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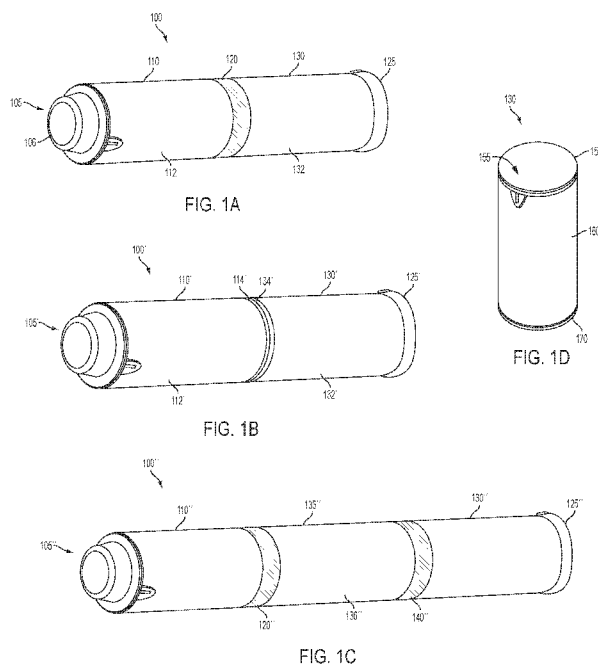
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## (54) Title: CONTAINER ASSEMBLY FOR MEDICAMENT APPLICATOR, AND SYSTEM FOR MONITORING SAME



(57) Abstract: The present disclosure relates to a container for housing a medication contained within an applicator, such as medications delivered intranasally, the container and applicator as a combination, an adapter or interface for connecting the container to other containers, and to devices, systems, and methods for tracking the location of one or more containers.



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CONTAINER ASSEMBLY FOR MEDICAMENT APPLICATOR, AND SYSTEM  
FOR MONITORING SAME

TECHNICAL FIELD

5           The present disclosure relates to a container for housing a medication contained within an applicator, such as medications delivered intranasally, the container and applicator as a combination, an adapter for connecting the container to other containers, and to devices, systems, and methods for tracking the location of one or more containers.

10   BACKGROUND

          In some cases, such as when one has diabetes, a person must carry one or more “rescue” medications with him or her at all times for emergency administration. Rescue medication, when consistently carried so that the medication can be properly and timely administered, can reduce the frequency of costly emergency room visits. Containers such  
15 as conventional pill bottles having screw top, “child safe,” or tamper resistant packaging can be difficult to open in these situations. When the medication is contained within a uniquely shaped application device, such as a purpose-designed nasal applicator, conventional containers often do not adequately protect the applicator from environmental conditions, damage, and accidental application/discharge, yet still be easy  
20 to open in an emergency situation.

          Often, people having medical conditions such as diabetes are required to carry one or more medications, such as glucagon, and/or additional related supplies such as glucose tablets, candy or other fast-acting carbohydrates, test strips, or even multiple doses of a rescue medication. Carrying multiple separate containers, however, may lead  
25 to one or more of the containers being lost or to making it more difficult for a third party to locate the appropriate medication in the event of an emergency, such as an episode of hypoglycemia.

          Patient compliance with carrying medications for emergency administration can reduce costly visits to the emergency room, and may even make the difference between  
30 life and death in situations where emergency medical care is not readily available. Thus,

there exists a need to encourage and monitor patient compliance with carrying medications for emergency administration.

## SUMMARY

5           In accordance with a first aspect of the present disclosure, a container assembly for a nasal medicament applicator is provided. The container assembly includes first and second containers. Each of the first and second containers has a body portion having an open top, a closed bottom, and an annular wall that defines an interior space; a cap for sealing the open top of the body portion; and a circular mating portion. The circular  
10       mating portion extends from the closed bottom of the container and has a flat exposed surface parallel to the closed bottom of the body portion to form a bottom of the container. The circular mating portion also has an external diameter such that the closed bottom of the body portion extends radially beyond the circular mating portion in all directions. The container assembly includes an interface coupler that has at least two  
15       openings for receiving the circular mating portion in a locking arrangement, and the interface coupler joins the first and second containers into the single container assembly. The container assembly also includes a first plug disposed in the interior space of the first container. The first plug has an external shape conforming to the interior of the wall of the first container, and a central opening for receiving an end of the nasal medicament  
20       applicator. In specific embodiments, the plug includes a desiccant.

          In accordance with a second aspect of the present disclosure, a container assembly for a nasal medicament applicator is provided. The container assembly includes first and second containers. The first and second containers each have a body portion having an open top, a closed bottom, and an annular wall defining an interior space. Each of the  
25       first and second containers has a cap for sealing the open top of the body portion and a circular mating portion. Each circular mating portion extends from the closed bottom of the container and has a flat exposed surface parallel to the closed bottom of the body portion to form a bottom of the container. Each circular mating portion has an external diameter such that the closed bottom of the body portion extends radially beyond the  
30       circular mating portion in all directions. The container assembly includes a third container portion, which has an annular wall defining an interior space and two mating

portions. One mating portion is disposed at each end of the annular wall. The container assembly also includes first and second interface couplers. The first interface coupler has a first opening for receiving the circular mating portion of the first container in a locking arrangement, and a second opening for receiving one of the third container mating portions in a locking arrangement. The second interface coupler has a first opening for receiving the circular mating portion of the second container in a locking arrangement, and a second opening for receiving one of the third container mating portions in a locking arrangement, and the interface couplers join the first and second containers and the third container portion into a single container. A first plug is disposed in the interior space of the first container, and has an external shape conforming to the interior of the annular wall, and a central opening for receiving an end of the nasal medicament applicator. In specific embodiments, the plug includes a desiccant.

In accordance with a third aspect of the present disclosure, a container assembly for a nasal medicament applicator is provided. The container assembly includes a first container having a body portion having an open top, a closed bottom, and an annular wall defining an interior space. The container assembly also includes a cap for sealing the open top of the body portion and a circular mating portion. The circular mating portion extends from the closed bottom of the container and has a flat exposed surface parallel to the closed bottom of the body portion to form a bottom of the container. The circular mating portion has an external diameter such that the closed bottom of the body portion extends radially beyond the circular mating portion in all directions. The container assembly includes a first plug disposed in the interior space of the first container. The first plug has an external shape conforming to the interior of the annular wall and a central opening for receiving an end of a nasal medicament applicator. In specific embodiments, the plug includes a desiccant. The container assembly also includes an interface coupler that has a first opening for receiving the circular mating portion of the first container in a locking arrangement, and a second opening for receiving a second container in a locking arrangement.

In accordance with a fourth aspect of the present disclosure, a system for tracking a user's proximity to one or more medicament containers is provided. The system includes a container assembly and a tracking device configured to receive queries. The

system also includes monitoring device configured to communicate with the tracking device. The monitoring device queries the tracking device at defined intervals of time and determines the status of the tracking device. The monitoring device is further configured to present an alarm or alert to the user when the monitoring device is unable to  
5 communicate with the tracking device. In specific embodiments, the tracking device is integrated with the container assembly.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The features and advantages of the present disclosure will become more apparent  
10 to those skilled in the art upon consideration of the following detailed description taken in conjunction with the accompanying figures, wherein

**Fig. 1A** illustrates an exemplary container assembly having two containers and one interface coupler;

**Fig. 1B** illustrates an exemplary container assembly having two containers, each  
15 container having a mateable connector formed integrally therewith;

**Fig. 1C** illustrates an exemplary container assembly having three containers and two interface couplers;

**Fig. 1D** illustrates an exemplary container;

**Fig. 2A** illustrates a perspective view of an exemplary interface coupler in accordance  
20 with the present disclosure;

**Fig. 2B** illustrates a top view of the exemplary interface coupler of Fig. 2A;

**Fig. 2C** illustrates a cross-sectional view of the exemplary interface coupler of Fig. 2A taken along line C-C of Fig. 2B;

**Fig. 2D** illustrates the cross-sectional view of Fig. 2C further including a container end  
25 received in the top portion of the interface coupler;

**Fig. 3A** illustrates a perspective view of another exemplary interface coupler in accordance with the present disclosure;

**Fig. 3B** illustrates a bottom view of the exemplary interface coupler of Fig. 3A;

**Fig. 3C** illustrates a cross-sectional view of the exemplary interface coupler of Fig. 3A  
30 taken along line C-C of Fig. 3B;

**Fig. 3D** illustrates the cross-sectional view of Fig. 3C further including a container end received in the top portion of the interface coupler;

**Fig. 4A** illustrates a front perspective view of another exemplary interface coupler in accordance with the present disclosure including two top portions for receiving two  
5 containers;

**Fig. 4B** illustrates a side perspective view of the exemplary interface coupler of Fig. 4A;

**Fig. 4C** illustrates a bottom view of the exemplary interface coupler of Fig. 4A;

**Fig. 4D** illustrates a cross-sectional view of the exemplary interface coupler of Fig. 4A taken along line D-D of Fig. 4C;

10 **Fig. 4E** illustrates a cross-sectional view of the exemplary interface coupler of Fig. 4A taken along line E-E of Fig. 4C;

**Fig. 4F** illustrates the cross-sectional view of Fig. 4D further including a container end received in each top portion of the interface coupler;

15 **Fig. 5** illustrates an exemplary container having a formed cap with thumb lip and a circular mating portion, in accordance with the present disclosure;

**Figs. 6A** illustrates a nasal medicament applicator inserted in a first orientation into a container having a plug;

**Fig. 6B** illustrates a nasal medicament applicator inserted in a second orientation into a container having a plug;

20 **Fig. 6C** illustrates a side perspective view of an exemplary plug of Figs. 6A and 6B according to an embodiment of the present disclosure;

**Fig. 6D** illustrates a top perspective view of the exemplary plug of Fig. 6C;

**Fig. 6E** illustrates an exemplary nasal medicament applicator of Figs. 6A and 6B according to an embodiment of the present disclosure;

25 **Fig. 7** illustrates a side perspective view of another exemplary plug of Figs. 6A and 6B according to an embodiment of the present disclosure;

**Fig. 8** illustrates an exemplary tracking system for tracking a user's proximity to a medicament container assembly;

30 **Fig. 9** illustrates a flow diagram of an exemplary method executed by a monitoring device of the tracking system of Fig. 8 for determining whether a user has become separated from his or her medicament container assembly; and

**Fig. 10** illustrates a cross-sectional view of an exemplary known nasal medicament applicator for a powder formulation.

## DETAILED DESCRIPTION

For the purposes of promoting an understanding of the principles of the present disclosure, reference will now be made to the embodiments illustrated in the drawings, and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended.

