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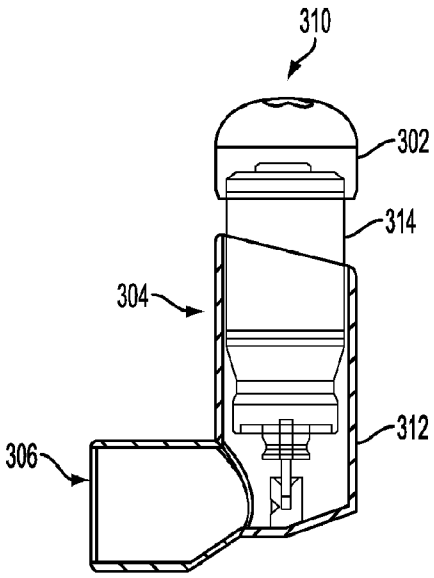

FIG. 5

(57) **Abstract**: Devices, systems, and methods are provided for adherence monitoring, and devices, systems, and methods are provided for monitoring use of consumable dispensers. In general, the devices, systems, and methods can facilitate an individual's adherence to a schedule for consuming consumables and can facilitate monitoring and tracking of the individual's adherence to the schedule. The devices, systems, and methods can allow data regarding the individual's historical adherence to the schedule to be accessible via a computer system. In one embodiment, an accessory is provided that can be configured to attach to consumable dispensers. The accessory can be configured to be removably and replaceably coupled to the dispenser. The accessory can be configured to provide a notification to a user indicating that a certain event occurred and/or that a certain action needs to be taken. The accessory can be configured to sense attachment thereof to and removal thereof from the dispenser.

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DEVICES, SYSTEMS, AND METHODS FOR ADHERENCE MONITORING AND DEVICES, SYSTEMS, AND METHODS FOR MONITORING USE OF CONSUMABLE DISPENSERS

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority to U.S. Provisional Patent Application No. 61/871,001 entitled "Devices, Systems, And Methods For Monitoring Use Of Consumable Dispensers" filed on August 28, 2013, and to U.S. Provisional Patent Application No. 61/871,056 entitled "Devices, Systems, And Methods For Adherence Monitoring And Patient Interaction" filed on August 28, 2013, which are hereby incorporated by reference in their entireties.

FIELD OF THE INVENTION

[0002] The present invention relates generally to devices, systems, and methods for adherence monitoring and devices, systems, and methods for monitoring use of consumable dispensers.

BACKGROUND OF THE INVENTION

[0003] Consumables such as medication, vitamins, and supplements can effectively benefit an individual's health. Consumables are typically consumed on a regular, usually daily, schedule. The closer a patient adheres to the schedule, the better the patient's condition can be managed, e.g., because adequate amounts of the consumable can be consistently present in the patient's system to consistently control adverse effects of a health condition such as asthma. Consumables for respiratory conditions, for dermatological issues, for cardiac issues, etc., can be prescribed for dosage on a regular schedule and can have their maximized effectiveness if taken on the regular schedule.

[0004] It can be difficult for patients to adhere to their treatment schedule for a variety of reasons, such as unfamiliarity with a new treatment schedule, being busy with an activity such as work, school, napping, or athletics, and simply forgetting to take the consumables on schedule. It can be particularly difficult for children to remember to take their consumables on schedule, particularly if any doses are required while a child is away from their parent or guardian, such as during school or while at summer camp. Non-adherence to a prescribed schedule can cause any number of adverse effects, such as unnecessary exacerbations, repeating symptoms, required doses of emergency treatment medication, and/or hospital

emergency room visits. Adhering to a schedule can thus help better maintain a patient's health, help reduce instances of emergency medication administration, and/or help reduce health care costs by requiring fewer emergency hospital visits or other medical practitioner consultations.

[0005] Accordingly, there remains a need for improved devices, systems, and methods for adherence monitoring and devices, systems, and methods for monitoring use of consumable dispensers.

SUMMARY OF THE INVENTION

[0006] In one embodiment, an apparatus is provided that includes a mechanical accessory removably and replaceably attachable to a consumables container that is movably coupled to a housing such that the movement of the container and the accessory as a unit relative to the housing is effective to dispense the consumable. The accessory can include a sensor configured to sense when the accessory is attached to the container, a processor, and a wireless communication mechanism. The processor can be configured to cause the wireless communication mechanism to wirelessly transmit data indicative of the sensed attachment to an external device that is external to the accessory and the dispenser. The accessory can be configured to determine when the consumable is dispensed from the container.

[0007] The apparatus can vary in any number of ways. For example, the sensor can be configured to sense when the accessory is removed from the container, and the processor can be configured to receive a second signal from the sensor in response to the sensor sensing the accessory being removed from the container. For another example, the sensor can include at least one of a motion sensor and a pressure sensor, and the sensor can be configured to sense when the consumable is dispensed from the dispenser. For yet another example, the sensor can be configured to sense when an electrical circuit is closed, thereby indicating that the accessory has been attached to the container. For another example, the apparatus can include a memory. The sensor can be configured to trigger the processor to store data in the memory regarding the attachment in response to the sensor sensing the attachment, and the data transmitted by the wireless communication mechanism can include the stored data.

[0008] In some embodiments, the sensor can include a pressure sensor. The pressure sensor can be configured to have pressure applied thereto by the container in response to the accessory being attached to the container. The processor can be configured to determine that

the accessory has been attached to the container when the pressure sensor has the pressure applied thereto. The pressure sensor can be configured to have the pressure released therefrom in response to the accessory being removed from the container, and the processor can be configured to determine that the accessory has been removed from the container when the pressure sensor has the pressure released therefrom.

[0009] In some embodiments, the sensor can include a motion sensor. The processor can be configured to determine that the accessory has been attached to the dispenser when the motion sensor senses a first predetermined motion of the accessory. The processor can be configured to determine that the accessory has been removed from the dispenser when the motion sensor senses a second predetermined motion of the accessory that is different from the first predetermined motion.

[0010] In some embodiments, the apparatus can include a second sensor configured to sense when the consumable is dispensed from the container. The apparatus can include a second mechanical accessory attachable to the dispenser. The second accessory can include the second sensor. The accessory can include the sensor at a first location and can include the second sensor at a location that is different from the first location.

[0011] In another embodiment, an apparatus is provided that includes a mechanical accessory removably and replaceably attachable to a consumables dispenser containing a consumable that is dispensable from the dispenser. The accessory can include a sensor configured to sense attachment of the accessory to the dispenser using one of pressure sensing and motion sensing, a processor configured to cause the accessory to provide a first notification in response to the sensor sensing that the accessory is attached to the dispenser so as to notify a user that the accessory has been attached to the dispenser, and a wireless communication mechanism. The processor can be configured to cause the wireless communication mechanism to wirelessly transmit data to an external device that is external to the accessory and the dispenser. The accessory can be configured to determine when the consumable is dispensed from the dispenser.

[0012] The apparatus can have any number of variations. For example, the sensor can include at least one of a motion sensor and a pressure sensor, and the sensor can be configured to sense when the consumable is dispensed from the dispenser. For another example, the sensor can be configured to sense when the accessory is removed from the

dispenser, and the processor can be configured to provide a second notification when the sensor senses that the accessory is removed from the dispenser so as to notify the user that the accessory has been removed from the dispenser. For yet another example, the apparatus can include a second sensor configured to sense when the consumable is dispensed from the dispenser. For another example, the dispenser can include a housing having the consumable disposed therein, the accessory can be removably and replaceably attachable to an external surface of the housing, and the housing can include at least one of a pill bottle, a pill box, a squeezable tube, a squeezable bottle, a syringe, a blister pack, and a respiratory inhaler.

[0013] In some embodiments, the apparatus can include a housing and a container. The container can be disposed within the housing, the container can contain the consumable therein, and the container can be movable relative to the housing so as to cause the consumable to be dispensed. The accessory can be removably and replaceably attachable to the container such that the accessory is movable with the container relative to the housing so as to cause the consumable to be dispensed.

[0014] In another aspect, a method is provided that in one embodiment includes attaching a mechanical accessory to a container of a consumables dispenser movably disposed within a housing of the consumables dispenser, and moving the accessory and the container relative to the housing so as to dispense a consumable contained in the container. A sensor can sense the attachment, and a transmitter can wirelessly transmit first data from the accessory to an external device. The first data can be indicative of the sensed attachment. The external device can be external to the accessory and the dispenser. The transmitter can wirelessly transmit second data from the accessory to the external device. The second data can be indicative of the dispensing.

[0015] The method can vary in any number of ways. For example, the method can include detaching the accessory from the container. The sensor can sense the detachment, the transmitter can wirelessly transmit third data from the accessory to the external device, and the third data can be indicative of the sensed detachment. For another example, the method can include, after the sensed detachment, attaching the accessory to a second container containing a second consumable. The sensor can sense the attachment of the accessory to the second container, the transmitter can wirelessly transmit third data from the accessory to the external device, and the third data can be indicative of the sensed attachment to the second container. For yet another example, the method can include, with the accessory attached to

the dispenser, providing a notification to a user indicating that the consumable is due to be consumed according to a predetermined schedule.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The invention will be more fully understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[0017] FIG. 1 is a schematic view of one embodiment of a consumables administration, management, and review system;

[0018] FIG. 2 is a schematic view of one embodiment of a network system including the system of FIG. 1;

[0019] FIG. 3 is a schematic view of one embodiment of a computer system;

[0020] FIG. 4 is a side view of one embodiment of a consumables dispenser having an accessory removably and replaceably attached thereto;

[0021] FIG. 5 is a side partially transparent view of the consumables dispenser and the accessory of FIG. 4;

[0022] FIG. 6 is a perspective view of the accessory of FIG. 4;

[0023] FIG. 7 is a perspective partially transparent view of one embodiment of an accessory configured to be removably and replaceably attached to a consumables dispenser;

[0024] FIG. 8 is a side cross-sectional view of the accessory of FIG. 7;

[0025] FIG. 9 is an exploded perspective view of the accessory of FIG. 7;

[0026] FIG. 10 is side cross-sectional view of the accessory of FIG. 7, the accessory removably and replaceably attached to a consumables dispenser;

[0027] FIG. 11 is an exploded perspective view of a spin ring of the accessory of FIG. 10;

[0028] FIG. 12 is an exploded perspective view of a printed circuit board of the accessory of FIG. 10;

[0029] FIG. 13 is an exploded perspective view of a main body of the accessory of FIG. 10;

[0030] FIG. 14 is a perspective view of one embodiment of a consumables dispenser in the form of a respiratory inhaler having first and second accessories attached thereto;

[0031] FIG. 15 is a perspective view of one embodiment of a consumables dispenser in the form of a pill bottle having first and second accessories attached thereto;

[0032] FIG. 16 is a perspective view of another embodiment of a consumables dispenser in the form of a pill bottle having first and second accessories attached thereto;

[0033] FIG. 17 is a perspective view of one embodiment of a consumables dispenser in the form of a lotion bottle having first and second accessories attached thereto;

[0034] FIG. 18 is a perspective view of one embodiment of a consumables dispenser in the form of a pill box having first and second accessories attached thereto;

[0035] FIG. 19 is a perspective view of one embodiment of a consumables dispenser in the form of a tube of cream having first and second accessories attached thereto;

[0036] FIG. 20 is a perspective view of another embodiment of a consumables dispenser in the form of a respiratory inhaler having an accessory attached thereto;

[0037] FIG. 21 is a side partially transparent view of another embodiment of a consumables dispenser in the form of a respiratory inhaler having first and second accessories attached thereto;

[0038] FIG. 22 is a perspective view of another embodiment of a consumables dispenser in the form of a respiratory inhaler having an accessory attached thereto;

[0039] FIG. 23 is a perspective view of another embodiment of a consumables dispenser in the form of a pill bottle having an accessory attached thereto;

[0040] FIG. 24 is a perspective view of another embodiment of a consumables dispenser in the form of a respiratory inhaler having an accessory attached thereto;

[0041] FIG. 25 is a perspective view of yet another embodiment of a consumables dispenser in the form of a respiratory inhaler having an accessory attached thereto;

[0042] FIG. 26 is a perspective view of another embodiment of a consumables dispenser in the form of a pill box having an accessory attached thereto; and

[0043] FIG. 27 is a schematic diagram of one embodiment of an adherence monitoring and patient interaction system.

DETAILED DESCRIPTION OF THE INVENTION

[0044] Certain exemplary embodiments will now be described to provide an overall understanding of the principles of the structure, function, manufacture, and use of the devices and methods disclosed herein. One or more examples of these embodiments are illustrated in the accompanying drawings. Those of ordinary skill in the art will understand that the devices and methods specifically described herein and illustrated in the accompanying drawings are non-limiting exemplary embodiments and that the scope of the present invention is defined solely by the claims. The features illustrated or described in connection with one exemplary embodiment may be combined with the features of other embodiments. Such modifications and variations are intended to be included within the scope of the present invention.

[0045] Further, in the present disclosure, like-named components of the embodiments generally have similar features, and thus within a particular embodiment each feature of each like-named component is not necessarily fully elaborated upon. Additionally, to the extent that linear or circular dimensions are used in the description of the disclosed systems, devices, and methods, such dimensions are not intended to limit the types of shapes that can be used in conjunction with such systems, devices, and methods. A person skilled in the art will appreciate that an equivalent to such linear and circular dimensions can be easily determined for any geometric shape.

[0046] Various exemplary devices, systems, and methods are provided for adherence monitoring and devices, systems, and methods for monitoring use of consumable dispensers. In general, the devices, systems, and methods can facilitate an individual's adherence to a schedule for consuming consumables and can facilitate monitoring and tracking of the individual's adherence to the schedule. The devices, systems, and methods can allow data regarding the individual's historical adherence to the schedule to be accessible via a computer system. A user such as the individual, the individual's family, the individual's care provider, a director of a clinical trial involving the individual, etc. can thus access the adherence data even when remotely located from the individual, which can facilitate evaluation and/or modification of the individual's treatment involving the consumable, facilitate evaluation and/or modification of the clinical trial involving the individual, and/or can facilitate

incentivizing the individual to adhere to the schedule. Examples of consumables include medications, vitamins, supplements, foods, and cosmetics.

[0047] In one embodiment, an accessory is provided that can be configured to attach to consumable dispensers, e.g., pill bottles, asthma inhalers, etc. The consumable dispensers can be existing dispensers retrofitted with the accessory or can be custom-made dispensers integrated with the accessory. The accessory can include a notification mechanism configured to provide a notification to a user indicating that a certain event occurred and/or that a certain action needs to be taken. For example, the accessory can include a light source (e.g., a light emitting diode (LED)) configured to light up when the next dose (also referred to herein as a "dosage") of a consumable is due, a speaker configured to provide an audible sound when the next dose of a consumable is due, a vibration mechanism configured to vibrate when the next dose of a consumable is due, and/or a temperature-changing element configured to increase or decrease in temperature when the next dose of a consumable is due. The accessory can include an on-board timer configured to trigger the notification mechanism to provide a notification, e.g., light, sound, vibration, etc. The accessory can also include a power source, e.g., a battery, configured to power the timer and the notification mechanism. The notification can help people of any age more easily adhere to their consumables schedule. Ailments such as asthma can therefore be better regulated through maintenance treatment, and people can be less likely to need to resort to unscheduled, emergency treatments, such as use of a rescue inhaler. The accessory can be configured to detect usage of the dispenser by being pressed when a consumable is dispensed from the dispenser so as to "wake up" a processor coupled to the accessory. In response to the detected usage, the processor can be configured to record the date and time of the dispenser's usage in a storage unit, such as an on-board memory. The stored data can be transmitted to an external source, e.g., computer system, that can store the data in a network cloud, where the data can be accessed via a user interface, such as a web interface. The user interface can allow a user to view and/or analyze the person's consumable usage trends.

[0048] In an exemplary embodiment, the accessory can be configured to be removably and replaceably coupled to the dispenser. The accessory can be configured to be used in any adherence/compliance application for consumables, such as creams for dermatology patients, inhalers for non-asthma respiratory ailments, pill bottles, blister packs, pill boxes, syringes, squeezable bottles, and squeezable tubes. The accessory can thus be configured for use in

monitoring and improving adherence and compliance for people and care-providers of people (e.g., doctors, parents, etc.) who could benefit from improved adherence, environmental monitoring, and/or behavior modification. For example, it can be beneficial for certain consumables to be consumed at a same time every day. The accessory can be configured to monitor use of a dispenser that dispenses consumables, thereby facilitating a person's adherence to a schedule of consuming the consumable at a same time every day and/or monitoring the person's adherence to the schedule.

[0049] The accessory can be configured to detect attachment and detachment thereof from a consumables dispenser. The detection of the attachment can facilitate registration of the accessory when attached to the dispenser, e.g., registration of the accessory over a network to facilitate association of the accessory with a specific person, a specific consumable, and/or a specific dispenser. The detection of the removal can facilitate various actions regarding the accessory and/or the consumable associated with the consumables dispenser from which the accessory has been removed. For example, the detection of the removal can facilitate timely reattachment of the accessory to the dispenser if the accessory was accidentally removed therefrom. For another example, the detection of the removal can signal to a care provider of a person that the person's accessory was removed from the person's consumable dispenser, thereby indicating that the person may be less likely to consume the consumable according to a predetermined schedule and/or that the care provider should discuss the reason for the accessory's removal with the person.

[0050] FIG. 1 illustrates one exemplary embodiment of a system 10 configured to facilitate adherence monitoring and monitoring use of consumable dispensers. The system 10 can include a mechanical accessory 12 (also referred to herein as an "accessory"), a wireless bridge 14, a network 16 (also referred to herein as a "distributed computing system"), a memory 18, and an interface 20 (also referred to herein as a "computer system" and a "client station"). In general, the accessory 12 can be attached to a consumables dispenser (not shown) configured to dispense a consumable disposed therein. The dispenser can include any of a variety of dispensers, such as an asthma inhaler, an inhaler for a non-asthma respiratory ailment, a liquid or semi-liquid dispenser such as a medicament tube or pump such as for a topical cream or a topical gel, blister packs for capsules and/or other types of pills, a pill bottle, a syringe, a squeezable bottle, and a squeezable tube. The accessory 12 can be configured to detect attachment of the accessory to the dispenser, detect removal of the

accessory from the dispenser, detect usage of the dispenser so as to determine when a consumable has been dispensed from the dispenser, and/or provide a notification to a person 22 when a consumable from the dispenser is due according to a predetermined schedule..

[0051] The accessory 12 can be configured to provide data regarding dispensing of the consumable to an external device, such as the interface 20. The data can be transmitted from the accessory 12 to the interface 20 using wireless communication, e.g., Bluetooth, WiFi, etc., over the network 16, e.g., the Internet, a cloud, a local area network (LAN), etc., via the wireless bridge 14. However, as will be appreciated by a person skilled in the art, the system 10 need not include the wireless bridge 14 if the accessory 12 is configured to communicate over the network 16 using a wired connection instead of a wireless connection. The data communicated to the interface 20 from the accessory 12 can optionally be supplemented with data stored in and transmitted from the memory 18, such as health record data for the person 22 (e.g., complete electronic health record (EHR) of the person 22, person name, person age, person medical record number, any medications or other consumables being taken by the person 22, identities of care providers for the person 22, medical diagnoses of the person 22, data for the person 22 previously transmitted by the accessory 12, geographic home of the person 22, etc.) and environmental data (which can be helpful in analyzing data for asthma and other respiratory ailments) such as weather data, traffic data, dust data, and pollen data. Similarly, data transmitted to the memory 18 can be stored therein so as to be associated with a record already stored therein, e.g., data gathered by the accessory 12 being added to the person's EHR stored in the memory 18. The interface 20 can be configured to analyze the data received from the accessory 12 and can be configured to provide the received data and/or results of the analysis on a user interface (not shown) for review by one or more users such as the person 22 and a user 24 associated with the person 22, such as a family member of the person 22, a friend of the person 22, or a medical care provider (doctor, nurse, clinical trial director, etc.) for the person 22. In an exemplary embodiment, the user interface can be customized based on an identity of the user accessing the interface 20.

[0052] Any of a variety of users can access, interact with, control, etc. a user interface from any of a variety of locations. For example, as shown in an embodiment illustrated in FIG. 2, the user interface can be accessible over a network 100 (e.g., over the Internet via cloud computing) from any number of client stations 102 in any number of locations such as a medical facility 104 (e.g., a hospital, an operating room (OR), a nurse's station, a medical

device distribution facility, a medical device company, a hospital's sterilization, records, or billing departments, etc.), a home base 106 (e.g., a person's home or office, a surgeon's home or office, etc.), a mobile location 108, and so forth. The client station(s) 102 can access the user interface through a wired and/or wireless connection to the network 100 such that the user interface is displayed on a display screen thereof, e.g., an LCD (liquid-crystal display), ePaper, a touch screen, etc. In an exemplary embodiment, at least some of the client station(s) 102 can access the user interface wirelessly, e.g., through WiFi connection(s), which can facilitate accessibility of the user interface from almost any location in the world. Data can be transmitted wirelessly using an existing protocol such as 802.11 or a proprietary protocol, e.g., a protocol that optimizes power, data, and range for a particular use more than an existing protocol. As shown in FIG. 2, the medical facility 104 includes client stations 102 in the form of a tablet and a computer touch screen, the home base 106 includes client stations 102 in the form of a mobile phone having a touch screen and a desktop computer, and the mobile location 108 includes client stations 102 in the form of a tablet and a mobile phone, but the medical facility 104, the home base 106, and the mobile location 108 can include any number and any type of client stations. In an exemplary embodiment, the user interface can be accessible by an interface via a web address and/or a client application (also referred to herein as an "app").

[0053] It will be appreciated that the user interface can be accessible using one or more security features such that the aspects of the user interface available to any particular user can be determined based on the identity of the user and/or the location from which the user is accessing the user interface. To that end, each user can have a unique username, password, and/or other security credentials to facilitate access to the user interface. The received security parameter information can be checked against a database of authorized users to determine whether the user is authorized and to what extent the user is permitted to interact with the user interface, view stored information, and so forth. Examples of users who can be permitted to access a user interface include patients, potential patients, significant others, friends, and family members of patients or potential patients, surgical technicians, imaging technicians (e.g., x-ray technicians, MRI technicians, etc.), surgeons, nurses, hospital administrators, surgical equipment manufacturer employees, insurance providers, and operating room directors.

[0054] The devices, systems, and methods disclosed herein can be implemented using one

or more computer systems, which as mentioned above are also referred to herein as interfaces and client stations.

[0055] FIG. 3 illustrates one exemplary embodiment of a computer system 200. As shown in the illustrated embodiment, the computer system 200 can include one or more processors 202 which can control the operation of the computer system 200. The processor(s) 202 can include any type of microprocessor or central processing unit (CPU), including programmable general-purpose or special-purpose microprocessors and/or any one of a variety of proprietary or commercially available single or multi-processor systems. The computer system 200 can also include one or more memories 204, which can provide temporary storage for code to be executed by the processor(s) 202 or for data acquired from one or more users, storage devices, and/or databases. The memory 204 can include read-only memory (ROM), flash memory, one or more varieties of random access memory (RAM) (e.g., static RAM (SRAM), dynamic RAM (DRAM), or synchronous DRAM (SDRAM)), and/or a combination of memory technologies.

[0056] The various elements of the computer system 200 can be coupled to a bus system 212. The illustrated bus system 212 is an abstraction that represents any one or more separate physical busses, communication lines/interfaces, and/or multi-drop or point-to-point connections, connected by appropriate bridges, adapters, and/or controllers. The computer system 200 can also include one or more network interface(s) 206, one or more input/output (I/O) interface(s) 208, and one or more storage device(s) 210.

