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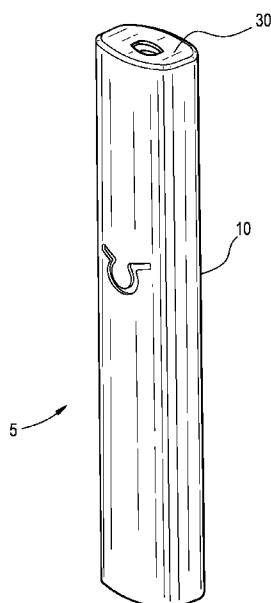
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FIG. 1



(57) Abstract: A vaporizer comprising an airflow routing/governing system and a locking mouthpiece is described in various embodiments. In various embodiments, a portable vaporizer comprising an airflow routing/governing system, a locking mouthpiece, and a label is provided. In various embodiments, a recyclable vaporizer is provided and method of disassembling the recyclable vaporizer.

PORTABLE VAPORIZER

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is an international patent application filed in accordance with the patent cooperation treaty. This international application claims priority benefit of U.S. Provisional Patent Application Ser. No. 62/650,272, filed March 29, 2018, and entitled "Portable Vaporizer." The disclosure of the aforementioned Provisional Patent Application Ser. No. 62/650,272 is hereby incorporated by reference in its entirety.

BACKGROUND

[0002] Vaporizers, or portable vaporizers, are generally battery powered devices that provide an alternative to burning, allowing for vaporizing of inhalation ingredients often from plant material such as tobacco, various herbs, herbal blends, and cannabis. Vaporizers provide for a healthier experience than burning with exciting and diverse user experiences.

SUMMARY

[0003] I like to think that vaporization experiences can achieve a sense of well-being. What is needed is that perfectly tuned vaporizer experience. Optimal vaporizing experiences are often hindered by undesirable flow of vapor and/or clogging due to unintended blockage from leaking liquids or substances contained within the vaporizer.

[0004] To address problems in the art with respect to providing an optimal vaporizing experience provided herein, in various embodiments, is a vaporizer that produces a desirable flow of vapor due to a controlled, consistent airflow that is unlikely to clog due to unintended blockage from leaking liquids to be vaporized. The vaporizer described herein, in various embodiments, comprises a consumer safety benefit due to mechanical features that prevent access to the liquids or substances contained within. In addition, in various embodiments, provided herein is a vaporizer that has a label describing vaporizable contents provides for additional user optimal experience. The label, in some embodiments, is affixed to the interior chassis of the vaporizer. In various embodiments, the label is inset into a well such that its exterior surface is flush with the bottom edge of the exterior housing.

[0005] In various embodiments provided herein is a vaporizer, or portable vaporizer, comprising an airflow routing and governing system which comprises an integrated locating pin and fresh air intake tube that locks and aligns the vaporizer exterior housing to the interior chassis of the

vaporizer. The airflow routing and governing system, in various embodiments, serves as the primary aperture through which air which will later be used to create vapor to be inhaled enters the device in a controlled fashion. In various embodiments, further airflow routing and governing is facilitated by an airflow sensor routing gasket comprising an aperture that governs the airflow to an integrated airflow sensor and IC assembly and is coupled to a corresponding aperture in the airflow routing/governing gasket such that when coupled the apertures align to create a single tube that connects airflow between the two areas.

[0006] In various embodiment, provided herein is a vaporizer, portable vaporizer, comprising an airflow routing and governing system, a locking mouthpiece, and a label describing vaporizable contents. In various embodiments, provided herein is a portable vaporizer comprising an airflow routing and governing system, a locking mouthpiece which further comprises a mouthpiece gasket that seals against the interior walls of a liquid tank to enable vapor flow to the user to proceed with no leaks, and a label describing the vaporizable contents.

[0007] In various embodiments, the vaporizer provided herein comprises a heating element connected to a power source that provides wattage in a range configured to provide for optimal vaporizer experiences.

[0008] In some embodiments described herein, a vaporizer is described that provides a desirable flow of vapor due to a controlled consistent airflow, a locking mouthpiece that prevents unauthorized user access, structure to prevent resist clogging and prevent leakage, and a label element that describes the vaporizer contents.

[0009] In various embodiments, provided herein is a vaporizer wherein the wattage ranged is tuned to provide an optimal vaporizer experience.

[0010] Optimal vaporizing experience can be achieved, in some embodiments described herein, by using a controlled consistent airflow using an airflow routing and governing system comprising an integrated locating pin and fresh air intake tube that locks and aligns the exterior housing to the interior chassis of a vaporizer.

[0011] The vaporizer described herein, in various embodiments, provides an improvement of prior devices through the integration of the functions of the primary aperture for controlling fresh air intake with the locking and unlocking features of the locating pin.

[0012] In some embodiments, provided herein is a vaporizer that achieves an optimal vaporizing experience producing a desirable flow of vapor due to a controlled consistent airflow. The

vaporizer described in various embodiments herein addresses the problem of providing an optimal vaporizing experience by producing a desirable flow of vapor due to a controlled, consistent airflow, wattage calibrated to produce desired temperature, and combinations thereof. The vaporizer described herein, in various embodiments, provides is an improvement of prior devices in that it does not clog due to unintended blockage from leaking liquids to be vaporized. In some embodiments described herein, a consumer safety benefit is achieved by mechanical features that prevent access to liquids or substances contained within.

[0013] In various embodiments described herein, the tangs on the locking mouthpiece form a mechanical engagement with the corresponding slots in an interior chassis such that the mouthpiece cannot be removed without a tool, such as pliers, and physical effort beyond the capabilities of a child to prevent access to the contents of a liquid tank to prevent ingestions of the contents of the liquid tank by a child.

[0014] In some embodiments described herein, provided is single use vaporizer capable of being disassembled. While in various embodiments, the vaporizer described herein is disposable, in some embodiments, the vaporizer is recyclable. In some embodiments described herein, provided is a single use vaporizer cable of being disassembled and recycled.

[0015] In various embodiments described herein, the vaporizer, the device, is designed for recycling. In some embodiments, the vaporizer described herein is disposable. In some embodiment described herein, the vaporizer is recyclable, and was designed to be recyclable by having easily separable constituent parts, such as the battery, plastics, metals, and electronics, that wherein the parts have accepted recycling or e-waste treatment destination. The recyclable vaporizer, in various embodiment is designed so that individual users can recycle the vaporizer following simple procedures outlined herein. The integrated locating pin and fresh air tube can function in the recycling procedures as an unlocking pin between external housing and the interior chassis. The vaporizer can be separated into its constituent parts to be recycled and the process of disassembly can be actuated by using the integrated locating pin and fresh air tube to actuate disassembly by pressing the integrated locating pin and fresh air tube down from the surface of the exterior housing and when the integrated locating pin and fresh air tube is below the level of the inside surface of the exterior housing the exterior housing becomes decoupled from the interior chassis. The interior chassis once decoupled from the exterior housing can be removed from the exterior housing by pushing and pulling it from the exterior housing. Thus, the

integrated locating pin and fresh air tube has an additional function in the disassembly process. In various embodiments, the integrated locating pin and fresh air tube can be pressed down to decouple the exterior housing from the interior chassis using a standard ballpoint pen or thumbtack, the exterior shapes of which are calibrated with the internal diameter of the integrated locating pin and fresh air intake tube. On pressing on the integrated locating pin and fresh air tube, mechanical engagement is created, allowing the pen or thumbtack to gain purchase on the integrated locating pin and fresh air tube to press it downwards and out of the plane of the exterior housing such that the interior chassis, now decoupled from the exterior housing, can easily slide out of the exterior housing.

[0016] In some embodiments, the vaporizer comprises a battery pull tab which enables easy removal of the battery from the battery well. The pull tab is configured, in some embodiments, to be disposed between the battery and interior chassis. In various embodiments, the pull tab and interior chassis are compressed together and an adhesive layer can cover an exposed area of the battery such that the battery adheres to the interior chassis, and wherein the pull tab can, in various embodiments, be reinforced in the graspable portion of the pull tab that, in various embodiments, protrudes from the battery and interior chassis.

[0017] In various embodiments, the vaporizer comprises an integrated locating pin and fresh air intake tube and battery pull tab that facilitate disassembling the vaporizer. In various embodiments, the vaporizer which comprises an integrated locating pin and fresh air intake tube and battery pull tab that facilitate disassembling the vaporizer is comprised of recyclable parts and is a recyclable vaporizer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. 1 is a perspective view of a vaporizer in some embodiments;

[0019] FIG. 2 is perspective cross-sectional view of a vaporizer;

[0020] FIG. 3 shows a cross sectional view of an embodiment of a vaporizer;

[0021] FIG. 4 shows a detail of the locking mouthpiece 30 and mouthpiece gasket 35 of an embodiment of a vaporizer and a cross sectional view of an embodiment of a portable vaporizer;

[0022] FIG. 5 show an exploded view of a locking mouthpiece that can be used in various embodiments of a vaporizer;

[0023] FIG. 6 is a cross sectional view of an interior chassis of an embodiment of a vaporizer;

[0024] FIG. 7 is a perspective view of an embodiment of the vaporizer;

[0025] FIG. 8 shows a exploded view of an airflow routing /governing gasket;

[0026] FIG. 9A shows a view of the vaporizer lying flat showing the lighting logo;

[0027] FIG. 9B show the opposite side of the vaporizer from FIG. 9A showing the exterior housing with integrated locating pin and fresh air intake tube;

[0028] FIG. 10A illustrates pressing down on the integrated locating pin and fresh air intake tube to unlock the exterior housing from the interior chassis.

[0029] FIG. 10B show the interior chassis extending from the exterior housing and illustrates steps in recycling the vaporizer described herein;

[0030] FIG 10C shows the exterior housing separated from the interior chassis;

[0031] FIG. 10D shows the interior chassis separated from the exterior housing and indicates, by the arrows, that in some embodiments, the next step is to rotate the vaporizer along the long axis, or flip the vaporizer over, to show the front side;

[0032] FIG. 10E show the interior chassis oriented to reveal the battery and a battery pull tab with numeric graphic;

[0033] FIG. 10F illustrates cutting battery lead wires with a scissor after the battery has been removed from the interior chassis;

[0034] FIG. 10 G illustrates the battery separated from the interior chassis;

[0035] FIG. 10 H illustrates that the flexible interior chassis arms can be pulled apart to expose the liquid tank;

[0036] FIG. 10I illustrates some of the components of the recyclable vaporizer in various embodiments and the direction from which the locking mouthpiece and components can be pulled from the interior chassis;

[0037] FIG. 10J shows further disassembly of the recyclable vaporizer with removal of the LED airflow sensor and IC assembly, and associated wiring, and the LED diffuser and airflow routing gasket for airflow sensor;

[0038] FIG. 10K shows the interior chassis that can be send to plastics recycling;

[0039] FIG. 11A shows components of the vaporizer prior to assembly;

[0040] FIG. 11B shows additional components of the vaporizer that can be assembled;

[0041] FIG. 11C illustrates the interior chassis with various components;

[0042] FIG. 12A shows the interior chassis separated from the exterior housing;

[0043] FIG 12B shows kerfs 25 positioned on either side of the internal cylindrical channel of the interior chassis 20 interior chassis that contains integrated locating pin and fresh air intake tube 111, and

[0044] FIG 12C shows controlled breakage along the kerfs 25 facilitated by hand force being applied to both ends of 20 interior chassis along the paths of the arrows, which allows for extraction of 111 with no additional tools required.

DETAILED DESCRIPTION

[0045] As used herein, portable vaporizer and vaporizer are used interchangeably. The terms vaporizer and portable vaporizer are both used in the art and commercially and will be considered synonymous terms in this specification. Recyclable vaporizer, and portable recyclable vaporizer are also used interchangeably herein.

[0046] In various embodiments provided herein is a vaporizer, or portable vaporizer that can be used such that a user would insert the end of the exterior housing that contains the locking mouthpiece into their mouth, creating a seal with their lips around the exterior housing and mouthpiece and inhale comfortably, which draws fresh air in through an integrated locating pin and fresh air intake tube, which automatically activates an airflow sensor, which connects power stored in a battery to a resistive element embedded in a porous ceramic cylinder, which heats and vaporizes the liquid contents stored in a tank, liquid tank, as the user inhales such that an ideal flow of vapor can be inhaled into the users lungs resulting in a pleasurable experience. In some embodiments the liquid contents stored in the tank can be cannabis "oil" extractions.

[0047] As used herein, "integrated locating pin/fresh air intake tube" and "integrated locating pin and fresh air intake tube" are used interchangeably. It is a unique and valuable feature of the vaporizer described herein, in some embodiments, that the integrated locating pin and fresh air intake tube has three functions, it functions, in some embodiments as an integrated locating, locking/unlocking pin, and fresh air intake tube and might be referred to, in some embodiments herein, as an "integrated locating locking/unlocking pin and fresh air intake tube". The integrated locating pin and fresh air intake tube can, in some embodiments, function to lock the interior

chassis and exterior housing in place, provide for fresh air intake, and disengage, or decouple, the interior chassis and exterior housing.

[0048] FIG. 1 is a perspective view of a portable vaporizer 5 comprising a locking mouthpiece 30, and an exterior housing 10. FIG. 2 is a perspective cross sectional view of the vaporizer 5 shown in FIG. 1 in accordance with various embodiments described herein showing external housing 10, an interior chassis 20, a locking mouthpiece 30, mouthpiece gasket 35, vapor routing tube 100, liquid tank 90, ceramic heating assembly 80, airflow routing/governing gasket 70, primary governing aperture 64, secondary airflow routing aperture 65, airflow sensor and IC assembly 60, airflow routing gasket for airflow sensor 50, integrated locating pin and fresh air intake tube 111, battery 120, label describing vaporizable contents 40.