Drugs that easily cross mucous membranes and are also intended for delivery in emergency or “rescue” situations, such as glucagon, in some instances may be easier to deliver as an intranasal formulation. In some embodiments, intranasally deliverable formulations such as powder, gel, and liquid formulations offer some advantages including, but not limited to, the increased likelihood of uniform dose deliverability, adequate drug content to provide the total dose of drug required to achieve therapeutic effect as a single dose into a single nostril, no requirement to mix medications, improved stability during storage under ambient conditions for an extended period of time, and a good safety and tolerability profile.

Additionally, it is estimated that at least 10% of the population suffers from trypanophobia, or “needle phobia” (a fear of needles). Hamilton, J.G. (1995). Needle phobia: a neglected diagnosis. *J Fam Pract.*, 41(2), 169-75. Individuals with needle phobia may refuse to seek health care or carry injectable rescue medications themselves. Further, people with needle phobia may be hesitant or refuse to assist in administering injectable rescue medications to others in an emergency situation as a result of their own fears. Intranasal formulations reduce the likelihood of the need to inject a patient, thereby increasing the likelihood for patient compliance with carrying rescue medication and for bystanders to be willing and able to assist with administration.

Nasal medicament applicators are typically used to administer intranasal formulations. Exemplary applicators for administering intranasal powder formulations are disclosed in the following patents and patent applications: U.S. Patent Nos. 5,702,362, 6,398,074, 6,938,798, and 7,722,566; U.S. Patent Application Publication No. 20110045088; and International Patent Publication No. WO2014004400, all of which are incorporated by reference herein. While the exemplary nasal medicament applicators described herein are designed for use with intranasal powder formulations, it should be appreciated that any medicament applicator, including nasal medicament applicators for

liquid and gel formulations, could be used with the container, container assembly, and tracking system disclosed herein without departing from the scope of the present disclosure. An exemplary nasal medicament applicator 620 compatible with the container assembly and tracking system of the present disclosure is illustrated in Fig. 6E. An  
5 exemplary known nasal medicament applicator 1000 compatible with the container assembly and tracking system of the present disclosure is illustrated in Fig. 10.

Referring to Fig. 10, a nasal applicator 1000 includes a reservoir 1010 containing a single dose 1018 of an intranasal powder formulation, such as the formulations disclosed in U.S. Provisional Patent Application Nos. 62/117,031 and 62/117,266, which  
10 are incorporated by reference herein. The reservoir 1010 has an air inlet 1011 and a product outlet 1015. A product retention device 1012 is disposed in the air inlet 1011 to keep the product 1018 (intranasal powder formulation) in the reservoir 1010 until the product 1018 is dispensed. The product outlet 1015 is blocked, preferably in a sealed fashion, by a closing ball 1016 which is removed from its blocking position by the flow  
15 of air when the product is being dispensed. In one embodiment, product retention device 1012 is configured as a grid permeable to air.

When a user actuates the device, the user exerts a pressure on a plunger 1025 in such a way that a piston 1021 compresses air 1020 contained in a chamber 1022. Since product retention device 1012 is permeable to air in the illustrated embodiment, the  
20 compression of the air 1020 in chamber 1022 is transmitted to the reservoir 1010 and, consequently, is applied to the closing ball 1016 which is blocking the product outlet 1015. The dimensions of the closing ball 1016 and its fixing at the reservoir product outlet 1015 are such that the ball 1016 is removed from its blocking position when a minimum predetermined pressure is created through the reservoir 1010 in an air blast.  
25 When this minimum pressure is reached, the ball is suddenly moved towards an outlet channel 1040 of the device and the flow of air 1020 created by the air blast expels the dose 1018 contained in the reservoir 1010. The pre-compression created by this closing ball 1016 ensures that when it is removed from its blocking position, the energy accumulated in the hand of the user is such that the piston 1021 integral with the plunger  
30 1025 is propelled within the chamber 1022, thereby creating a powerful air flow. The air

flow is suitable to finely spray the dose of product 1018 and, notably, to get rid of any product agglomerates if it is a powder product.

However, in order to effectively administer an intranasal formulation such as an intranasal powder, liquid, or gel formulation, a nasal medicament applicator should not be damaged so that the plunger mechanism fails, should not be accidentally discharged in the bottom of a purse or backpack, and in the case of a powder formulation should preferably be kept dry in the event that a seal fails. Thus, there exists a need for a container for transporting medicament applicators such as nasal medicament applicators. In some cases, it is preferable to store the nasal medicament applicator in close proximity to other items the user might need such as glucose tablets or candy or some other form of ready available sugar or fast-acting carbohydrate preferred by the user. Exemplary container assemblies 100, 100', 100'' for nasal medicament applicators are illustrated in Figs. 1A, 1B, and 1C and are described herein.

An exemplary container 130 is illustrated in Fig. 1D. The exemplary container illustrated in Figure 1D has an open top 150, an annular wall 160, and a closed bottom 170. In one embodiment, closed bottom 170 includes a cap 125 illustrated in Fig. 1A. The annular wall 160 defines an interior space 155 that is preferably used for medicament storage, but could be used to store any object that would fit within the container 130. Containers described herein, such as container 130 of Fig. 1D, may be constructed of any of a variety of materials including, but not limited to, plastics such as polyethylene, metals, or glass. Preferably, such containers are constructed of materials that are resilient and shock-absorbing so that the contents of the containers are not damaged when the container is dropped.

Figs. 6A and 6B illustrate a container 610 configured to store a nasal medicament applicator. Container 610 is an illustrative embodiment of containers 110, 130 of Fig. 1A. A plug 630 is positioned in container 610 to cradle the nasal medicament applicator 620. In one embodiment, plug 630 is removable and is friction fit inside container 610. Plug 630 may optionally include a desiccant to reduce moisture in the container 610. Plug 630 is disposed in the interior space of container 610 formed by annular wall 612 and illustratively has a cylindrical external shape conforming to the interior of the annular wall 612. When plug 630 is positioned in container 610, an annular ledge 640 of plug 630

abuts an annular seat 642 located at the closed end of container 610. Plug 630 also has a central opening 632 for receiving an end 622, 624 of the nasal medicament applicator 620.

In Fig. 6A, nasal medicament applicator 620 is oriented such that the product outlet 626 is directed towards the bottom or closed end of container 610. An annular flange 646 of applicator 620 is supported by an annular end wall 650 of plug 630 and is retained via an annular ridge 638 formed on the interior surface of container wall 612. In this embodiment, applicator 620 will not fall out of container 610 unless it is pulled out with a force sufficient to slide flange 646 past ridge 638. In Fig. 6B, nasal medicament applicator 620 is oriented such that the product outlet 626 is directed outwards from the open end of container 610, and an annular shoulder 648 of applicator 620 is supported by annular end wall 650 of plug 630. In the orientation of Fig. 6B, applicator 620 is not retained within container 610 via ridge 638.

Plug 630 is further illustrated in Figs. 6C and 6D. As illustrated, an interior wall 658 of plug 630 which forms central opening 632 includes a plurality of circumferentially spaced longitudinal ridges 660 forming a longitudinal groove 662 between each ridge 660. In Fig. 7, another exemplary plug 630' is illustrated. Similar to plug 630 of Figs. 6C and 6D, plug 630' of Fig. 7 includes an annular ledge 640' and an annular end wall 650'. Interior wall 658' of plug 630' illustratively has a smooth cylindrical surface and does not include longitudinal ridges and grooves such as the ridges 660 and grooves 662 of plug 630 of Figs. 6C and 6D.

Fig. 1A illustrates a container assembly 100 having two containers: container 110 and container 130. Each container 110, 130 has a respective body portion 112, 132 each having an open top, a closed bottom, and an annular wall defining an interior space (see container 610 of FIGS. 6A and 6B, for example). In the illustrated embodiment, in assembly the open tops of containers 110, 130 face away from each other and the closed ends of containers 110, 130 face towards each other and are coupled together via an interface coupler 120. Each of containers 110, 130 includes a cap 105, 125, respectively, for sealing the open end of the respective container 110, 130. In the illustrated embodiment, cap 105 on container 110 has a raised portion 106 in the center of cap 105. Raised portion 106 follows the general shape of an end 622 of a nasal medicament

applicator 620 (see Fig. 6A) that protrudes from container 110 when the applicator 620 is inserted into container 110, and cap 105 thereby facilitates securing the nasal medicament applicator 620 within the container 110. In one embodiment, container 110 also includes a plug (e.g., see plug 630 of Fig. 6A) for cradling the nasal medicament applicator 620, as described herein.

Container 130 is intended for the storage of any item that fits within the interior space of the container 130, such as glucose tablets, candy, test strips, or other fast-acting carbohydrates, and in the illustrated embodiment is not intended for the storage of another nasal medicament applicator, although in other embodiments container 130 may store another nasal medicament applicator. Caps 105 and 125 may be secured to their respective containers 110, 130 by a snap fit, a compression fit, threads, or any other closure mechanism suitable for securing a cap or lid on a container 110 130. The closed bottoms of containers 110 and 130 include circular mating portions (see mating portion 634 of Fig. 6A) which are connected together via interface coupler 120, such as via threads, snap fit, compression fit, or other suitable coupling mechanism. Any portion of the containers 110, 130 and/or interface coupler 120 may also include a tracking device (see, for example, tracking device 808 of Fig. 8 described herein). The tracking device may be embedded in the container(s) 110, 130 and/or interface coupler 120 at the time of manufacture, or affixed to the container(s) 110, 130 and/or interface coupler 120 after manufacture.

Figure 1B illustrates another embodiment of a container assembly 100' that includes containers 110' and 130' having respective body portions 112', 132' each having an open end, a closed end, and an annular wall defining an interior space. Caps 105', 125' are coupled at the open ends of respective containers 110', 130'. Containers 110', 130' are connected directly together at their respective closed ends via their respective integrated mating portions 114', 134', which are configured to mate with each other via threads, snap fit, compression fit, or other suitable coupling mechanism. In this embodiment, mating portions 114', 134' cooperate to serve as the interface coupler, and a separate interface coupler is not required.

Figure 1C illustrates a another exemplary container assembly 100'' having three containers coupled together, including container 110'', container 130'', and container

135''. Containers 110'', 130'' illustratively have the same configuration as containers 110, 120 described herein with respect to Fig. 1A, including a respective cap 105'', 125'' for sealing the open container ends. Container 110'' also preferably includes a desiccant plug, such as plug 630 of Figs. 6A and 6B. Containers 130'' and 135'' are intended for the storage any item that fits within the interior space of the container, such as glucose tablets, candy, test strips, or other fast-acting carbohydrates, and is not intended for the storage of nasal medicament applicators. Alternatively, container 130'' may be identical or similar to container 110'' to permit carrying of two nasal medicament applicators. Caps 105'' and 125'' may be secured to their respective containers 110'', 130'' by a snap fit, a compression fit, threads, or any other closure mechanism suitable for securing a lid on a container.