[0057] The network interface(s) 206 can enable the computer system 200 to communicate with remote devices, e.g., other computer systems, over a network, and can be, for example, remote desktop connection interfaces, Ethernet adapters, and/or other local area network (LAN) adapters. The I/O interface(s) 208 can include one or more interface components to connect the computer system 200 with other electronic equipment. For example, the I/O interface(s) 208 can include high speed data ports, such as universal serial bus (USB) ports, 1394 ports, Wi-Fi, Bluetooth, etc. Additionally, the computer system 200 can be accessible to a user, and thus the I/O interface(s) 208 can include display screens, speakers, keyboards, pointing devices, and/or various other video, audio, or alphanumeric interfaces. The storage device(s) 210 can include any conventional unit or medium for storing data in a non-volatile and/or non-transient manner. The storage device(s) 210 can thus hold data and/or instructions in a persistent state, i.e., the value is retained despite interruption of power to the

computer system 100. The storage device(s) 210 can include one or more hard disk drives, flash drives, USB drives, optical drives, various media cards, diskettes, compact discs, and/or any combination thereof and can be directly connected to the computer system 200 or remotely connected thereto, such as over a network. In an exemplary embodiment, the storage device(s) can include a tangible or non-transitory computer readable medium configured to store data, e.g., a hard disk drive, a flash drive, a USB drive, an optical drive, a media card, a diskette, a compact disc, etc.

[0058] The elements illustrated in FIG. 3 can be some or all of the elements of a single physical machine. In addition, not all of the illustrated elements need to be located on or in the same physical machine. Exemplary computer systems include conventional desktop computers, workstations, minicomputers, laptop computers, tablet computers, personal digital assistants (PDAs), mobile phones, and the like.

[0059] The computer system 200 can include a web browser for retrieving web pages or other markup language streams, presenting those pages and/or streams (visually, aurally, or otherwise), executing scripts, controls and other code on those pages/streams, accepting user input with respect to those pages/streams (e.g., for purposes of completing input fields), issuing Hypertext Transfer Protocol (HTTP) requests with respect to those pages/streams or otherwise (e.g., for submitting to a server information from the completed input fields), and so forth. The web pages or other markup language can be in HyperText Markup Language (HTML) or other conventional forms, including embedded Extensible Markup Language (XML), scripts, controls, and so forth. The computer system 200 can also include a web server for generating and/or delivering the web pages to client computer systems.

[0060] In an exemplary embodiment, the computer system 200 can be provided as a single unit, e.g., as a single server, as a single tower, contained within a single housing, etc. The systems and methods disclosed herein can thus be provided as a singular unit configured to provide the various modules, display the various user interfaces, and capture the data described herein. The singular unit can be modular such that various aspects thereof can be swapped in and out as needed for, e.g., upgrade, replacement, maintenance, etc., without interrupting functionality of any other aspects of the system. The singular unit can thus also be scalable with the ability to be added to as additional modules and/or additional functionality of existing modules are desired and/or improved upon.

[0061] While some embodiments are described herein in the context of web pages, it will be appreciated that in other embodiments, one or more of the described functions can be performed without the use of web pages and/or by other than web browser software. A computer system can also include any of a variety of other software and/or hardware components, including for example, operating systems and database management systems. Although an exemplary computer system is depicted and described herein, it will be appreciated that this is for sake of generality and convenience. In other embodiments, the computer system may differ in architecture and operation from that shown and described here.

[0062] Referring again to the system 10 of FIG. 1, the wireless bridge 14 can have a variety of sizes, shapes, and configurations. The wireless bridge 14 can include a base station 38 and a router 40, as in the illustrated embodiment. A person skilled in the art will appreciate, however, that the wireless bridge 14 can include these and/or other components to facilitate electronic communication, similar to that discussed above regarding the network interface 32. The base station 38 and/or the router 40 can, as mentioned above, be included as part of the accessory 12 or can be remotely located therefrom, such as at the patient's home, the patient's school, the patient's work office, the patient's doctor's office, the patient's day care center, etc. The accessory 12 can be configured to communicate with only one base station 38, or with a plurality of pre-approved or pre-registered base stations 38, which can help ensure that data regarding the patient 22 is not transmitted to an unauthorized area. Embodiments of wireless bridges are further discussed in Intl. App. No. PCT/US13/047507 (Intl. Pub. No. WO 2014/004437) entitled "Devices, Systems, And Methods For Adherence Monitoring And Patient Interaction" filed June 25, 2013, which is hereby incorporated by reference in its entirety.

[0063] As mentioned above, any of a variety of users can access, interact with, control, etc. a user interface, with the user interface optionally being customized for a category of a particular user, such as any one or more of a relationship of the user to the person 22 (e.g., the patient, a family member of the patient, a care provider for the patient, etc.), a gender of the user, and an age of the user. The user interface can provide data regarding any one or more aspects of a system including an accessory, a consumable associated with the accessory, and a person associated with the consumable. In addition to providing data to a user, the user interface can be configured to accept user input, e.g., via an I/O device, and data input by the

user can be stored in any one or more memories. For example, the user interface can be configured to prompt a user to enter data in response to a question regarding consumable administration that can help explain any anomalies, e.g., a question asking what the patient was doing or experiencing when emergency medication was administered (e.g., playing sports, sleeping, attending school class, suffering from allergies, etc.), etc., a question asking why a consumable dosage was missed, etc. An accessory's processor and/or a processor located remotely from the accessory can be configured to analyze input answers so as to "learn" patient behavior and incorporate the "learned" behavior into, e.g., recommendations regarding the patient's treatment plan and predictions of the patient's future behavior. The system can be configured to generate and provide a report providing results of analysis using data from the accessory, which can help the person 22 and/or one or more of the person's care providers (e.g., doctors, family members, etc.) evaluate the person's consumables usage, facilitate the development of questions tailored to the person's specific history, and/or facilitate comparison of the person's consumables usage with clinical trends. Embodiments of user interfaces that can be configured for use with a system including an accessory are described in more detailed in previously mentioned Intl. App. No. PCT/US13/047507.

[0064] The system 10 as a whole can be integrated with one or more external devices, such as a lung function device / peak flow meter. The data provided by the external device(s) can be combined with the data collected by the system 10, e.g., data gathered by the accessory 12 attached to a consumables dispenser, to provide a more comprehensive picture of the person's status, to perform additional analytics, and so on.

[0065] The accessory 12 can have a variety of sizes, shapes, and configurations. In general, the accessory 12 can be mechanical, e.g., a physical component including machinery and/or electrical elements. The accessory 12 can be configured to be removably and replaceably attached to the dispenser so as to allow the accessory 12 to be attached to the person's existing dispenser and/or to be removed from an empty dispenser and attached to another dispenser. Examples of the accessory include a cap configured to attach to an end of a dispenser, a band or strap configured to wrap at least partially around a dispenser, and a box configured to attach to a surface of a dispenser. As mentioned above, the accessory 12 can instead be integrally attached to a dispenser, such as by being integrally formed therewith during manufacturing of the dispenser before a consumer receives the dispenser.

[0066] The accessory 12 can include any one or more of an activation member 26, a sensor

28, an actuator 30, a network interface 32, a processor 34, and a power source 36. Each of the activation member 26, the sensor 28, the actuator 30, the network interface 32, the processor 34, and the power source 36 can have a variety of sizes, shapes, and configurations.

[0067] The activation member 26 can be configured to be activated when a consumable is dispensed from the dispenser, and in some embodiments, the activation member 26 can be configured to be automatically activated when the consumable is dispensed. In other words, the consumable being dispensed in its ordinary way can activate the activation member 26 such that a user of the dispenser need not perform any special action to activate the activation member 26. The activation member 26 can thus be integrated into the functionality of the dispenser, which can help the accessory 12 gather data regarding the consumable, as discussed further below. For example, the activation member 26 can be positioned at an end of a respiratory inhaler and can be configured to be pushed down by a user to push down a medication canister and release a metered-dose of respiratory medication from the inhaler such that, even without the accessory 12 attached thereto, the canister can be configured to be pushed down by a user to release a metered-dose of respiratory medication from the inhaler. The activation member 26 can thus be configured to move when the respiratory medication is dispensed.

[0068] The activation member 26 can include a depressible member. For example, the depressible member can include a button, e.g., a push button, but the depressible member can be in another form, such as a depressible switch or a force sensitive resistor. Pushing the accessory 12, e.g., pushing on an inhaler to release a consumable therefrom, can automatically activate the activation member 26 as well as cause the consumable to be released.

[0069] Another example of the activation member 26 includes a motion-sensitive member such as a motion sensor configured to sense movement of the accessory 12. For example, the motion-sensitive member can be positioned at an end of a respiratory inhaler (e.g., an asthma inhaler) and can be configured to be moved by a user to move the inhaler's medication canister to release a metered-dose of respiratory medication from the inhaler such that, even without the accessory 12 attached thereto, the canister can be configured to be moved by a user to release a metered-dose of respiratory medication from the inhaler, such that the motion-sensitive member can sense movement when the accessory 12 is pushed down. For another example, a first motion-sensitive member can be positioned on an exterior plastic

container of a respiratory inhaler (e.g., an asthma inhaler), and a second motion-sensitive member can be positioned on a medication canister that is at least partially encased by the exterior plastic container and that is movable relative thereto when medication is dispensed. A difference in motion detected by the two motion-sensitive members can indicate that a consumable was dispensed. For another example, a first motion-sensitive member can be coupled to a consumables dispenser at a first location, and a second motion-sensitive member can be coupled to the consumables dispenser at a second, different location. The two motion-sensitive members can be configured to sense movement in different areas of the dispenser that can together provide sensed data indicative of a consumable being dispensed, e.g., movement sensed by a first motion-sensitive member coupled to a bottle cap and movement sensed by a second motion-sensitive member coupled to a main body of the bottle to which the cap is releasable attached.

[0070] When the activation member 26 is activated, thereby indicating that a consumable is being dispensed, the activation member 26 can be configured to activate or "wake up" the processor 34. The activation member 26 can thus be configured to trigger data gathering by the processor 34. The activation member 26 can be configured to "wake up" the processor 34 in a variety of ways, as will be appreciated by a person skilled in the art, such as by the activation member 26 being configured to cause an activation signal to be transmitted to the processor 34. The activation signal can cause the processor 34 to perform one or more functions in connection with dispensing of the consumable. For example, the activation member 26 can be configured to cause a circuit to close when the activation member 26 is in a depressed position. The circuit can correspondingly be open when the activation member 26 is in a non-depressed position. The closing of the circuit can cause an activation signal to be transmitted to the processor 34 and/or for a circuit within the processor 34 to be closed.

[0071] The activation of the activation member 26 can be enough to cause the processor 34 to perform function(s) in connection with dispensing of the consumable. However, in some embodiments, the processor 34 can be configured to perform the function(s) in connection with dispensing of the consumable in response to receipt of the activation signal only upon a secondary determination that consumable was dispensed. In other words, the processor 34 can be configured to check for false positives. The sensor 28 can be configured to facilitate the secondary determination. The sensor 28 can help eliminate false positives when, for example, the dispenser is within a backpack or other bag and is jarred against a side of the

bag so as to unintentionally move the activation member 26 (e.g., partially depress the activation member 26, jostle the activation member 26 so as to register kinetic motion, etc.) and activate or "wake-up" the processor 34 even though a consumable was not actually dispensed.

[0072] The sensor 28 can have a variety of sizes, shapes, and configurations. The sensor 28 can be configured to sense at least one condition indicative of the consumable being dispensed from the dispenser. The sensor 28 can be configured to transmit data regarding its sensed parameter(s) to the processor 34, which can be configured to analyze the received sensed data to help determine whether a consumable was dispensed from the dispenser. In general, the processor 34 can be configured to determine if the sensed parameter is above or below a predetermined threshold amount for the sensed parameter and conclude based on that determination whether the sensed parameter indicates that a consumable was dispensed.

[0073] The accessory 12 can include any number of sensors 28. If the accessory 12 includes a plurality of sensors 28, the sensors 28 can be configured to sense at least two different parameters so as to provide a plurality of different factors to aid in the processor's secondary determination of the consumable being dispensed or not. For example, the accessory 12 can include a pressure sensor and a motion sensor. Alternatively, if the accessory 12 includes a plurality of sensors 28, each of the sensors 28 can be configured to sense a same parameter so as to provide a plurality of measurements of the parameter that can be compared with one another to assess whether a consumable was dispensed. For example, the accessory 12 can include a plurality of motion sensors.

[0074] The sensor 28 can be configured to continuously sense data, or the sensor 28 can be configured to sporadically sense data based on activation of the activation member 26. The sensor 28 continuously sensing data can help ensure that the sensor 28 has adequate data available each time the processor 34 is activated by the activation member 26. Continually sensing data can help the processor 34 "learn" ambient conditions of the dispenser, the accessory 12, and/or the consumable over time, which can help the processor 34 better distinguish false positives from actual instances of the consumable being dispensed. The sensor 28 can be configured to sporadically sense data by being triggered by the processor 34 to begin sensing. The processor 34 can be configured to provide such a trigger when the processor 34 is activated by the activation member 26. Sporadically sensing data can consume less power than continuously sensing data, which can help prolong a life of the

accessory 12.

[0075] Examples of the sensor 28 include a motion sensor, a pH sensor, a temperature sensor, a pressure sensor, an audio sensor, an air pressure sensor, and a geographic location sensor. Various embodiments of the sensor 28 are described in previously mentioned Intl. App. No. PCT/US13/047507. Generally, the motion sensor (e.g., an accelerometer, a gyroscope, a magnetic field sensor, etc.) can be configured to sense motion (e.g., movement, shock, vibration, orientation, etc.) of the accessory 12, the pH sensor can be configured to sense a pH at a location where the consumable is dispensed from the dispenser, the temperature sensor can be configured to sense a change in temperature and/or humidity such as a change in temperature and/or humidity of the dispenser, the pressure sensor can be configured to sense a weight or pressure being exerted thereon, the audio sensor (e.g., a microphone, etc.) can be configured to sense a sound of consumable dispensing, and the geographic location sensor (e.g., a global positioning system (GPS) sensor, etc.) can be configured to sense a geographic location.

[0076] In some embodiments, an external device (e.g., a smartphone, etc.) can include a geographic location sensor that can provide geographic location information that can be used in combination with data sensed by the accessory's sensor 28 to help the processor 34 determine whether a consumable was dispensed from a dispenser to which the accessory is coupled. For example, if sensed kinetic motion from a motion sensor of the accessory 12 indicates motion indicative of consumable dispensing, and geographic location information from the external device indicates a predetermined location where the person 22 typically dispenses consumables (e.g., the person's home, an eating location such as the person's kitchen, the person's school cafeteria, a restaurant, etc.), then the processor 34 can be configured to determine that the consumable was dispensed. Conversely, if the geographic location information from the external device indicates a predetermined location where consumables are not typically dispensed (e.g., a highway, a subway line, etc.), the processor 34 can be configured to determine that, despite the motion data indicating a motion that could be indicative of a consumable being dispensed, a consumable was not dispensed, such as because the dispenser is being jostled during transportation.

[0077] In some embodiments, the accessory's sensor 28 can include a pressure sensor, which can be attached to a consumables dispenser at a location where a weight or pressure is applied to the dispenser to dispense the consumable. In other words, a weight or pressure

applied to dispense the consumable will also be applied to the pressure sensor. If the weight or pressure sensed by the pressure sensor is above a predetermined threshold amount of weight or pressure, a processor (e.g., the processor 34 on board the accessory and/or a remote processor that can communicate with the accessory) can be configured to determine that a consumable was dispensed from a dispenser coupled to the accessory because weight or pressure exerted on the pressure sensor increased enough to indicate that the consumable was dispensed, e.g., a canister was pushed down so as to dispense a consumable. The predetermined threshold amount of weight or pressure can vary based on the dispenser, as different dispensers can require a different amount of user-caused motion to dispense a consumable from the dispenser. For one example of a pressure sensor of an accessory, the pressure sensor can be positioned at a bottom of a medication canister containing respiratory medication that is pushed down to dispense medication therefrom, thereby exerting pressure on the pressure sensor disposed beneath the canister. Such a location of a pressure sensor is shown in the embodiment of FIG. 21, discussed further below, where an accessory 1306 including a pressure sensor is positioned at a bottom of a canister 1302. For another example of a pressure sensor of an accessory, the pressure sensor can be located on a cap of a pill bottle, e.g., on an internal surface thereof, and can be configured to be removed from the bottle when the cap is removed from the bottle, e.g., the cap is unscrewed, the cap is snapped off, etc. The cap being removed from the bottle can release pressure being exerted on the cap by the bottle. In other embodiments, the pressure sensor of the accessory can be located on the pill bottle instead of on the cap such that removal of the cap from the bottle can release pressure being exerted thereby on the pressure sensor.

[0078] For another example of a pressure sensor of an accessory, the pressure sensor can be positioned at a portion of a consumables dispenser that typically rests on a table, shelf, or other surface when the dispenser is not in use. When resting on a surface, a weight or pressure will be continuously applied to the pressure sensor. If the weight or pressure sensed by the pressure sensor decreases by at least a predetermined threshold amount of weight or pressure, a processor (e.g., the processor 34 on board the accessory and/or a remote processor that can communicate with the accessory) can be configured to determine that the consumable was dispensed because weight or pressure exerted on the pressure sensor by the surface was removed, e.g., one or more pills were removed from a pill bottle having the accessory coupled to a bottom thereof that typically rests on a surface when the bottle is not in use. The predetermined threshold amount of weight or pressure can vary based on the

dispenser, because different consumables can have different weights and because different prescriptions can require different amounts of consumables to be dispensed at a time. Such a location is shown, for example, in the embodiment of FIG. 19, discussed further below, with an accessory 1100 including a pressure sensor being positioned at a cap 1104 on which a tube 1102 typically rests when the tube 1102 is not in use.

[0079] In some embodiments, the sensor 28 can be disposed adjacent an opening of the dispenser through which the consumables can be dispensed. A change in a condition adjacent the opening can be detected by the sensor 28, thereby indicating that a consumable was dispensed. For example, the sensor 28 can be disposed adjacent a mouthpiece of a consumables dispenser, such as a mouthpiece of a respiratory inhaler, through which the consumables can exit the dispenser so as to be dispensed. In an exemplary embodiment, the sensor 28 can be positioned within a pathway within the dispenser through which the consumable passes before exiting the dispenser. The sensor 28 can thus be protected from inadvertent damage by being exposed outside the dispenser and/or can be less likely to detect ambient conditions outside the dispenser that may cause registration of a false positive of a consumable being dispensed. Such a location is shown, for example, in the embodiment of FIG. 22, discussed further below, with an accessory 1400 positioned adjacent a mouthpiece 1402 within a consumables pathway 1406.

[0080] One example of a sensor configured to sense at least one condition indicative of the consumable being dispensed from the dispenser is an air pressure sensor. Some types of consumables can cause air pressure adjacent the consumable's exit area from the dispenser to temporarily change when the consumable is dispensed from the dispenser. The air pressure sensor can be positioned adjacent a consumable exit area such that the consumable passes thereby and/or therethrough when the consumable is dispensed from the dispenser. For example, respiratory medication administered through a mouthpiece of a medication dispenser can cause air pressure to temporarily change, e.g., increase, at the mouthpiece when medication is dispensed therefrom. The air pressure sensor can thus be located adjacent the mouthpiece. Such a location is shown, for example, in the embodiment of FIG. 22 with the accessory 1400 positioned adjacent the mouthpiece 1402 within the consumables pathway 1406.

[0081] If air pressure sensed by the air pressure sensor is outside a predetermined air pressure range, is above a predetermined air pressure temperature, and/or changes by more

than a predetermined threshold amount, a processor (e.g., the processor 34 on board the accessory and/or a remote processor that can communicate with the accessory) can be configured to determine that a consumable was dispensed from a dispenser to which the accessory is coupled because the air pressure changed enough to indicate that the consumable was dispensed. For example, at least some respiratory medications dispensed from an inhaler can cause air pressure within the dispenser's mouthpiece to temporarily change, e.g., increase, in air pressure. The air pressure sensor can thus facilitate determination that medication was dispensed from the dispenser. For another example, some consumable dispensers are pressurized, such as canisters of respiratory inhalers, and change in air pressure when damaged, e.g., decrease in air pressure if the canister cracks or otherwise breaks. The air pressure sensor can facilitate determination of dispenser damage by detecting a decrease in air pressure since such a decrease would typically only be indicative of an error such as dispenser damage.

[0082] Another example of a sensor configured to sense at least one condition indicative of the consumable being dispensed from the dispenser is a temperature sensor. Some types of consumables can cause a temperature adjacent the consumable's exit area from the dispenser to temporarily change when the consumable is dispensed from the dispenser. The temperature sensor can be positioned adjacent consumable exit area such that consumable passes thereby and/or therethrough when the consumable is dispensed from the dispenser. Similar to that discussed above regarding the air pressure sensor, if the temperature sensed by the temperature sensor changes by more than a predetermined threshold amount, a processor can be configured to determine that a consumable was dispensed from a dispenser to which the accessory is coupled because the temperature changed enough to indicate that the consumable was dispensed and/or that an error such as dispenser damage occurred. For example, respiratory medication administered through a mouthpiece of a medication dispenser can cause a temperature adjacent the mouthpiece to temporarily change, e.g., decrease, at the mouthpiece when medication is dispensed therefrom. The temperature sensor can thus be located adjacent the mouthpiece. Such a location is shown, for example, in the embodiment of FIG. 22 with the accessory 1400 positioned adjacent the mouthpiece 1402 within the consumables pathway 1406.

[0083] In some embodiments, the sensor configured to sense at least one condition indicative of the consumable being dispensed from the dispenser can include a motion sensor.

A change in kinetic motion of the accessory, and hence the dispenser to which the accessory is attached, can indicate that a consumable was dispensed from the dispenser. For example, if the motion sensor is attached to a pill box and the motion sensor senses that the box was titled, a processor (on-board the accessory and/or located off-board from the accessory) in communication with the motion sensor can infer that a consumable was dispensed from the pill box. In addition, as discussed herein, the processor can be configured to consider one or more additional data that can be used to further confirm or to refute that a consumable was dispensed, such as information from a second motion sensor attached to the pill box. The motion sensor can be configured to be omnidirectional, e.g., sense motion in every direction. In an exemplary embodiment, the motion sensor can be three-dimensional, e.g., sense motion in three directions such as along x, y, and z axes. If the motion sensed by the motion sensor is above a predetermined threshold amount of motion, a processor (on-board the accessory and/or located off-board from the accessory) can be configured to determine that a consumable was dispensed because the accessory including the sensor moved enough to cause the consumable to be dispensed from the dispenser to which the accessory is attached. The predetermined threshold amount of motion can vary based on the dispenser, as different dispensers can require a different amount of user-caused motion to dispense a consumable from the dispenser. Accessories including motion sensors are shown, for example, in the embodiments of FIGS. 14-20 and 23-26, which are discussed further below.

[0084] In some embodiments, the motion sensor can be configured to sense motion (e.g., tilting, shaking, rotation, a jolt, etc.) and to sense orientation. If the motion sensor is configured to sense orientation, a processor (on-board the accessory and/or located off-board from the accessory) can be configured to determine whether the sensed orientation matches a predetermined orientation indicative of a consumable-dispensing position of the dispenser. For example, respiratory inhalers are typically held in an upright position when medication is dispensed in order for the dispenser to be comfortably held by hand with the dispenser's mouthpiece at a person's mouth. The motion sensor sensing this orientation can thus be indicative of a consumable being dispensed. In some embodiments, the motion sensor sensing this orientation for at least a predetermined minimum amount of time can be indicative of the consumable being dispensed, while the motion sensor sensing this orientation for less than the predetermined minimum amount of time can be dismissed as not being indicative of a consumable being dispensed, e.g., because the dispenser was only briefly in that orientation while being dropped into a person's purse. For another example, a

type of the motion sensed can be indicative of whether a consumable was dispensed, such as a small vibration typically not being indicative of dispensing, but a sensed motion that corresponds with lifting a dispenser, then tilting the dispenser, and then placing the dispenser back to its original position typically indicates dispensing.