[0049] FIG. 3 shows a cross sectional view of an embodiment of a vaporizer in accordance with various embodiments described herein showing a locking mouthpiece 30, mouthpiece gasket 35, primary governing aperture 64, airflow routing/governing gasket 70, airflow sensor and IC assembly 60, airflow routing gasket for airflow sensor 50, integrated pin and fresh air intake tube 111, battery 120, interior chassis 20, external housing 10, and label describing vaporizable contents 40.

[0050] FIG. 4 shows a detail of the locking mouthpiece 30 and mouthpiece gasket 35 of some embodiments of a vaporizer described herein and a cross sectional view of a vaporizer in accordance with various embodiments described herein demonstrating the integrated pin and fresh air intake tube 111 in a position external to the vaporizer, a vapor routing tube 100, liquid tank 90, ceramic heating assembly 80, airflow routing/governing gasket 70, primary governing gasket 64, airflow sensor and IC assembly 60, airflow routing gasket for airflow sensor 50, integrated locating pin and fresh air intake tube 111, battery 120, interior chassis 20, external housing 10, and label describing vaporizable contents 40. The integrated locating pin and fresh air intake tube 111 can be inserted in the hole shown the external housing 10 in FIG. 4 and then a hole in the interior chassis to affix the external housing 10 to the interior chassis.

[0051] FIG. 5 shows an exploded view of a locking mouthpiece that can be used in various embodiments of the vaporizer described herein illustrating locking mouthpiece tangs 31.

[0052] FIG. 6 is a cross sectional view of an interior chassis 20 in accordance with various embodiments of a vaporizer described herein showing a locking mouthpiece 30, locking

mouthpiece tangs 31, and mouthpiece gasket 35, slots for locking mouthpiece tangs 21, interior chassis arms 22 and an integrated locating pin and fresh air intake tube 111.

[0053] FIG. 7 is a perspective view of an embodiment of a vaporizer described herein showing the exterior housing 10, exterior housing wall edges 11, label describing vaporizable contents 40, and integrated locating pin and fresh air intake tube 111.

[0054] FIG. 8 shows a detail of an airflow routing/governing gasket 70 with electrical lead passageways 72, clog avoidance well 73, primary governing aperture 64, secondary airflow routing aperture 71, in accordance with various embodiments of a vaporizer described herein.

[0055] To address the problem of providing an optimal vaporizing experience producing a desirable flow of vapor due to a controlled, consistent airflow that is unlikely to clog due to unintended blockage from leaking liquids to be vaporized, and a consumer safety benefit due to mechanical features that prevent access to the liquids or substances contained within, the inventor provides, in some embodiments, a portable vaporizer comprising an airflow routing and governing system, a locking mouthpiece, which in some embodiments comprises a locking mechanism to prevent accidental access and a mouthpiece gasket that seals against the interior walls of a liquid to enable vapor flow without leakage.

[0056] In various embodiments, provided herein is a vaporizer comprising an airflow routing and governing system, which comprises an integrated locating pin and fresh air intake tube 111 that locks and aligns the exterior housing 10 to the interior chassis 20 and can also, in some embodiments, actuate disassembly on pressing. In some embodiments, disassembly can be actuated by pushing 111 with a ballpoint pen, or similarly sized object. The airflow routing and governing system, in various embodiment, is also the primary aperture through which air which will later be used to create vapor to be inhaled enters the device in a controlled fashion. Further airflow routing and governing can be by the airflow sensor routing gasket 50 which has an aperture that governs the airflow to the integrated airflow sensor and IC assembly 60 and is coupled to a corresponding aperture in the airflow routing/governing gasket 70 such that when coupled the apertures align to create a single tube that connects airflow between the two areas.

[0057] In various embodiments described herein, provided is a vaporizer comprising an airflow routing/governing gasket 70 that has four apertures, two of the apertures are used as passageways for electrical leads 72 but do not contribute substantially to airflow into the vaporizing chamber subassembly. A secondary routing aperture 65 connects to the corresponding aperture in the

airflow routing gasket for airflow sensor 50 as described herein in the previous paragraph. The fresh airflow into the ceramic heating assembly 80 can be controlled by the primary governing aperture 64, the diameter of which in combination with the suction strength supplied by the user determines the flow rate and "feel" of inhaling through the overall device. In various embodiments, all four of the apertures in the airflow routing/governing gasket 70 are on raised "stalks" inset into a well molded into the gasket 73, such that the openings of those apertures resist clogging from un-vaporized liquids that might drip down from the vaporizing chamber, since it would tend to pool below in the well and not cover the aperture openings.

[0058] In some embodiments of the vaporizer described herein, the interior chassis 20 is a molded shuttle that organizes the internal components into discrete component positioning areas. The three primary component positioning areas of the interior chassis 20 are for the battery, the airflow sensor/IC assembly 60, and the liquid tank 90. In various embodiments, the flexibility of the interior chassis arms 22 allows them to capture the liquid tank 90.

[0059] In various embodiments of the vaporizer described herein, the vaporizer comprises a locking mouthpiece 30 that has two locking mouthpiece tangs 31 that lock into corresponding slots 21 molded into the interior chassis arms 22 of the interior chassis 20. As the mouthpiece is inserted into the device, the tangs flex toward the center axis of the device and then snap into the slots in a permanently locked fashion. In various embodiments of the vaporizer described herein, this locking mechanism serves to prevent accidental access to the liquid to be vaporized such that it can only be removed with a tool and is intended to be child-resistant. In various embodiments, the mouthpiece gasket 35 seals against the interior walls of the liquid tank 90 and the vapor routing tube 100 to provide for vapor flow to the user without leaks.

[0060] In some embodiments of the vaporizer, a label describing vaporizable contents 40 is affixed with adhesive to the interior chassis 20 so it is visible on the bottom surface of the device. In some embodiments, the label can be inset into a well such that the exterior housing wall edges 11 of the exterior housing 10 are seen as a frame around the label describing vaporizable contents 40. The advantages of such a label arrangement wherein the label is inset into a well such that the exterior housing wall edges 11 of the exterior housing 10 are seen as a frame around the label describing vaporizable contents 40 is that it is at the same time easily assembled onto the device at the time of filling with a specific liquid to be vaporized, the name

of which is presented on the label and not easily removable by the user without a tool such as an exacto knife.

[0061] In some embodiments of the vaporizer described herein, wattage can be chosen to provided vapor flow with optimal user experiences. In various embodiments wattage tuning can be used to provide for the lowest possible wattage to achieve an optimal user experience and avoid a vapor that is too hot. In various embodiments, the vaporizer described herein can achieve a balance of airflow and heat. In various embodiments, the vaporizer provided herein can produce a puff of vapor having a certain quality of balance between easy airflow and heat to produce atomization and absorption such that an optimal experience is achieved.

[0062] FIG. 9A shows a vaporizer 5 in accordance with various embodiments described herein. The top side in FIG. 9A shows a lighting logo 19. In various embodiments described herein, the lighting logo 19 can be illuminated by light. In some embodiments the light is an LED light, i.e., the light comes from an LED light source, not shown in FIG. 9A. FIG. 9B shows the opposite side of the vaporizer, if the vaporizer was turned over, for example on a table. FIG. 9B show the exterior housing and the integrated locating pin and fresh air intake tube 111.

Recyclable Vaporizer

[0063] In some embodiments provided herein is a vaporizer that is recyclable, that is referred to in some embodiments herein as a recyclable vaporizer. In some embodiments, provided is a single use recyclable vaporizer. The recyclable vaporizer described herein is, in various embodiments, capable of being disassembled from its parts using simple household implements. Scissors and a ballpoint pen, or tack, are all that is necessary to disassemble the recyclable vaporizer as described in various embodiments herein. Moreover, the recyclable vaporizer is made from parts that can then be recycled. Because all of the parts can be disassembled without special tools and the parts are made of recyclable materials, the recyclable vaporizer can be simply and conveniently recycled.

[0064] A method of disassembling the vaporizer described herein, in some embodiments, is described herein. It is understood by person of skill in the art that there may be other ways to prepare the vaporizer described herein in various embodiments for recycling, but the method described herein provides for a simple stepwise method wherein the constituent parts can be efficiently disengaged and recycled.

[0065] FIG. 10A shows how, in some embodiments, a ballpoint pen, or similar implement such as a thumbtack, can be pressed down on the integrated locating pin and fresh air intake tube to unlock the exterior housing 10 from the interior chassis 20. Step 1 of the disassembly of the recyclable vaporizer comprises pressing firmly down on the integrated locating pin/fresh air intake tube 111 to unlock the exterior housing 10 from the interior chassis 20. Pressing firmly down on the integrated locating pin and fresh air intake tube 111 pushes the integrated locating pin/fresh air intake tube 111 below the level of the inside surface of the exterior housing 10 and mechanically decouples the exterior housing 10 from the interior chassis 20. This unlocks the mechanical fastening between exterior housing 10 and interior chassis 20, which then allows subsequent operations to break down the recyclable vaporizer, the device, into its constituent parts that can be individually recycled. The integrated locating pin/fresh air intake tube thus has this additional feature of facilitating the disassembly process of a recyclable vaporizer.

[0066] The dimensions of the integrated locating pin and fresh air intake tube 111, in various embodiments, are such that it would be suitable for using a standard ballpoint pen to press on the integrated locating pin/fresh air intake tube 111, the integrated locating pin/fresh air intake tube 111 has in some embodiments an internal diameter (ID) of between about 1.25 and about 1.35mm and an outer diameter (OD) of between about 1.9 and about 2.0 mm. In some embodiments, the integrated locating pin and fresh air intake tube 111 has an internal diameter (ID) of between 1.25 and 1.35mm and an outer diameter (OD) of between 1.9 and 2.0 mm.

[0067] FIG. 10B show the interior chassis 20 extending from the exterior housing. In various embodiments, step 2 in the removal of the interior chassis 20 is to push the interior chassis up from the bottom, as indicated by the arrow, the interior chassis 20 then emerges from the top as shown in the FIG. 10B. A finger, pencil, pen, or other implement, for example, can be used to push the interior chassis 20 from the exterior housing 10 in this step. The interior chassis 20 can then be pulled, step 3, as indicated by the arrow in the direction of the arrow to completely remove the interior chassis 20 from the exterior housing 10. The steps are indicated as step 2 and 3 to indicate the order of removal of the interior chassis 20 from the exterior housing 10.

[0068] FIG 10C shows the exterior housing 10 separated from the interior chassis 20. In various embodiments described herein, the exterior housing is made of aluminum and can be sent to aluminum recycling.

[0069] FIG. 10D shows the interior chassis 20 separated from the exterior housing 10 and indicates, by the arrows, that in some embodiments, the next step is to rotate the vaporizer along the long axis, or flip the vaporizer over, to show the front side. In FIG. 10E, the interior chassis 20 has been flipped over to reveal the battery 120, an LED diffuser 61, and the liquid tank 90. Also exposed is a battery pull tab 121, and a battery pull tab numeric graphic 122, present in some embodiments. In various embodiments, the recyclable vaporizer comprises a pull tab 121 wrapped around the battery 120 that can be used to remove the battery from a battery well molded into the interior chassis. To continue the disassembly process, a user can pull up on the battery pull tab 121 to remove the battery 120 from the interior chassis 20. For the convenience of users, the battery pull tab comprises, in some embodiments, a numeric graphic 122 with a numeral 1 enclosed in a circle with an arrow pointing upwards indicating the order of operations and direction of pull.

[0070] The next step of the disassembly of the recyclable vaporizer, shown in FIG. 10F, is to cut the battery lead wires 123 at both ends of the battery 120. The battery 120 can then be removed, or separated from, the interior chassis 20 as shown in FIG. 10G. In various embodiments can be recycled at a battery recycling facility or drop-off. In some embodiments, the battery 120 is a Li-ion battery that can be recycled.

[0071] FIG 10H shows that the interior chassis arms 22, or wings, can now be pulled apart to expose the liquid tank 90 (also referred to herein as oil tank). In various embodiments, the interior chassis arms 22 are flexible and can be manipulated by hand. FIG. 10I also illustrates the various remaining components of the recyclable vaporizer. The mouthpiece 30, mouthpiece gasket 35, and inner and liquid tank 90 can now be pulled and separated from the ceramic heating assembly 80. Other remaining parts associated with the inner chassis 20, including the airflow routing/governing gasket 70, heating lead wires 124, crimps 125, resistive wire 126 (the element that heats up with the vaporizer is being used), and battery lead wires 123. The stainless steel liquid tank 90, and other metal parts, can be sent to metal recycling. The locking mouthpiece 30, mouthpiece gasket 35, and inner chassis 20 can be sent to plastics recycling. FIG. 10J shows further disassembly of the recyclable vaporizer with removal of the LED 62, airflow sensor and IC assembly 60, and associated wiring that can be sent to electronics waste, and the removal of the LED diffuser 61 and airflow routing gasket for airflow sensor 50 that can be sent to general plastic recycling.

[0072] FIG 12A shows the interior chassis 20 separated from the exterior housing, as shown in FIG 10E, with a circle around the detail described in FIG. 12B.

[0073] FIG. 12 B shows kerfs 25 positioned on either side of an internal cylindrical channel of the interior chassis 20 that contains the integrated locating pin and fresh air intake tube 111.