Container 135'' differs from container 110'' and container 130''. In the illustrated embodiment, container 135'' is tube-shaped and includes an annular wall 136'' that defines an interior space and is open at both ends. Each open end of container 135'' includes a mating portion. One mating portion of container 135'' is connected to container 110'' by an interface coupler 120'', and the other mating portion of container 135'' is connected to container 130'' by an interface coupler 140''. Thus, the closed end/mating portions of containers 110'' and 130'' form "caps" at both ends of container 135''. In some implementations, container 135'' may also include a plug or desiccant plug, such as plug 630 of Figs. 6A and 6B. Interface couplers 120'', 140'' may each have the same configuration as interface coupler 120 of Fig. 1A, or alternatively one or both of couplers 120'', 140'' may have a different configuration, such as any of the configurations described herein in Figs. 2-4.

Any one of the containers 110'', 120'', 135'' and/or interface couplers 120'', 140'' may also include a tracking device (see, for example, tracking device 808 of Fig. 8 described herein). The tracking device may be embedded in the container(s) and/or interface coupler at the time of manufacture, or affixed to the container(s) and/or interface coupler after manufacture.

Figure 5 illustrates container 610 of Figs. 6A and 6B configured with a cap 636 at its open end for securing nasal medicament applicator 620 (Fig. 6A) inside of the container 610, as described herein with respect to cap 105 of Fig. 1A. Cap 636 includes a

thumb lip 645 to facilitate removing the cap 636 from container 610. Cap 636 may be secured with container 610 via any means suitable for securing a cap to the opening of a container, including press fitting, compression fitting, threading, or the like. Cap 636 includes a raised portion 644, as similarly described herein with raised portion 106 of Fig.

5 1A.

Figure 5 also illustrates an exemplary circular mating portion 634 of container 610. Circular mating portion 634 is integral with and extends from the closed bottom of container 610. Mating portion 634 includes a threaded annular outer portion 654 extending from the bottom of container 610 having a smaller external diameter than annular wall 612, and an annular shoulder 655 extends between the bottom end of wall 612 and annular outer portion 654. An annular space or valley 656 extends between annular outer portion 654 and an inner end portion 657, as illustrated in Figs. 5, 6A, and 6B. Inner end portion 657 has a circular flat outer surface 652 and forms the bottom of the container 610. As such, the external diameter of the circular mating portion 634 is illustratively smaller than the external diameter of the annular wall 612 of the container 610.

Figures 2A through 2D illustrate an exemplary interface coupler 120 in accordance with the present disclosure. Coupler 120 includes opposite first and second openings 210, 220 formed by an outer cylindrical wall 222. Each of the openings 210, 220 is designed to receive an end of a container (e.g., closed ends of containers 110, 130, 610 or open ends of container 135). For example, first and second openings 210, 220 are each designed to receive a circular mating portion 634 of container 610 (see Figs. 5-6B). Referring to Fig. 2C, interface coupler 120 includes a circular interior wall 228 extending perpendicular to outer cylindrical wall 222. An annular ridge 226 is formed on both surfaces of the interior wall 228, and each annular ridge 226 has a smaller diameter than the inner surface of outer wall 222. The ends of each annular ridge 226 are illustratively angled (e.g., 45 degrees), such as to facilitate positioning of the mating portion 634 (Figs. 5-6B) within coupler 120. The inner surface of outer wall 222 includes threads 224 for mating with corresponding threads of annular outer portion 654 of mating portion 634 (Figs. 5-6B). In assembly as illustrated in Fig. 2D, annular outer portion 654 of mating portion 634 (Figs. 5-6B) threadably engages the inner surface of outer wall 222 of

coupler 120 and extends into the channel formed between annular ridge 226 and outer wall 222 of coupler 120. Further, end portion 657 of mating portion 634 (Figs. 5-6B) is received in the interior of annular ridge 226 of coupler 120 such that outer surface 652 (Figs. 5-6B) is adjacent interior wall 228 of coupler 120.

5           Figures 3A through 3D illustrate another exemplary interface coupler 300 having a first opening 310 formed by a first cylindrical wall 304 and configured to receive a circular mating portion 634 (Figs. 5-6B). A second opposite opening 320 formed by a second cylindrical wall 302 serves as an adaptor opening and is configured to receive an end of a container that does not have a circular mating portion 634. For example, the  
10           adaptor opening 320 may be configured to receive an end of a commercially available tube of glucose tablets. In the illustrated embodiment, protrusions 308 extend into adaptor opening 320 and are configured to secure the end of the received tube or container via a snap fit or compression fit. In other implementations, where the received tube or container has a threaded end, the adaptor opening 320 may be threaded to receive the  
15           threaded end of the container.

Referring to Fig. 3C, interface coupler 300 includes a circular interior wall 328 extending perpendicular to outer cylindrical walls 302, 304. An annular ridge 326 is formed on the top surface of the interior wall 328 and includes angled ends (e.g., 45 degrees). The inner surface of outer wall 304 includes threads 324 for mating with  
20           corresponding threads of annular outer portion 654 of mating portion 634 (Figs. 5-6B). In assembly as illustrated in Fig. 3D, annular outer portion 654 of mating portion 634 (Figs. 5-6B) threadably engages the inner surface of outer wall 304 of coupler 300 and extends into the channel formed between annular ridge 326 and outer wall 304. Further, end portion 657 (Figs. 5-6B) is received in the interior of annular ridge 326 such that outer  
25           surface 652 (Figs. 5-6B) is adjacent interior wall 328 of coupler 300.

A “side by side” interface coupler 400 is illustrated in Figs. 4A through 4F. Openings 410, 412 formed by respective cylindrical walls 404, 406 are each configured to receive a circular mating portion 634 (Figs. 5-6B). A second opposite opening 420 formed by a cylindrical wall 402 serves as an adaptor opening configured to receive an  
30           end of a container that does not have a circular mating portion 634, such as a tube of glucose tablets as described herein with respect to Figs. 3A-3D via a snap fit,

compression fit, or threaded coupling, for example. It should be appreciated that one or more of the openings 410, 412, 420 may be adapted to receive other types of couplings or containers. Referring to Figs. 4D and 4E, interface coupler 400 includes a wall 428 extending perpendicular to outer cylindrical wall 402. An annular ridge 426 is formed on the top surface of the interior wall 328 in each opening 410, 412 and includes angled ends (e.g., 45 degrees). The inner surface of each outer wall 404, 406 includes threads 424 for mating with corresponding threads of annular outer portion 654 of mating portion 634 (Figs. 5-6B). In assembly as illustrated in Fig. 4F, annular outer portion 654 of each mating portion 634 (Figs. 5-6B) threadably engages the inner surface of the respective outer wall 404, 406, as described herein with respect to Figs. 3A-3D.

A system and method for tracking a user's proximity to a medicament container assembly are also provided herein in Figs. 8 and 9. It should be appreciated that any wireless communication protocol may be used to implement the tracking system 800 described herein, so long as the wireless communication protocol enables a tracking device 808 and a monitoring device 802 (and/or proxy device 806) to communicate with each other over a wireless network 804. Exemplary wireless communication protocols include, but are not limited to, Bluetooth, Rubee, RFID, Zigbee, Wi-Fi, cellular communication protocols, and near field communication protocols such as those used to implement Apple Pay, Samsung Pay, and Google Wallet. In one embodiment, the tracking device 808 is a low power or ultra lower power device that draws little power, so that the battery life of the tracking device meets or exceeds the shelf life of the medicine contained within the container assembly.

A tracking device 808 is securely affixed to or embedded in a medicament container(s) and/or one or more interface couplers in a container assembly as described above. A monitoring device 802 is configured to communicate with the tracking device 808. For example, if the tracking device 808 is a Bluetooth device, a smartphone such as an Apple iPhone® or Samsung Galaxy S® may serve as the monitoring device 802. It should be appreciated that the monitoring device 802 may be any computing device including, but not limited to, a smartphone, tablet computer, laptop computer, wearable computer (Google Glass or the like), smart watch, or the like. As illustrated, monitoring device 802 includes a tracking device interface 824 for communicating via network 804

with tracking device 808, a network interface 826 for communicating via network 810 with a remote computing device 812, a display adapter and display 828, audio input/output 830, an input device 832 (e.g., keyboard, mouse, touchscreen, voice command, etc.), and system memory 834.

5           In the illustrated embodiment, the monitoring device 802 is first paired or setup with the tracking device 808 in accordance with the communication protocol used, so that the monitoring device 802 recognizes the tracking device 808 and communicates with the tracking device 808 via a network 804 (referred to herein as the “tracking network” 804). Once the tracking device 808 is paired or set up to communicate with the monitoring  
10       device 802 via an appropriate protocol, such as Bluetooth, a processor 822 of the monitoring device 802 may be used to configure and run a tracking program that is stored on a non-transitory computer-readable storage medium 820 associated with (locally or remotely) with the monitoring device 802. It should be understood that, in some implementations, the non-transitory computer-readable storage medium 820 may be co-  
15       located with the transmitting device or be physically within the monitoring device 802. In other implementations, the non-transitory computer-readable storage medium 820 may be located at a remote location and accessed remotely via a network connection, such as via network 810.

          The tracking program is configured with instructions that cause the processor 822  
20       of monitoring device 802 to perform the functions described herein. A flow diagram 900 of an exemplary method of operation of monitoring device 802 is illustrated in Fig. 9. At block 902, monitoring device 802 sends a query to (e.g., pings) the tracking device 808 via the tracking network 804 to determine whether or not the tracking device 808 is within communication range of the monitoring device 802. At block 904, the monitoring  
25       device 802 receives a response from the tracking device 808 (and/or other configured devices on the tracking network 804) or determines that a response has not been received. At block 906, monitoring device 802 stores the response (or no response event) and compares the tracking device response history to predefined conditions such as status and/or alarm conditions to determine the status of the tracking device 808. At block 908,  
30       monitoring device 802 communicates the status or alarm to a user, such as by displaying

the status/alarm on a display of monitoring device 802 or by communicating the status/alarm to a remote computing device 812 via network 810.

