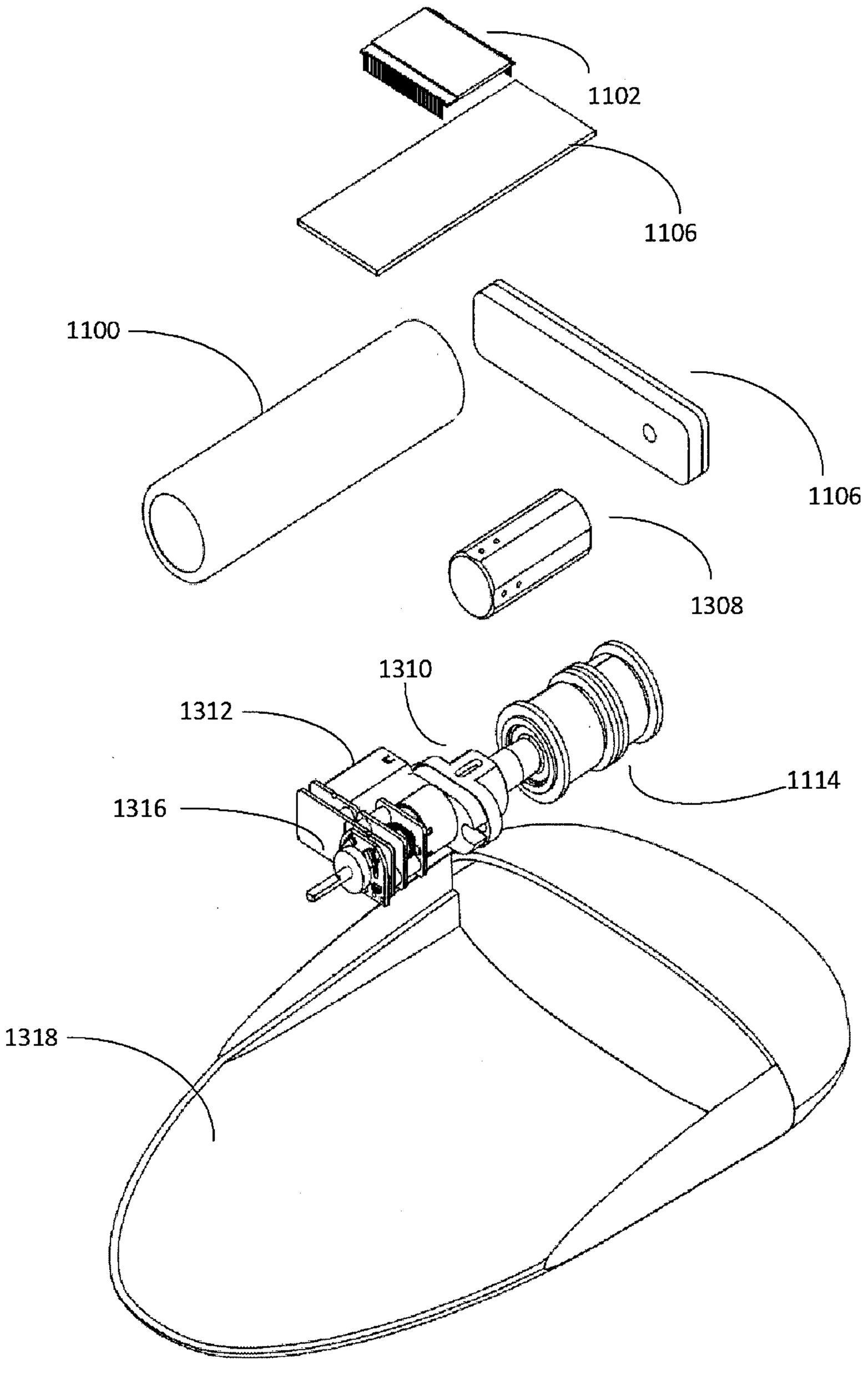

FIG. 13

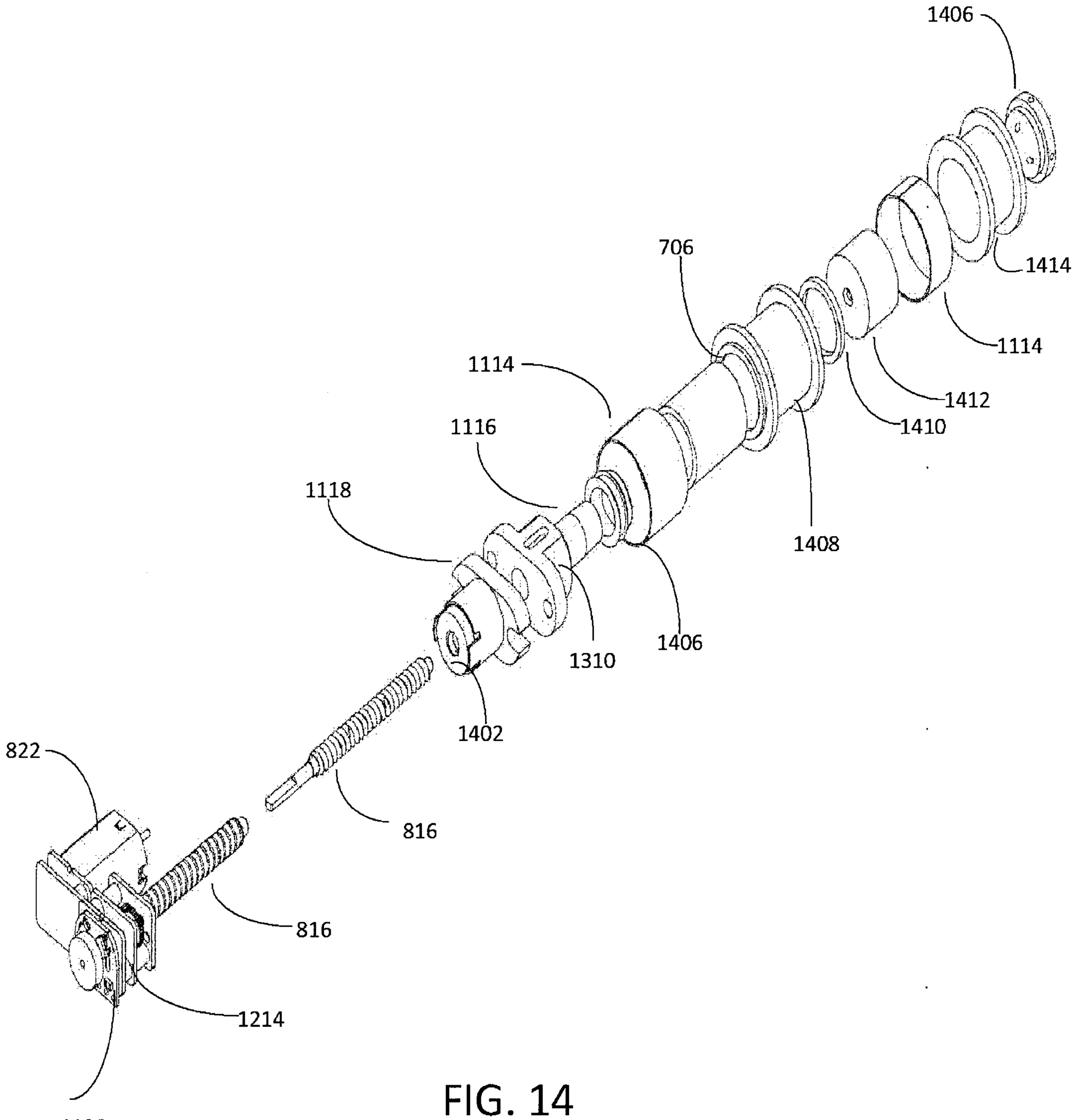
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