Kerfs 25, in some embodiments, are molded into the interior chassis 20 and enables for controlled breakage of the interior chassis 20 along the edges of the central cylindrical aperture that contains the integrated locating pin and fresh air intake tube 111.

[0074] Fig 12C shows controlled breakage along the kerfs 25 facilitated by hand force being applied to both ends of 20 interior chassis along the paths of the arrows, which allows for extraction of 111 with no additional tools required. The application of force to the interior chassis 20 that results in a deformation of the interior chassis 20 such that the integrated locating pin and fresh air intake tube 111 can be removed by hand with no special tool and thereby enable, in some embodiments, the separation of the inner chassis 20 and the integrated locating pin and fresh air intake tube 111.

[0075] FIG. 10K shows the interior chassis 20 with its empty interior chassis arms 22 that can be sent to plastics recycling. The interior chassis 20, in various embodiments, is made of a polycarbonate, and in some embodiment's polycarbonate #7 resulting in a recyclable item that provides sufficient flexibility for disassembly with the interior chassis arms 22 of the interior chassis 20 manufactured from a polycarbonate and of the size and thickness to be flexible enough to be manipulated by hand in the disassembly process.

[0076] Materials that can be used in some embodiments of the recyclable vaporizer include recyclable parts made from polycarbonate, silicone, acrylonitrile butadiene styrene (ABS), stainless steel, aluminum, and a Li-Ion battery. The integrated locating pin and fresh air intake tube 111 and the liquid tank 90 can be made, in some embodiments, from stainless steel. The exterior housing 10, can be made, in some embodiments, from aluminum. The inner chassis 20, LED diffuser 61, and label for describing vaporizable contents 40, can be made, in some embodiments, from polycarbonate. The mouthpiece gasket 35, airflow routing/governing gasket 70, and airflow routing gasket for airflow sensor 50 can be made, in some embodiments, from silicone. The battery 120, in some embodiments, can be a Li-Ion Battery, and the locking mouthpiece 30, in some embodiments, can be made from Acrylonitrile butadiene styrene (ABS).

[0077] Biodegradable materials can be used, in some embodiments, for some of the components of the recyclable vaporizer. For example, the interior chassis 20, LED diffuser 61, and locking mouthpiece 30 could, in some embodiments be made with such materials as PE (bioplastic polyethylene), PEF (polyethylene furanoate), PLA (polylactic acid), and/or combinations thereof. The integrated locating pin and fresh air intake tube 111 could be made from an appropriate biodegradable, in some embodiments.

[0078] Further, 111, which is currently stainless steel, could be changed to a polymer that is the same as used in part 20, since then the two items could be recycled as a single unit without requiring disassembly, as they do now since the plastic part and metal part need to be separated with a mechanical action step that would be part of the recycling process.

Assembly Process

[0079] The vaporizer described herein, in various embodiments, can be assembled from that can be purchased or manufactured by methods known in the art.

[0080] FIG. 11A shows various components of the vaporizer described in various embodiments herein. In FIG. 11A an exterior housing 10 is shown with lighting logo 19. The interior chassis 20 is shown comprises a battery well 24, electronics well 23, and interior chassis arms 22. Other components shown include the LED diffuser 61, the airflow routing gasket for airflow sensor 50, the airflow sensor and IC assembly 60; heating lead wires 124, crimps 125, an airflow routing/governing gasket 70 with electrical lead passageways 72, resistive wire 126 (the element that heats up), a ceramic heating assembly 80, and liquid tank 90. Also shown is a battery 120 and battery lead wires 123.

[0081] Using the parts shown in FIG 11A, the vaporizer can be assembled, in some embodiments, as follows. The ceramic heating assembly 80 is inserted into liquid tank 90, 126 (2x) is then threaded through 72 (2x), 70 is inserted into liquid tank 90, then 126 is attached to 124 with 125 (all 2x), 60 is inserted into 50, 50 (with 60) is inserted into 23, 90 (with additional captive parts) is inserted into 22, 124 is wrapped into channel 23, 124 (2x) is trimmed to length, 124 (2x) is soldered to 60, 123 (2x) is soldered to 120, 120 is inserted into 24, 123 (2x) is trimmed to length, 123 is soldered to 60, 61 is inserted into 23, and 20 with additional captive parts, is inserted into 10.

[0082] FIG. 11B shows additional components of the vaporizer described in various embodiments herein and continues the assembly procedure for a vaporizer, in some

embodiments, described herein. In FIG. 11B, the integrated locating pin and fresh air intake tube 111 is shown removed from the exterior housing, the label for describing vaporizable contents 40, the interior chassis, the mouthpiece gasket 35 and the locking mouthpiece 30.

[0083] 111 slides into the hole in 10 and then into a hole in 20, located directly beneath, which affixes 10 to 20. 30 is then inserted into 35. 30 and 35 together are inserted into 20 and 90 in order to seal the tube and mechanically lock the mouthpiece to the interior chassis. 40 is then affixed to 20 such that it is flush with the bottom edge of 10 and visible to an observer.

[0084] FIG. 11C shows the interior chassis 20 with some additional components of the vaporizer described herein in various embodiments. The interior chassis 20 with a battery 120, heating lead wires 124, an LED 62, airflow sensor and IC assembly 60, LED diffuser 61 are shown with the interior chassis.

[0085] A number of embodiments have been described and are to be considered as illustrative and not restrictive. It will be understood that various modifications may be made without departing from the spirit and scope of the invention and that the claims should not be limited to the versions and embodiments described herein.

What is claimed is:

1. A vaporizer comprising an airflow routing and governing system and a locking mouthpiece.
2. The vaporizer of claim 1, wherein the locking mouthpiece further comprises a mouthpiece gasket that seals against the interior wall of a liquid tank.
3. The vaporizer of claim 1, further comprising a label describing vaporizable contents of a liquid to enable vapor flow without leakage.
4. A vaporizer comprising an airflow routing and governing system, a locking mouthpiece, and a label describing vaporizable contents.
5. The vaporizer of claim 4, wherein the locking mouthpiece further comprises a mouthpiece gasket that seals against the interior walls of a liquid tank.
6. A vaporizer comprising an airflow routing and governing system, which comprises an integrated locating pin and fresh air intake tube that locks and aligns an exterior housing to an interior chassis.
7. The vaporizer of claim 6, further comprising an airflow sensor routing gasket which comprises an aperture that governs the airflow to the integrated airflow sensor and an IC assembly and is coupled to a corresponding aperture in the airflow routing/governing gasket.
8. The vaporizer of claim 6, comprising an airflow routing/governing gasket comprising four apertures.
9. The vaporizer of claim 8, wherein two of the apertures are used as passageways for electrical leads and a secondary routing aperture connects to the corresponding aperture in the airflow routing gasket for an airflow sensor.

10. The vaporizer of claim 6, wherein the interior chassis is a molded shuttle that organizes the internal components into discrete component positioning areas for a battery, an airflow sensor/IC assembly, and a liquid tank.

11. The vaporizer of claim 10, wherein the interior chassis has flexible interior chassis arms.

12. The vaporizer of claim 6, wherein the vaporizer comprises a locking mouthpiece that has two locking mouthpiece tangs that lock into corresponding slots molded into the interior chassis arms of the interior chassis.

13. The vaporizer of claim 6, further comprising a label describing vaporizable contents.

14. The vaporizer of claim 13, wherein the label is inset into a well and wherein the exterior surface of the label is flush with the exterior housing at the exterior housing bottom edge.

15. The vaporizer of claim 15, further comprising a pull tab associated with a battery.

16. A recyclable vaporizer, comprising:

an integrated locating pin and fresh air intake tube;

an exterior housing comprising an exterior housing hole for receiving the integrated locating pin and fresh air intake tube;

an interior chassis comprising a battery well, an internal cylindrical channel, an interior chassis hole aligned with the exterior housing hole, for receiving the integrated locating pin and fresh air intake tube, and flexible interior chassis arms;

a battery in the battery well with wire connections to the recyclable vaporizer, and

a pull tab disposed between the battery and the interior chassis battery well and wrapped around the battery.

17. The recyclable vaporizer of claim 16, further comprising kerfs positioned on either side of the internal cylindrical channel that holds the integrated locating pin and fresh air intake tube.

18. The recyclable vaporizer of claim 16, wherein insertion of the integrated locating pin and fresh air intake tube in the exterior housing hole and the interior chassis hole locks and aligns the exterior housing to the interior chassis.

19. The recyclable vaporizer of claim 16, wherein pushing the integrated locating pin and fresh air intake below an inside surface of the exterior housing decouples the exterior housing from the interior chassis.

20. The recyclable vaporizer of claim 16, wherein the integrated locating pin and fresh air intake tube provides a conduit for fresh air intake.

21. A method of recycling a recyclable vaporizer of claim 16,
pressing down on the integrated locating pin and fresh air intake tube to unlock the exterior housing from the interior chassis;
pushing the interior chassis from the exterior housing;
pulling the interior chassis out from the exterior housing to separate the interior chassis from the exterior housing;
grasping the pull tab wrapped around the battery and pulling the battery from the interior chassis;
cutting the wire connections;
separating the interior chassis from the battery, and
recycling the exterior housing, interior chassis, and battery by distributing them to recycling facilities.

22. The method of claim 21, wherein pressing down on the integrated locating pin and fresh air intake tube comprises pressing with a ballpoint pen, a pencil, or a thumbtack.

23. A method of recycling a vaporizer, comprising:
providing a vaporizer capable of being disassembled into recyclable component parts using household items;
disassembling the vaporizer using household items, and

distributing the recyclable component parts to a recycling destination for recycling.

24. The method of claim 23, wherein the household items are selected from a scissor, a ballpoint pen, a thumbtack, or combinations thereof.

AMENDED CLAIMS**received by the International Bureau on 31 August 2019 (31.08.2019)**

- [Claim 1] A vaporizer comprising an airflow routing and governing system, a locking mouthpiece, and an integrated locating pin and fresh air intake tube that locks and aligns an exterior housing to an interior chassis.
- [Claim 2] The vaporizer of claim 1, wherein the locking mouthpiece further comprises a mouthpiece gasket that seals against the interior wall of a liquid tank.
- [Claim 3] The vaporizer of claim 1, further comprising a label describing vaporizable contents.
of a liquid to enable vapor flow without leakage.
- [Claim 4] A vaporizer comprising an airflow routing and governing system, a locking mouthpiece, and a label describing vaporizable contents.
- [Claim 5] The vaporizer of claim 4, wherein the locking mouthpiece further comprises a mouthpiece gasket that seals against the interior walls of a liquid tank.
- [Claim 6] (canceled)
- [Claim 7] The vaporizer of claim 6, further comprising an airflow sensor routing gasket which comprises an aperture that governs the airflow to the integrated airflow sensor and an IC assembly and is coupled to a corresponding aperture in the airflow routing/governing gasket.
- [Claim 8] The vaporizer of claim 6, comprising an airflow routing/governing gasket comprising four apertures.
- [Claim 9] The vaporizer of claim 8, wherein two of the apertures are used as passageways for electrical leads and a secondary routing aperture connects to the corresponding aperture in the airflow routing gasket for an airflow sensor.
- [Claim 10] The vaporizer of claim 6, wherein the interior chassis is a molded shuttle that organizes the internal components into discrete component positioning areas for a battery, an airflow sensor/IC assembly, and a liquid tank.
- [Claim 11] The vaporizer of claim 10, wherein the interior chassis has flexible interior chassis arms.
- [Claim 12] The vaporizer of claim 6, wherein the vaporizer comprises a locking mouthpiece that has two locking mouthpiece tangs that lock into corresponding slots molded into the interior chassis arms of the interior chassis.
- [Claim 13] The vaporizer of claim 6, further comprising a label describing va-

- porizable contents.
- [Claim 14] The vaporizer of claim 13, wherein the label is inset into a well and wherein the exterior surface of the label is flush with the exterior housing at the exterior housing bottom edge.
- [Claim 15] The vaporizer of claim 15, further comprising a pull tab associated with a battery.
- [Claim 16] A recyclable vaporizer, comprising:
 an integrated locating pin and fresh air intake tube;
 an exterior housing comprising an exterior housing hole for receiving the integrated locating pin and fresh air intake tube;
 an interior chassis comprising a battery well, an internal cylindrical channel, an interior chassis hole aligned with the exterior housing hole, for receiving the integrated locating pin and fresh air intake tube, kerfs positioned on either side of the internal cylindrical channel of the interior chassis which comprises the integrated locating pin and fresh air intake tube, and flexible interior chassis arms;
 a battery in the battery well with wire connections to the recyclable vaporizer, and
 a pull tab disposed between the battery and the interior chassis battery well and wrapped around the battery.
- [Claim 17] (cancelled)
- [Claim 18] The recyclable vaporizer of claim 16, wherein insertion of the integrated locating pin and fresh air intake tube in the exterior housing hole and the interior chassis hole locks and aligns the exterior housing to the interior chassis.
- [Claim 19] The recyclable vaporizer of claim 16, wherein pushing the integrated locating pin and fresh air intake below an inside surface of the exterior housing decouples the exterior housing from the interior chassis.
- [Claim 20] The recyclable vaporizer of claim 16, wherein the integrated locating pin and fresh air intake tube provides a conduit for fresh air intake.
- [Claim 21] A method of recycling a recyclable vaporizer of claim 16, comprising:
 pressing down on the integrated locating pin and fresh air intake tube to unlock the exterior housing from the interior chassis;
 pushing the interior chassis from the exterior housing;
 pulling the interior chassis out from the exterior housing to separate the interior chassis from the exterior housing;
 facilitating controlled breakage of the interior chassis along the kerfs by applying hand force to both ends of the interior chassis;

grasping the pull tab wrapped around the battery and pulling the battery from the interior chassis;
cutting the wire connections;
separating the interior chassis from the battery, and
recycling the exterior housing, interior chassis, and battery by distributing them to recycling facilities.