Queries from monitoring device 802 may occur at predetermined intervals, user-defined intervals, user-configurable intervals, or variable intervals depending on location, the percentage of successful responses, or other user-defined conditions. In some implementations, the frequency of queries may be varied depending upon the geographic location of the user/tracking device/transmitting device. For example, if the GPS in a user's phone (monitoring device 802) determines that a user is at home, school, or work (a pre-determined, user-defined location), the frequency of queries may decrease in order to preserve battery life because the user is at a known location. If the GPS determines that the user/tracking device/transmitting device is moving – for example, the user has gone on a hike – the frequency of queries to the tracking device 808 may be increased to assist the user in locating the medicament container quickly (by narrowing the search area) in the event that the medicament container becomes separated from the user.

Preferably, the tracking device 808 should respond to each received query via an appropriate protocol to confirm that the tracking device 808 is still within range of the transmitting device 802. Bluetooth, for example, has a range of approximately 32 feet (10 meters). Thus, if a Bluetooth tracking device 808 is not within the range of the transmitting device 802, the tracking device 808 will not respond to queries from the transmitting device 802. In some implementations, the number of unsuccessful queries (no response) is stored and the percentage of time a user is “compliant” in keeping his or her container assembly in close proximity can be computed. It should be appreciated that successful responses may also be stored, along with timestamps, the GPS location of the monitoring device 802 (if the device is configured with GPS) and other data related to queries sent and responses received may also be stored, either locally in the monitoring device 802 or remotely, for example, in a remotely hosted database residing on a non-transitory computer-readable storage device and communicated via a network connection 810. It should also be appreciated that all query/response-related data stored, either locally or remotely, may be exported so that it can be viewed by a third party.

The program running on the monitoring device 802 may offer user-configurable functionality relating to alarm conditions or prompts/reminders for repeated occurrences

of non-compliance with maintaining proximity to the container assembly. For example, if the number of queries without responses exceeds a predetermined or user-defined threshold value, an alert or alarm condition will be relayed to the user or a third party (via SMS, iMessage, e-mail, etc.). The alert may result on either or both of the tracking device 808 and transmitting device 802 sides. It should be appreciated that, because alert conditions are configurable, they may also be turned off by the user.

In some implementations, the tracking device 808 may include GPS capabilities. When the tracking device 808 is GPS-enabled, responses to queries will include GPS coordinates for the tracking device 808. Preferably, these coordinates are received and at least recent responses are stored by the transmitting device 802 in a non-transitory computer-readable storage medium 820, so that the last known position of the tracking device 808 can be relayed (displayed, emailed, sent to a third party via SMS, iMessage, or the like) to a user when the tracking device 808 fails to return a response to a query. In some implementations, the number and/or frequency of alarm conditions may be tracked by the software so that compliance with carrying the medicament container can be determined. Similarly, GPS coordinates of the monitoring device 802 (smartphone) may be associated with successful query responses so that, when the tracking device 808 fails to respond to a query, a user may be able to determine an area in which to search for his or her container assembly.

In some implementations, such as those intended for young children or other persons that would not ordinarily carry a smartphone, a wearable transmitting device 806 may be programmed using a computer or smart phone. In this implementation, the wearable transmitting device 806 acts as a proxy for a smart phone or more complex computing device 802 and is referred to herein as a “proxy device” 806. In this implementation, the proxy device 806 may have a simplified interface that provides feedback, such as audible or visual feedback, when an alarm condition occurs. Preferably, the proxy device 806 has communication means sufficient to query and receive responses from a tracking device 808 (and other devices on the tracking network 804), non-transitory computer readable storage for storing responses to queries and for storing instructions regarding predefined conditions such as status and/or alarm conditions, and a processor for comparing results to the stored predefined conditions and to cause a status

or alarm to be communicated to a user. Proxy devices 806 may be light, small, non-intrusive, preferably have long battery life, and are lower cost than many traditional commercially available consumer computing devices.

5 In some implementations, the monitoring device 802 provides feedback to the user to incentivize the user for compliance. Incentives are preferably programmable, for example, by a parent. Milestones in compliance may be communicated to a third party (parent, physician, insurance agent) via a communications protocol (SMS, iMessage, email), to encourage or reward compliance.

10 In still other implementations, multiple tracking devices 808 may be used and monitored simultaneously, for example, in the event that the various pieces of the container assembly were to become detached from one another.

What is claimed is:

1. A container assembly for a nasal medicament applicator, comprising:

(a) first and second containers, each of said first and second containers

5 having:

a body portion having an open top, a closed bottom, and an outer wall defining an interior space;

a cap for closing the open top of the body portion; and

a mating portion, said mating portion extending from the closed bottom of  
10 the container and having a flat exposed surface parallel to the closed bottom of the body portion to form a bottom of the container, and said mating portion having an external dimension such that the closed bottom of the body portion extends radially beyond the mating portion in all directions;

(b) an interface coupler, said interface coupler having at least two openings  
15 each configured to receive one of the mating portions in a locking arrangement, whereby the interface coupler joins the first and second containers; and

(c) a first plug disposed in the interior space of the first container, said first  
plug having an external shape conforming to the interior of the outer wall of the first  
container, and a central opening for receiving an end of the nasal medicament applicator.

20

2. The container assembly of claim 2, wherein the first plug comprises a desiccant.

3. The container assembly of any of claims 1 or 2, further comprising a second plug  
disposed in the interior space of the second container, said second plug having an  
25 external shape conforming to the interior of the outer wall of the second container, and a  
central opening for receiving an end of a nasal medicament applicator.

4. The container assembly of any of claims 1 to 3, wherein the second plug  
comprises a desiccant.

30

5. The container assembly of any of claims 1 to 4, wherein the at least two openings  
in the interface coupler are disposed on opposing faces of a disk shaped coupler, whereby

the first and second containers are joined in a bottom-to-bottom relationship to form the container assembly.

6. The container assembly of claims 1 to 5, wherein the two openings in the interface coupler are disposed in a side-by-side relationship on a coupler support, wherein the first and second containers are joined in a side-by-side relationship to form the container assembly.

7. The container assembly of any one of claims 1 to 6, wherein the mating portions of the first and second containers have the same size and shape.

8. The container assembly of any of claims 1 to 6, wherein the mating portions of the first and second containers are configured to mate with each other.

9. The container assembly of claims 1 to 8, wherein the mating portions of the first and second containers form a locking arrangement with the openings in the interface coupler by a snap fitting, a compression fitting, or a threaded fitting.

10. The container assembly of any one of claims 1 to 6, 8, and 9, wherein the mating portions of the first and second containers are different from each other.

11. The container assembly of claims 1 to 6, 8, and 9, wherein the mating portions of the first and second containers form a locking arrangement with the openings in the interface coupler by a snap fitting or a threaded fitting.

12. The container assembly of any of claims 1 to 6, 8, and 9, wherein the mating portions of the first and second containers form a locking arrangement with the openings in the interface coupler by a compression fitting and a threaded fitting.

13. The container assembly of any one of claims 1 to 6, 8, and 9, wherein the mating portions of the first and second containers form a locking arrangement with the openings in the interface coupler by a compression fitting and a snap fitting.

5 14. A container assembly for a nasal medicament applicator comprising:

(a) first and second containers, each of said first and second containers having:

a body portion having an open top, a closed bottom, and an annular wall defining an interior space;

10 a cap for closing the open top of the body portion; and

a circular mating portion, said circular mating portion extending from the closed bottom of the container and having a flat exposed surface parallel to the closed bottom of the body portion to form a bottom of the container, and said circular mating portion having an external diameter such that the closed bottom of the body portion  
15 extends radially beyond the circular mating portion in all directions;

(b) a third container portion, said third container portion having an annular wall defining an interior space and two mating portions, one mating portion being disposed at each end of the annular wall;

(c) first and second interface couplers,

20 the first interface coupler having a first opening for receiving the circular mating portion of the first container in a locking arrangement, and a second opening for receiving one of the third container mating portions in a locking arrangement, and

the second interface coupler having a first opening for receiving the circular mating portion of the second container in a locking arrangement, and a second  
25 opening for receiving one of the third container mating portions in a locking arrangement, whereby the interface couplers join the first and second containers and the third container portion into a single container; and

(d) a first plug disposed in the interior space of the first container, said plug having an external shape conforming to the interior of the wall, and a central opening for  
30 receiving an end of the nasal medicament applicator.

15. The container assembly of claim 14, wherein the first plug comprises a desiccant.

16. The container assembly of any of claims 14 and 15, further comprising a second plug disposed in the interior space of the second container or third container, said second  
5 plug having an external shape conforming to the interior of the wall of the second or third container, and a central opening for receiving an end of the nasal medicament applicator.

17. The container assembly of claim 16, wherein the second plug comprises a desiccant.

10

18. A container assembly for a nasal medicament applicator, comprising:

(a) a first container having:

a body portion having an open top, a closed bottom, and an annular wall defining an interior space;

15

a cap for closing the open top of the body portion; and

a circular mating portion, said circular mating portion extending from the closed bottom of the container and having a flat exposed surface parallel to the closed bottom of the body option to form a bottom of the container, and said circular mating portion having an external diameter such that the closed bottom of the body portion  
20 extends radially beyond the circular mating portion in all directions;

(b) a first plug disposed in the interior space of the first container, said plug having an external shape conforming to the interior of the wall and a central opening for receiving an end of a nasal medicament applicator, and

(c) an interface coupler having a first opening for receiving the circular mating  
25 portion of the first container in a locking arrangement, and a second opening for receiving a second container in a locking arrangement.

19. The container assembly of claim 18, wherein the first plug comprises a desiccant.

30

20. A container assembly for a nasal medicament applicator, comprising:

(a) a first container having:

a body portion having an open top, a closed bottom, and an annular wall defining an interior space;

a cap for sealing the open top of the body portion; and

a circular mating portion, said circular mating portion extending from the closed bottom of the container and having a flat exposed surface parallel to the closed bottom of the body portion to form a bottom of the container, and said circular mating portion having an external diameter such that the closed bottom of the body portion extends radially beyond the circular mating portion in all directions, said circular mating portion being configured to mate with a circular mating portion of a second container;

and

(b) a first plug disposed in the interior space of the first container, said plug having an external shape conforming to the interior of the wall and a central opening for receiving an end of a nasal medicament applicator.

21. The container assembly of claim 20, wherein the plug comprises a desiccant.

22. The container assembly of claim 20, further comprising:

(c) a second container having:

a body portion having an open top, a closed bottom, and an annular wall defining an interior space;

a cap for sealing the open top of the body portion; and

a circular mating portion, said circular mating portion extending from the closed bottom of the container and having a flat exposed surface parallel to the closed bottom of the body portion to form a bottom of the container, and said circular mating portion having an external diameter such that the closed bottom of the body portion extends radially beyond the circular mating portion in all directions, said circular mating portion being configured to mate with a circular mating portion of the first container such that, when mated, the bottom of the first container is adjacent to the bottom of the second container.