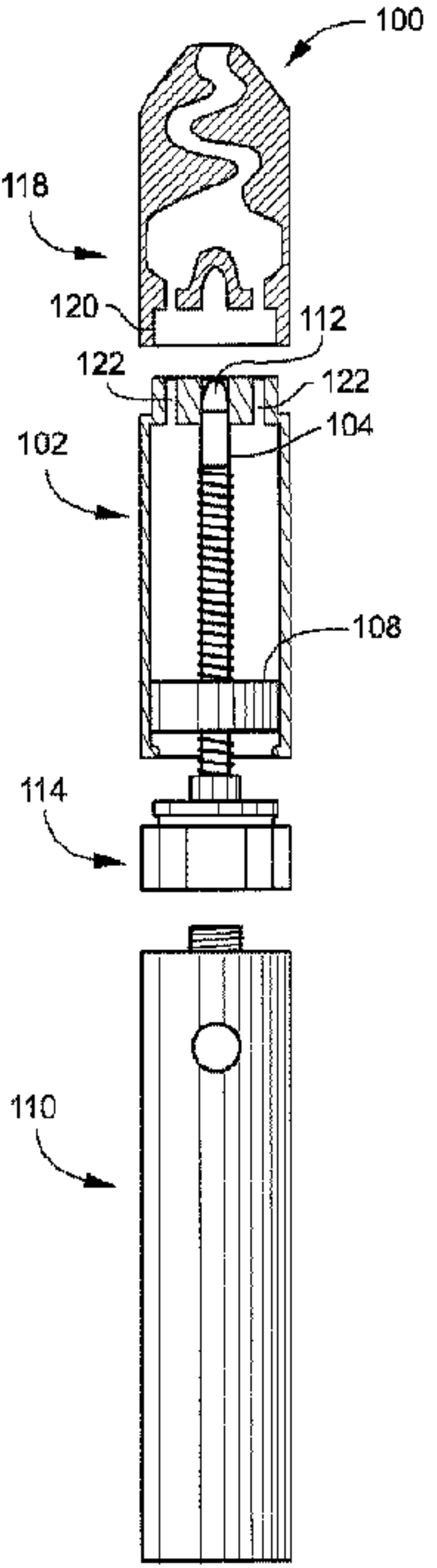
FIG. 14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