[0085] In some embodiments, the motion sensor can be positioned on an external surface of a consumables dispenser, such as a strap or band that can be wrapped around an external surface of the dispenser. The accessory including the motion sensor can thus be retrofitted to existing consumable dispensers without requiring any modification of the dispenser (other than the simple attachment of the accessory thereto).

[0086] In some embodiments, the motion sensor can be included as part of a strap or band configured to attach to a consumables dispenser, and the strap or band can be configured to sense one or more environmental factors (e.g., temperature, humidity, vibration, time of day, etc.). Sensed data regarding the one or more environmental factors can be used to help determine whether motion detected by the motion sensor is actually indicative of a consumable being dispensed from the dispenser.

[0087] The actuator 30 can have a variety of sizes, shapes, and configurations. The actuator 30 can be configured to indicate to a user, e.g., to the person 22, a care provider for the person 22, etc., that a predetermined condition has occurred. The predetermined condition can reflect that action by the user is needed, such as the patient 22 consuming the consumable (e.g., taking a pill, applying cream, taking a dose of medication, etc.), the dispenser being replaced due to a lot amount of consumables remaining therein, or the dispenser being replaced due to no consumables remaining therein. The predetermined condition can occur without any user action, such as a scheduled dose of the consumable not being taken and data being transmitted from the accessory 12 to the wireless bridge 14. The processor 34 can be configured to actuate one or more of the actuators 30 in response to the processor 34 detecting occurrence of the predetermined condition, as discussed further below. Examples of the actuator 30 include a light (e.g., an LED, a fluorescent material, etc.) configured to illuminate, a speaker configured to output an audible sound, a vibration element configured to vibrate so as to cause palpable and/or audible vibration of the accessory 12 and/or the dispenser, a temperature-changing element configured to temporarily heat and/or cool so as to cause a palpable change in temperature of the accessory 12 and/or the dispenser, and a display screen configured to display text and/or images as a message to the user. If the

actuator 30 includes a light, the accessory 12 can include the actuator 30 at a location configured to make the light visible from all vantage points of the accessory 12. For example, the actuator 30 can include a plurality of lights arranged around a full perimeter of the accessory 12, e.g., arranged equidistantly around the perimeter.

[0088] The accessory 12 can include any number of actuators 30, e.g., zero, one, two, three, etc. If the accessory 12 includes a plurality of actuators 30, in an exemplary embodiment, each of the actuators 30 can be configured to provide a different type of notification than at least one other of the actuators 30, e.g., a plurality of actuators 30 including at least one light and at least one speaker, so as to allow the accessory 12 to provide a plurality of different notifications when a consumable is due and/or to provide a different type of notification upon different types of predetermined conditions, a light of a first color and one vibration element for a consumable being due, a light of a second color for a consumable in the dispenser running low and a blinking light of the second color for a consumable in the dispenser being depleted, a blinking light when a dose is missed and a notification such as an email, text message, or phone call (which can be a live phone call or an automated phone call and can include leaving a voicemail or other recorded message) being sent to a location remote from the dispenser indicating that the dose was missed, etc.

[0089] The accessory 12 can be configured to cause a notification to be transmitted to a location remote from the dispenser instead of or in addition to a notification being provided via the actuator 30 at the dispenser. Providing a remote notification can facilitate supervision of the person 22 and/or management of the person's treatment plan. For example, if the person 22 is a child, it can be beneficial to notify the user 24 associated with the person 22 upon occurrence of certain events to help make the user 24 aware of the person's status so the user 24 can take any appropriate action in real time and/or at a later time.

[0090] For another example, if a dose of a consumable is due, the processor 34 can be configured to cause a first notification to be provided to the person 22 via the actuator 30 at the dispenser and to cause a second notification to be provided to the user 24, who may be at a location remote from the person 22. The user 24 can then decide whether to independently contact the person 22 as a secondary reminder to take the consumable.

[0091] For yet another example, if the processor 34 determines that a consumable was dispensed outside of the person's predetermined schedule, the processor 34 can be configured

to cause a notification such as an email, text message, or phone call to be provided to the user 24, who, given this atypical use of the consumable, may be the person's care provider or be able to contact the person's medical care provider as the person's parent or guardian. If multiple off-schedule doses are detected, the person's care provider may choose to contact the person 22 (or an adult contact for the person 22 if the person 22 is a child) to discuss possible changes to the person's health and/or to the person's treatment plan.

[0092] For still another example, if the processor 34 determines that the consumable is running low, the processor 34 can be configured to cause a notification such as an email, text message, or phone call to be provided to the user 24, such as the person's doctor or pharmacist, who can begin processing a new supply of consumables for the person 22 before the patient's current consumables are depleted.

[0093] For another example, if a consumable is not dispensed within a predetermined period of time after a notification is provided indicating that a scheduled dose of the consumable is due, the processor 34 can be configured to cause a missed dosage notation to be saved in the accessory's memory, and the wireless bridge 14 can be configured to wirelessly transmit the stored missed dosage notation to an external device such as the database 18. The missed dosage notation can be included as part of adherence data and/or incentives data provided on a user interface, discussed further below. An external device, e.g., the interface 20, can be configured to determine that a dose was missed without the processor 34 providing any notice thereof, such as by the external device being configured to detect that notice of an expected dose was not taken, e.g., notice of a consumable being dispensed at a scheduled date/time was not received at the external device from the accessory 20.

[0094] In some instances, the person 22 may have multiple consumable dispensers, each of the dispensers having the same consumable contained therein. For example, the person 22 may have multiple containers of the same consumable each kept in a different location, e.g., home, work, car, etc., for easy accessibility when use of the consumable is needed. Each of the multiple consumable dispensers can have an accessory coupled thereto. Each of the accessories can be categorized in the system 10 as clones of one another so as to be linked together as being associated with the person 22 for a specific consumable, e.g., for a specific prescription medication. Thus, when a dose of the consumable is due according to a predetermined dosage schedule, the dose will likely not be dispensed from each of the

dispensers containing the consumable. Instead, the dose will likely be dispensed from only one of the dispensers, or none of the dispensers if the dose is missed. If any one of the dispensers having the "cloned" accessories coupled thereto dispenses the scheduled dose, the dose can be considered to have been consumed on schedule. If none of the dispensers having the "cloned" accessories coupled thereto dispenses the scheduled dose, the dose can be considered to have been missed. The system 10 can thus be less likely to register false instances of missed dosages and/or less likely to transmit a notification to the person 22 and/or other person that a dose was missed when the dose was actually dispensed.

[0095] In some embodiments, in order to stop a notification (e.g., stop a light from blinking, stop a consumables dispenser from vibrating, etc.), a predetermined action must be taken in response to the predetermined condition that triggered the notification. In this way, certain user actions can be more likely to happen within a short amount of time. For example, if the predetermined condition includes a dose of a consumable being due, the notification can be configured to be provided (e.g., a light continually blinks on and off, an audio tone sounds on and off, a light continually glows, etc.) until dispensing of the consumable is detected. In some embodiments, in the absence of the predetermined action being taken within a predetermined amount of time from the notification being first provided, the notification can be configured to stop after the predetermined amount of time, which can help conserve power (e.g., not require an endlessly glowing light, etc.) and/or can compensate for situations in which it may not be currently possible for the person 22 to take the consumables dose.

[0096] The processor 34 can be configured to control one or more components of the accessory 12. The processor 34 can have a variety of sizes, shapes, and configurations, as discussed above. The processor 34 in the illustrated embodiment is shown as a microcontroller, but the processor 34 can include any of a variety of elements, as mentioned above. The processor 34 can, as will be appreciated by a person skilled in the art, include a timer configured to count time and/or a memory configured to store data. Alternatively, the timer and/or the memory can be included as part of the accessory 12 but be external components to the processor 34.

[0097] The processor 34 can be configured to cause gathered data to be stored in the memory and to cause stored data to be transmitted to an external device, e.g., wirelessly transmitted via the wireless bridge 14 across the network 16 to the interface 20 and/or the

memory 18. The memory 18 in the illustrated embodiment includes a database, but as discussed above, the memory 18 can include any one or more memory technologies. The interface 20 in the illustrated embodiment includes a client station in the form of a distributed computer system (e.g., a phone, a computer, etc.), but the interface 20 can include any form of client station.

[0098] The processor 34 can be configured to transmit stored data to the interface 20 and/or the memory 18 on a predetermined transmission schedule, e.g., a schedule stored in the memory and time-tracked using the timer, in response to occurrence of a predetermined condition, and/or in response to a data request signal to the processor 34 from an external device. The processor 34 can be configured to delete transmitted data from the memory in response to the data having been transmitted, which can help free space for new data, the processor 34 can be configured to delete transmitted data on a regular deletion schedule (e.g., at the top of each hour, at the end of a day, at the end of a week, twice daily, etc.), or the processor 34 can be configured to delete transmitted data as needed for storage space. The processor 34 can be configured to maintain all data until the data is transmitted to an external device, which can help prevent data loss. The processor 34 can be configured to mark data stored in the memory as having been transmitted to an external device, which can facilitate clearing of the accessory's memory and/or help ensure that data is not unnecessarily repeatedly transmitted to an external device.

[0099] Various types of data can be received and stored by the processor 34. For example, data sensed by the sensor 28 can be received and stored. For another example, data regarding occurrences of predetermined conditions can be stored. Examples of predetermined conditions include a consumable being dispensed (e.g., as triggered by activation of the activation mechanism 26 and/or as confirmed by data from the sensor 28), low power source 36 power, power source 36 depletion, a consumable not being dispensed in accordance with a predetermined schedule, and device component failure. The processor 34 can therefore be configured to receive, store, and transmit a relatively complete picture of the patient's consumable usage and of a functional status of the dispenser and a functional status of the accessory 12. Data transmitted by the processor 34 can be analyzed by and/or viewed on the interface 20, as discussed further below.

[00100] The processor 34 can be configured to maintain a running tally of a total amount of consumables dispensed from the dispenser. In this way, the processor 34 can be

configured to determine when the dispenser is running low on the consumable and/or when all the consumables have been dispensed from the dispenser. For example, some types of dispensers, such as respiratory inhalers, can be configured to dispense a predetermined amount of medication each time the medication is dispensed therefrom. The processor 34 can be configured to maintain the running tally of a total amount of consumables dispensed from the dispenser by adding a predetermined value to the previously logged total amount each time a consumable is determined to have been dispensed from the dispenser. For another example, the accessory 12 can be configured to detect an amount of a consumable dispensed, e.g., by using the sensor 28, and to subtract the measured amount from a previously stored total amount of consumables in the dispenser to arrive at a current total amount of consumables in the dispenser.

[00101] The processor 34 can be configured to provide a warning to a user when the processor determines that the dispenser is running low on consumables and/or when all consumables have been dispensed from the dispenser. Providing warnings about low/no consumables remaining can help the user effectively manage reordering and replacement of consumables. The processor 34 can be configured to provide the warning by actuating the actuator 30.

[00102] The processor 34 can be configured to actuate the actuator 30 by transmitting a signal thereto. In response to the triggering signal from the processor 34, the actuator 30 can be configured to provide an audible and/or palpable signal to a user, e.g., to the patient 22, indicating one or more predetermined conditions. One example of the predetermined condition is the low consumables warning mentioned above, and another example of the predetermined condition is the consumables depleted warning also mentioned above.

[00103] Another example of the predetermined condition is a notification when a dosage of the consumable is due. In other words, the accessory 12 can be configured to provide notice to a user, e.g., to the patient 22, that a consumable needs to be taken in order to adhere to a predetermined schedule. The accessory 12 providing the notification can allow the dispenser itself to play a role in a person's regimen, which can help reduce the need for the person 22, the person's family, the person's doctor, etc. to maintain and monitor an external notification system, such as watch alarms, alarms on a mobile device, phone calls to the patient, text messages to the patient's mobile phone, etc.

[00104] The processor 34 can be configured to determine that a dosage of a consumable is due in a variety of ways. A predetermined schedule for the person 22 can be accessible to the processor 34, e.g., stored in a memory included in the accessory 12 or stored in an external memory accessible via the network 16, such as the memory 18. The predetermined schedule can, as will be appreciated by a person skilled in the art, be specific to the person 22 as determined by the person 22 and/or the person's doctor or other care provider, or the predetermined schedule can be dictated by a manufacturer of the consumable. The accessory 12 can be configured to register itself, e.g., with the memory 18, when purchased and/or when attached to a dispenser so as allow the predetermined schedule to be transmitted to the accessory 12, e.g., from the memory 18. This registration can facilitate identification of "clone" accessories. The accessory 12 can be configured to detect attachment and detachment thereof from a dispenser, as discussed further below, which can facilitate registration of the accessory 12 when attached to the dispenser. The processor 34 can be configured to determine when a consumable is due according to the predetermined schedule based on time counted by the timer. The accessory 12 can thus be configured as a self-contained monitoring unit able to notify the user that a consumable is due to be taken regardless of the accessory's location relative to the interface 20 and/or other external device. Alternatively, or in addition, an external device such as the interface 20 can be configured to determine when a dosage of the consumable is due for the person 22 in a similar way and transmit a signal to the accessory 12 via the network 16. The signal can cause the actuator 30 to be actuated. Allowing the external device to trigger the actuator 30 can provide backup functionality to the processor 34 and/or can help move processing resources off-board from the accessory 12, which can help reduce cost and/or help reduce a size of the accessory 12.

[00105] Another example of a predetermined condition is data being transmitted from the accessory 12 via the network interface 32. Providing notice to the user that data is being transmitted can help explain why the accessory 12 may be buzzing or otherwise making a noise not typically associated with the dispenser. Similarly, another predetermined condition is data being transmitted to the accessory 12 via the network interface 32, such as an update to the patient's predetermined schedule stored onboard the accessory 12.

[00106] As mentioned above, a predetermined condition can include the power source 36 running low, thereby indicating that the accessory 12 is due for removal from the dispenser and replacement with another accessory. Similarly, another predetermined condition is the

power source 36 being depleted of available power.

[00107] As mentioned above, a predetermined condition can include failure of any component of the accessory 12, such as a failure of the sensor 28 or the actuator 30, thereby indicating that the accessory 12 should be removed from the dispenser and replaced with another accessory. The processor 34 can be configured to detect failure of a component of the accessory 12, such as by being programmed to regularly query component(s), as will be appreciated by a person skilled in the art, and, based on a response received from the queried component, including whether a response was received or not, determine whether the component is properly functioning.

[00108] The network interface 32 can be configured to facilitate electronic communication of the accessory 12 with one or more external devices such as the wireless bridge 14. The network interface 32 can have a variety of sizes, shapes, and configurations, as discussed above. Although the network interface 32 is illustrated as a radio and as being in electronic communication with the wireless bridge 14 in the illustrated embodiment, the network interface 32 can be a component other than a radio and can be configured to be in electronic communication with a wireless bridge and/or any number of other components to facilitate communication over the network 16. The network interface 32 can be configured to communicate using long-range, low frequency / low power / low bandwidth radio communication using a proprietary, an open source, or a mesh protocol.

[00109] The power source 36, e.g., one or more batteries, one or more solar panels, one or more piezo elements, one or more inductively charged power elements, etc., can have a variety of sizes, shapes, and configurations. The power source 36 can be configured to provide power to one or more of the accessory's components, e.g., to the sensor 28, the processor 34, the wireless bridge 14, the actuator 30, etc. In some embodiments, an accessory can lack a power source and instead be powered by an external power source, such as a power source wired to the accessory via wired connection or a power source configured to telemetrically provide power when moved into proximity of the accessory. In some embodiments, an accessory can include an on-board power source, as in the illustrated embodiment of FIG. 1, configured to provide power to only a portion of the accessory's on-board components, and the accessory can be configured to have another portion of the accessory's on-board components be powered by an external power source. Providing power with an external power source can help reduce a size of the accessory and/or free space for

other components.

[00110] In some embodiments, the power source 36 can be configured to move between a first state in which the power source 36 provides a first amount of power to components of the accessory 12 and a second state in which the power source 36 provides a second, greater amount of power to the components of the accessory 12. The power source 36 can thus be configured to conserve power by being in the first state when the greater amount of power provided in the second state is not necessary for proper functioning of the accessory 12. Embodiments of power sources being configured to move between first and second states are described in more detail in previously mentioned Intl. App. No. PCT/US13/047507.

[00111] In some embodiments, the accessory 12 can include energy-harvesting technology (solar, piezo, etc.) configured to increase a life of the power source 36, e.g., to increase a battery life of a battery when the power source 36 includes a battery.

[00112] The accessory 12 can include a housing 42 configured to house the activation member 26, the sensor 28, the actuator 30, the network interface 32, the processor 34, the power source 36, and the wireless bridge 14. The accessory 12 as a singular unit including the housing 42 and all components housed therein can be configured to be removably and replaceably attached to the dispenser, thereby allowing simple attachment of a single piece to the dispenser to attach the accessory 12 thereto. The accessory 12 can thus lack any required user assembly and can be easily attached to a dispenser by adults and by at least older children.

[00113] The housing 42 can have a variety of sizes, shapes, and configurations and can be formed from one or more materials. In an exemplary embodiment, the housing 42 can be formed from one or more polymers (e.g., thermoplastic elastomers (TPE), acrylonitrile-butadiene-styrene (ABS), etc.) and can be non-toxic. The housing 42 can be rigid or, as in the illustrated embodiment, have some degree of flexibility, which can facilitate depression of the activation member 26, as discussed further below. The housing 42 can be transparent or translucent so as to allow a light to visibly shine therethrough, as also discussed further below. The housing 42 can be waterproof so as to help protect the various components housed therein from moisture damage. The housing 42 can be permanently closed or sealed (e.g., closed or sealed under conditions of ordinary end-user use) so as to help prevent tampering with and/or inadvertent damage to the various components housed therein. The

housing 42, and hence the accessory 12, can be configured to be disposable, e.g., thrown out or recycled. An accessory can, in some embodiments, be non-removably attached to a dispenser, in which case the accessory can be configured to be disposed of with the dispenser.

[00114] The housing 42 is shown in the illustrated embodiment as housing all of the activation member 26, the sensor 28, the actuator 30, the network interface 32, the processor 34, the power source 36, and the wireless bridge 14, but one or more of these components can be disposed in at least one other housing configured to attach to the dispenser similar to that discussed herein regarding the housing 42. For example, the wireless bridge 14 can be housed in a second housing (not shown) of the accessory 12, which can help facilitate hardware and/or software repair and/or upgrades related to electronic communication that otherwise do not substantially affect operation of the accessory 12. The second housing can be made, configured, and used similar to that discussed herein regarding the housing 42.

[00115] The accessory 12 can be configured to be attached to the dispenser in a variety of ways. The accessory 12 can include an attachment mechanism configured to engage the dispenser and removably and replaceably attach the accessory 12 thereto. Examples of the attachment mechanism include a magnet configured to magnetically attach the accessory 12 to a magnet included in or a metallic material of the dispenser, Velcro®, a cavity formed in the accessory configured to fit around a portion of the dispenser in a press fit, a strap or band configured to be tied to secure the accessory 12 to the dispenser, a strap or band configured to elastically secure the accessory 12 to the dispenser similar to a rubber band, a clip configured to clip the accessory 12 to the dispenser, and a guide track configured to slidably receive a portion of the dispenser therein. The attachment mechanism as a magnet can be particularly effective for use with pressurized dispensers, such as respiratory inhalers, which are typically metallic containers. The attachment mechanism being attachable to the dispenser by press fit can help prevent mis-attachment of the accessory 12 to the dispenser because the cavity can be configured to be attachable to the dispenser in one location via the press fit, e.g., the cavity being configured to only accommodate one unique portion of the dispenser. The accessory 12 can thus be keyed to the dispenser so as to be attachable thereto in a predetermined orientation relative thereto, as further described in previously mentioned Intl. App. No. PCT/US13/047507. The accessory 12 can be included as part of a kit including a plurality of differently sized and/or differently shaped members (e.g., flexible rings, rigid rings, etc.) configured to be selectively attached to the accessory 12 to facilitate press fit of the accessory

12 to a particular dispenser. For example, one of the members having a size and shape corresponding to a circular size of an end of a respiratory inhaler can be inserted into a cavity of an accessory in the form of a cap so as to be seated in a groove formed therein. The member can be configured to form a press fit with the inhaler when the cap is attached thereto. The attachment mechanism being an adjustable member, such as a strap or band, can facilitate attachment of the accessory 12 to differently sized and/or irregularly shaped dispensers. In some embodiments, the adjustable member can be configured to dynamically adjust to a size and shape of the dispenser to which the adjustable member is attached, such as by being an elastic member. In some embodiments, the adjustable member can be configured to be manually adjustable to be securely attached to a dispenser, such as by being adjustable similar to a belt with a hook and release mechanism or a slidably adjustable member.

[00116] The attachment mechanism can allow the accessory 12 to be replaceably and removably attached to the dispenser without requiring any modification of the dispenser by the end-user or by a designer or manufacturer of the dispenser to accommodate the accessory 12. In this way, the accessory 12 can be used with nearly any consumables dispenser regardless of whether or not the dispenser was made for use with the accessory 12. Examples of attachment mechanisms that can allow for such attachment include a magnet, a cavity, and a strap or band. Other attachment mechanisms, such as a magnet or Velcro®, may require a modification of the dispenser to allow attachment of the accessory 12 thereto, such as by attaching a magnet or Velcro® to the dispenser using a self-stick adhesive.

[00117] A consumables dispenser to which the accessory 12 is removably and replaceably attached can be configured to dispense a consumable whether or not the accessory 12 is attached thereto. The consumables dispenser can thus be available to the person 22 for use even if an unexpected error occurs with the accessory 12, e.g., the accessory 12 is accidentally broken, the person 22 accidentally forgets to attach the accessory 12 to a new dispenser, etc., and the person 22 will not have to miss any required doses of the consumable due to the accessory error. The accessory 12 being configured to be replaceably and removably attached to a consumables dispenser can facilitate this maintained functionality of the dispenser. FIGS. 4, 7, and 14-26, which are discussed further below, illustrate embodiments of accessories configured to be coupled to consumables dispensers that can properly dispense consumables whether or not the accessory is attached thereto.

[00118] In some embodiments, the accessory 12 can include a grip mechanism configured to facilitate attachment of the attachment mechanism to the consumables dispenser. The grip mechanism can be configured to deform when the attachment mechanism is attached to the dispenser, which can help form a secure interference fit between the accessory 12 and the dispenser, can compensate for differently sized dispensers, and/or can compensate for an uneven dispenser surface to which the accessory 12 is coupled. For example, the grip mechanism can include protrusions extending radially inward from a cavity formed in the accessory 12 and being configured to deform when the dispenser is seated in the cavity. For another example, the grip mechanism can include a textured surface on an interior surface of a strap or band configured to engage an exterior surface of the dispenser.