23. A container assembly for a nasal medicament applicator, comprising:

- (a) a first container having:  
a body portion having an open top, a closed bottom, and an outer wall defining an interior space;  
a cap for closing the open top of the body portion; and  
5 a mating portion, said mating portion extending from the closed bottom of the container and having an exposed surface parallel to the closed bottom of the body opening to form a bottom of the container, and said mating portion having an external dimension such that the closed bottom of the body portion extends radially beyond the mating portion in all directions, said mating portion being configured to mate with a  
10 mating portion of a second container;
- (b) a first plug disposed in the interior space of the first container, said plug having an external shape conforming to the interior of the wall and a central opening for receiving an end of a nasal medicament applicator; and
- (c) a tracking device affixed to or formed integrally with the first container.

15 24. A container assembly as in any of claims 1 to 23, further comprising a tracking device.

20 25. A container assembly as in claim 24, wherein the tracking device is affixed to one of the first container and the second container.

26. A container assembly as in claim 24, wherein the tracking device is formed integrally with the container assembly.

25 27. A container assembly as in claim 24, wherein the tracking device is a Bluetooth tracking device.

28. A container assembly as in claim 24, wherein the tracking device is an ultra low powered tracking device.

29. A container assembly as in claim 24, wherein the tracking device is a Rubee tag, an RFID tag, a near field communication device, a Wi-Fi device, or a GPS receiver.

30. A system for tracking a user's proximity to a container assembly for an intranasal medicament applicator, comprising:

(a) a first container having:

a body portion having an open top, a closed bottom, and an outer wall defining an interior space;

a cap for closing the open top of the body portion; and

a mating portion, said mating portion extending from the closed bottom of the container and having a flat exposed surface parallel to the closed bottom of the body portion to form a bottom of the container, and said mating portion having an external dimension such that the closed bottom of the body portion extends radially beyond the mating portion in all directions, said mating portion being configured to mate with a mating portion of a second container or an interface coupler;

a tracking device configured to receive and respond to queries; and

a monitoring device configured to communicate with the tracking device via a tracking network, wherein the monitoring device is configured to query the tracking device, and record information regarding response (or lack of response) of the tracking device to queries.

31. A system for tracking medicament containers according to claim 30, wherein the tracking device is affixed to or formed integrally with a medicament container.

32. A system for tracking medicament containers according to any of claims claim 30 or 31, further comprising an interface coupler having a first opening for receiving the mating portion of the first container in a locking arrangement, wherein the tracking device is affixed to or formed integrally with the interface coupler.

33. A system for tracking medicament containers according to claim 31, wherein the tracking device is formed integrally with the interface coupler.

34. A system for tracking medicament containers according to any of claims 30 to 33, wherein the tracking device is a ultra low powered tracking device.

5 35. A system for tracking medicament containers according to any of claims 30 to 33, wherein the tracking device is a Rubee tag, an RFID tag, a Bluetooth device, or a GPS receiver.

10 36. A system for tracking medicament containers according to any of claims 30-33, wherein the tracking device is a GPS receiver, and the tracking device is configured to communicate location information (GPS coordinates) to the transmitting device in response to each query received from the transmitting device, and wherein the transmitting device is configured to receive the location information and store said location information on a non-transitory computer readable storage medium.

15 37. A system for tracking medicament containers according to any of claims 30-36, wherein the transmitting device further comprises networking hardware configured to connect the transmitting device to a computer network and/or the Internet, and the transmitting device is configured to communicate at least one of an alarm condition, an alert condition, and location information to a third party via the network and/or the Internet.

20 38. A system for tracking medicament containers according to any of claims 30-37, further comprising a proxy device configured to communicate with the tracking device and the monitoring device via the tracking network.

25 39. A system for tracking medicament containers according to any of claims 30 to 38, wherein the monitoring device is a smart phone, tablet computer, portable computer, or a smart watch.

30

40. A system for tracking medicament containers according to any of claims 30 to 39, wherein the transmitting device is configured to be connected to the Internet.

5 41. A system for tracking medicament containers according to any of claims 30 to 40, wherein the transmitting device is further configured to relay alarm or alert conditions to a third party via the Internet.

42. A system for tracking medicament containers according to claim 38, further comprising a bracelet or wrist strap configured to house the pr.