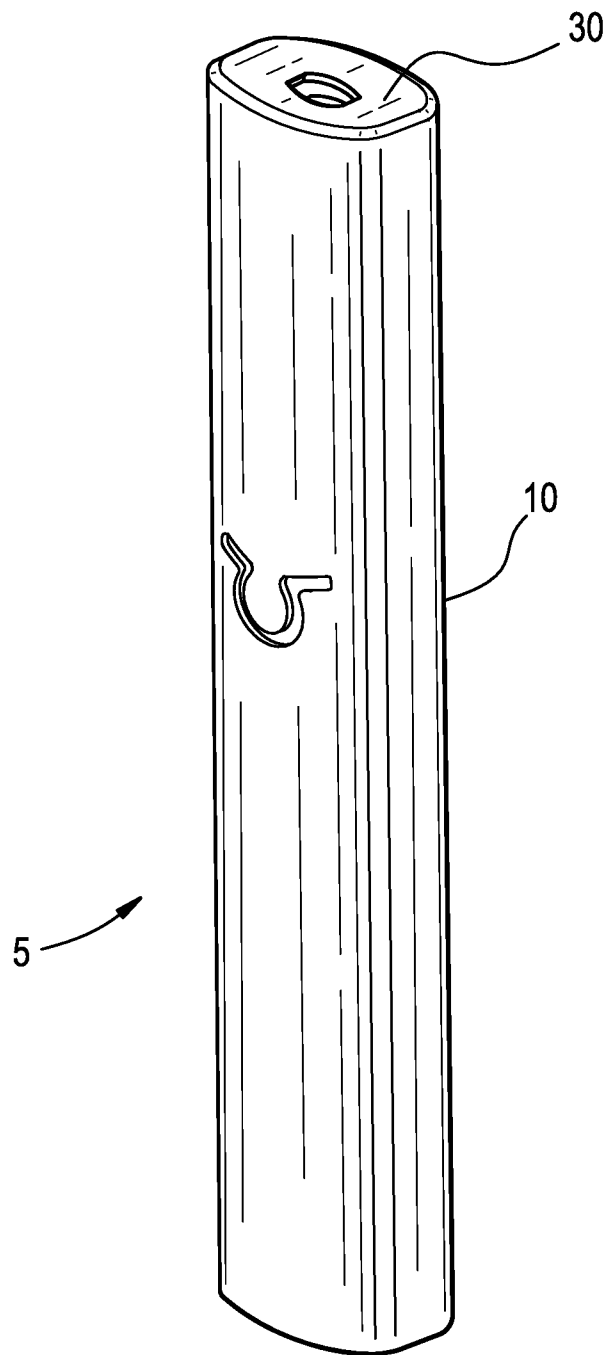
[Claim 22] The method of claim 21, wherein pressing down on the integrated locating pin and fresh air intake tube comprises pressing with a ballpoint pen, a pencil, or a thumbtack.

[Claim 23] A method of recycling a vaporizer, comprising:
providing a vaporizer capable of being disassembled into recyclable component parts using household items and wherein the vaporizer comprises an interior chassis which comprises kerfs positioned on the interior chassis;
disassembling the vaporizer using household items and hand force to the interior chassis, and
distributing the recyclable component parts to a recycling destination for recycling.

[Claim 24] The method of claim 23, wherein the household items are selected from a scissor, a ballpoint pen, a thumbtack, or combinations thereof.

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FIG. 1



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FIG. 2

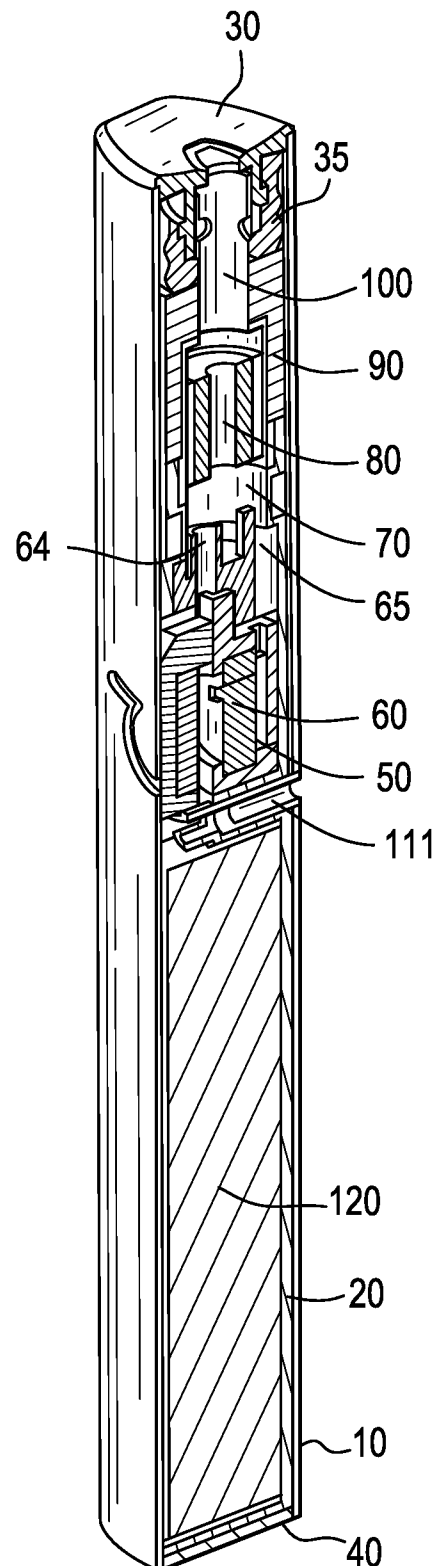


FIG. 3

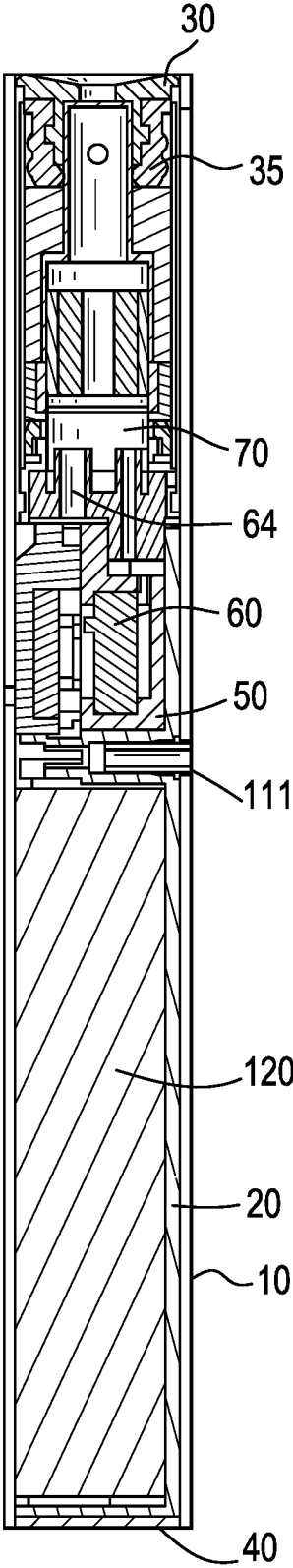
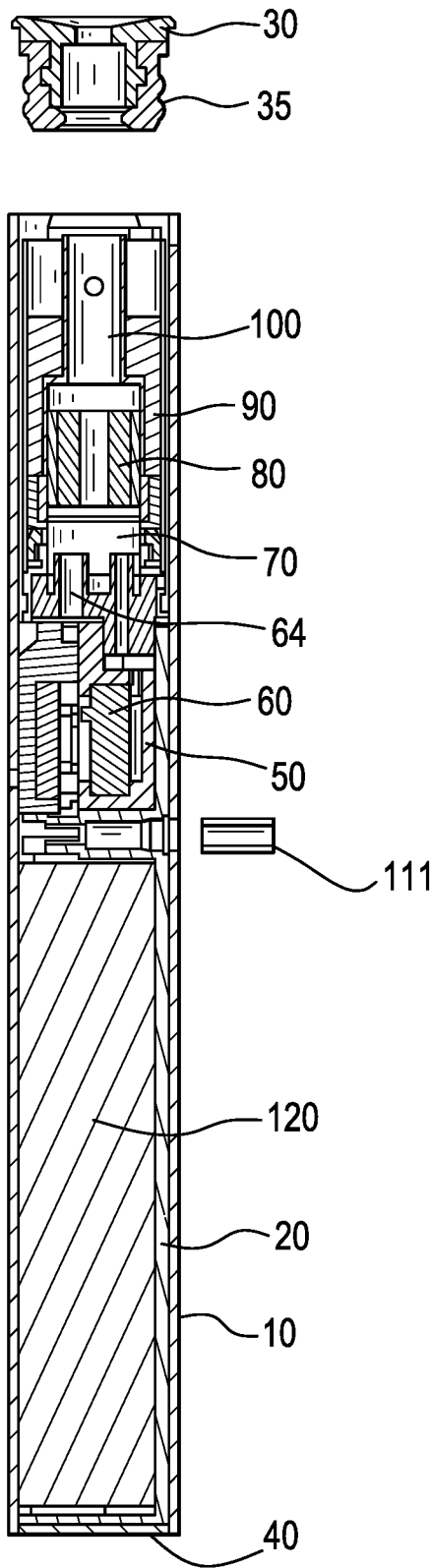


FIG. 4



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FIG. 5

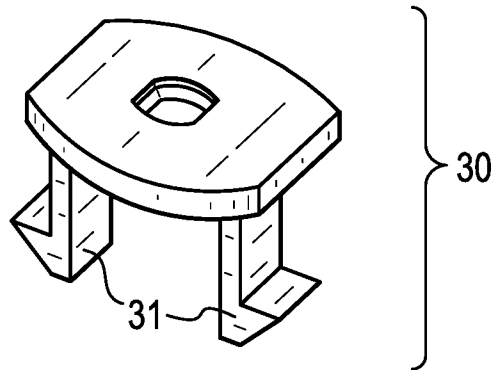
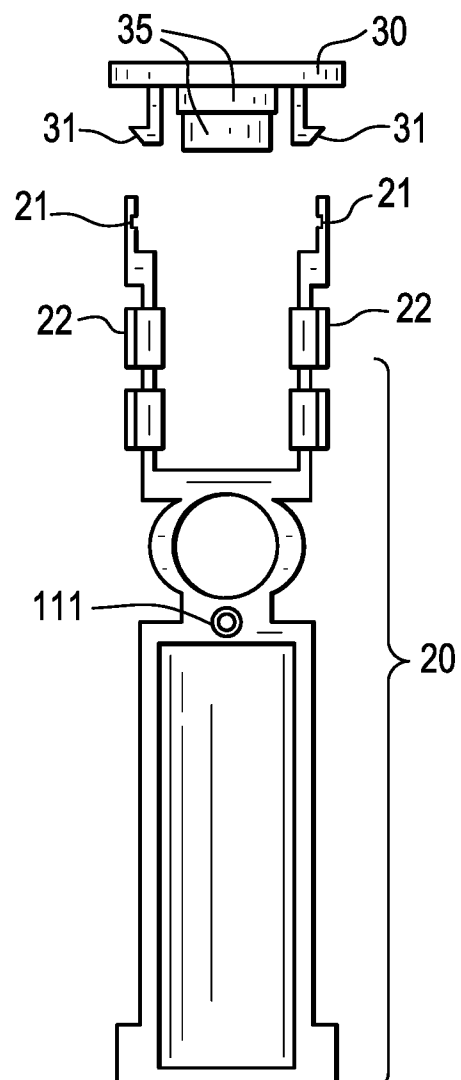


FIG. 6



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FIG. 7

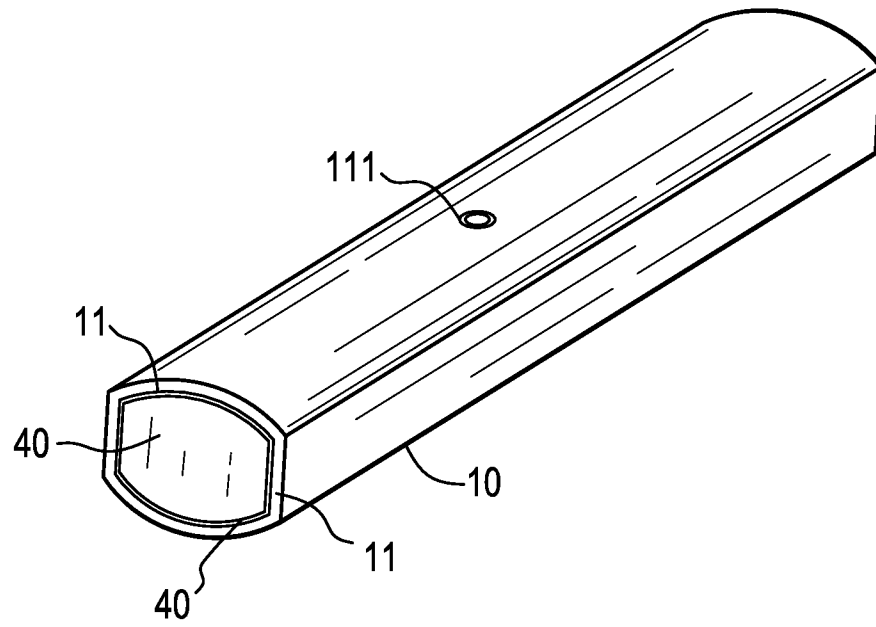
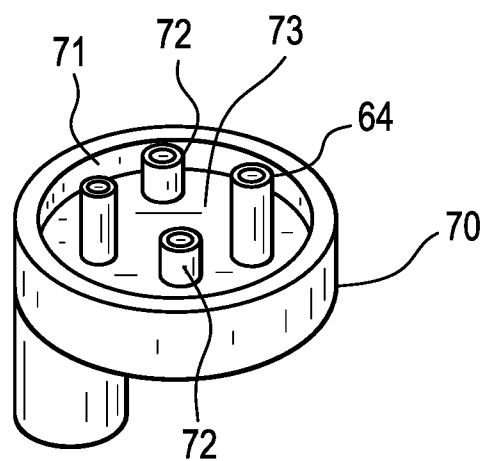