[00119] A consumables dispenser to which an accessory can be coupled can include a physical dose counter or other dose counting mechanism, as will be appreciated by a person skilled in the art. In some embodiments, the physical dose counter or other dose counting mechanism can be linked to or integrated with the accessory. For example, the physical dose counter can be located at a bottom of the dispenser, and an accessory can be linked to or integrated with the physical dose counter or other dose counting mechanism so as to also be located at the bottom of the dispenser. If the linked or integrated accessory is configured to be removably and replaceably coupled to the dispenser, the physical dose counter or other dose counting mechanism can be removed and replaced with the accessory. In some embodiments, the accessory can be a separate element from the physical dose counter or other dose counting mechanism. In such a case, the accessory and the physical dose counter or other dose counting mechanism can be located at a same location relative to the dispenser, e.g., both at a top thereof, or can be located in different locations relative to the dispenser, e.g., one on a top of the dispenser and one of a side of the dispenser.

[00120] FIGS. 4-6 illustrate one embodiment of an accessory 302. The accessory 302 is shown in FIGS. 4 and 5 removably and replaceably attached to a dispenser 304 and is shown in FIG. 6 as a standalone element unattached to any dispenser. The dispenser 304 of FIGS. 4 and 5 is a respiratory inhaler that includes a housing 312 and a medication canister 314 removably and replaceably seated in the dispenser housing 312 and containing a medication for treating a respiratory condition such as asthma, but as mentioned above, an accessory can be configured to attach to a variety of different types of dispensers containing different types of consumables.

[00121] A housing 300 of the accessory 302 can be a cap, as in the illustrated embodiment of FIGS. 4-6. The cap can be configured to removably and replaceably attach to a portion of the dispenser 304, such as to an end of the canister 314 containing the consumable and being configured to be pressed by a user to dispense the consumable from the dispenser. The accessory 302 can thus be configured to be depressed to cause consumable to be dispensed from an output 306 of the dispenser 304 similar to how the consumable would be dispensed from the dispenser 304 without the accessory 302 attached thereto. The accessory 302 can thus be relatively seamlessly integrated into a person's familiar use of the dispenser 304. The accessory 302 can include a printed circuit board (PCB) (not shown), which can be engaged in response to the pressing of the accessory 302 to facilitate a determination as to whether a consumable was dispensed from the dispenser 304, as described in more detail in previously mentioned Intl. App. No. PCT/US13/047507. In general, the PCB can be coupled to the accessory's processor on-board the accessory, or the PCB can be configured to cooperate with at least one off-board component, e.g., a CPU control store (CCS) module located outside the cap.

[00122] In the illustrated embodiment, the attachment mechanism of the accessory 302 includes a cavity 308 formed in the housing 300. The cavity 308 can be configured to receive a portion of the dispenser 304 therein, e.g., an end portion of the dispenser 304. As in the illustrated embodiment, the cavity 308 can be configured to only be attachable to that one portion of the dispenser 304, which can help ensure that the accessory 302 is properly attached to and used with the dispenser 304 because there is only one option to the user in choosing where to attach the accessory 302 to the dispenser 304.

[00123] The housing 300 can include a symbol 310 thereon, e.g., printed thereon, formed therein as a depression (as in the illustrated embodiment), formed thereon as a protrusion, embedded therein, etc. The symbol 310 can include any one or more of numbers, alphabet characters, and geometric shapes, logos, and other symbols. Although only one symbol 310 is shown in the illustrated embodiment, a housing can include any number of symbols thereon. The symbol 310 can identify a manufacturer of the accessory 12, can identify a specific consumable or type of consumables for use with the accessory 12, and/or can be decorative (e.g., a person's name, a person's first initial, a cartoon character, etc.). In the illustrated embodiment, the symbol 310 includes a plus sign. Symbols for accessories are further described in previously mentioned Intl. App. No. PCT/US13/047507.

[00124] FIGS. 7-10 illustrate another embodiment of an accessory 400 in the form of a cap configured to be removably and replaceably attached to a dispenser. The accessory 400 is shown in FIGS. 7-9 as a standalone element unattached to any dispenser and is shown in FIG. 10 removably and replaceably attached to a canister 402 of a consumables dispenser. The canister 402 in this illustrated embodiment contains an inhalable consumable, e.g., respiratory medication, disposed therein, and is configured to be seated in a housing (not shown) and moved relative thereto to dispense the consumable through a mouthpiece (not shown) of the dispenser housing, as discussed herein. However, as mentioned above, the accessory 400 can be configured to attach to a variety of different types of dispensers containing different types of consumables.

[00125] As in this illustrated embodiment, the accessory 400 can include a distal portion 404, also referred to herein as a "distal base," and a proximal portion 406, also referred to herein as a "proximal cap." The proximal cap 406 can be configured to move relative to the distal base 404, thereby causing the consumable to be dispensed from the dispenser and causing the accessory 400 to detect usage of the dispenser, e.g., to detect that the consumable was dispensed. The proximal cap 406 and the distal portion 404 can each have a variety of sizes, shapes, and configurations.

[00126] As in this illustrated embodiment, the proximal cap 406 can include a lid 408 and a bias element 410. The lid 408 can have a variety of sizes, shapes, and configurations. In this illustrated embodiment, the lid 408 includes a domed member. The lid 408 can include a mating element 412 configured to engage a corresponding mating feature 414 of the distal base 404 so as to non-removably mate the proximal cap 406 to the distal base 404. Such permanent fixation of the proximal and distal portions 406, 404 can help protect any electronic components disposed within the accessory 400. In some embodiments, the proximal cap 404 can be removably and replaceably mated to the distal base 404, which can allow replacement of one or more the accessory's electronic components, e.g., replacement of a depleted battery, replacement of a burned out light, etc.

[00127] As in this illustrated embodiment, the mating element 412 can include a bayonet foot extending distally from the proximal cap 406, and the mating feature 414 can include a ledge extending from the distal base 404, e.g., from a spin ring 416 of the distal base 404. The spin ring 416 is also illustrated in FIG. 11. The ledge in this illustrated embodiment includes four ledges extending radially inward from an interior surface of the distal base 404,

one ledge for each bayonet foot. In other embodiments, there can be another number of ledges and another number of bayonet feet. For example, there can be one ledge configured to engage each bayonet foot, e.g., one ledge extending circumferentially around the spin ring 416. For another example, there can be an equal number of bayonet feet and ledges such that each one of the bayonet feet engages one of the ledges. The bayonet foot can be configured to be movable toward and away from the ledge in response to the proximal cap 406 being depressed, e.g., by a user manually pressing down on the lid 408, and released, e.g., by the user releasing manual pressure from the lid 408. In other embodiments, the distal base's mating feature can include a bayonet foot, and the proximal cap's mating element can include a ledge.

[00128] The lid 408 can include a button 418 facing the distal base 404. In general, the button 418 can be configured to be depressed when a consumable is dispensed from a dispenser to which the accessory 400 is attached, e.g., from the canister 402 of FIG. 10, as discussed further below. The button 418 can thus be configured to detect usage of the dispenser.

[00129] The lid 408 can be configured to be movable relative to the distal base 404 between a first position and a second position. In the first position, the lid 408 can be at a first distance from the distal base 404, the at least one mating element 412 can be engaged with the at least one mating feature 414 (e.g., the bayonet feet can be in contact with the ledges, as shown in FIGS. 8 and 10), the bias element 410 can be in an expanded configuration, and the button 418 can be out of contact from the distal base 404. In the second position, the lid 408 can be at a second distance from the distal base 404 that is less than the first distance, the at least one mating element 412 can be disengaged from the at least one mating feature 414 (e.g., the bayonet feet can be out of contact with the ledges), the bias element 410 can be in a compressed configuration, and the button 418 can be pressed against the distal base 404 (e.g., against a processor assembly 420 of the distal base 404, discussed further below). The first distance can define a void space between the button 418 and the distal base 404 (e.g., against the processor assembly) when the button 418 is in a non-depressed position, as in FIGS. 8 and 10. The void space can provide some "give" space for movement of the button 418, which can help prevent the consumable from being accidentally dispensed.

[00130] The bias element 410 can have a variety of sizes, shapes, and configurations. In

general, the bias element 410 can be configured to bias the lid 408 to the first position, e.g., bias the button 418 away from the processor assembly 420. Examples of the bias element 410 include a coil spring, a volute spring, an elastic member similar to a rubber band, a leaf spring, and a wave spring. In this illustrated embodiment, the bias element 410 includes a wave spring. A bias strength or spring rate of the bias element 410 can vary based on one or more factors, such as a height of the bayonet feet 412, a height of the button 418, etc. For example, the bias strength or spring rate of the bias element 419 can be about 26.0 lb/in. A size of the bias element 410 can vary based on one or more factors, e.g., a diameter of the button 418, a diameter of the lid 408, etc. For example, the bias element 410 can have an outer diameter of about 0.526 in., a radial wall thickness of about 0.058 in., and a free length of about 0.325 in. A person skilled in the art will appreciate that a bias element may not have a precise measurement but nevertheless be considered to be "about" that measurement due to one or more factors, such as manufacturing tolerances.

[00131] In an exemplary embodiment, the bias element 410 can surround the button 418, e.g., extend circumferentially therearound, as in this illustrated embodiment. By extending circumferentially around the button 418 configured to be pressed in response to manual actuation of the accessory 400 by a user, e.g., by the user pressing down thereon, the bias element 410 can be configured to help evenly transmit the force applied by the user to the button 418, thereby helping to ensure that the button 418 is pressed against the distal base 404 regardless of where on the lid 408 the user presses to dispense a consumable. For example, if a user presses down on the lid 408 at a substantial center thereof (e.g., where a symbol is on the lid 408) so as to be pushing substantially directly on top of the button 418, the applied user force can facilitate pressing of the button 418. However, a user may not always press the lid 408 at a substantial center thereof and/or may not always press on the lid 408 in a direction that the button 418 extends such that the button 418 is not pressed directly downward. The bias element 410 completely surrounding the button 418, as in this illustrated embodiment, can help ensure that off-center user pressure on the lid 408 presses the button 408 down against the distal base 404. The bias element's center can be substantially at the button's center, as in this illustrated embodiment, which can help ensure that off-center user pressure on the lid 408 presses the button 408 down against the distal base 404, even if the pressure is far off the lid's center.

[00132] As in this illustrated embodiment, the distal base 404 can include the spin ring

416, the processor assembly 420 (also shown in FIG. 12), a grip ring 422, a main body 424 (also shown in FIG. 13), a power source 426, a power source protective member 428, and a power source housing 430. The spin ring 416, the processor assembly 420, the grip ring 422, the main body 424, the power source 426, the power source protective member 428, and the power source housing 430 can each have a variety of sizes, shapes, and configurations.

[00133] The spin ring 416 can include an outer member 432 and an inner member 434 configured to be seated in the outer member 432, e.g., seated in a central portion thereof. The outer and inner members 432, 434 can be overmolded. The spin ring 416, e.g., the outer member 432, can be configured to seat the bias element 410 so as to sandwich the bias element 410 between the spin ring 416 and the lid 408. The spin ring 416 can have a central opening 436 extending therethrough in which the button 418 can be configured to move in a downward direction toward the processor assembly 420 underlying the spin ring 416 and to move in an upward direction away from the processor assembly 420. Each of the outer and inner members 432, 434 can have central apertures 432a, 434a that define the central opening 436.

[00134] The processor assembly 420 can include a side sensor 438, a positive power source contact 440, a processor 441, a PCB 442, at least one light 443 (e.g., at least one LED, etc.), a negative power source contact 444, an antenna 445 configured to facilitate wireless communication, and a force sensitive resistor 446. The processor 441 can include a memory (not shown). The positive and negative power source contacts 440, 444 can be configured to contact corresponding positive and negative contacts of the power source 426 to facilitate power supply from the power source 426 o the PCB 442.

[00135] The PCB 442 can, as mentioned above, be coupled to the accessory's processor, or the PCB 442 can be configured to cooperate with at least one off-board component, e.g., a CPU control store (CCS) module located outside the accessory 400. As discussed above, the PCB 442 can be configured to, in response to actuation of the button 418 on the force sensitive resistor 446 (e.g., by moving the proximal portion 406 toward to the distal portion 404), record the date and time of the usage of the dispenser to which the accessory 400 is coupled in a storage unit, such as an on-board memory included in the PCB 442. The stored data can be transmitted to an external source, e.g., computer system, as also discussed above.

[00136] The force sensitive resistor 446 can be configured to facilitate detection of the

movement of the proximal cap 406 relative to the distal base 404 so as to facilitate detection of a consumable being dispensed from a dispenser to which the accessory 400 is attached. In general, the force sensitive resistor 446 can be configured as a pressure sensor that senses a weight or pressure being exerted thereon. The force sensitive resistor 446 can be configured to change resistance when pressure is applied thereto, as will be appreciated by a person skilled in the art. The button 418 can be configured to move within the central opening 436 of the spin ring 416 and can be configured to contact the force sensitive resistor 446 underlying the spin ring 416 when moved in a downward direction toward the PCB 442 and hence toward the force sensitive resistor 446. The force sensitive resistor 446 can be configured to change resistance in response to pressure applied thereto from the button 418. In this way, when the lid 408 is pressed downward so as to move the button 418 in a downward direction, the button 418 can apply pressure to the force sensitive resistor 446, thereby changing the force sensitive resistor's resistance to indicate actuation of the cap 400 and dispensing of a consumable. Similarly, when the lid 408 is released so as to move upwardly, the button 408 can move upwardly so as to decrease pressure on the force sensitive resistor 446, thereby again changing the resistance of the force sensitive resistor 446.

[00137] The processor can be configured to compare the force sensitive resistor's resistance value with a predetermined threshold resistance value, e.g., a value stored in the memory, so as to determine whether the consumable has been dispensed. The resistance value can be a numerical value of the actual resistance or can be a value representative of the actual resistance. By being able to compare specific values instead of merely detecting a sensor's "on" or "off" position, e.g., "on" as having pressure applied thereto and "off" as having no pressure applied thereto, to determine dispensing of the consumable, the processor can help eliminate false positives. If the force sensitive resistor's resistance value equals or exceeds the threshold resistance, then the processor can be configured to determine that the consumable was dispensed because a certain threshold amount of pressure has been applied to the accessory 400 attached to the dispenser containing the consumable. For example, if the threshold resistance value corresponds to a pressure of 20 N, but the force sensitive resistor's resistance value corresponds to a pressure of 15 N (e.g., increases from 0 N without any contact with the button 418 to 15 N upon contact with the button 418), then the processor can determine that dispensing of the consumable did not occur. In other words, the lid 408 can be presumed to have not been pushed with enough force to cause the consumable to exit the canister 402. For another example, if the threshold resistance value corresponds to a pressure

of 25 N and the force sensitive resistor's resistance value corresponds to a pressure of 26 N (e.g., increases from 0 N without any contact with the button 418 to 26 N upon contact with the button 418), then the processor can determine that actuation did occur. In other words, the lid 408 can be presumed to have been pushed with enough force to cause the consumable to exit the canister 402.

[00138] The predetermined threshold resistance value can depend on the dispenser to which the accessory is attached, e.g., different canisters can require different amounts of force to dispense a consumable therefrom. The memory can be configured to store threshold resistance values for various canisters, and the processor can be configured to compare the force sensitive resistor's resistance value with the one of the threshold resistance values corresponding to the canister to which the accessory 400 is coupled. In some embodiments, the threshold resistance value for the canister to which the accessory 400 is attached can be transmitted to the PCB 442 using the wireless bridge, and the transmitted threshold resistance value can be stored in the memory for later comparison with resistance values of the force sensitive resistor 446. The correct threshold resistance value for the processor to compare with the force sensitive resistor's resistance value can be determined, whether the threshold resistance value is pre-stored in the memory or is transmitted to the accessory 400, by having identification information transmitted thereto. Transmission of identification information, as well as other types of data, to an accessory is described in further detail in previously mentioned Intl. App. No. PCT/US13/047507.

[00139] In an exemplary embodiment, a user can enter consumable schedule information (e.g., prescription information for the consumable with which the accessory 400 will be used, meal times when a vitamin with which the accessory 400 will be used should be consumed, etc.) and consumable identification information (e.g., identification of the specific consumable with which the accessory 400 will be used, the specific supplement with which the accessory 400 will be used, etc.) via a user interface via a client terminal, as discussed herein. The user interface can be configured to provide a list of consumables from which the user can select to identify the specific consumable, and/or the user interface can allow the user to enter any consumable. The client terminal can be configured to have access to a database of consumables and their associated threshold resistance values, with the database being stored locally at the client terminal or remotely accessible to the client terminal. The client terminal can be configured to determine from the database which threshold resistance

value corresponds to the consumable identified by the user. The client terminal can be configured to communicate with the accessory 400, e.g., via wireless communication between the accessory 400 and, to provide the consumable schedule information, the consumable identification information, and the threshold resistance value to the accessory 400, which can store the received data in the memory. The accessory 400 can thus be configured to compare the force sensitive resistor's resistance value with the threshold resistance value appropriate for the specific dispenser to which the accessory 400 is coupled.

[00140] The side sensor 438 can be configured to facilitate detection of the accessory's attachment to and removal from a consumables dispenser. Detecting whether the accessory 400 is attached to a dispenser can facilitate proper attachment of the accessory 400 to the dispenser and/or facilitate proper use of the accessory 400. As in this illustrated embodiment, the accessory 400 can itself be configured to determine accessory removal/attachment, e.g., using the side sensor 438 and the PCB 420. In other embodiments, a processor that is off-board the accessory 400 can be configured to detect removal and attachment of the accessory 400 with respect to a consumables dispenser.

[00141] The side sensor 438 can be located adjacent a perimeter of the accessory 400 so as to be located at a radial outward location. The side sensor 438 can be configured to sense pressure. When a dispenser, e.g., a medicament canister such as the canister 402, is seated in a cavity 448 of the accessory 400, e.g., of the main body 424, the dispenser can exert outward pressure on the accessory 400 so as to apply pressure to the side sensor 438. The side sensor 438 can be configured to sense this pressure directed radially outward, thereby allowing the processor to determine that a dispenser has been attached to the accessory 400 since the side sensor 438 sensed an increase in pressure. Similarly, when a dispenser is removed from the cavity 448, the pressure exerted on the side sensor 438 can decrease. The processor can accordingly determine that the accessory 400 is no longer coupled to the dispenser since the side sensor 438 sensed a decrease in pressure.

[00142] The side sensor 438 can facilitate the accessory 400 moving from a first mode, in which the accessory 400 is inactive as not being attached to a dispenser, to a second mode, in which the accessory 400 is active as being attached to a dispenser. In the first mode, the accessory 400 can be configured to use no or little power from the power source 426, thereby conserving resources. In some embodiments, the accessory 400 can have a third mode in which the accessory 400 is inactive as not being attached to a dispenser and as never having

been attached to a dispenser. The third mode can thus reflect that the accessory 400 is at a manufacturing plant and/or is in factory packaging so as to be "new." The accessory 400 in the third mode can be configured to use no power and to not communicate with an external device wirelessly or via wire. The third mode can thus be the accessory's initial mode. Once the accessory 400 has been attached to a dispenser at least once, the accessory 400 can be configured to move between the first and second modes. In the first mode in which the accessory 400 is inactive, as compared to the third mode in which the accessory 400 is also inactive, the accessory 400 can be configured to use a low amount of power so as to allow an external device to communicate with the accessory 400, e.g., to receive data stored in the accessory's memory regarding the accessory's previous attachment to a dispenser such as a date and time the accessory 400 was last removed from a dispenser, etc. By allowing the external device to communicate with the accessory 400 when the accessory 400 is not currently attached to a dispenser but was so attached in the past, the external device can be more likely to have the most up to date information and/or can use date and time information regarding the accessory's removal from the dispenser to prompt the user to indicate via the user interface why the accessory 400 was removed from the dispenser (e.g., accidental removal, change in prescription, change of accessory owner, broken accessory, broken dispenser, etc.).

[00143] The accessory 400 can be configured to provide a notification to a user of the accessory 400 regarding the accessory's attachment and/or the accessory's non-attachment to the dispenser. The PCB 420 can be configured to trigger the notification in response to the detection of the attachment and/or detection of the removal. The notification can be provided in any one or more ways, such as a light (e.g., a light that illuminates when the accessory 400 is not attached to a dispenser and is otherwise unilluminated, a light that blinks when the accessory 400 is not attached to a dispenser and is otherwise unilluminated, a light that illuminates in one color when the accessory 400 is not attached to a dispenser and a second light that illuminates in a different color when the accessory 400 is not attached to a dispenser, etc.); a vibration element (e.g., a vibration element that vibrates for a predetermined length of time upon the accessory 400 being attached to a dispenser and is otherwise non-vibrating, a vibration element that vibrates for a predetermined length of time in response to the accessory 400 being unattached to a dispenser and is otherwise non-vibrating, a vibration element that in response to the accessory 400 being unattached to a dispenser alternatively vibrates for a predetermined length of time and does not vibrate for a

predetermined length of time, etc.); and an email message, a text message, an icon alert (e.g., a pop-up text and/or image on a smartphone or computer, etc.) or a phone call (which can be a live phone call or an automated phone call and can include leaving a voicemail or other recorded message) being sent to a location remote from the dispenser, etc.

[00144] The notification can prompt the user for an action, such as confirming (e.g., via a user interface) whether the accessory 400 was replaced on the same dispenser that it was previously coupled to or was coupled to a different dispenser. Being placed onto the same or different dispenser can be important, for example, for dose scheduling purposes since a different dispenser may be associated with a different schedule, e.g., as being associated with a different prescription, as being a stronger or weaker concentration of medicine, etc. Another example of the action includes confirming to the user that the accessory 400 was properly attached to the dispenser and is therefore ready to use. Another example of the action includes informing a user when the dispenser does not have the accessory 400 attached thereto, thereby indicating to the user that the dispenser should have the accessory 400 and/or other accessory attached thereto before dispensing any consumable therefrom. All consumable usage can therefore be more likely to be detected and analyzed.

[00145] In other embodiments, in alternative to or in addition to a side sensor such as the side sensor 438, an accessory can be configured to identify removal/reattachment to/from a dispenser by opening an electrical circuit when the accessory is removed and by closing the electrical circuit when the accessory is replaced. The accessory can thus be configured to indicate whether it is attached to a dispenser or not attached to a dispenser. The accessory can be configured to make this determination itself, e.g., using an on-board processor configured to identify removal/reattachment of the accessory such as by detecting whether the electrical circuit is open or closed. Alternatively or additionally, a processor that is off-board from the accessory can be configured to identify such removal/reattachment.

[00146] In some embodiments, in alternative to or in addition to a side sensor such as the side sensor 438, an accessory can be configured to identify removal/reattachment to/from a dispenser using a stretch sensor configured to change an electrical property (e.g., resistance) in response to being stretched. When the stretch sensor is stretched, the changed electrical property can indicate that that accessory to which the stretch sensor is coupled has been coupled to or removed from a consumables dispenser. For example, an accessory configured to couple to a cap of a pill bottle can include a stretch sensor configured to stretch when the

cap is attached to or removed from the pill bottle.

[00147] The grip ring 422 can be configured to facilitate handling of the accessory 400. The grip ring 422 can be formed from rubber and/or other material configured to facilitate gripping of the accessory 400 by hand. The grip ring 422 can be particularly useful in gripping the accessory 400 during attachment of the accessory 400 to and removal of the accessory 400 from a dispenser. The grip ring 422 can be of a color different than a color of the main body 424, e.g., a primary color grip ring 422 and a white main body 424, etc., which can help improve aesthetics of the accessory 400 and/or can help facilitate identification of the dispenser to which the accessory 400 is attached, e.g., an accessory with a yellow grip ring being attached to a person's regular inhaler and another accessory with a red grip ring being attached to the person's emergency inhaler. In some embodiments, the main body 424 can be color-coded in a similar way, e.g., different colored main bodies being attached to different consumable containers.