10

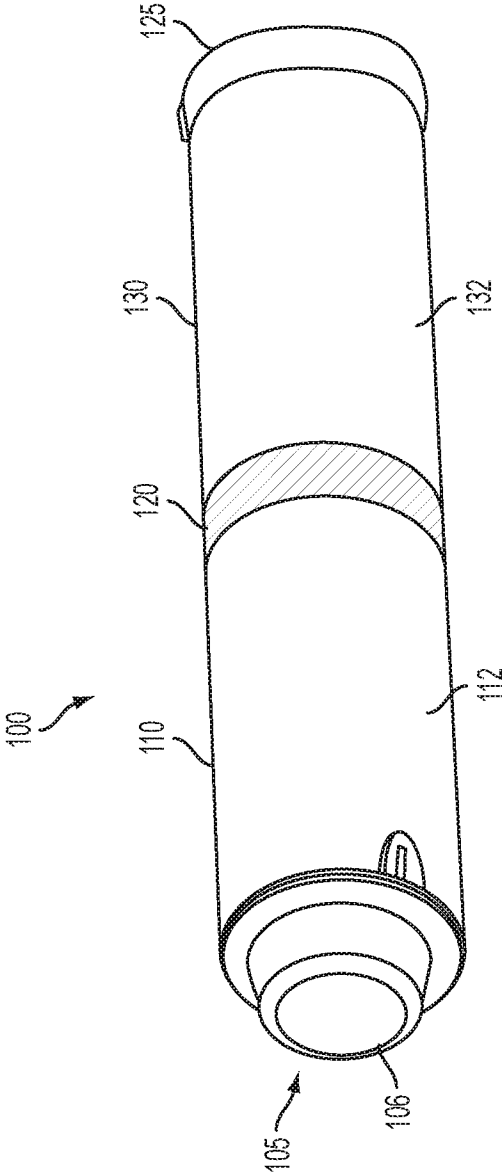


FIG. 1A

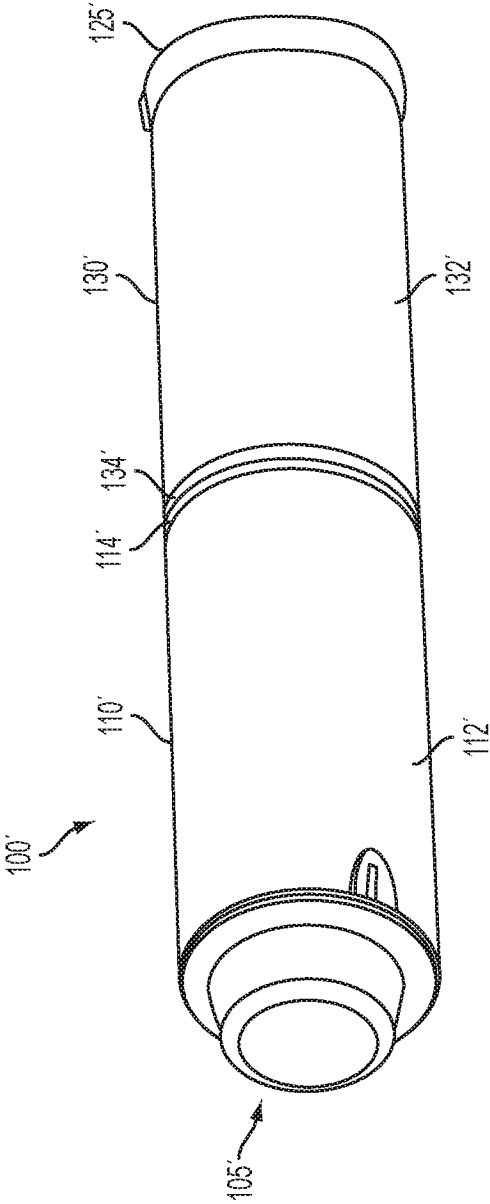


FIG. 1B

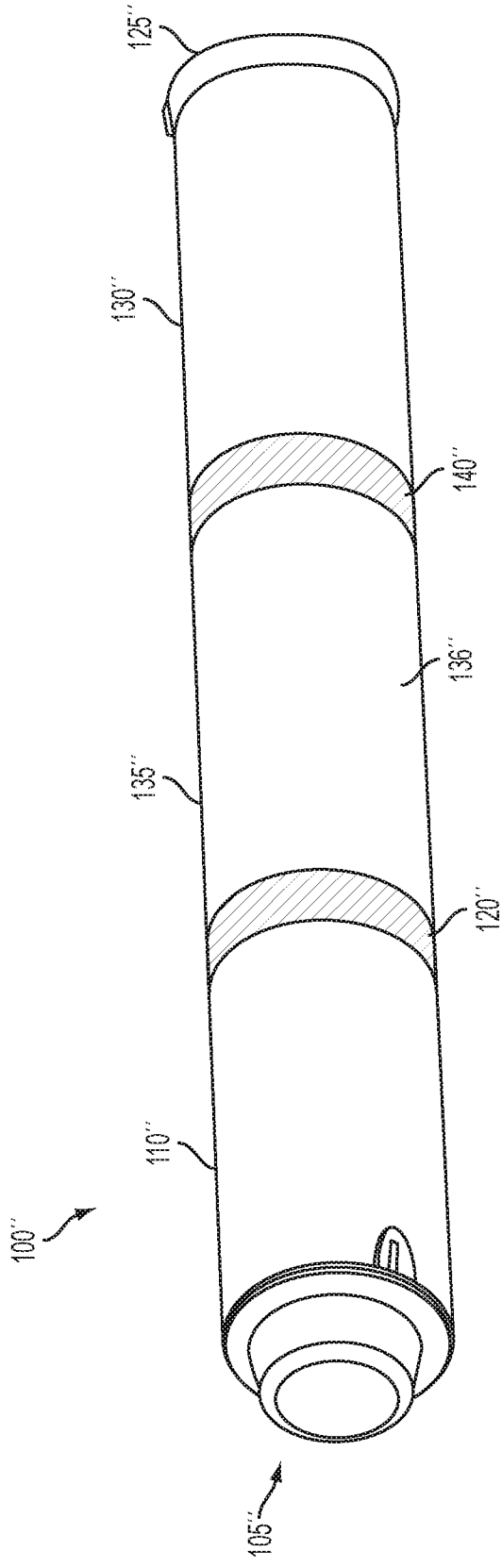


FIG. 1C

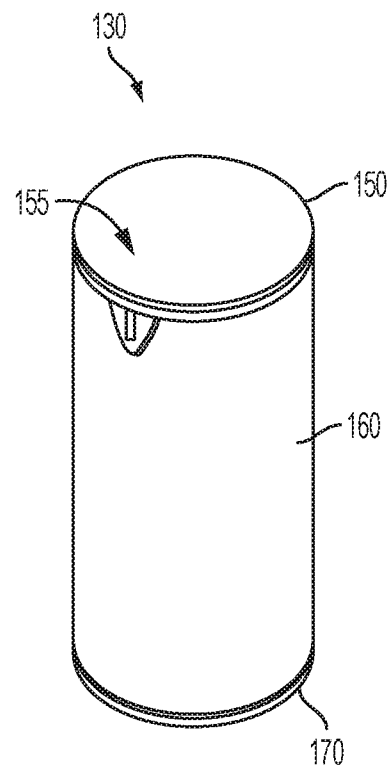


FIG. 1D

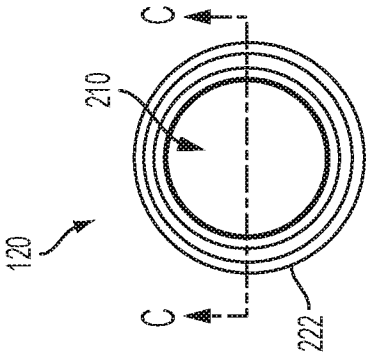


FIG. 2B

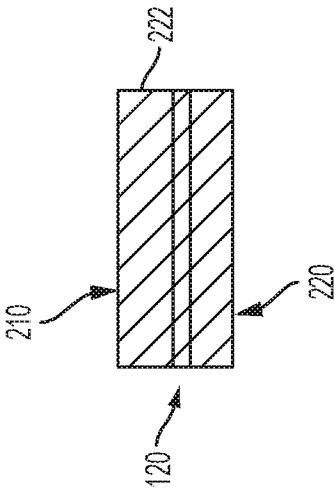


FIG. 2A

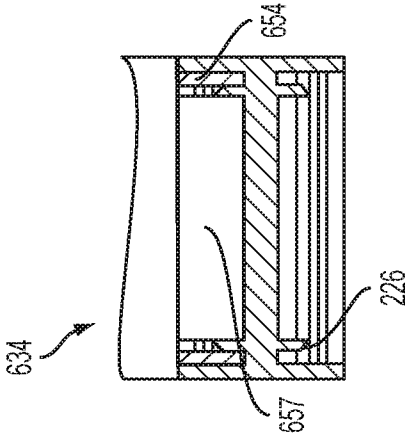


FIG. 2D

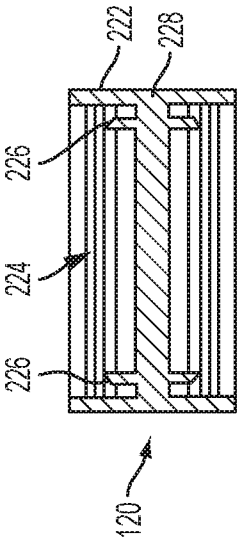


FIG. 2C

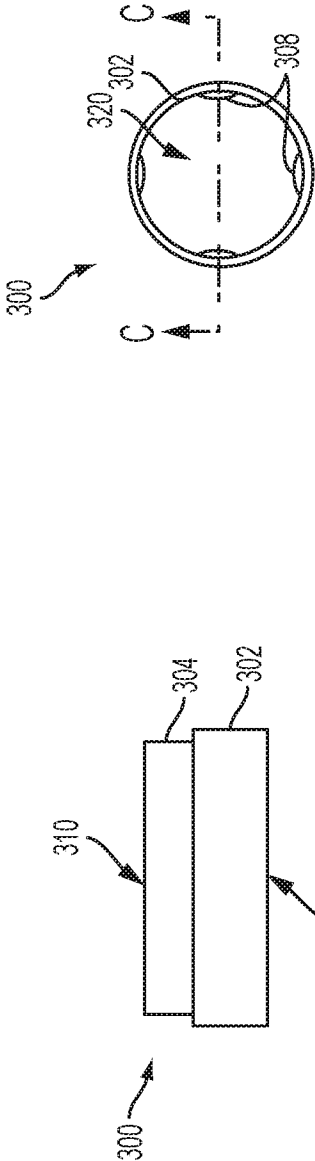


FIG. 3A

FIG. 3B

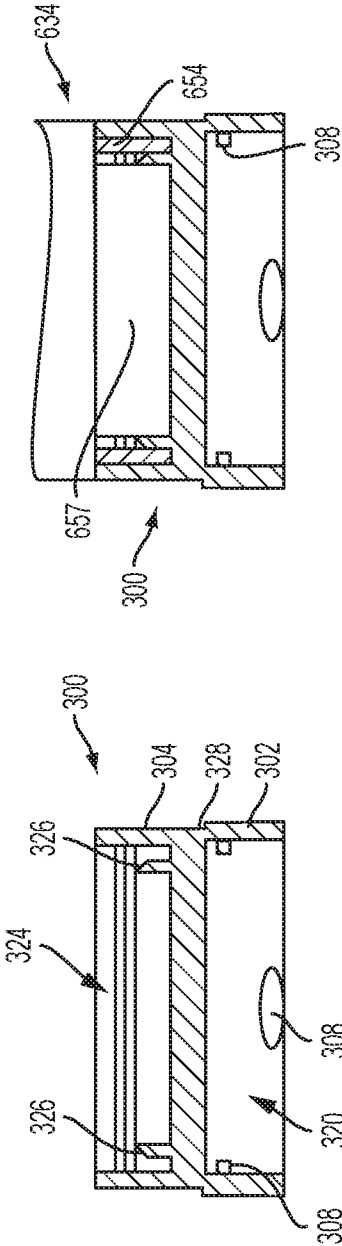


FIG. 3C

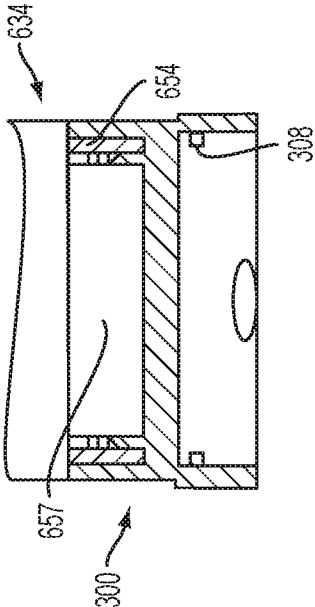


FIG. 3D

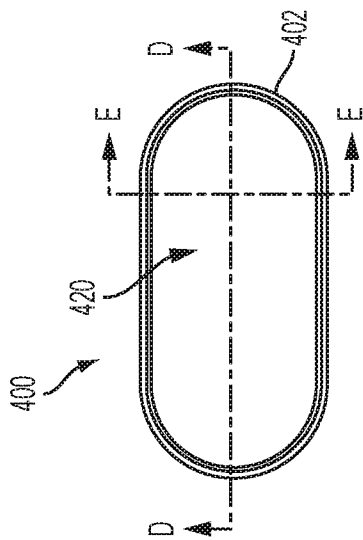


FIG. 4C

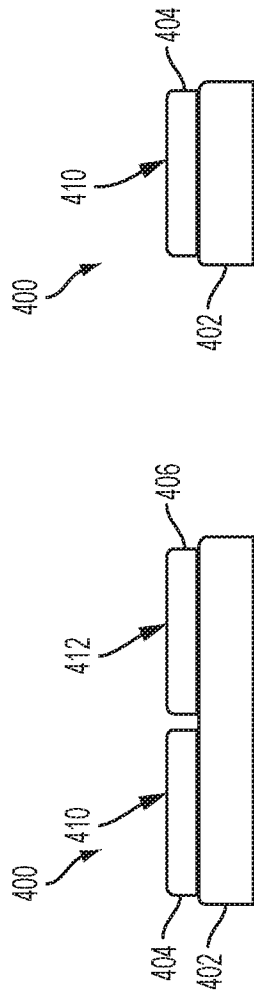


FIG. 4B

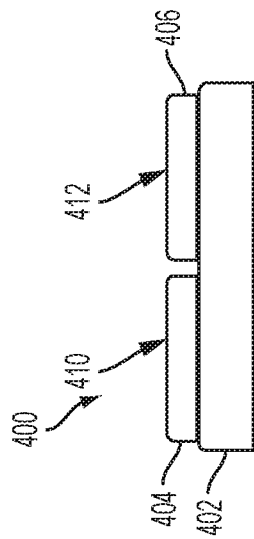


FIG. 4A

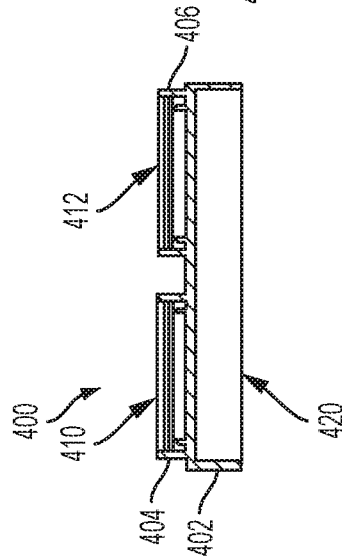


FIG. 4D

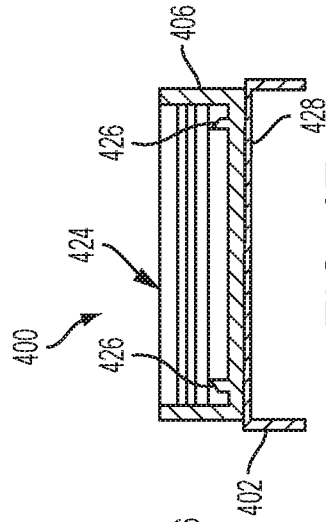


FIG. 4E

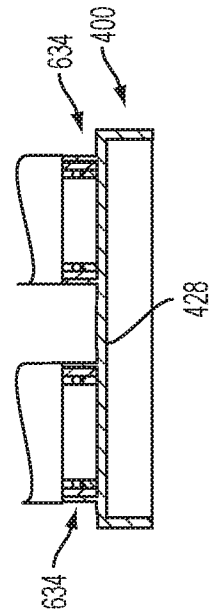


FIG. 4F

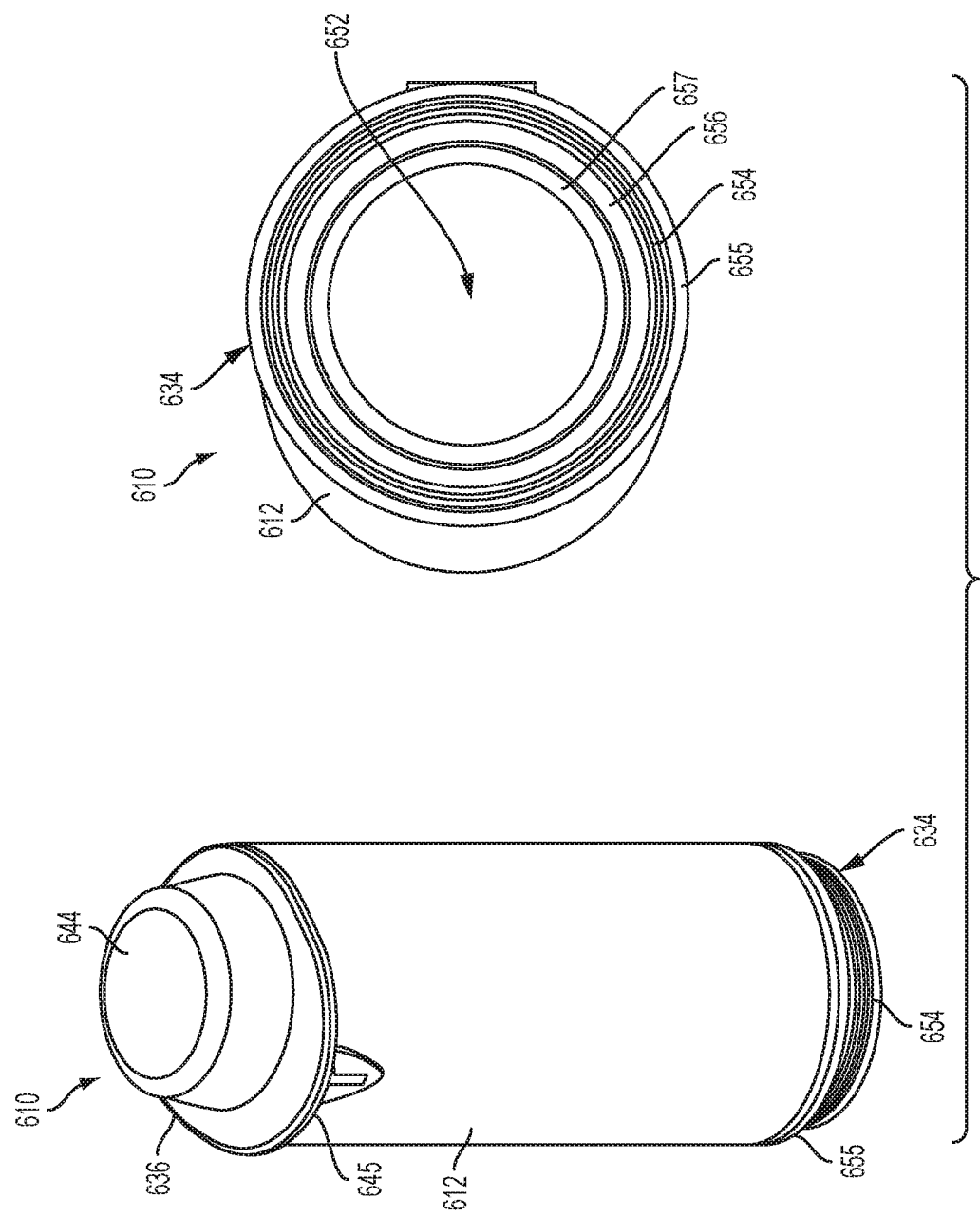


FIG. 5

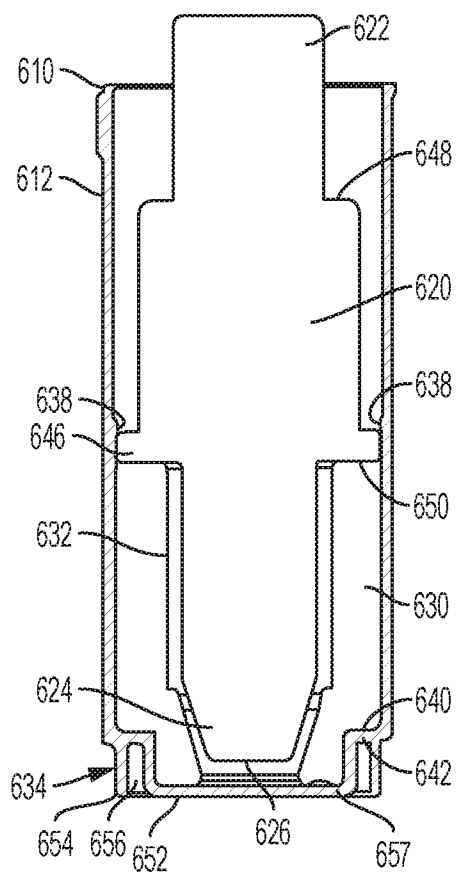


FIG. 6A

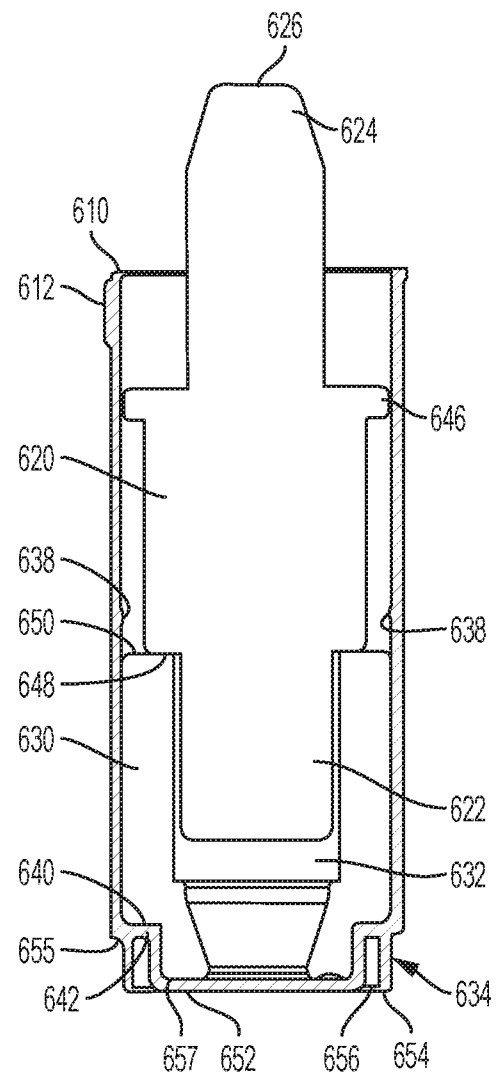


FIG. 6B

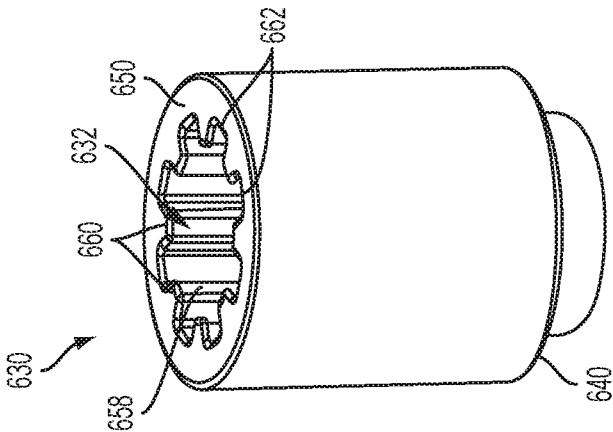


FIG. 6C

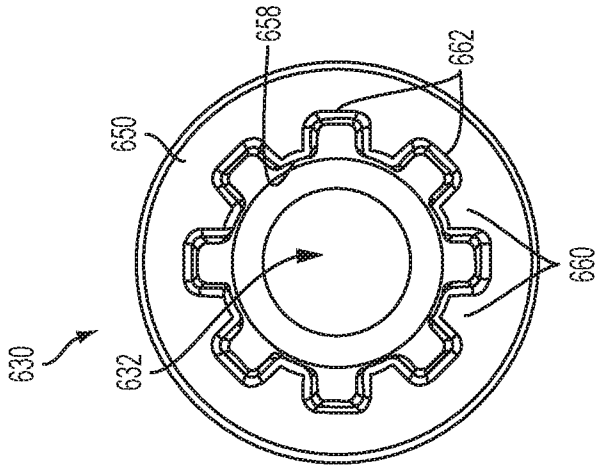


FIG. 6D

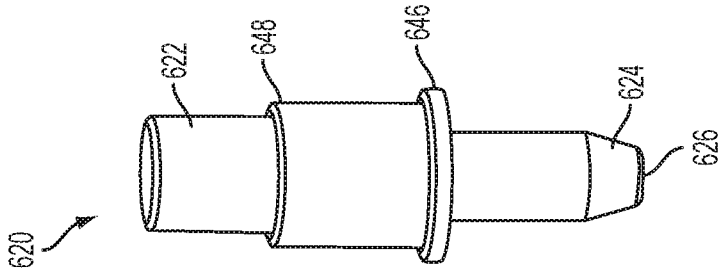


FIG. 6E

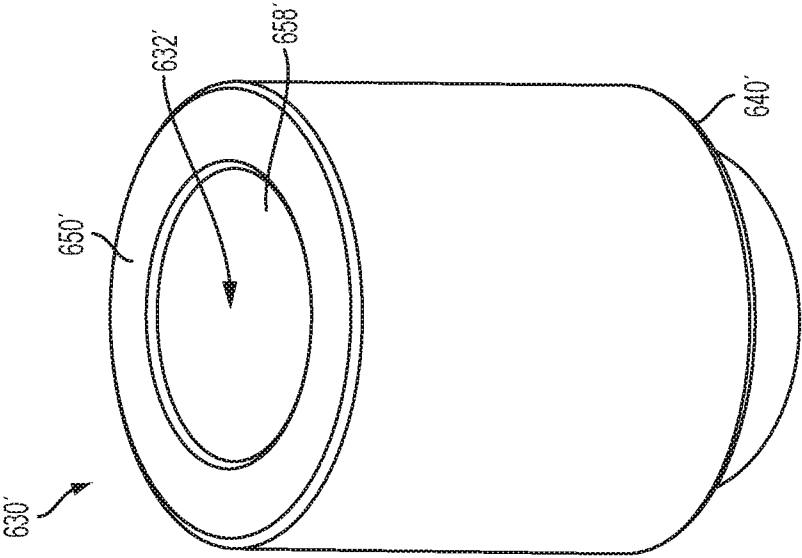


FIG. 7

12/14

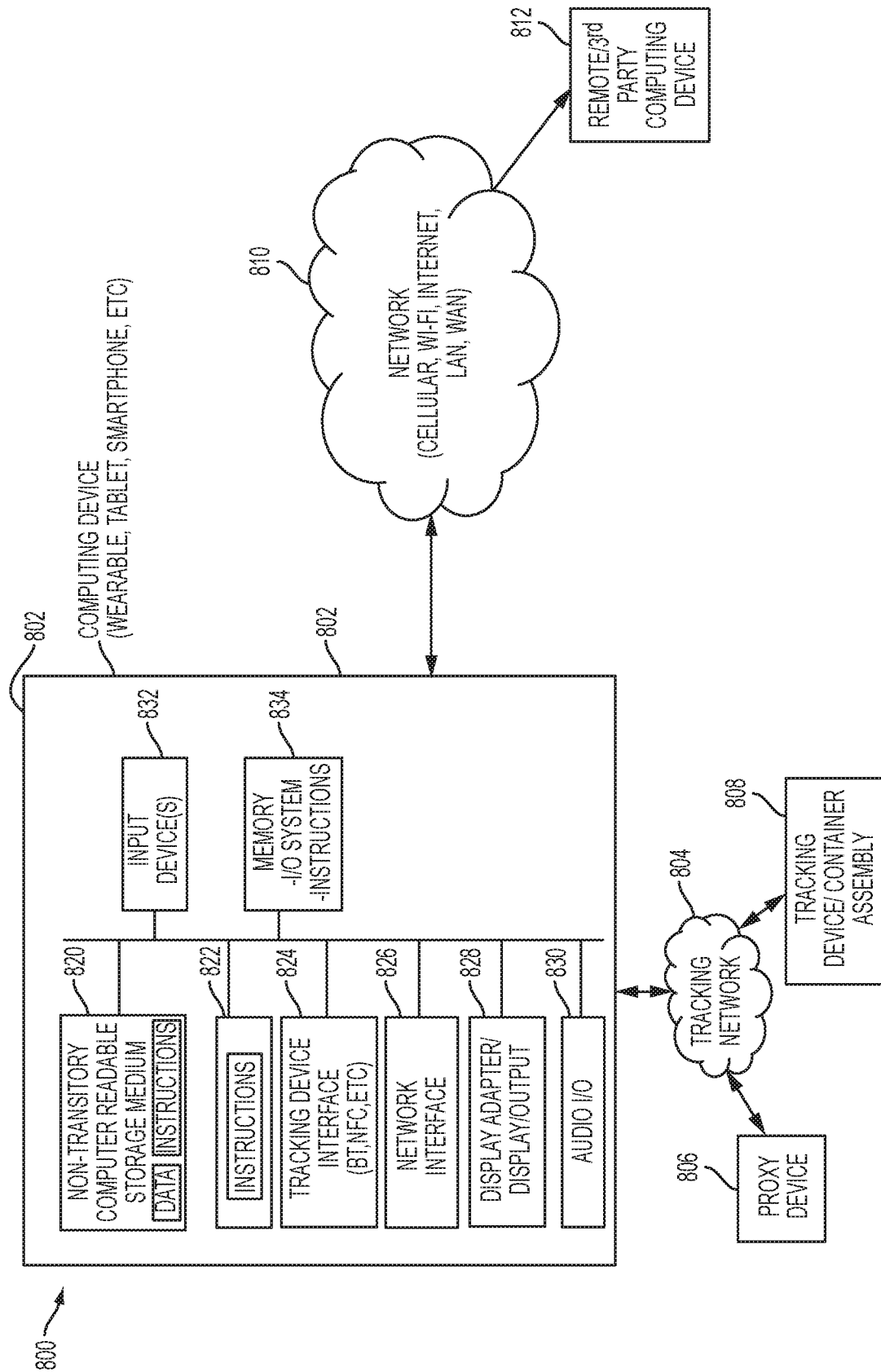


FIG. 8