FIG. 8



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FIG. 9A

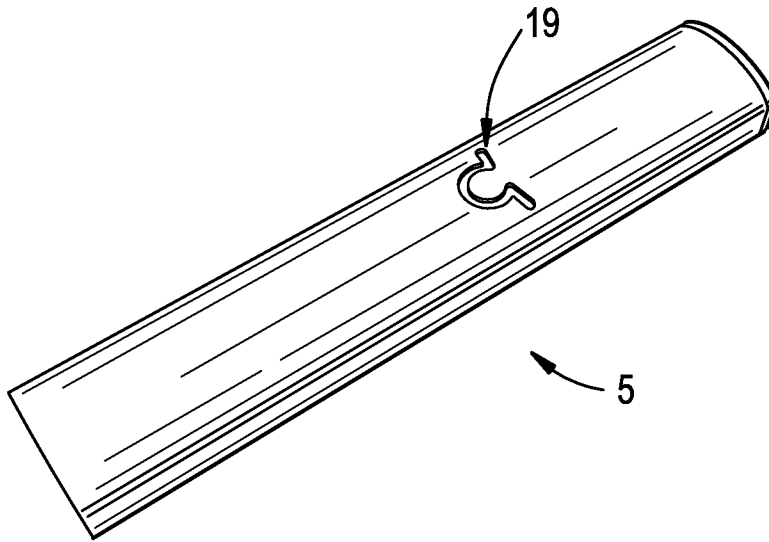
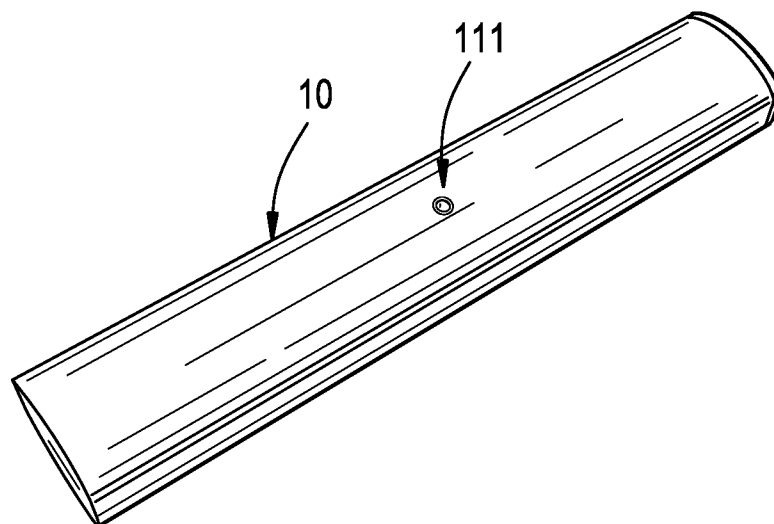


FIG. 9B



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FIG. 10A

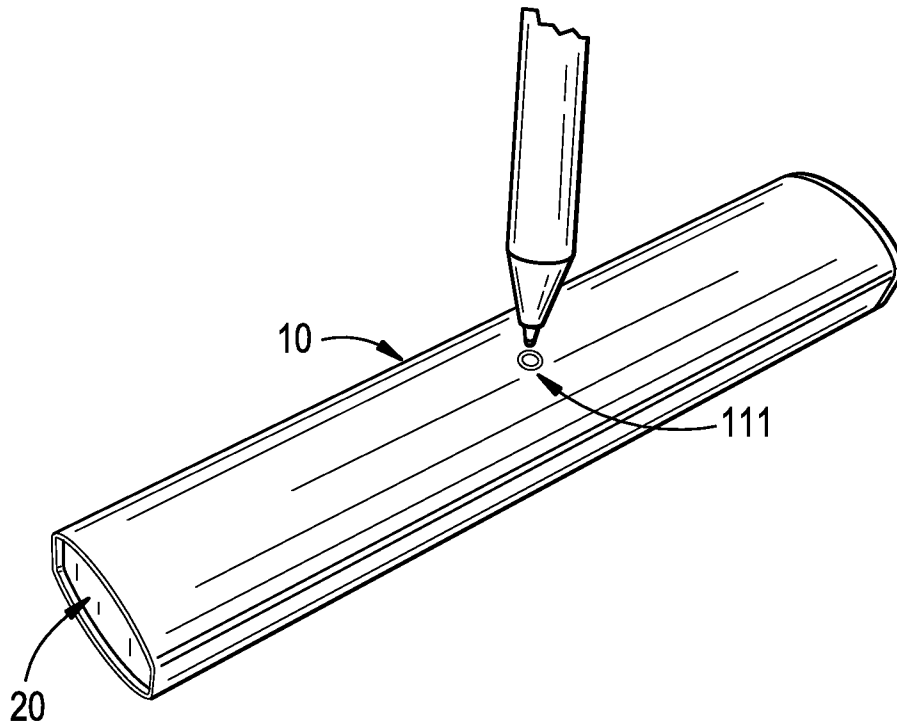
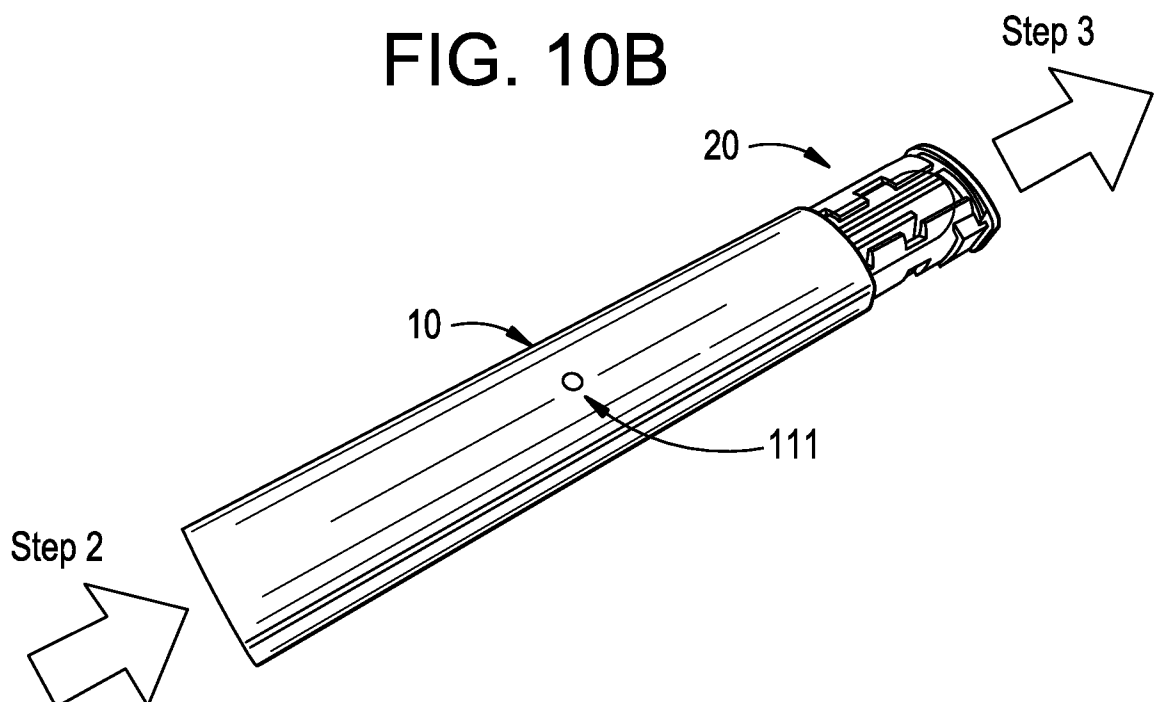


FIG. 10B



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FIG. 10C

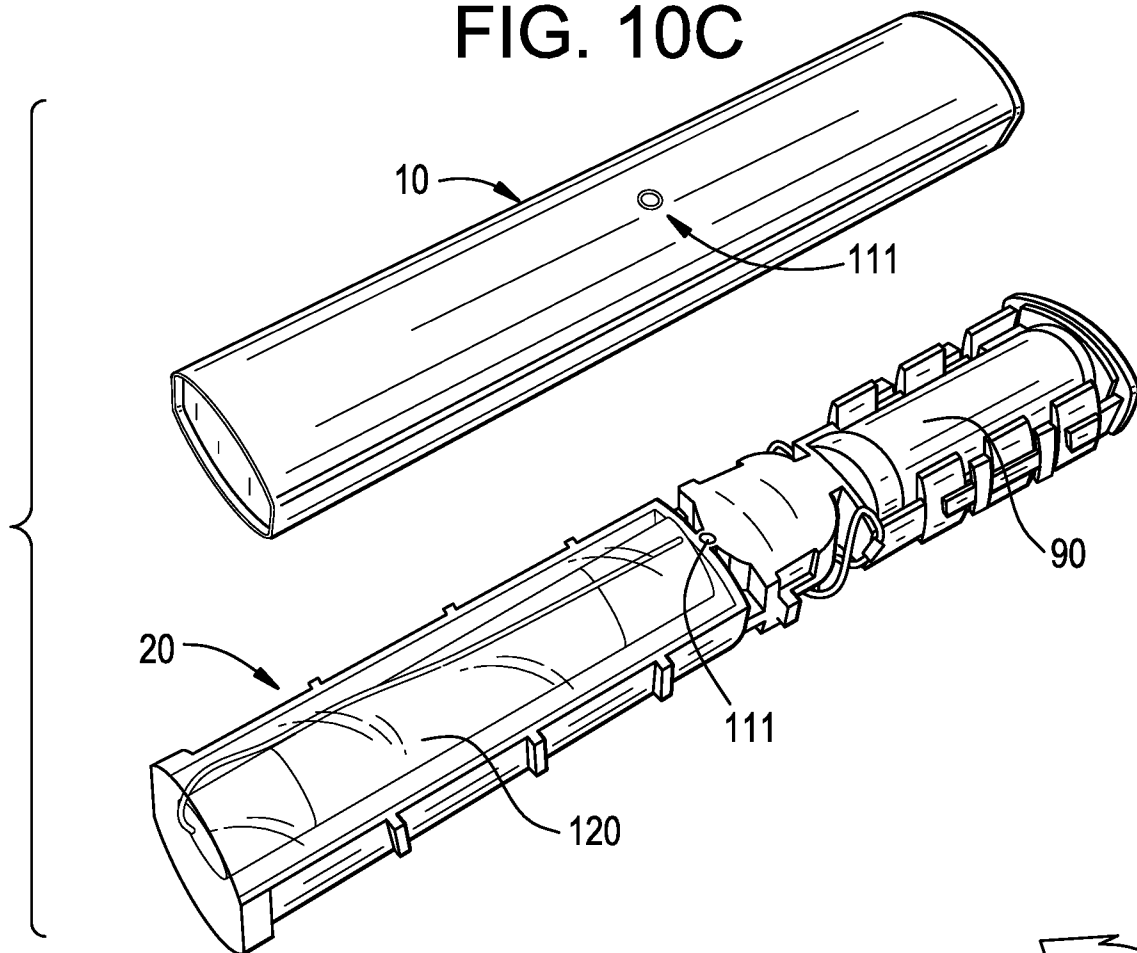
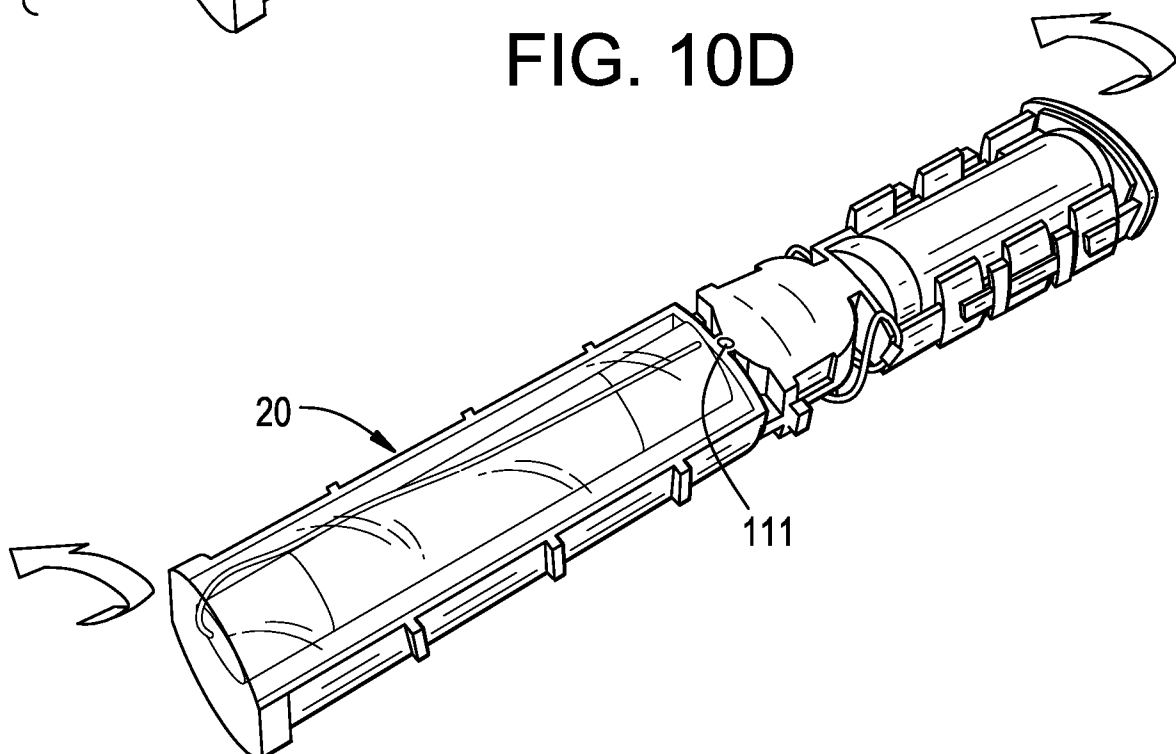