[00148] The main body 424 can include a proximal body 450 and a distal body 452. In an exemplary embodiment, the proximal and distal bodies 450, 452 can be non-removably attached together in a fluid tight seal, which can help protect the components contained within the main body 424 and/or can help prevent fluid from leaking into the accessory 400 and damaging any components disposed therein. The proximal and distal bodies 450, 452 can be overmolded to form the main body 424 and be non-removably attached together. The proximal portion's lid 408 and the distal portion's main body 424 can define a housing of the accessory 400 which, as discussed above, can have some degree of flexibility (e.g., the deformation of the distal body 452), can be transparent or translucent (e.g., at least the lid 408 through which a light can be configured to glow), can be waterproof, can be permanently closed or sealed, and/or can be configured to be disposable.

[00149] The proximal body 450 can include a sensor protector 454 extending distally therefrom at a sidewall thereof, e.g., at a perimeter of the proximal body 450. The sensor protector 454 can be configured to have the side sensor 438 disposed adjacent thereto, and the sensor protector 454 can be configured to protect the side sensor 438 so positioned and/or be configured to facilitate electronic communication between the side sensor 438 and the PCB 442. The distal body 452 can include a pocket 456 formed in a sidewall thereof and configured to receive the sensor protector 454 and the side sensor 438 therein. The pocket 456 can help protect the side sensor 438 from pressure applied thereto, e.g., pressure directed

radially outward from a dispenser inserted into the cavity 448.

[00150] The main body 424 can define the accessory's cavity 448 configured to receive a dispenser, e.g., a canister such as the canister 402, in a distal portion thereof. The main body 424 can be configured to deform in response to insertion of the dispenser into the cavity 448. The cavity's sidewall can be defined by an inner surface of the distal body 452, as in this illustrated embodiment. The distal body 452 can be formed from a material (e.g., thermoplastic elastomers, etc.) configured to flex so as to allow the deformation. The proximal body 450 can be formed from a material (e.g., ABS, etc.) that is more rigid than the material forming the distal body 452, which can help provide stability to the main body 424 and the accessory 400 while still allowing the accessory 400, e.g., the distal body 452, to deform in response to the accessory 400 being coupled to a dispenser. The deformation of the accessory 400, e.g., of the main body's distal body 452, can facilitate a secure interference fit between the accessory 400 and the dispenser to which the accessory 400 is coupled. Different dispensers can have different sizes, and the deformation can make the accessory 400 more versatile by facilitating a secure interference fit between the accessory 400 and different sized dispensers.

[00151] The main body 424 can include a grip mechanism 458 which, as mentioned above, can be configured to facilitate attachment of the accessory 400 to a dispenser and can be configured to deform when the accessory 400 is attached to a dispenser. As in this illustrated embodiment, the grip mechanism 458 can include a plurality of protrusions extending radially inward from the cavity 448, e.g., from the inner surface of the distal body 452 that defines the cavity 448. Although the accessory 400 includes four grip mechanisms 458 in this illustrated embodiment, an accessory can include another number of grip mechanisms. Each of the grip mechanisms 458 can be configured to deform radially outward in response to pressure exerted thereon by a dispenser inserted into the cavity 448. In this illustrated embodiment, the protrusions each include a longitudinally extending rib that extends along an entire longitudinal length 448L of the cavity 448, as shown in FIG. 8. In this illustrated embodiment, the cavity's longitudinal length 448L of the cavity 448 is about 0.32 in., but the longitudinal length 448L of the cavity 448 can be different in other embodiments. Similarly, the accessory's longitudinal length 400L is about 1.04 in. and the accessory's width 400W is about 1.28 in. in this illustrated embodiment, but the accessory 400 in other embodiments can have a different longitudinal length 400L and/or a different

width 400W. The values of the accessory's longitudinal length 400L and width 400W in this illustrated embodiment can facilitate use of the accessory 400 with a variety of currently available respiratory inhalers.

[00152] The power source 426 can be configured to provide power to one or more components of the accessory 400, e.g., components of the PCB 420. The processor 441 can be configured to facilitate power saving by being configured to move between a first state in which the power source 426 provides a first amount of power to components of the accessory 400 and a second state in which the power source 426 provides a second, greater amount of power to the components of the accessory 400. The power source 426 is in the form of a coin cell battery in this illustrated embodiment, and is only a single battery, but the power source in other embodiments can be another type of power source (e.g., another type of battery, etc.) and/or can include more than one power source (e.g., include a battery pack, etc.).

[00153] The power source protective member 428 can be configured to help protect the power source 426 from being damaged during movement of the accessory 400 when a consumable is being dispensed. The power source protective member 428 can have a size and shape corresponding to a size and shape of the power source 426, which can facilitate full protection of the power source. The power source protective member 428 in this illustrated embodiment includes a cushion, but the power source protective member 428 can have other configurations in other embodiments.

[00154] The power source housing 430 can be configured to seat the power source protective member 428 and the power source 426 therein. The power source housing 430 can be permanently closed so as to prevent access to the power source 426 seated therein or, as in this illustrated embodiment, the power source housing 430 can be configured to be selectively closed so as to allow access to the power source 426 seated therein. Allowing access to the power source 426 can allow the power source 426 to be removed and replaced in the event that the power source 426 is depleted and/or allow the power source 426 to be removed for safety reasons prior to disposal of the accessory 400. The power source housing 430 can be configured to be selectively closed in a variety of ways. For example, as in this illustrated embodiment, the power source housing 430 can be configured to be detached from and reattached to the main body 424, such as by being twisted. For another example, the power source housing 430 can include a hinged door (not shown) configured to allow the power source housing 430 to be selectively manually opened and closed.

[00155] An accessory can be configured to be attached to a consumables dispenser in a variety of different locations relative to the dispenser. In some embodiments, an accessory can be configured to be attached to a top of a consumables dispenser. For example, the accessory can be configured to attach to a top of a canister of a dispenser, such as a canister containing respiratory medication and being configured to be seated in a housing of the dispenser, e.g., an exterior plastic container of a respiratory inhaler (e.g., an asthma inhaler). The accessory 302 of the embodiment of FIG. 4, the accessory 400 of the embodiment of FIG. 7, and accessories 600, 700, 800, 900, 1000, 1100, 1200, and 1300, of the embodiments of FIGS. 14-21 are examples of accessories configured to be attached to a top of a dispenser. The specific locations where accessories are attached to dispensers in the illustrated embodiments of FIGS. 14-21 as well as in other embodiments provided herein are examples, and accessories can be attached at various other locations, e.g., a different location on an external surface of a dispenser.

[00156] The accessory 600 of FIG. 14 is a cap similar to the accessory 302 of FIG. 4 and is shown in FIG. 14 coupled to a top of a canister 602 of a consumable dispenser 604 in the form of a respiratory inhaler similar to the dispenser 304 of FIG. 4. The dispenser 604 in this illustrated embodiment also has a second accessory 606 coupled thereto. The second accessory 606 in this illustrated embodiment includes a band or strap configured to be wrapped around the dispenser 604, e.g., around a housing 608 thereof that seats the canister 602 therein and that is configured to be held by hand when the consumable is dispensed through the dispenser's mouthpiece 610. The second accessory 606 in this illustrated embodiment includes a sensor in the form of a motion sensor.

[00157] In the embodiment of FIG. 15, the accessory 700 is coupled to a consumables dispenser 702 in the form of a pill bottle having a releasable cap 704 at a top thereof to which the accessory 700 is coupled. The accessory 700 can include a motion sensor. The dispenser 702 in this illustrated embodiment also has a second accessory 706 coupled thereto, which can include a second motion sensor. The second accessory 706 in this illustrated embodiment is disposed inside the dispenser 702 where the pills are contained. The second accessory 706 can be freely movable within the dispenser 702 similar to a pill being freely movable therein, as in this illustrated embodiment, which can facilitate removing and replacing the second accessory 706. Alternatively, the second accessory can be coupled to an inner surface of the dispenser 702, e.g., to an interior sidewall thereof, such as with an

adhesive.

[00158] In the embodiment of FIG. 16, the accessory 800 is coupled to a consumables dispenser 802 in the form of a pill bottle having a releasable cap 804 at a top thereof to which the accessory 800 is coupled. The dispenser 802 in this illustrated embodiment also has a second accessory 806 coupled thereto. Similar to the embodiment of FIG. 15, the two accessories 800, 806 can each include a motion sensor. The second accessory 806 in this illustrated embodiment is coupled to an exterior surface of the dispenser 802. The second accessory 806 can be attached to the dispenser's exterior surface in a variety of ways, such as by using a Velcro® strap 808 (as in this illustrated embodiment), an adhesive, etc.

[00159] In the embodiment of FIG. 17, the accessory 900 is coupled to a consumables dispenser 902 in the form of a lotion bottle having a releasable cap 904 at a top thereof to which the accessory 900 is coupled. The dispenser 902 in this illustrated embodiment also has a second accessory 906 coupled thereto. Similar to the embodiment of FIG. 15, the two accessories 900, 906 can each include a motion sensor. Similar to the embodiment of FIG. 16, the second accessory 906 can be coupled to an exterior surface of the dispenser 902.

[00160] In the embodiment of FIG. 18, the accessory 1000 is coupled to a consumables dispenser 1002 in the form of a pill box having a releasable cap 1004 at a top thereof to which the accessory 1000 is coupled. The releasable cap 1004 in this illustrated embodiment is hinged, but as will be appreciated by a person skilled in the art, pill boxes in other embodiments can have other types of releasable caps The dispenser 1002 in this illustrated embodiment also has a second accessory 1006 coupled thereto. Similar to the embodiment of FIG. 15, the two accessories 1000, 1006 can each include a motion sensor. Similar to the embodiment of FIG. 16, the second accessory 1006 can be coupled to an exterior surface of the dispenser 1002.

[00161] In the embodiment of FIG. 19, the accessory 1100 is coupled to a consumables dispenser 1102 in the form of a squeezable cream tube having a releasable cap 1104 at a top thereof to which the accessory 1000 is coupled. The accessory 1100 can include a pressure sensor. The dispenser 1102 in this illustrated embodiment also has a second accessory 1106 coupled thereto. Similar to the embodiment of FIG. 14, the second accessory 1106 can include a motion sensor. Similar to the embodiment of FIG. 16, the second accessory 1006 can be coupled to an exterior surface of the dispenser 1102.

[00162] In the embodiment of FIG. 20, the accessory 1200 is coupled to a consumables dispenser 1202 in the form of a disc-shaped respiratory inhaler having a mouthpiece 1204 through which a consumable (e.g., a dry powder) disposed in the dispenser 1202 can be dispensed in response to actuation of a slidable button 1026. Similar to the embodiment of FIG. 14, the accessory 1200 can include a motion sensor. Similar to the embodiment of FIG. 16, the accessory 1200 can be coupled to an exterior surface of the dispenser 1202.

[00163] The accessory 1300 of FIG. 21 is a cap similar to the accessory 302 of FIG. 4 and is shown in FIG. 14 coupled to a top of a canister 1302 of a consumable dispenser 1304 in the form of a respiratory inhaler similar to the dispenser 304 of FIG. 4. The dispenser 1304 in this illustrated embodiment also has a second accessory 1306 coupled thereto. The second accessory 606 in this illustrated embodiment is to a bottom of the dispenser 1304 and includes a pressure sensor configured to detect pressure changes caused by movement of the canister 1302 relative to a housing 1308 of the dispenser 1304.

[00164] In some embodiments, an accessory can be configured to be attached to a bottom of a consumables dispenser. For example, the accessory can be configured to attach to a bottom of a consumables dispenser's canister adjacent a mouthpiece of the dispenser through which the consumable can be dispensed, the canister being configured to be depressed by a user to dispense the consumable out a mouthpiece of the dispenser. The accessories 1306 and 1400 of the embodiments of FIGS. 21 and 22 are examples of accessories configured to be attached to a bottom of a dispenser.

[00165] The accessory 1400 of FIG. 22 is positioned adjacent a mouthpiece 1402 of a consumables dispenser 1404, which in this illustrated embodiment includes a respiratory inhaler, within a passageway 1406 of the dispenser's housing 1410 through which the consumable 1412 contained in the dispenser's canister 1408 can be released. The accessory 1400 in this illustrated embodiment includes an air pressure sensor configured to sense changes in air pressure

[00166] In some embodiments, an accessory can be configured to be attached to a side of a consumables dispenser. For example, the accessory can be configured to attach to a sidewall of a pill bottle. For another example, the accessory can be configured to be attached to a sidewall of a dispenser housing configured to seat a medication canister therein. The accessories 606, 706, 806, 906, 1006, 1106, 1500, 1600, 1700, and 1800 of the embodiments

of FIGS. 14-19, and 23-26 are examples of accessories configured to be attached to a side of a dispenser.

[00167] In the embodiment of FIG. 23, the accessory 1500 is coupled to a consumables dispenser 1502 in the form of a pill bottle similar to the dispenser 702 of FIG. 15. Similar to the embodiment of FIG. 14, the accessory 1500 can include a motion sensor and can be coupled to the dispenser 702 with a band or strap, e.g., around an exterior surface of the bottle below the bottle's cap 1504.

[00168] In the embodiment of FIG. 24, the accessory 1600 is coupled to a consumables dispenser 1602 in the form of a respiratory inhaler similar to the dispenser 304 of FIG. 4. Similar to the embodiment of FIG. 14, the accessory 1600 can include a motion sensor and can be coupled to the dispenser 1602 with a band or strap, e.g., around an exterior surface of the dispenser's housing 1604.

[00169] In the embodiment of FIG. 25, the accessory 1700 is coupled to a consumables dispenser 1702 in the form of a respiratory inhaler similar to the dispenser 304 of FIG. 4. Similar to the embodiment of FIG. 14, the accessory 1700 can include a motion sensor and can be coupled to the dispenser 1702 with a clip, e.g., clipped to an exterior surface of the dispenser's housing 1604.

[00170] In the embodiment of FIG. 26, the accessory 1800 is coupled to a consumables dispenser 1802 in the form of a pill box similar to the dispenser 1002 of FIG. 18. The pill box 1802 in this illustrated embodiment is rectangular, while the pill box 1002 of FIG. 18 is circular. Pill boxes can have other shapes in other embodiments. Similar to the embodiment of FIG. 14, the accessory 1800 can include a motion sensor and can be coupled to the dispenser 1802 with a band or strap, e.g., around an exterior surface of the dispenser 1802.

[00171] In some embodiments, an accessory can be configured to be attached to a part of a consumables dispenser configured to be manually actuated by a user to dispense the consumable from the dispenser. The part of the dispenser can be located at a variety of locations, depending on the configuration of the dispenser, e.g., at a top of the dispenser, on a side of the dispenser, etc. For example, the accessory can be configured to attach to a top of a consumables dispenser's canister, which can be configured to be depressed by a user to dispense the consumable out a mouthpiece of the dispenser. For another example, the accessory can be configured to attach to a pill bottle cap configured to be unscrewed from the

pill bottle to allow consumables (e.g., pills) to be dispensed from the pill bottle. The accessory 310 of the embodiment of FIG. 4, the accessory 400 of the embodiment of FIG. 7, and accessories 600, 700, 800, 900, 1000, 1100, and 1300, of the embodiments of FIGS. 14-19 and 21 are examples of accessories configured to be attached to a part of a consumables dispenser configured to be manually actuated by a user to dispense the consumable from the dispenser.

[00172] In some embodiments, a consumables dispenser can have a plurality of accessories coupled thereto. Each of the accessories can be coupled to a top of the dispenser, each of the accessories can be coupled to a bottom of the dispenser, each of the accessories can be coupled to a side of the dispenser, each of the accessories can be coupled to a part of a consumables dispenser configured to be manually actuated by a user to dispense the consumable from the dispenser, or the accessories can each be coupled to the dispenser at different locations (e.g., one accessory coupled to a top of a dispenser and another accessory coupled to a bottom of the dispenser, one accessory coupled to a part of a consumables dispenser configured to be manually actuated by a user to dispense the consumable from the dispenser and another accessory coupled to a side of the dispenser, etc.).

[00173] FIGS. 14-19 and 21 illustrate embodiments of dispensers each having a plurality of accessories coupled thereto. A dispenser having a plurality of accessories coupled thereto can help better distinguish false positives from actual instances of the consumable being dispensed because dispensing can be verified in at least two ways, e.g., verified once with each accessory. A processor associated with the dispenser, e.g., a processor that is part of one of the accessories, can be configured to determine that a consumable was dispensed only when all of the accessories indicate that a consumable has been dispensed, e.g., when all of the accessories have been activated. A dispenser having a plurality of accessories coupled thereto can allow one of the accessories to be removed from the dispenser for repair, replacement, etc. without having to disturb the other one or more accessories coupled to the dispenser.

[00174] In an exemplary embodiment, at least one of the plurality of accessories can be removably and replaceably coupled to the dispenser, and at least one other of the plurality of accessories can be non-removably coupled to the dispenser. In this way, the dispenser can be ensured of having at least one accessory coupled thereto at all times since at least one of the accessories can be non-removably coupled thereto. Thus, if an error occurs with the

removable and replaceable accessory/accessories, then dispensing of consumables can still be accurately determined by a processor associated with the dispenser considering activation of the properly attached and properly functioning one or more of the plurality of accessories. Examples of such errors include as a person forgetting to removably attach an accessory to the dispenser before using the accessory, an accessory not being properly removably coupled to the dispenser, and an accessory's battery being depleted.

[00175] In an exemplary embodiment, at least one of the plurality of accessories can be configured to be manually manipulated to cause dispensing of the consumable from the dispenser (e.g., be pressed to dispense the consumable as with an accessory in the form of a cap coupled to an inhaler canister), and at least one other of the plurality of accessories can be configured to passively detect dispensing of the consumable (e.g., be a sensor configured to passively sense a parameter such as motion, pH, temperature, noise, or geographic location). Dispensing of the consumable can thus be more accurately determined than if the dispenser has no passive accessories or if the dispenser has no accessories configured to cause consumable dispensing by user manipulation thereof because the dispensing can be detected in different ways.

[00176] A dispenser can include a plurality of accessories with at least two of the accessories including a motion-sensitive member. As discussed above, a difference in motion detected by the at least two motion-sensitive members can indicate that a consumable was dispensed. In some embodiments, each of the plurality of accessories can include a motion-sensitive member, while in other embodiments, at least two of the plurality of accessories can include a motion-sensitive member and at least one of the plurality of accessories can lack a motion-sensitive member and be configured to be detect dispensing of a consumable in another way, e.g., by sensing temperature, by being depressed, etc.

[00177] FIG. 27 is a schematic block diagram of one exemplary embodiment of a consumables analysis system 1900. The system 1900 can include a plurality of modules which can each be implemented using one or more digital data processing systems of the type described above, and in particular using one or more web pages which can be viewed, manipulated, and/or interacted with using such digital data processing systems. The system 1900 can thus be implemented on a single computer system, or can be distributed across a plurality of computer systems. The system 1900 also includes at least one database, which can be stored on and accessed by computer systems. It will be appreciated by a person

skilled in the art that any of the modules or databases disclosed herein can be subdivided or can be combined with other modules or databases.

[00178] The system 1900 can include an accessory data input module 1902, a remote data input module 1904, an adherence module 1906, and a consumables module 1908, and an incentives module 1910. Any of the accessory data input module 1902, the remote data input module 1904, the adherence module 1906, and the consumables module 1908, and the incentives module 1910 can be used independently from one another and can be used in combination with any one or more of the other modules 1902, 1904, 1906, 1908, 1910. Each of the modules 1902, 1904, 1906, 1908, 1910 is discussed further below in turn. Although each of the modules 1902, 1904, 1906, 1908, 1910 is illustrated in FIG. 27 as a single-component module, each of the modules 1902, 1904, 1906, 1908, 1910 can include any number of component modules, e.g., one, two, three, etc., the same or different from any of the other modules 1902, 1904, 1906, 1908, 1910. Further, as mentioned above, it will be appreciated by a person skilled in the art that any of the modules 1902, 1904, 1906, 1908, 1910, and any of their various component modules, can be subdivided or can be combined with other modules, including modules illustrated in FIG. 27 as being in different ones of the modules 1902, 1904, 1906, 1908, 1910.

[00179] The system 1900 can also include an accessory data database 1912 and a remote data database 1914. The accessory data database 1912 can be configured to be accessible by the accessory data input module 1902 and to store data regarding a mechanical accessory. The remote data database 1914 can be configured to be accessible by the remote data input module 1904 and to store data regarding individuals in an individual database 1916 and data regarding incentives in an incentives database 1918. Each of the databases 1912, 1914 can include any number of component databases, e.g., one, two, three, etc., the same or different from any of the other databases 1912, 1914. As mentioned above, a person skilled in the art will appreciate that any of the databases 1912, 1914, and any of their various component databases (if any), can be subdivided or can be combined with other databases, including databases illustrated in FIG. 27 as being in different ones of the databases 1912, 1914. Any portion of any of the databases 1912, 1914 can be configured to be accessed, e.g., read from and/or written to, by any one or more of the modules 1902, 1904, 1906, 1908, 1910 and any additional module(s) (if any). Although the system 1900 in the illustrated embodiment stores data in database(s), any of the systems disclosed herein can store data in database(s) and/or in

other memor(y/ies).

[00180] Generally, the system 1900 can be configured to allow individual data 1916 to be input via the accessory data input module 1902 and remote data 1914 to be input via the remote data input module 1904. The adherence module 1906 can be configured to analyze the input individual data 1916 and/or the input remote data 1914 so as to output an indication of at least one individual's adherence to a predetermined consumables schedule. The consumables module 1908 can be configured to analyze the input individual data 1914 and/or the input remote data 1914 so as to output one or more recommended changes to a patient's predetermined consumables schedule, one or more recommended changes to how soon before a dose is due are consumable dose notifications provided to the person by an accessory attached to a consumables dispenser, and/or one or more recommended changes to a patient's consumable (e.g., change to different brand, etc.). The incentives module 1910 can be configured to analyze the input individual data 1916 and/or the input remote data 1914 so as to output incentives data for at least one individual. The system 1900, embodiments thereof, and embodiments of user interfaces that can be provided thereby are described in further detail in previously mentioned Intl. App. No. PCT/US13/047507.

[00181] Although the invention has been described by reference to specific embodiments, a person skilled in the art will understand that numerous changes may be made within the spirit and scope of the inventive concepts described. A person skilled in the art will appreciate further features and advantages of the invention based on the above-described embodiments. Accordingly, the invention is not to be limited by what has been particularly shown and described, except as indicated by the appended claims. All publications and references cited herein are expressly incorporated herein by reference in their entirety.

[00182] What is claimed is:

CLAIMS:

1. An apparatus, comprising:

a mechanical accessory removably and replaceably attachable to a consumables container that is movably coupled to a housing such that the movement of the container and the accessory as a unit relative to the housing is effective to dispense the consumable, the accessory including

a sensor configured to sense when the accessory is attached to the container,

a processor, and

a wireless communication mechanism, the processor being configured to cause the wireless communication mechanism to wirelessly transmit data indicative of the sensed attachment to an external device that is external to the accessory and the dispenser; and

wherein the accessory is configured to determine when the consumable is dispensed from the container.

2. The apparatus of claim 1, wherein the sensor is configured to sense when the accessory is removed from the container, and the processor is configured to receive a second signal from the sensor in response to the sensor sensing the accessory being removed from the container.

3. The apparatus of claim 1, wherein the sensor includes at least one of a motion sensor and a pressure sensor, and the sensor is configured to sense when the consumable is dispensed from the dispenser.