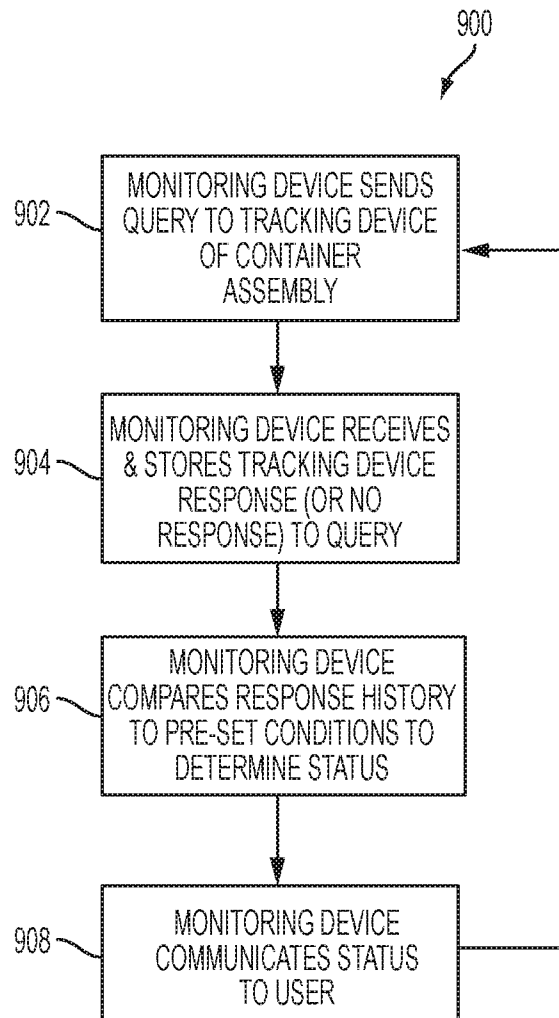


FIG. 9

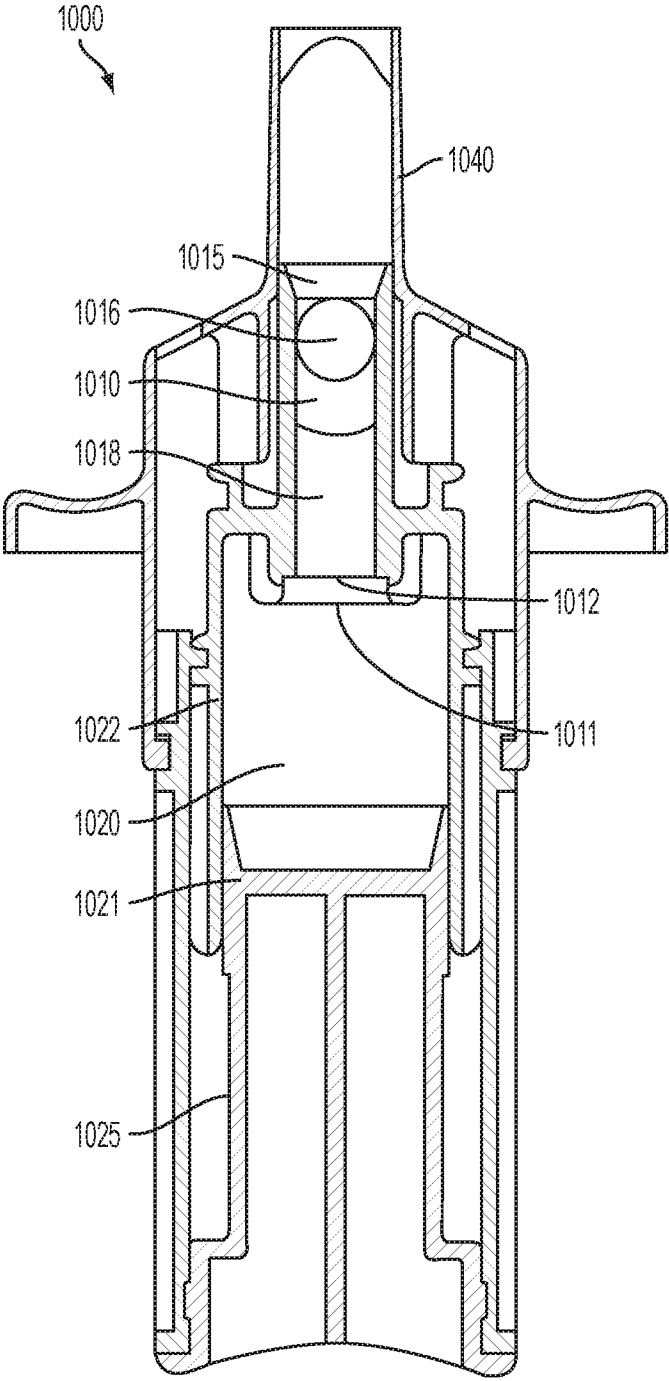


FIG. 10  
PRIOR ART

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2016/027433

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

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

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

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

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

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-22(completely); 24(partially)

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2016/027433

## A. CLASSIFICATION OF SUBJECT MATTER

INV. A24F47/00 A61M5/00 H04W4/02  
ADD. A61M15/06 A61M15/08

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 H04W

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, 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         | US 2014/334804 A1 (CHOI DONG SU [KR])<br>13 November 2014 (2014-11-13)<br>figures 1-3<br>paragraph [0046] - paragraph [0071]<br>paragraph [0102]<br>----- | 1-22,24               |



Further documents are listed in the continuation of Box C.



See patent family annex.

## \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

13 June 2016

Date of mailing of the international search report

19/08/2016

Name and mailing address of the ISA/

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## INTERNATIONAL SEARCH REPORT

### Information on patent family members

International application No

PCT/US2016/027433

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| US 2014334804 A1                          | 13-11-2014          | CN 104114049 A             | 22-10-2014          |
|                                           |                     | US 2014334804 A1           | 13-11-2014          |
|                                           |                     | WO 2013147492 A1           | 03-10-2013          |
| -----                                     |                     |                            |                     |

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-22(completely); 24(partially)

Essentially defines a container assembly comprising a first container, a body portion, a cap, a mating a mating portion and a desiccant

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2. claims: 23, 25-42(completely); 24(partially)

Essentially defines a system comprising a container assembly comprising a first container, a body portion, a cap, a mating a mating portion and a tracking device and a monitoring device for tracking a user's proximity to a container assembly.

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