FIG. 10D



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FIG. 10E

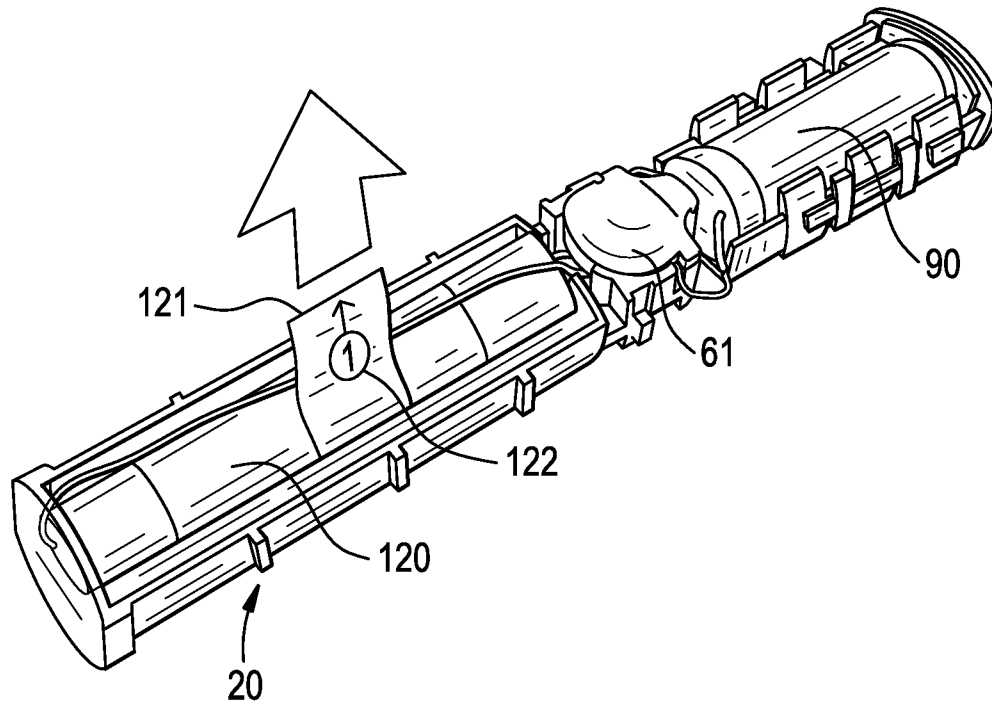
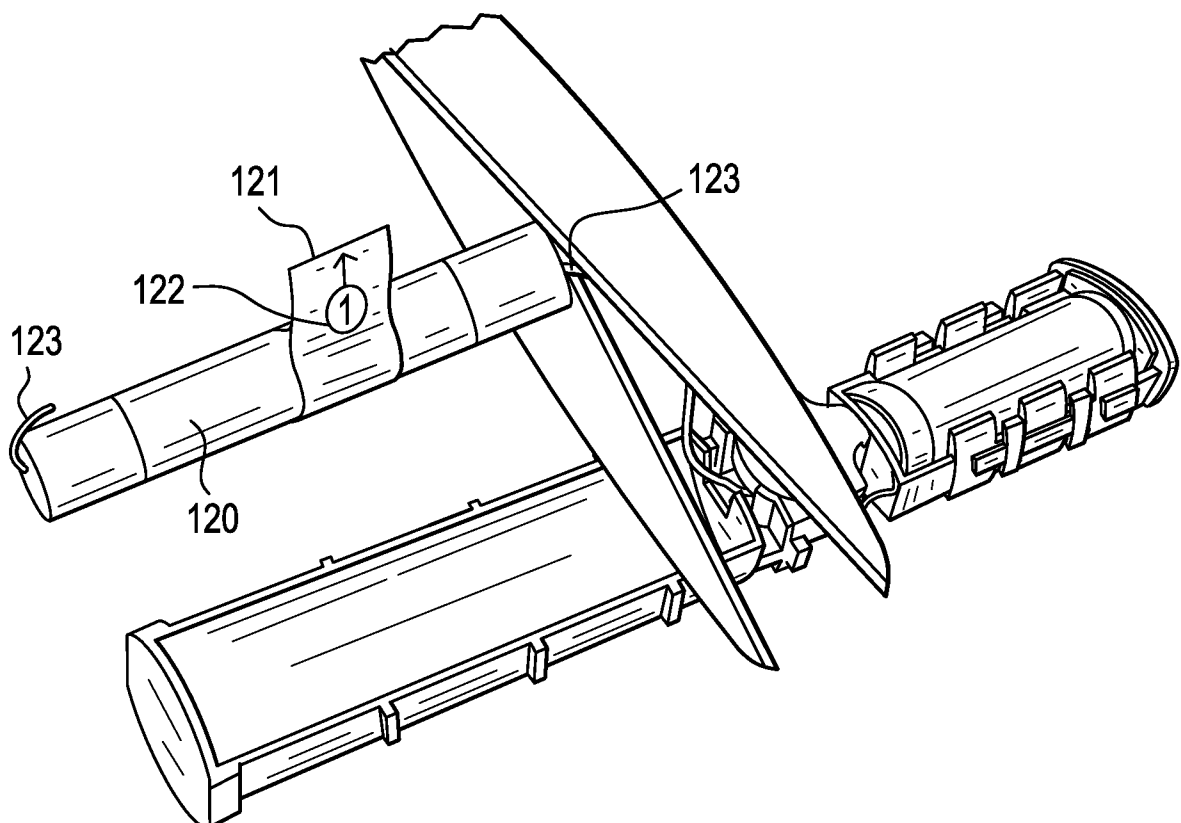


FIG. 10F



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FIG. 10G

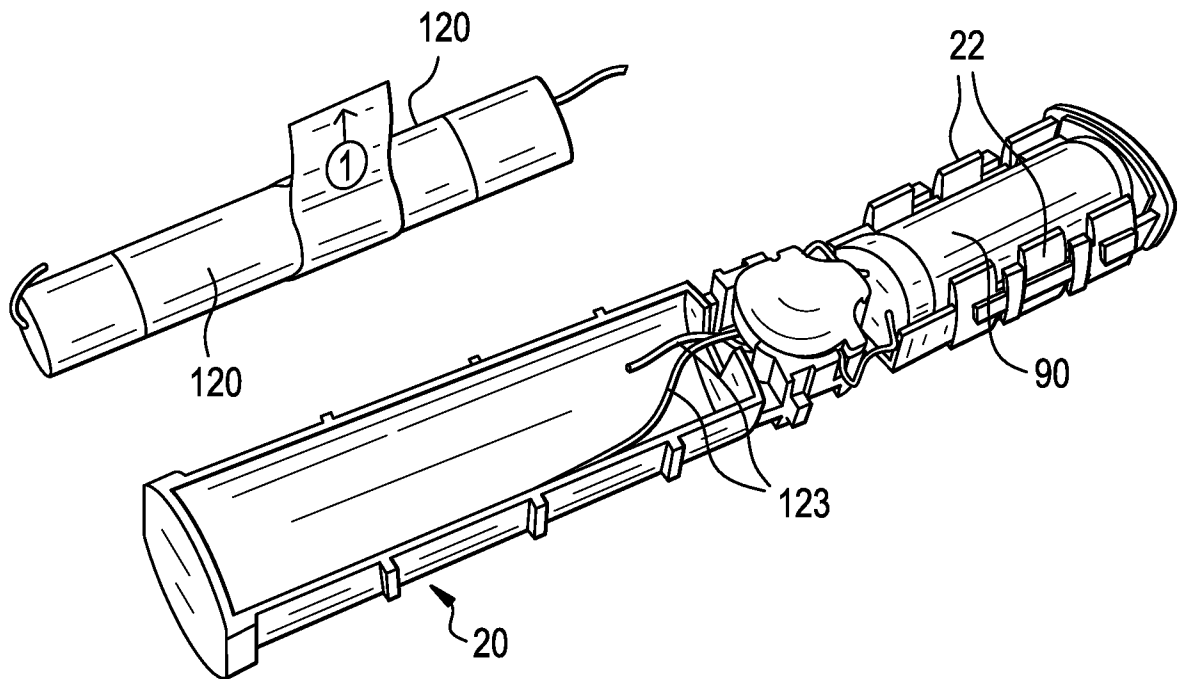


FIG. 10H

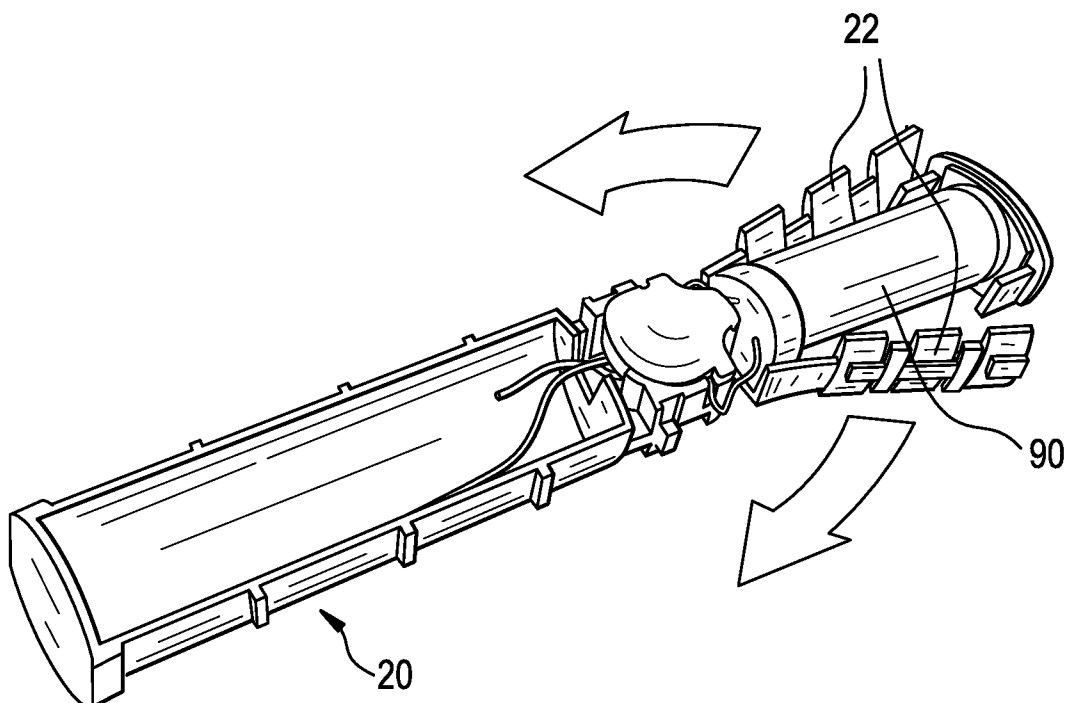
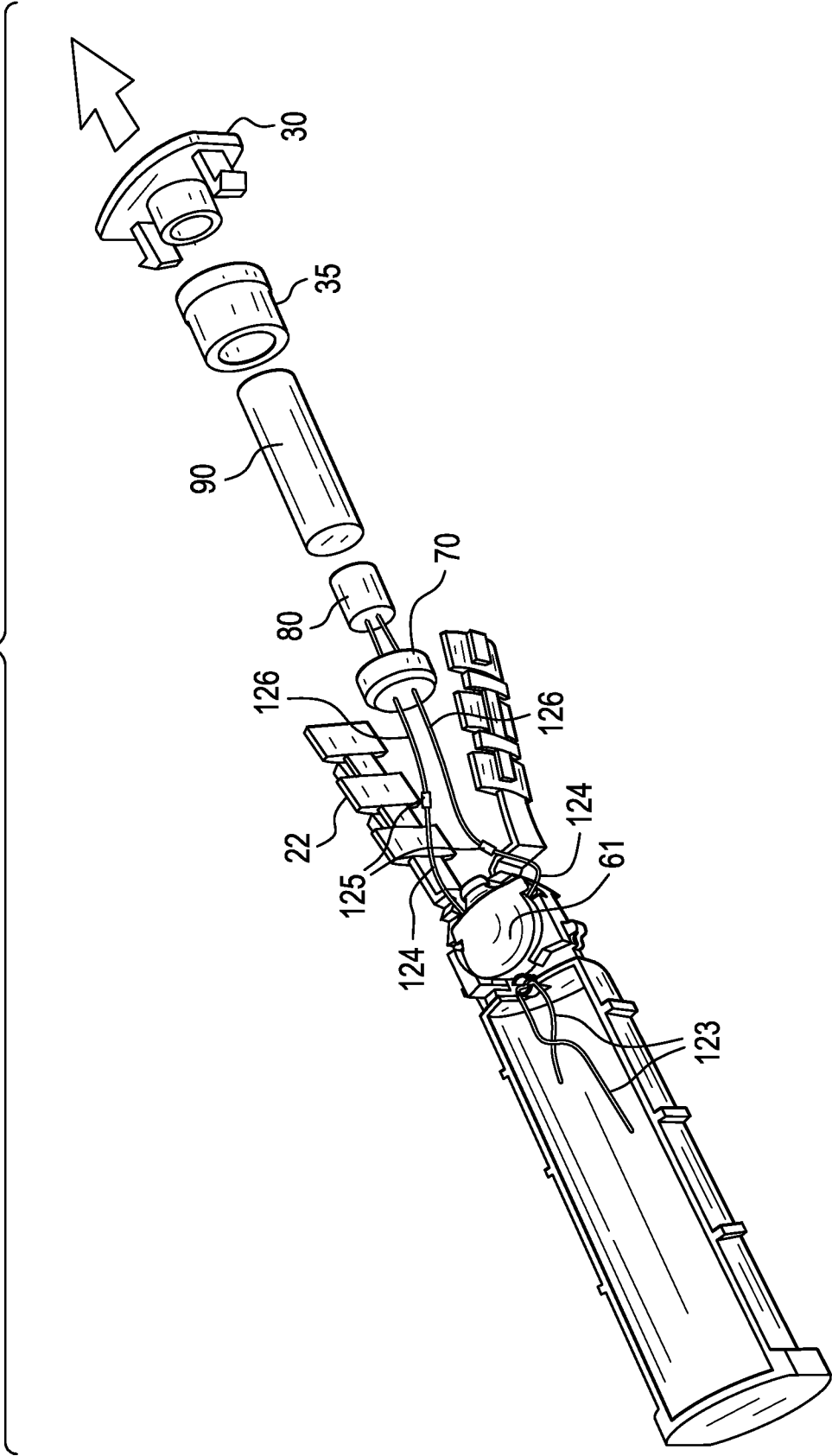