4. The apparatus of claim 1, wherein the sensor includes a pressure sensor, the pressure sensor being configured to have pressure applied thereto by the container in response to the accessory being attached to the container, and the processor being configured to determine that the accessory has been attached to the container when the pressure sensor has the pressure applied thereto.

5. The apparatus of claim 4, wherein the pressure sensor is configured to have the pressure released therefrom in response to the accessory being removed from the container, and the processor being configured to determine that the accessory has been removed from the container when the pressure sensor has the pressure released therefrom.

6. The apparatus of claim 1, wherein the sensor includes a motion sensor, and the

processor is configured to determine that the accessory has been attached to the dispenser when the motion sensor senses a first predetermined motion of the accessory.

7. The apparatus of claim 6, wherein the processor is configured to determine that the accessory has been removed from the dispenser when the motion sensor senses a second predetermined motion of the accessory that is different from the first predetermined motion.

8. The apparatus of claim 1, wherein the sensor is configured to sense when an electrical circuit is closed, thereby indicating that the accessory has been attached to the container.

9. The apparatus of claim 1, further comprising a memory, the sensor being configured to trigger the processor to store data in the memory regarding the attachment in response to the sensor sensing the attachment, and the data transmitted by the wireless communication mechanism includes the stored data.

10. The apparatus of claim 1, further comprising a second sensor configured to sense when the consumable is dispensed from the container.

11. The apparatus of claim 10, further comprising a second mechanical accessory attachable to the dispenser, the second accessory including the second sensor.

12. The apparatus of claim 10, wherein the accessory includes the sensor at a first location and includes the second sensor at a location that is different from the first location.

13. An apparatus, comprising:

a mechanical accessory removably and replaceably attachable to a consumables dispenser containing a consumable that is dispensable from the dispenser, the accessory including

a sensor configured to sense attachment of the accessory to the dispenser using one of pressure sensing and motion sensing,

a processor configured to cause the accessory to provide a first notification in response to the sensor sensing that the accessory is attached to the dispenser so as to notify a user that the accessory has been attached to the dispenser, and

a wireless communication mechanism, the processor being configured to cause the wireless communication mechanism to wirelessly transmit data to an external device that is external to the accessory and the dispenser; and

wherein the accessory is configured to determine when the consumable is dispensed from the dispenser.

14. The apparatus of claim 13, wherein the sensor includes at least one of a motion sensor and a pressure sensor, and the sensor is configured to sense when the consumable is dispensed from the dispenser.

15. The apparatus of claim 13, wherein the sensor is configured to sense when the accessory is removed from the dispenser, and the processor is configured to provide a second notification when the sensor senses that the accessory is removed from the dispenser so as to notify the user that the accessory has been removed from the dispenser.

16. The apparatus of claim 13, further comprising a second sensor configured to sense when the consumable is dispensed from the dispenser.

17. The apparatus of claim 13, further comprising:

a housing; and

a container disposed within the housing, the container containing the consumable therein, and the container being movable relative to the housing so as to cause the consumable to be dispensed;

wherein the accessory is removably and replaceably attachable to the container such that the accessory is movable with the container relative to the housing so as to cause the consumable to be dispensed.

18. The apparatus of claim 13, wherein the dispenser includes a housing having the consumable disposed therein, the accessory being removably and replaceably attachable to an external surface of the housing, and the housing includes at least one of a pill bottle, a pill box, a squeezable tube, a squeezable bottle, a syringe, a blister pack, and a respiratory inhaler.

19. A method, comprising:

attaching a mechanical accessory to a container of a consumables dispenser movably disposed within a housing of the consumables dispenser, wherein a sensor senses the attachment and a transmitter wirelessly transmits first data from the accessory to an external device, the first data being indicative of the sensed attachment, and the external device being external to the accessory and the dispenser; and

moving the accessory and the container relative to the housing so as to dispense a consumable contained in the container, wherein the transmitter wirelessly transmits second data from the accessory to the external device, the second data being indicative of the dispensing.

20. The method of claim 19, further comprising detaching the accessory from the container, wherein the sensor senses the detachment and the transmitter wirelessly transmits third data from the accessory to the external device, the third data being indicative of the sensed detachment.

21. The method of claim 20, further comprising, after the sensed detachment, attaching the accessory to a second container containing a second consumable, wherein the sensor senses the attachment of the accessory to the second container and the transmitter wirelessly transmits third data from the accessory to the external device, the third data being indicative of the sensed attachment to the second container.

22. The method of claim 19, further comprising, with the accessory attached to the dispenser, providing a notification to a user indicating that the consumable is due to be consumed according to a predetermined schedule.

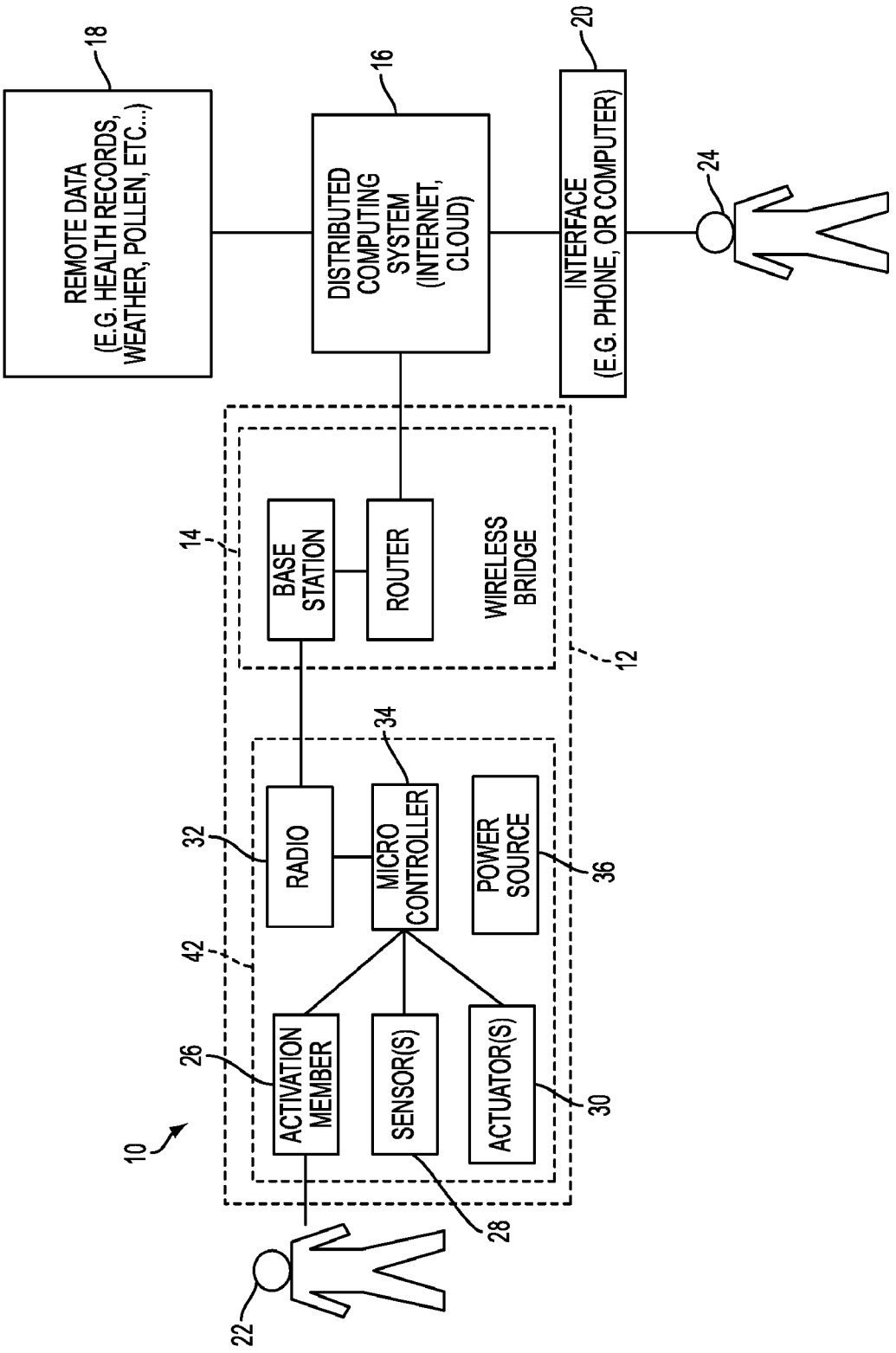
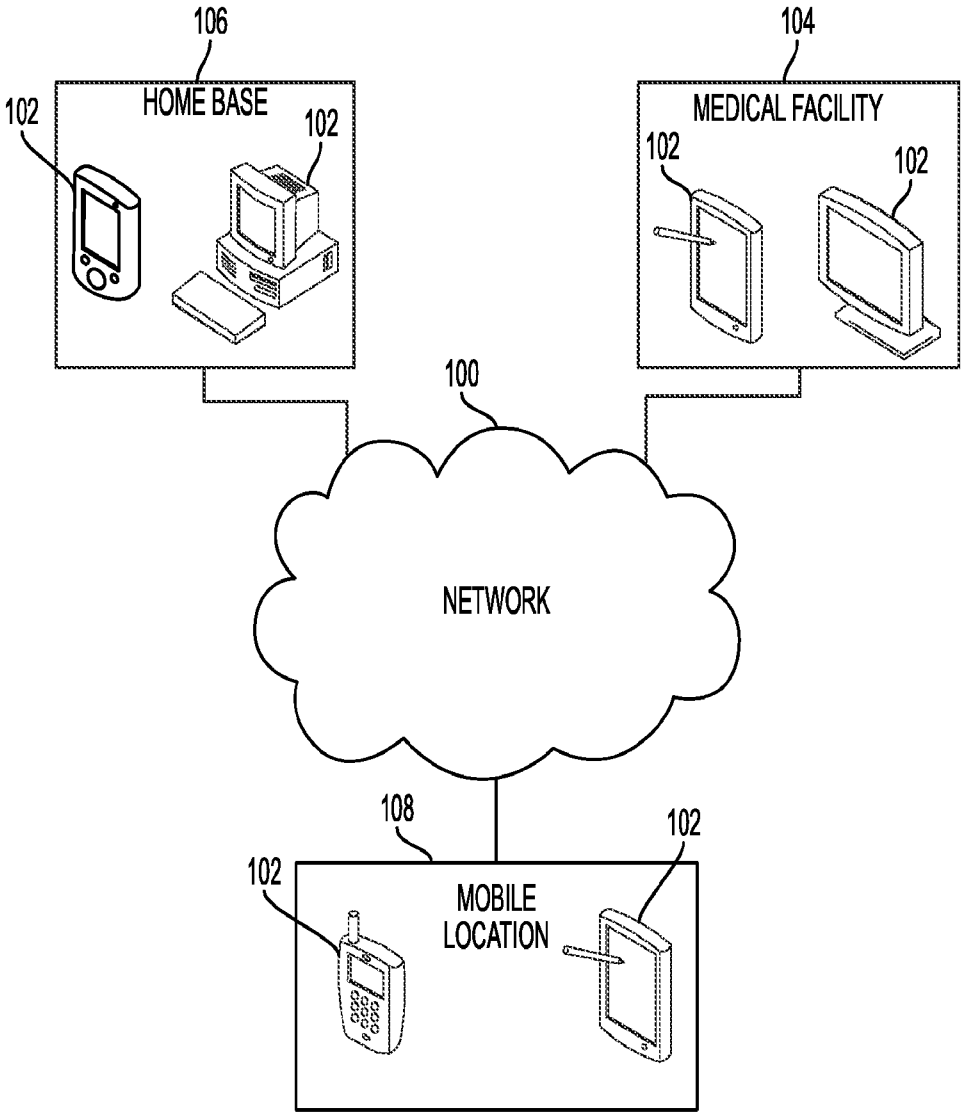

REMOTE DATA (E.G. HEALTH RECORDS, WEATHER, POLLEN, ETC...)
18
DISTRIBUTED COMPUTING SYSTEM (INTERNET, CLOUD)
16
INTERFACE (E.G. PHONE, OR COMPUTER)
20
24
BASE STATION
ROUTER
WIRELESS BRIDGE
14
12
RADIO
MICRO CONTROLLER
34
POWER SOURCE
32
36
42
ACTIVATION MEMBER
SENSOR(S)
ACTUATOR(S)
26
30
28
10
22

FIG. 1


106
HOME BASE
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102
104
MEDICAL FACILITY
102
102
100
NETWORK
108
MOBILE
LOCATION
102
102

FIG. 2

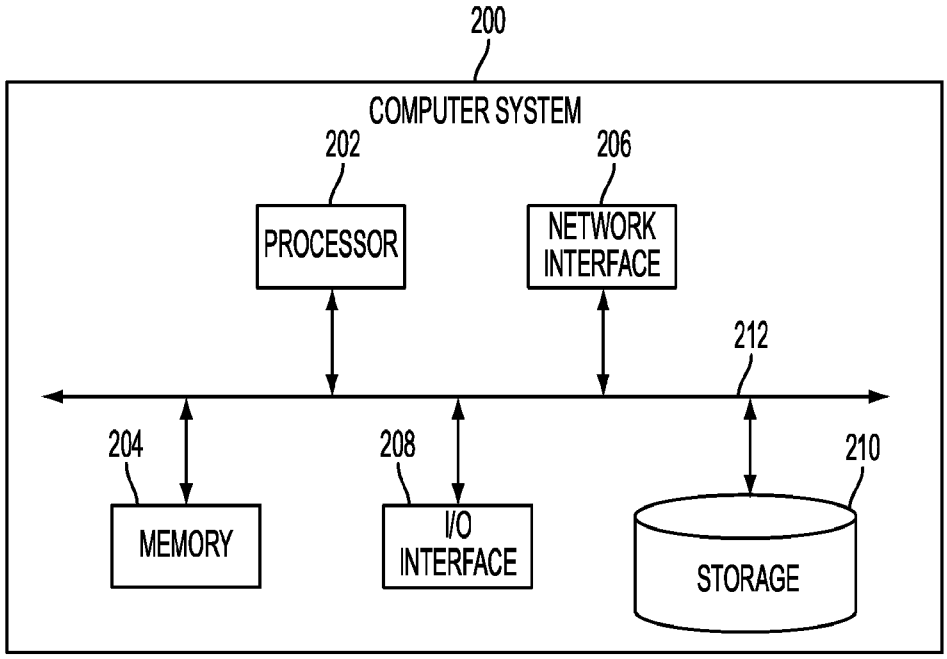

200
COMPUTER SYSTEM
202
206
PROCESSOR
NETWORK INTERFACE
212
204
208
210
MEMORY
I/O INTERFACE
STORAGE

FIG. 3

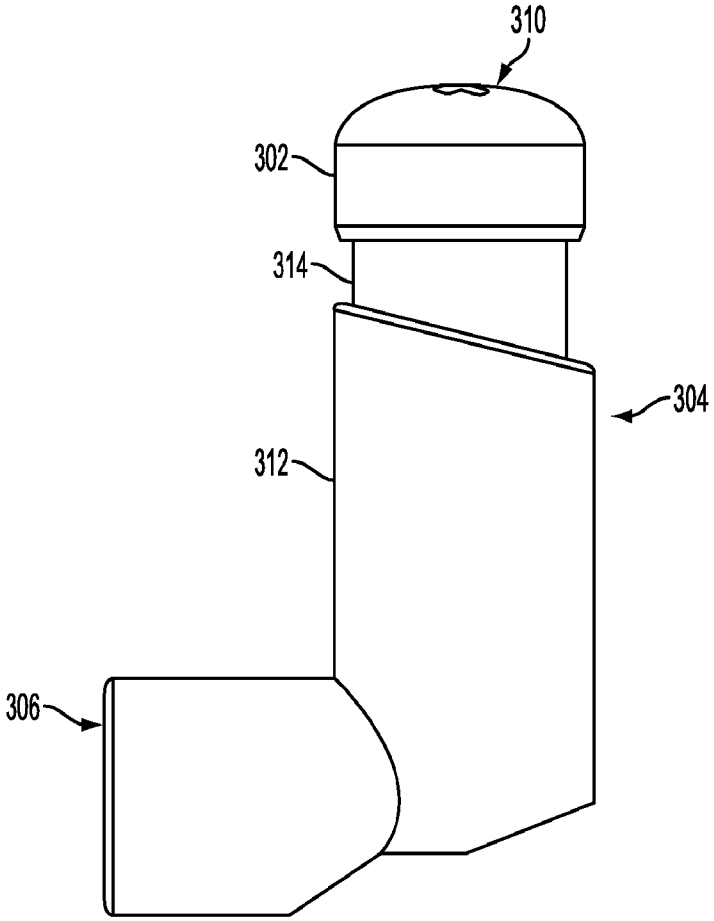


FIG. 4

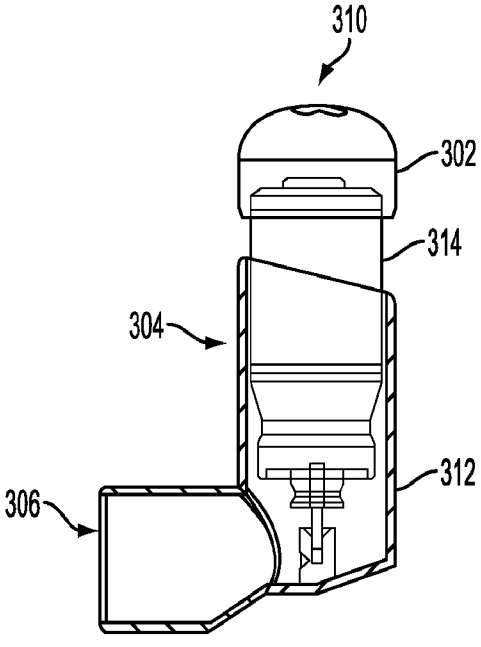


FIG. 5

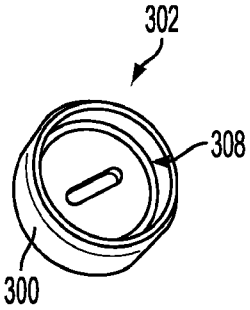


FIG. 6

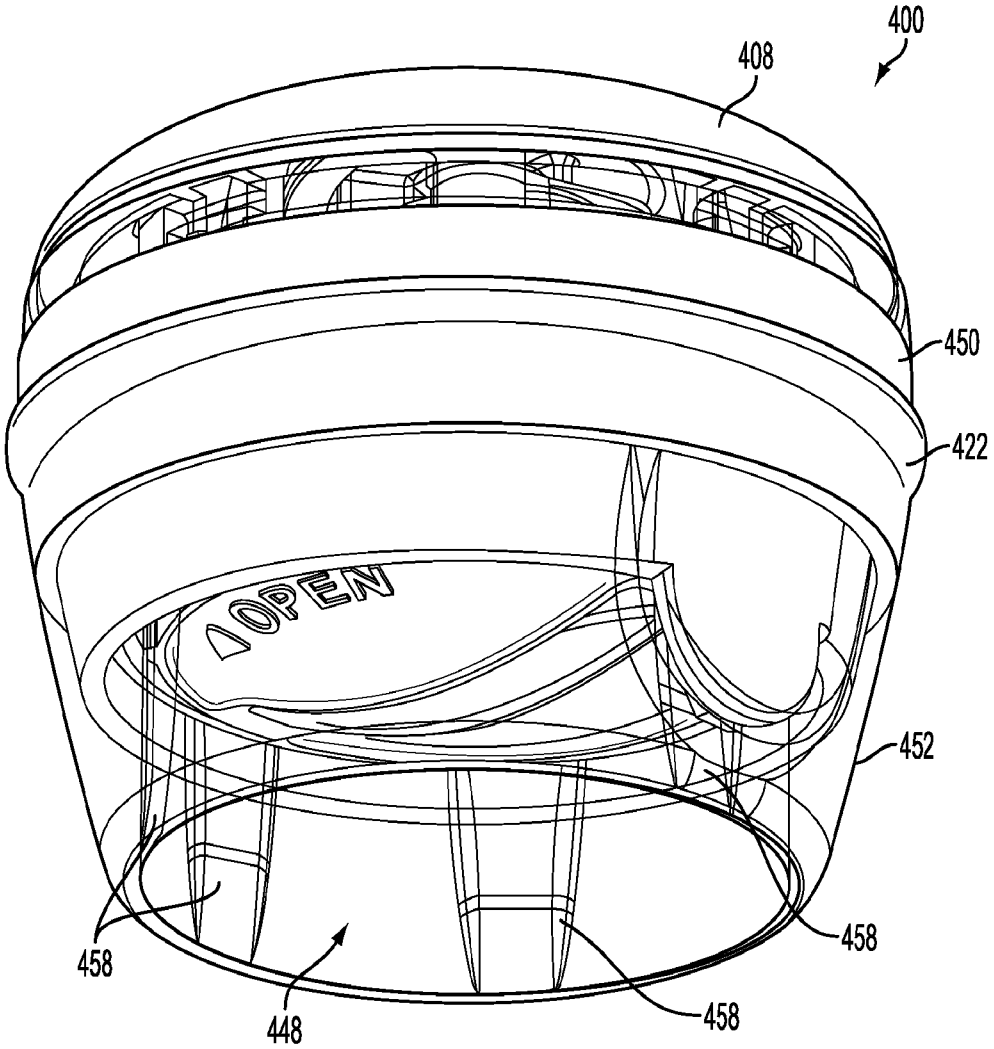
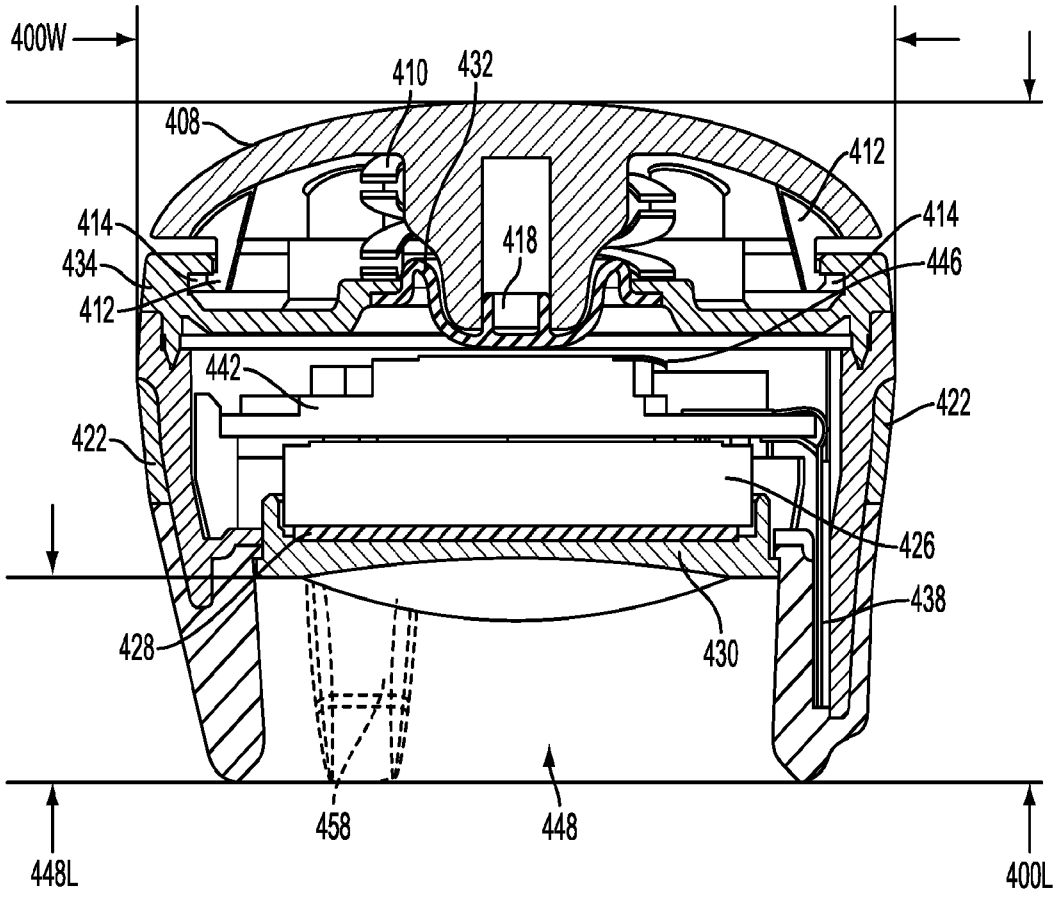