FIG. 10I



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FIG. 10J

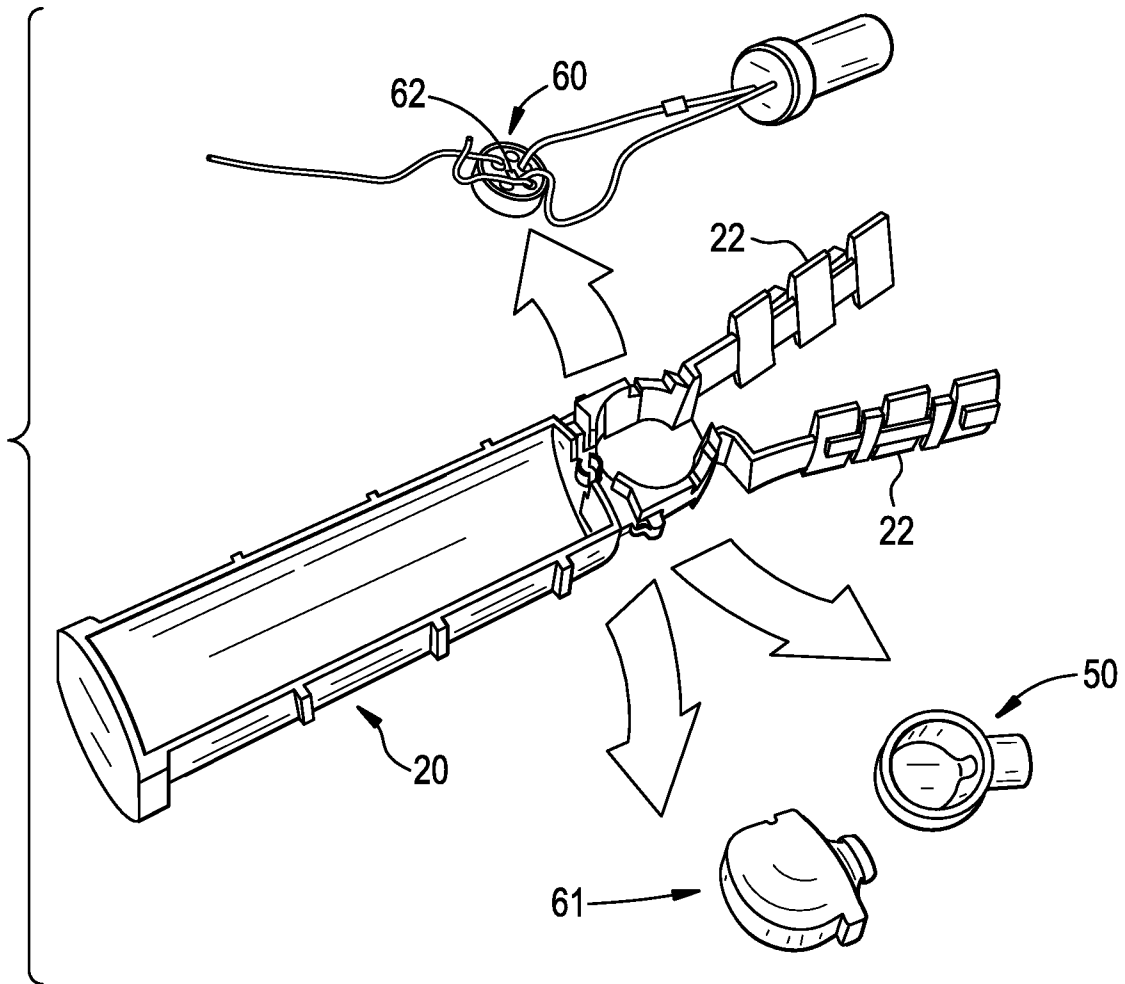
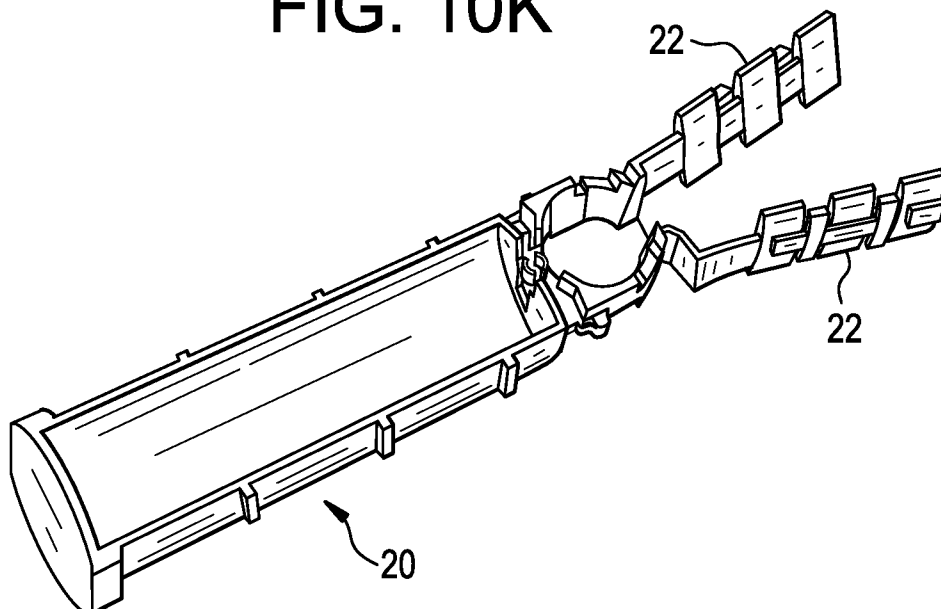
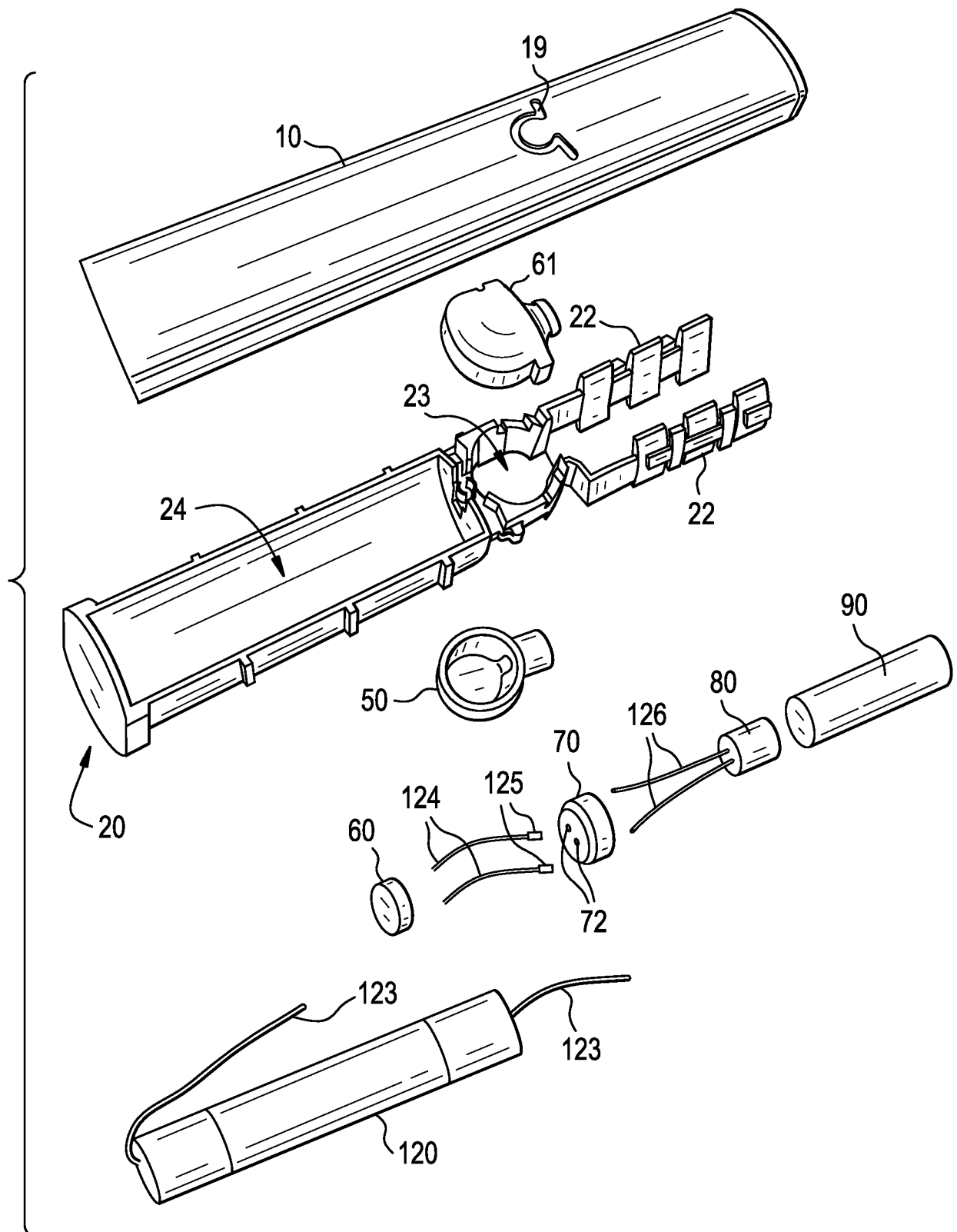


FIG. 10K



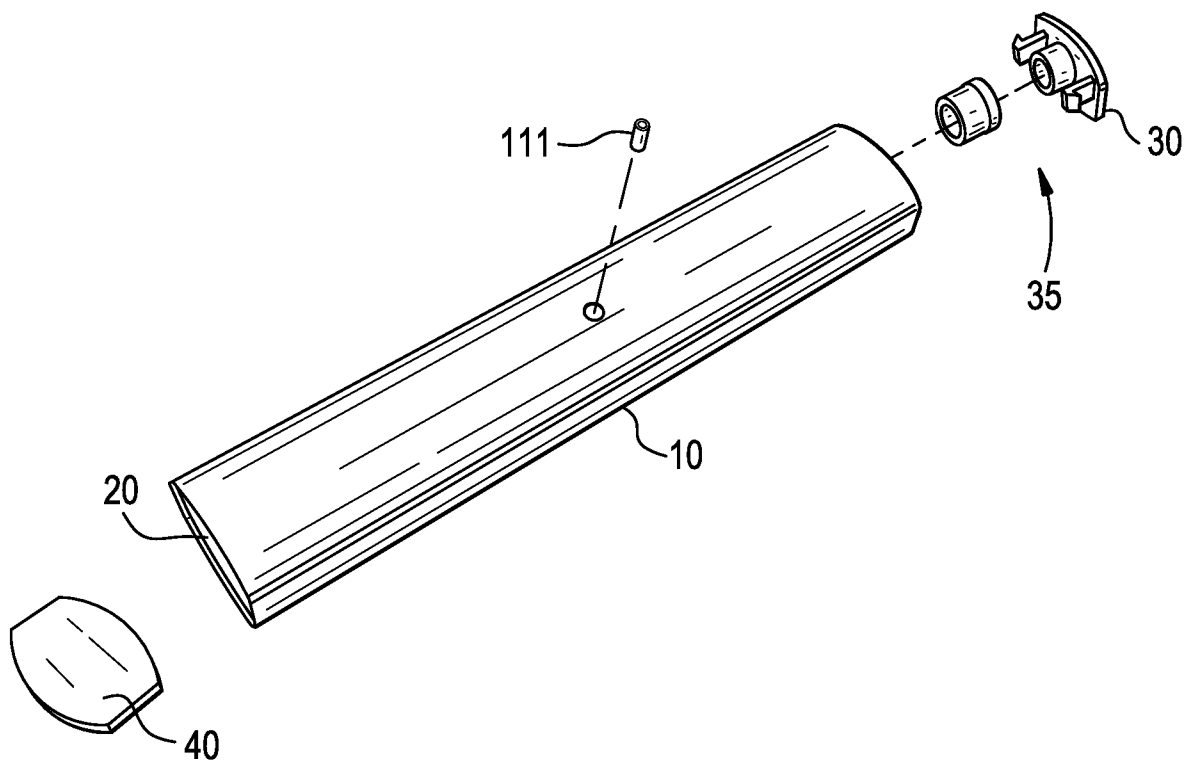
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FIG. 11A



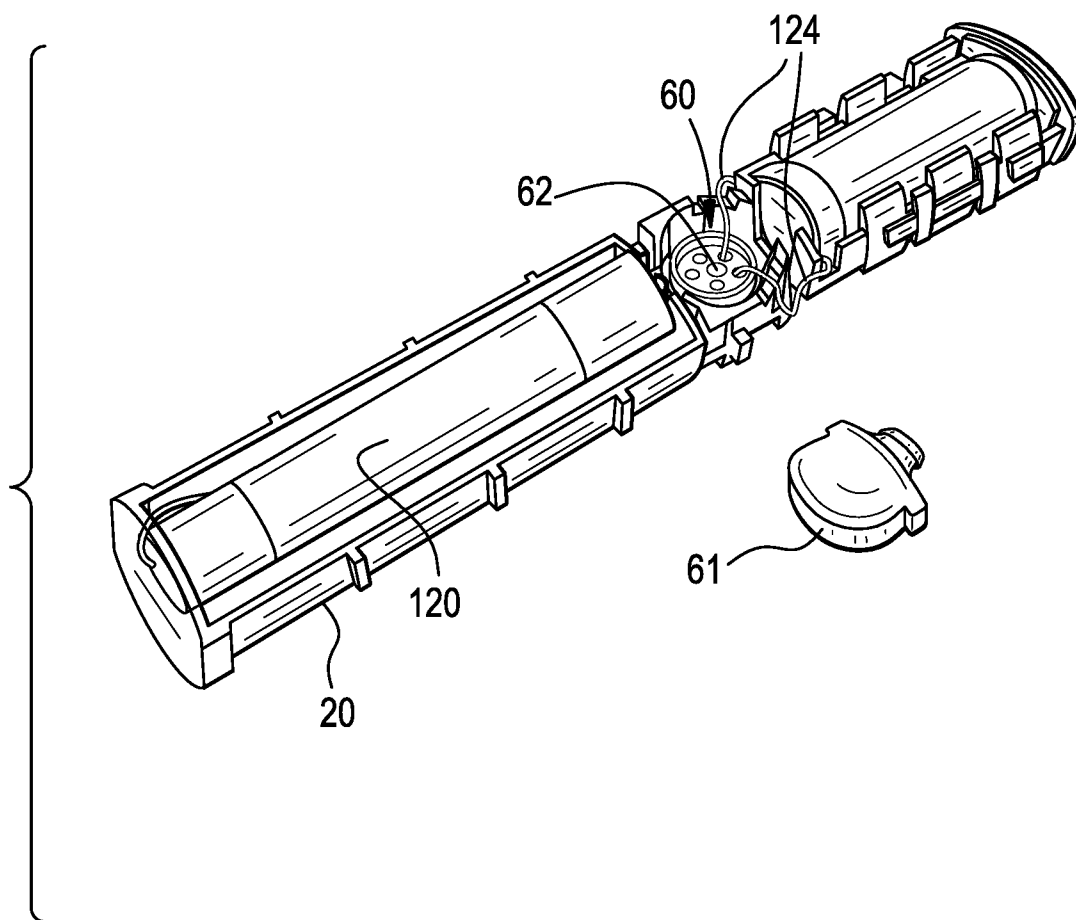
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FIG. 11B



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FIG. 11C



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FIG. 12A

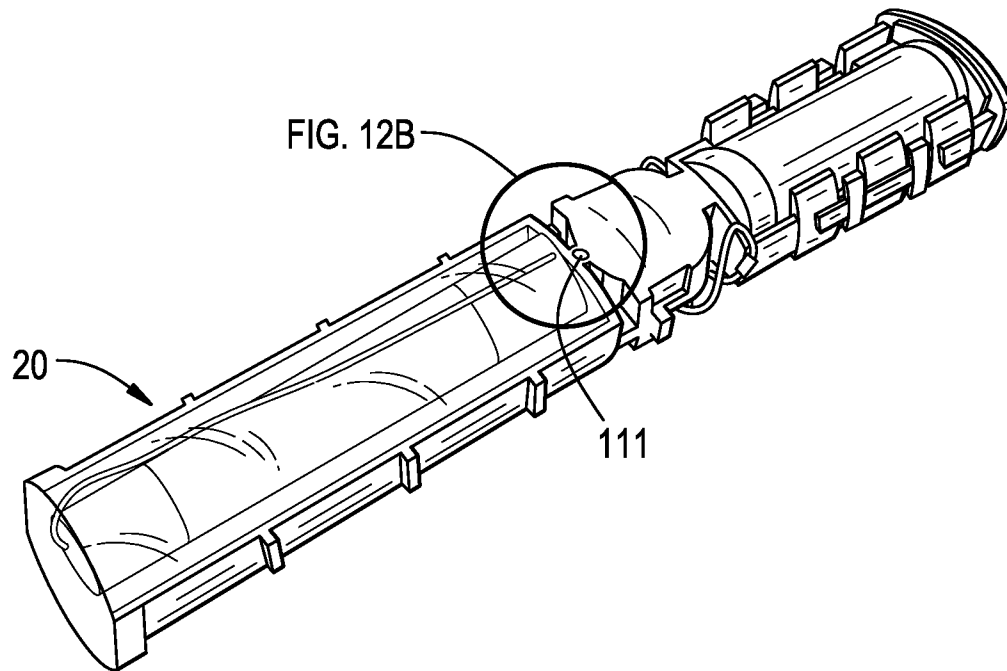


FIG. 12B

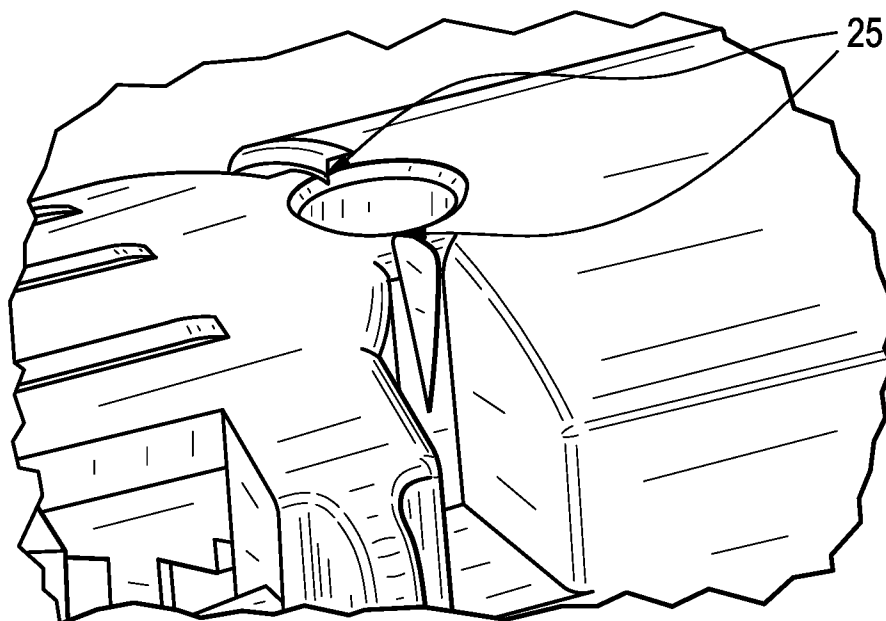
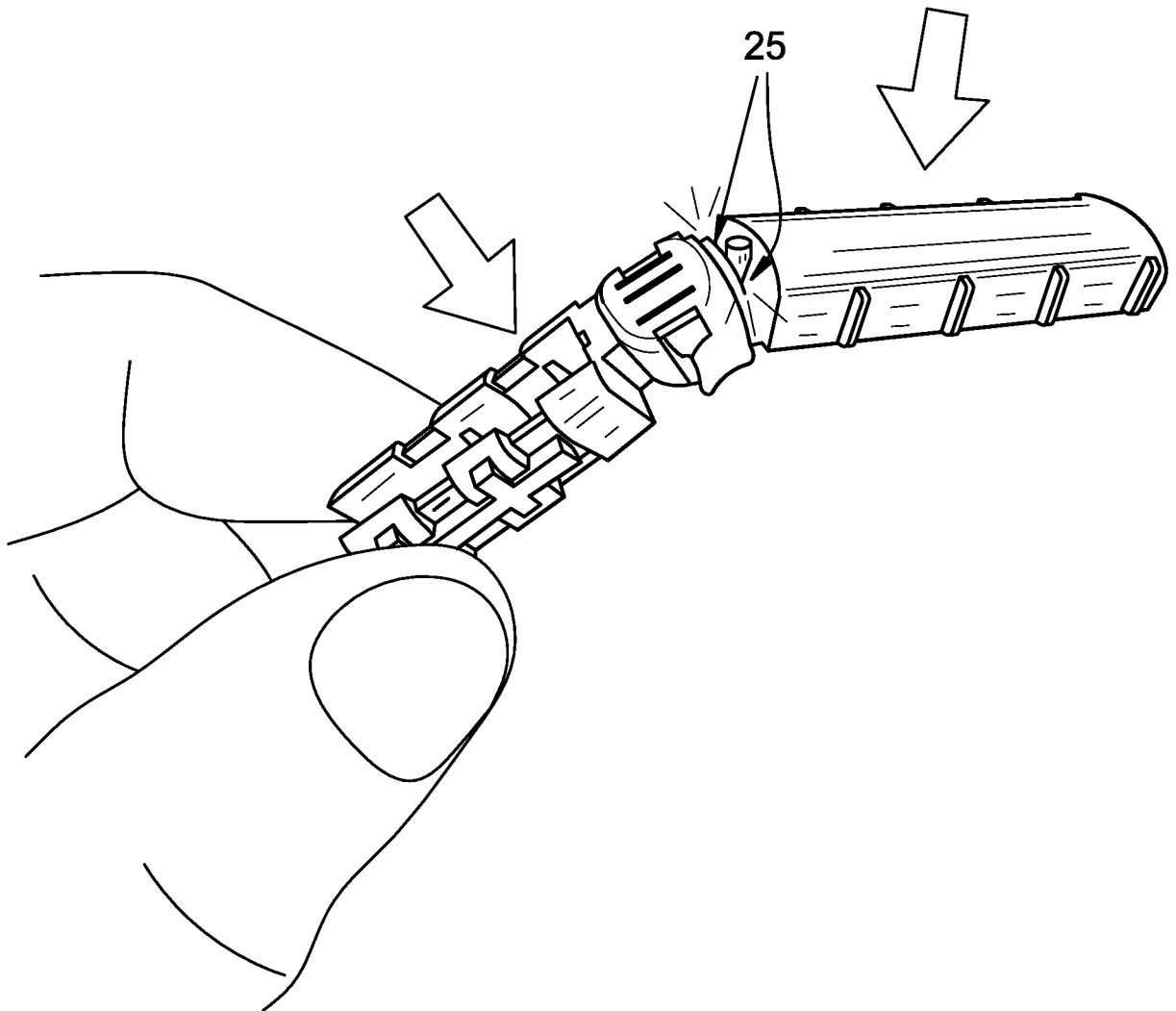


FIG. 12C



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2019/025041

A. CLASSIFICATION OF SUBJECT MATTER

INV. A24F47/00 A61M15/06 A61M11/04
ADD.

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)

A24F A61M

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

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

EPO-Internal, BIOSIS, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2018/048813 A1 (JUUL LABS INC [US]) 15 March 2018 (2018-03-15) abstract; figures 7, 9-15, 27, 28, 30 paragraphs [0008], [0215], [0227], [0312] - [0316], [0336], [0337], [0345] -----	1-24
A	WO 2016/147188 A1 (RAICHMAN YOSSEF [IL]) 22 September 2016 (2016-09-22) abstract; figures 1-14 -----	1-24
A	WO 2011/146320 A2 (TERRY NATHAN ANDREW [US]; MINSKOFF NOAH MARK [US]) 24 November 2011 (2011-11-24) claims 1-12 -----	1-24
A	US 2016/330999 A1 (CAMERON JOHN [US]) 17 November 2016 (2016-11-17) abstract; claims 1-20 -----	1-24
	-/-	



Further documents are listed in the continuation of Box C.



See patent family annex.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search

14 June 2019

Date of mailing of the international search report

01/07/2019

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Fax: (+31-70) 340-3016

Authorized officer

Weijland, Albert

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2019/025041

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2016/366944 A1 (LARSON MICHAEL RAYMOND [US]) 22 December 2016 (2016-12-22) abstract; claims 1-20 -----	1-24

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2019/025041

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