FIG. 7


400W
410
432
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448L
400L

FIG. 8

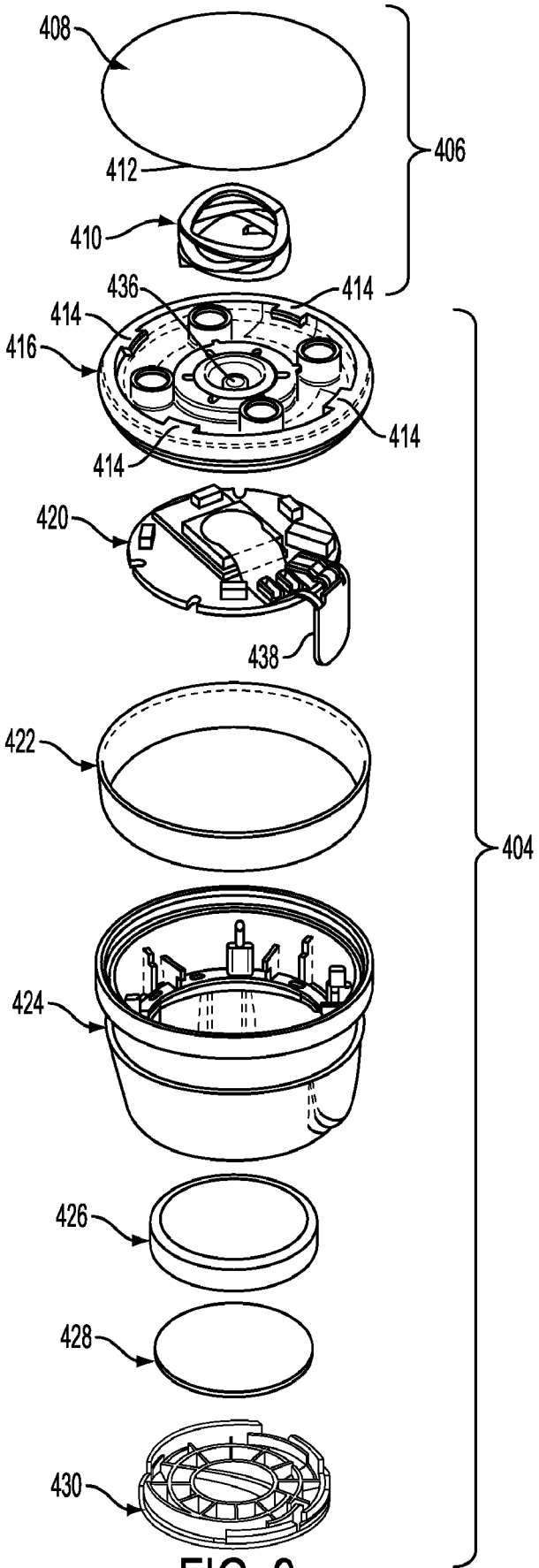
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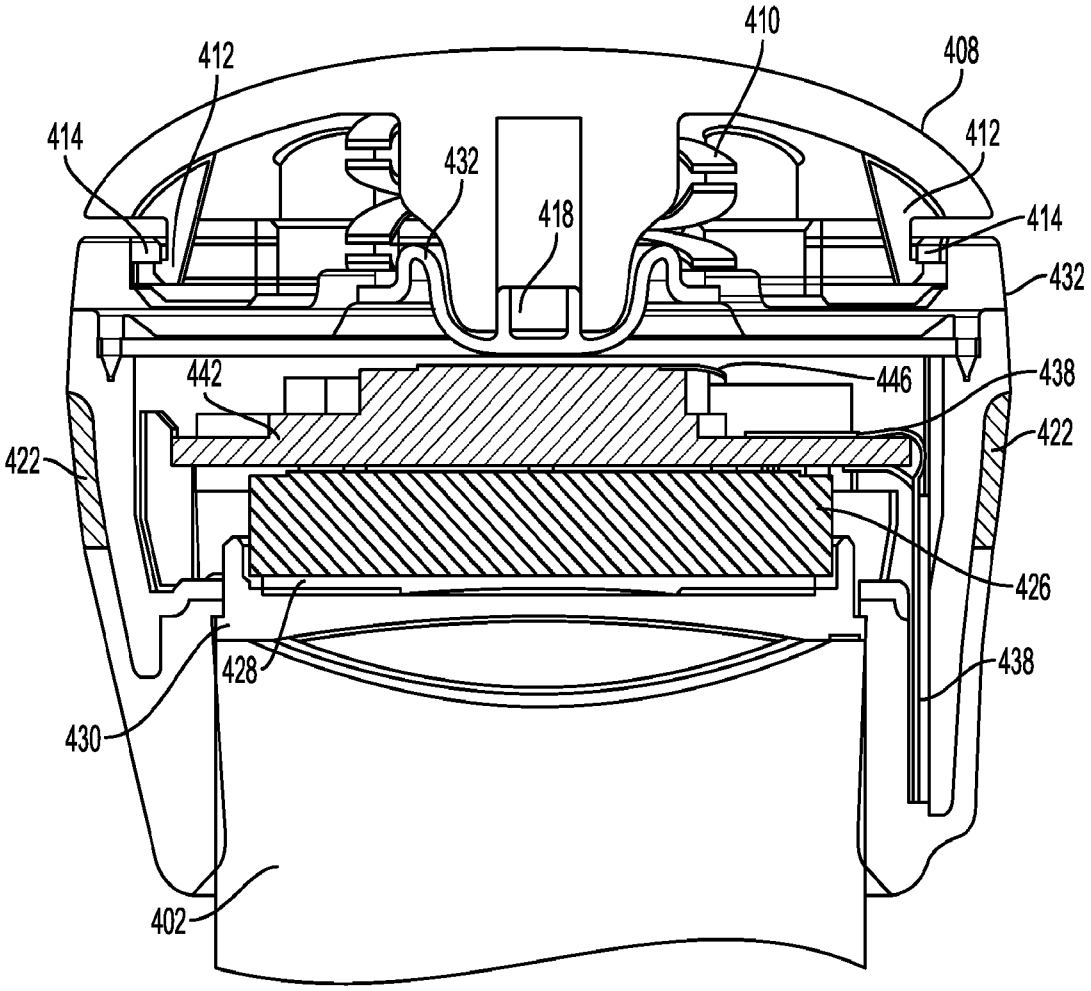
FIG. 9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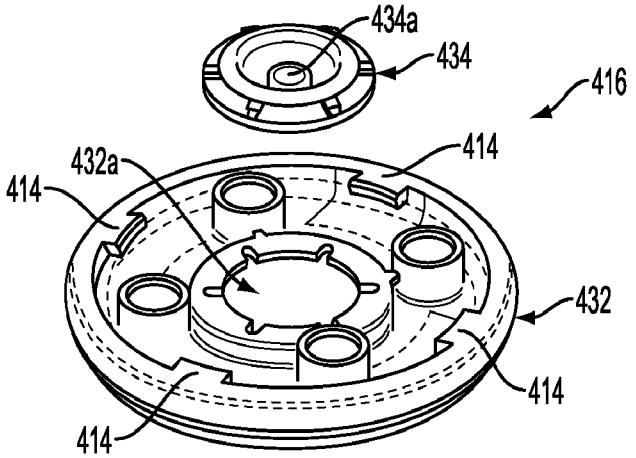
402

FIG. 10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432a
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432
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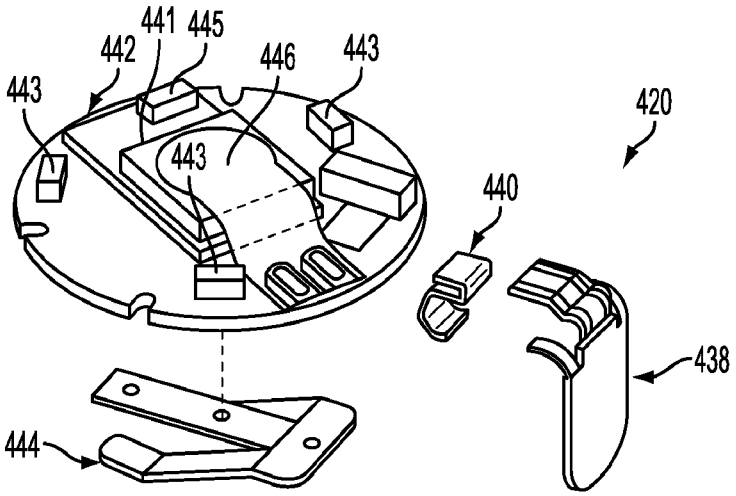
414

FIG. 11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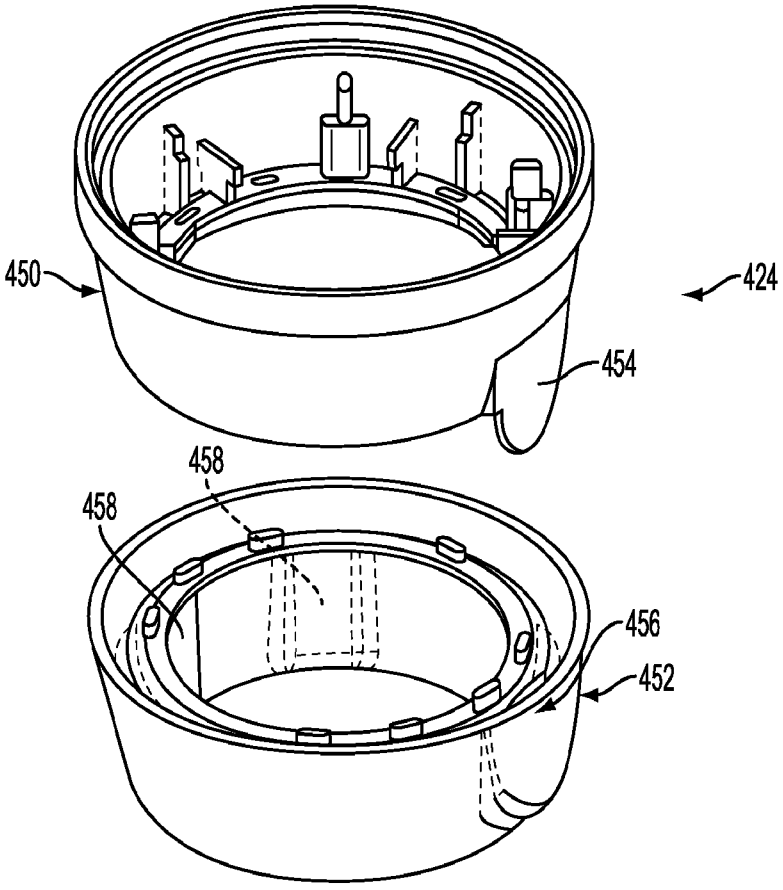
444

FIG. 12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458
458
456
452

FIG. 13

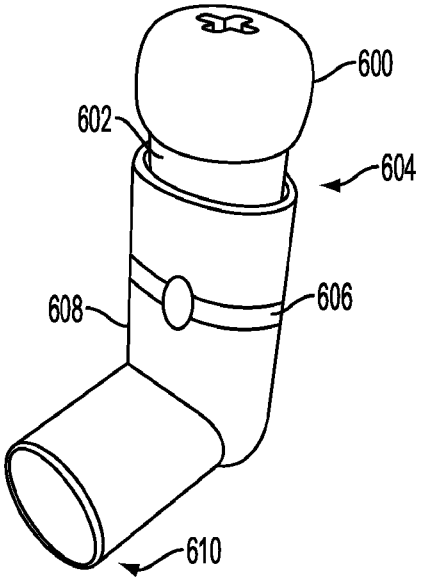

FIG. 14

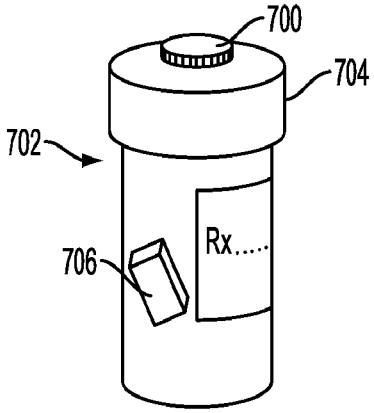

FIG. 15

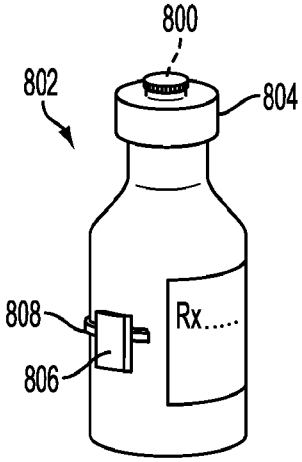

FIG. 16

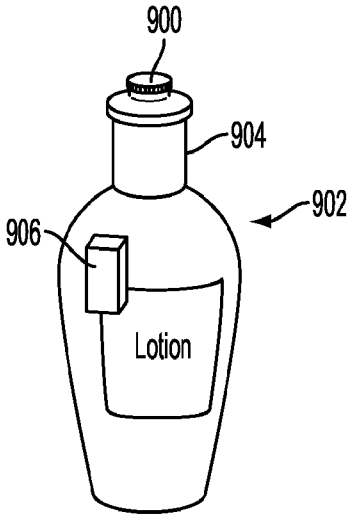

FIG. 17

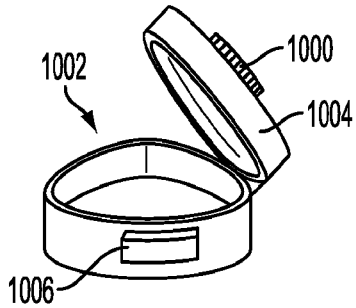

FIG. 18

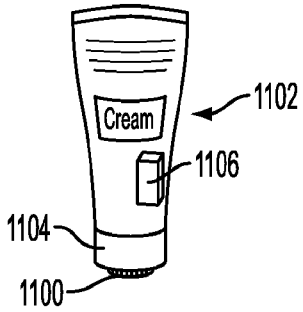

FIG. 19

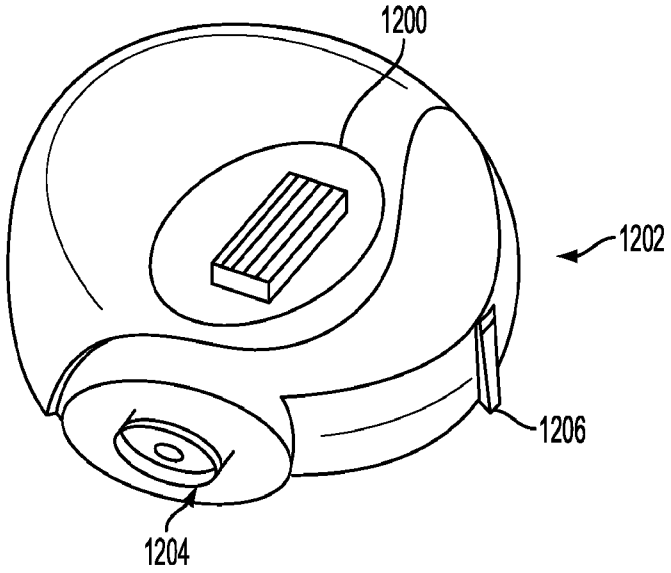

FIG. 20

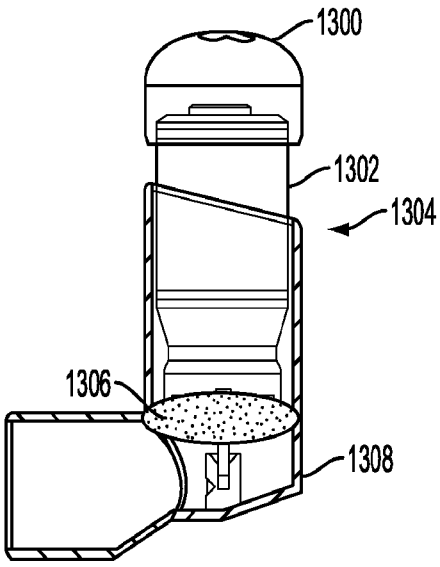

FIG. 21

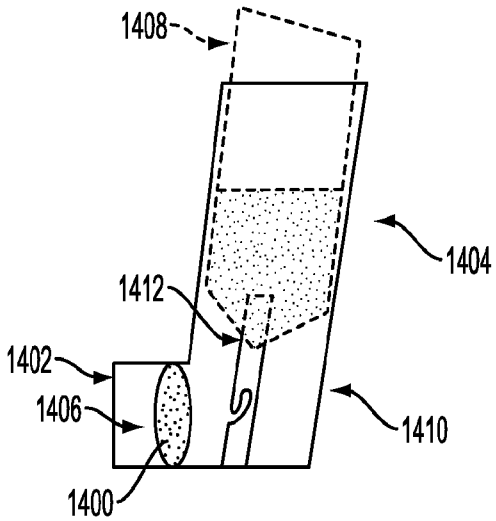

FIG. 22

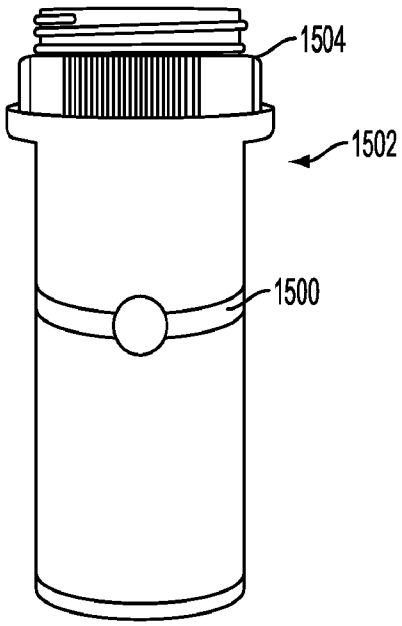

FIG. 23

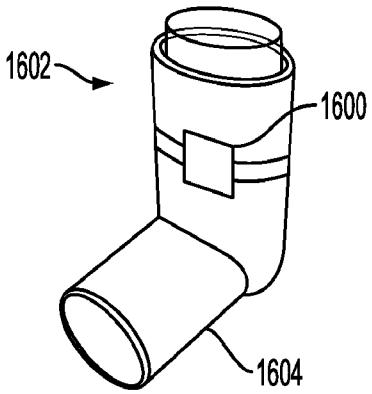

FIG. 24

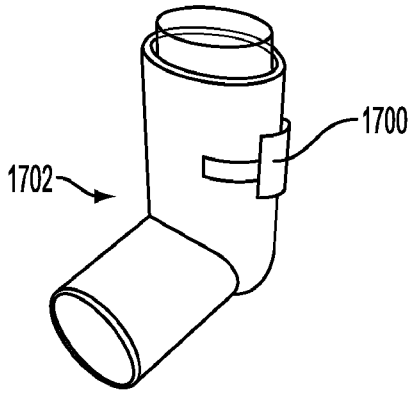

FIG. 25

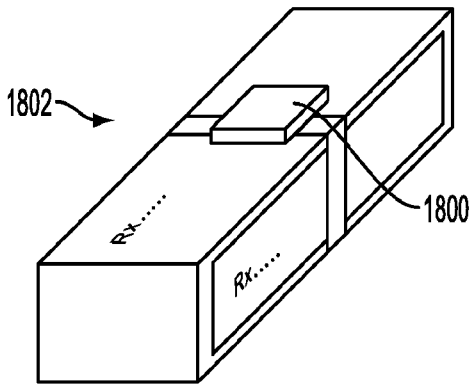

FIG. 26

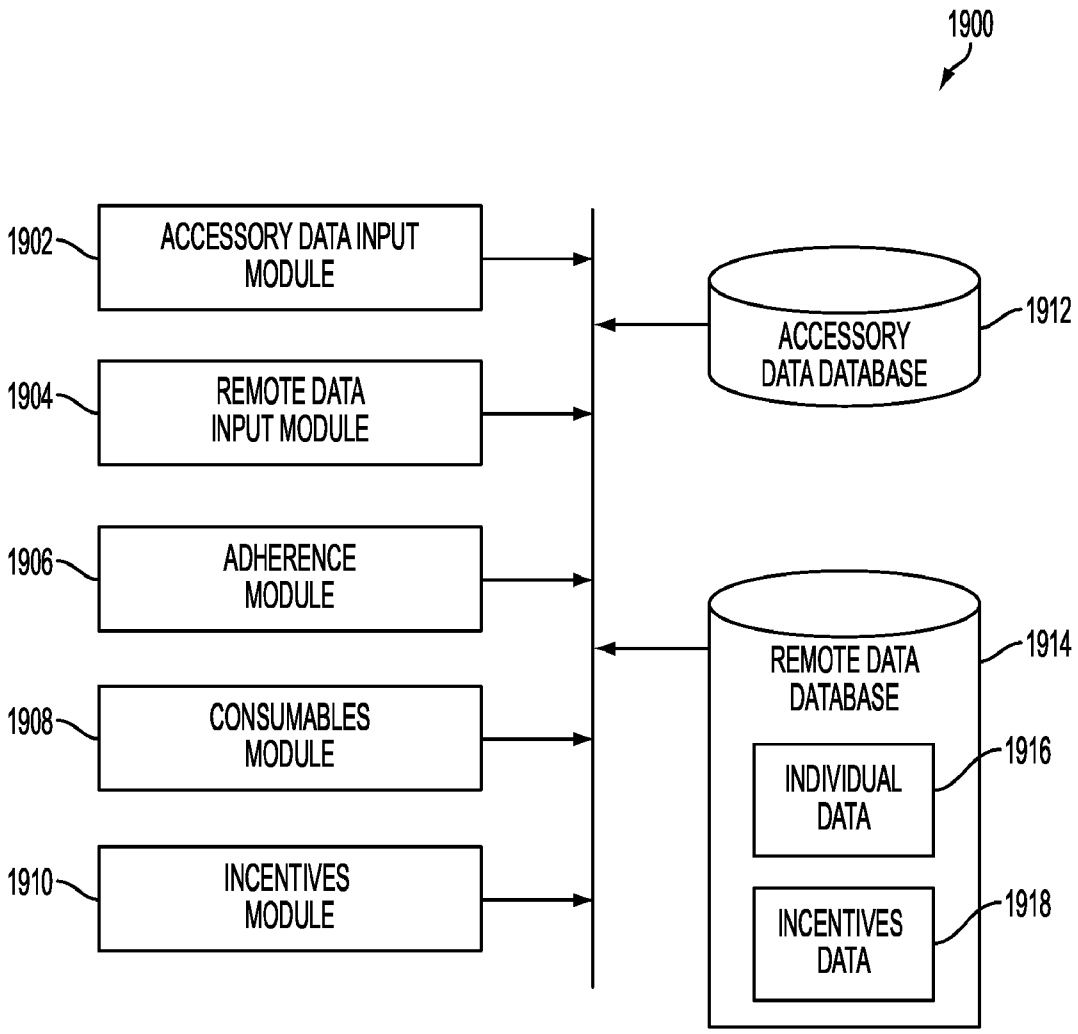
1900
1902
ACCESSORY DATA INPUT MODULE
1904
REMOTE DATA INPUT MODULE
1906
ADHERENCE MODULE
1908
CONSUMABLES MODULE
1910
INCENTIVES MODULE
ACCESSORY DATA DATABASE
1912
REMOTE DATA DATABASE
1914
INDIVIDUAL DATA
1916
INCENTIVES DATA
1918

FIG. 27

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/052896

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A61M 15/08 (2014.01)
CPC - A61M 15/009 (2014.09)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - A61M 15/00; 15/08; G06B 15/02 (2014.01)
USPC -128/200.14; 340/539.12; 705/2

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC - A61M 15/00; 15/008; 15/009 (2014.09) (keyword delimited)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Orbit, Google Patents, Google Scholar, Google.
Search terms used: pressure sensor, motion sensor, housing, container, medication, dispenser

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,958,691 B1 (ANDERSON et al) 25 October 2005 (25.10.2005) entire document	1-22
Y	US 2003/0099158 A1 (DE LA HUERGA) 29 May 2003 (29.05.2003) entire document	1-22
A	US 2012/0012106 A1 (BARI) 19 January 2012 (19.01.2012) entire document	1-22
A	US 6,148,815 A (WOLF) 21 November 2000 (21.11.2000) entire document	1-22

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

* 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	Date of mailing of the international search report
21 October 2014	28 NOV 2014
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

(19)中华人民共和国国家知识产权局

(12)发明专利申请

(10)申请公布号 CN 105492058 A
(43)申请公布日 2016.04.13

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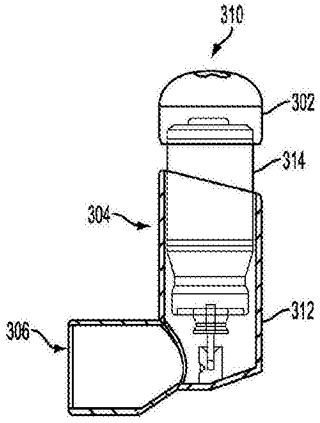
权利要求书2页 说明书29页 附图12页

(54)发明名称

用于遵守度监控的设备、系统和方法及用于监控消耗品分配器的使用的设备、系统和方法

(57)摘要

提供了用于遵守度监控的设备、系统和方法，及提供了用于监控消耗品分配器的使用的设备、系统和方法。通常，设备、系统和方法可以有利于个人对使用消耗品的时间表的遵守，并可以有利于监控并追踪个人对时间表的遵守。设备、系统和方法可以允许借助计算机系统访问与个人对时间表的历史遵守度有关的数据。在一个实施例中，提供了附件，其可以被配置为附接到消耗品分配器。附件可以被配置为可移除及可替换地耦合到分配器。附件可以被配置为向用户提供通知，指示特定事件发生和/或需要采取特定动作。附件可以被配置为感测其与分配器的附接和移除。



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1.一种装置,包括:

机械附件,所述机械附件可移除及可替换地附接到消耗品容器,所述消耗品容器可移动地连接到外壳,以使得容器和附件作为一个单元相对于外壳的移动对于分配消耗品起作用,所述附件包括:

传感器,所述传感器被配置为感测附件何时附接到容器,

处理器,及

无线通信机构,所述处理器被配置为使得无线通信机构将表示感测的附接的数据无线发送到外部设备,所述外部设备在附件和分配器的外部;并且

其中,所述附件被配置为确定何时从容器分配消耗品。

2.根据权利要求1所述的装置,其中,所述传感器被配置为感测附件何时从容器移除,并且所述处理器被配置为响应于传感器感测到从容器移除附件而从所述传感器接收第二信号。

3.根据权利要求1所述的装置,其中,所述传感器包括运动传感器和压力传感器的至少一个,并且所述传感器被配置为感测何时从分配器分配消耗品。

4.根据权利要求1所述的装置,其中,所述传感器包括压力传感器,所述压力传感器被配置为响应于附件附接到容器而得到由容器施加于其的压力,并且所述处理器被配置为当所述压力传感器得到施加于其的压力时,确定附件已经附接到容器。

5.根据权利要求4所述的装置,其中,所述压力传感器被配置为响应于从容器移除附件而得到从其释放的压力,所述处理器被配置为当所述压力传感器得到从其释放的压力时,确定附件已经从容器移除。

6.根据权利要求1所述的装置,其中,所述传感器包括运动传感器,并且所述处理器被配置为当所述运动传感器感测到附件的第一预定运动时,确定附件已经附接到分配器。

7.根据权利要求6所述的装置,其中,所述处理器被配置为当所述运动传感器感测到附件的与第一预定运动不同的第二预定运动时,确定附件已经从分配器移除。

8.根据权利要求1所述的装置,其中,所述传感器被配置为感测何时闭合电路,从而指示附件已经附接到容器。

9.根据权利要求1所述的装置,进一步包括存储器,所述传感器被配置为响应于所述传感器感测到附接而触发处理器以在存储器中存储与附接有关的数据,并且由所述无线通信机构发送的数据包括存储的数据。

10.根据权利要求1所述的装置,进一步包括第二传感器,所述第二存储器被配置为感测何时从容器分配消耗品。

11.根据权利要求10所述的装置,进一步包括可附接到分配器的第二机械附件,第二附件包括第二传感器。

12.根据权利要求10所述的装置,其中,所述附件包括在第一位置的传感器,并且包括在不同于第一位置的位置的第二传感器。

13.一种装置,包括:

机械附件,所述机械附件可移除及可替换地附接到消耗品分配器,所述消耗品分配器包含可以从分配器分配的消耗品,所述附件包括:

传感器,所述传感器被配置为使用压力传感器和运动传感器之一来感测附件到分配器

的附接，

处理器，所述处理器被配置为响应于所述传感器感测到附件附接到分配器而使得附件提供第一通知，以便向用户通知附件已经附接到分配器，及

无线通信机构，所述处理器被配置为使得所述无线通信机构将数据无线发送到外部设备，所述外部设备在附件和分配器的外部；并且

其中，所述附件被配置为确定何时从分配器分配消耗品。

14.根据权利要求13所述的装置，其中，所述传感器包括运动传感器和压力传感器的至少一个，并且所述传感器被配置为感测何时从分配器分配消耗品。

15.根据权利要求13所述的装置，其中，所述传感器被配置为感测附件何时从分配器移除，并且所述处理器被配置为当所述传感器感测到附件从分配器移除时，提供第二通知，以便向用户通知附件已经从分配器移除。

16.根据权利要求13所述的装置，进一步包括第二传感器，所述第二传感器被配置为感测何时从分配器分配消耗品。

17.根据权利要求13所述的装置，进一步包括：

外壳；及

容器，所述容器布置在外壳内，所述容器在其中包含消耗品，所述容器可以相对于外壳移动，以致使消耗品被分配；

其中，所述附件可移除且可替换地附接到容器，以使得所述附件可以与容器一起相对于外壳移动，以致使消耗品被分配。

18.根据权利要求13所述的装置，其中，所述分配器包括外壳，外壳具有布置于其中的消耗品，所述附件可移除且可替换地附接到外壳的外表面，外壳包括至少一个药瓶、药盒、可挤压管、可挤压瓶、注射器、泡罩包装和呼吸吸入器。

19.一种方法，包括：

将机械附件附接到消耗品分配器的容器，所述容器可移动地布置在消耗品分配器的外壳内，其中，传感器感测附接，发射器将第一数据从附件无线发送到外部设备，所述第一数据表示感测的附接，及所述外部设备在附件和分配器外部；及

相对于外壳移动附件和容器，以便分配包含在容器中的消耗品，其中，所述发射器将第二数据从附件无线发送到所述外部设备，所述第二数据表示分配。

20.根据权利要求19所述的方法，进一步包括将附件从容器拆卸，其中，所述传感器可以感测所述拆卸，所述发射器将第三数据从附件无线发送到外部设备，所述第三数据表示感测的拆卸。

21.根据权利要求20所述的方法，进一步包括在感测到拆卸后，将附件附接到包含第二消耗品的第二容器，其中，所述传感器感测附件到第二容器的附接，所述发射器将第三数据从附件无线发送到外部设备，所述第三数据表示感测的到第二容器的附接。

22.根据权利要求19所述的方法，进一步包括借助附接到分配器的附件，向用户提供通知，指示按照预定时间表应该使用消耗品。

用于遵守度监控的设备、系统和方法及用于监控消耗品分配器的使用的设备、系统和方法

[0001] 相关申请的交叉参考

[0002] 本申请要求于2013年8月28日提交的题为“Devices,Systems,And Methods For Monitoring Use Of Consumable Dispensers”的美国临时专利申请No.61/871,001和于2013年8月28日提交的题为“Devices,Systems,And Methods For Adherence Monitoring And Patient Interaction”的美国临时专利申请No.61/871,056的优先权，它们借以通过参考整体上并入本文。

技术领域

[0003] 本发明总体上涉及用于遵守度监控的设备、系统和方法及用于监控消耗品分配器的使用的设备、系统和方法。

背景技术

[0004] 诸如药品、维生素和补充剂之类的消耗品可以有效地有益于个人的健康。消耗品典型地按照有规律的、常常是每天的、时间表来使用。患者对于时间表的遵守得越接近，就可以越好地管理患者的状况，例如由于适量的消耗品会始终存在于患者的系统中，而始终控制诸如哮喘的健康状况的不良影响。用于呼吸状况、皮肤病问题、心脏问题等的消耗品可以按照有规律的时间表开出服药的处方，并且在按照有规律的时间表服用的情况下会获得其最大有效性。

[0005] 出于各种原因，患者难以遵守其治疗时间表，例如对于新治疗时间表不熟悉，忙于诸如工作、上学、打盹或运动的活动，和仅是忘记按时服用消耗品。对于儿童尤其难以记住按时服用其消耗品，特别是在儿童离开其父母或监护人时如果需要任何服药，例如在学校期间或者在夏令营中。不遵守指定的时间表可以导致许多不良影响，例如不必要的恶化、反复的症状、所需的紧急治疗药物的服用和/或医院急诊室就诊。借助需要更少的急诊就诊或其他医生会诊，遵守时间表因而可以更好地帮助保持患者的健康，帮助减少急救药物给与的情况，和/或帮助减少健康护理费用。

[0006] 因此，需要用于遵守度监控的改进的设备、系统和方法及用于监控消耗品分配器的使用的设备、系统和方法。

发明内容

[0007] 在一个实施例中，提供了一种装置，其包括机械附件，可以可移除及可替换地附接到消耗品容器，所述消耗品容器可移动地连接到外壳，以使得容器和附件作为一个单元相对于外壳的移动对于分配消耗品起作用。附件可以包括传感器，所述传感器被配置为感测附件何时附接到容器，处理器和无线通信机构。处理器可以被配置为使得无线通信机构将表示感测的附接的数据无线发送到外部设备，所述外部设备在附件和分配器的外部。附件可以被配置为确定何时从容器分配消耗品。

[0008] 所述装置可以以多种方式变化。例如，传感器可以被配置为感测附件何时从容器移除，及处理器可以被配置为响应于传感器感测到从容器移除附件而从传感器接收第二信号。对于另一个示例，传感器可以包括至少一个运动传感器和压力传感器，传感器可以被配置为感测何时从分配器分配消耗品。对于再另一个示例，传感器可以被配置为感测何时闭合电路，从而指示附件已经附接到容器。对于另一个示例，装置可以包括存储器。传感器可以被配置为响应于传感器感测到附接而触发处理器以在存储器中存储与附接有关的数据，及由无线通信机构发送的数据可以包括存储的数据。

[0009] 在一些实施例中，传感器可以包括压力传感器。压力传感器可以被配置为响应于附件附接到容器而得到由容器施加于其的压力。处理器可以被配置为当压力传感器得到施加于其的压力时，确定附件已经附接到容器。压力传感器可以被配置为响应于从容器移除附件而得到从其释放的压力，处理器可以被配置为当压力传感器得到从其释放的压力时，确定附件已经从容器移除。

[0010] 在一些实施例中，传感器可以包括运动传感器。处理器可以被配置为当运动传感器感测到附件的第一预定运动时，确定附件已经附接到分配器。处理器可以被配置为当运动传感器感测到附件的与第一预定运动不同的第二预定运动时，确定附件已经从分配器移除。

[0011] 在一些实施例中，装置可以包括第二传感器，被配置为感测何时从容器分配消耗品。装置可以包括可附接到分配器的第二机械附件。第二附件可以包括第二传感器。附件可以包括在第一位置的传感器，并可以包括在不同于第一位置的位置的第二传感器。

[0012] 在另一个实施例中，提供了一种装置，包括机械附件，可以可移除及可替换地附接到消耗品分配器，所述消耗品分配器包含可以从分配器分配的消耗品。附件可以包括传感器，所述传感器被配置为使用压力传感器和运动传感器之一来感测附件到分配器的附接，处理器，所述处理器被配置为响应于传感器感测到附件附接到分配器而使得附件提供第一通知，以便向用户通知附件已经附接到分配器，及无线通信机构。处理器可以被配置为使得无线通信机构将数据无线发送到外部设备，所述外部设备在附件和分配器的外部。附件可以被配置为确定何时从分配器分配消耗品。

[0013] 装置可以具有多种变化。例如，传感器可以包括至少一个运动传感器和压力传感器，传感器可以被配置为感测何时从分配器分配消耗品。对于另一个示例，传感器可以被配置为感测附件何时从分配器移除，及处理器可以被配置为当传感器感测到附件从分配器移除时，提供第二通知，以便向用户通知附件已经从分配器移除。对于再另一个示例，装置可以包括第二传感器，被配置为感测何时从分配器分配消耗品。对于另一个示例，分配器可以包括外壳，具有布置于其中的消耗品，附件可以可移除且可替换地附接到外壳的外表面，外壳可以包括至少一个药瓶、药盒、可挤压管、可挤压瓶、注射器、泡罩包装和呼吸吸入器。

[0014] 在一些实施例中，装置可以包括外壳和容器。容器可以布置在外壳内，容器可以其中包含消耗品，容器可以相对于外壳移动，以致使消耗品被分配。附件可以可移除且可替换地附接到容器，以使得附件可以与容器一起相对于外壳移动，以致使消耗品被分配。

[0015] 在另一个方面，提供了一种方法，在一个实施例中，包括将机械附件附接到消耗品分配器的容器，所述容器可移动地布置在消耗品分配器的外壳内，及相对于外壳移动附件和容器，以便分配包含在容器中的消耗品。传感器可以感测附接，发射器可以将第一数据从

附件无线发送到外部设备。第一数据可以表示感测的附接。外部设备可以在附件和分配器外部。发射器可以将第二数据从附件无线发送到外部设备。第二数据可以表示分配。

[0016] 方法可以以多种方式变化。例如，方法可以包括将附件从容器拆卸。传感器可以感测拆卸，发射器可以将第三数据从附件无线发送到外部设备，第三数据可以表示感测的拆卸。对于另一个示例，方法可以包括在感测到拆卸后，将附件附接到包含第二消耗品的第二容器。传感器可以感测附件到第二容器的附接，发射器可以将第三数据从附件无线发送到外部设备，第三数据可以表示感测的到第二容器的附接。对于再另一个示例，方法可以包括借助附接到分配器的附件，向用户提供通知，指示按照预定时间表应该使用消耗品。

附图说明

[0017] 依据以下的详细说明并结合附图可以更充分地理解本发明，在附图中：

[0018] 图1是消耗品给与、管理和检查系统的一个实施例的示意图；

[0019] 图2是包括图1的系统的网络系统的一个实施例的示意图；

[0020] 图3是计算机系统的一个实施例的示意图；

[0021] 图4是具有可移除且可替换地附接于其的附件的消耗品分配器的一个实施例的侧视图；

[0022] 图5是图4的消耗品分配器和附件的侧视局部透视图；

[0023] 图6是图4的附件的透视图；

[0024] 图7是被配置为可移除且可替换地附接到消耗品分配器的附件的一个实施例的局部透视图；

[0025] 图8是图7的附件的横截面侧视图；

[0026] 图9是图7的附件的分解透视图；

[0027] 图10是图7的附件的横截面侧视图，附件可移除且可替换地附接到消耗品分配器；

[0028] 图11是图10的附件的旋转环的分解透视图；

[0029] 图12是图10的附件的印刷电路板的分解透视图；

[0030] 图13是图10的附件的主体的分解透视图；

[0031] 图14是呼吸吸入器形式的消耗品分配器的一个实施例的透视图，具有附接到其的第一和第二附件；

[0032] 图15是药瓶形式的消耗品分配器的一个实施例的透视图，具有附接到其的第一和第二附件；

[0033] 图16是药瓶形式的消耗品分配器的另一个实施例的透视图，具有附接到其的第一和第二附件；

[0034] 图17是洗剂瓶形式的消耗品分配器的一个实施例的透视图，具有附接到其的第一和第二附件；

[0035] 图18是药盒形式的消耗品分配器的一个实施例的透视图，具有附接到其的第一和第二附件；

[0036] 图19是乳剂管形式的消耗品分配器的一个实施例的透视图，具有附接到其的第一和第二附件；

[0037] 图20是呼吸吸入器形式的消耗品分配器的另一个实施例的透视图，具有附接到其

的附件；

[0038] 图21是呼吸吸入器形式的消耗品分配器的另一个实施例的侧视局部透视图，具有附接到其的第一和第二附件；

[0039] 图22是呼吸吸入器形式的消耗品分配器的另一个实施例的透视图，具有附接到其的附件；

[0040] 图23是药瓶形式的消耗品分配器的另一个实施例的透视图，具有附接到其的附件；

[0041] 图24是呼吸吸入器形式的消耗品分配器的另一个实施例的透视图，具有附接到其的附件；

[0042] 图25是呼吸吸入器形式的消耗品分配器的再另一个实施例的透视图，具有附接到其的附件；

[0043] 图26是药盒形式的消耗品分配器的另一个实施例的透视图，具有附接到其的附件；及

[0044] 图27是遵守度监控和患者交互系统的一个实施例的示意图。

具体实施方式

[0045] 现在将说明特定示例性实施例以提供对本文公开的设备和方法的结构、功能、制造和使用的原理的全面理解。在附图中示出了这些实施例的一个或多个示例。本领域普通技术人员会理解，本文具体说明并在附图中示出的设备和方法是非限制性示例性实施例，本发明的范围仅由权利要求书来限定。结合一个示例性实施例示出或说明的特征可以与其他实施例的特征组合。这种修改和变化旨在包括在本发明的范围内。

[0046] 此外，在本公开内容中，实施例相似命名的组件通常具有相似的特征，因而在特定实施例内，不一定充分地详细阐述每一个相似命名的组件的每一个特征。另外，就在公开的系统、设备和方法的说明中使用线性或圆形尺寸来说，这种尺寸并非旨在限制可以结合这种系统、设备和方法使用的形状的类型。本领域技术人员会意识到，可以易于针对任意几何形状确定这种线性和圆形尺寸的等效替代。

[0047] 提供了用于遵守度监控的多个示例性设备、系统和方法及用于监控消耗品分配器的使用的设备、系统和方法。通常，设备、系统和方法可以有利于个人对使用消耗品的时间表的遵守，并可以有利于监控并追踪个人对时间表的遵守。设备、系统和方法可以允许借助计算机系统访问与个人对时间表的历史遵守度有关的数据。诸如个人、个人的家庭、个人的保健提供者、涉及个人的临床试验的指导者等的用户因而即使远离个人，也可以访问遵守度数据，者可以有利于涉及消耗品的个人的治疗的评价和/或修改，有利于涉及个人的临床试验的评价和/或修改，和/或可以有利于鼓励个人遵守时间表。消耗品的示例包括药品、维生素、补充剂、食品和化妆品。

[0048] 在一个实施例中，提供了附件，其可以被配置为附接到消耗品分配器，例如药瓶、哮喘吸入器等。消耗品分配器可以是以附件改型的现有的分配器，或者可以是与附件集成的定制的分配器附件可以包括通知机构，被配置为向用户提供通知，指示特定事件发生和/或需要采取特定动作。例如，附件可以包括光源(例如发光二极管(LED))，被配置为在消耗品的下一次服药(也称为“给药”)时间到时点亮，扬声器，被配置为在消耗品的下一次服药

时间到时提供可听到的声音，振动机构，被配置为在消耗品的下一次服药时间到时振动，和/或变温元件，被配置为在消耗品的下一次服药时间到时增大或降低温度。附件可以包括机载定时器，被配置为触发通知机构以提供通知，例如光、声音、振动等。附件还可以包括电源，例如电池，被配置为为定时器和通知机构供电。通知可以帮助任何年龄的人更易于遵守他们的消耗品时间表。因此通过保持治疗可以更好地控制诸如哮喘的疾病，人们不太可能需要求助于计划外的紧急治疗，例如使用急救吸入器。附件可以被配置为借助在从分配器分配消耗品时的按压来检测分配器的使用，以便“唤醒”耦合到附件的处理器。响应于检测的使用，处理器可以被配置为在储存单元中记录分配器的使用的日期和时间。存储的数据可以发送到外部源，例如计算机系统，其可以在网络云中存储数据，再次，可以经由用户接口访问数据，例如网络接口。用户接口可以允许用户查看和/或分析人的消耗品使用趋势。

[0049] 在示例性实施例中，附件可以被配置为可移除且可替换的耦合到分配器。附件可以被配置为用于对于消耗品的任何遵守度/依从度应用，例如用于皮肤病患者的药膏、用于非哮喘呼吸疾病的吸入器、药瓶、泡罩包装、药盒、注射器、可挤压瓶和可挤压管。附件因而可以被配置为用于为人和人的保健提供者(例如医生、父母等)监控并改进遵守度和依从度，他们会得益于改进的遵守度、环境监控和/或行为修正。例如，对于要在每天的相同时间使用的特定消耗品是有益的。附件可以被配置为监控分配消耗品的分配器的使用，从而有利于人对在每天的相同时间使用消耗品的时间表的遵守和/或监控人对时间表的遵守。

[0050] 附件可以被配置为检测其与消耗品分配器的附接和拆卸。附接的检测可以有利于在附接到分配器时附件的注册，例如附件通过网络的注册，以利于附件与特定人、特定消耗品和/或特定分配器的关联。移除的检测可以有利于与相关于附件可以从其移除的消耗品分配器的附件和/或消耗品的各种动作。例如，如果附件是意外地从其移除，移除的检测可以有利于附件到分配器的及时重新附接。对于另一个示例，移除的检测可以向人的保健提供者发送信号，告知人的附件从人的消耗品分配器移除，从而指示人不太可能按照预定时间表使用消耗品和/或保健提供者应探讨附件从人的移除的原因。

[0051] 图1示出了被配置为有利于遵守度监控和监控消耗品分配器的使用的系统10的一个示例性实施例。系统10可以包括机械附件12(本文也称为“附件”)、无线网桥14、网络16(本文也称为“分布式计算系统”)、存储器18和接口20(本文也称为“计算机系统”和“客户站”)。通常，附件12可以附接到被配置为分配布置于其中的消耗品的消耗品分配器(未示出)。分配器可以包括任意的各种分配器，例如哮喘吸入器，用于非哮喘呼吸疾病的吸入器，液体或半液体分配器，例如药剂管或泵，如用于外用药膏或外用凝胶的，用于胶囊和/或其他类型药丸的泡罩包装，药瓶，注射器，可挤压瓶和可挤压管。附件12可以被配置为检测附件到分配器的附接，检测附件从分配器的移除，检测分配器的使用以便确定何时从分配器分配消耗品，和/或在按照预定时间表来自分配器的消耗品时间到时向人22提供通知。

[0052] 附件12可以被配置为将与消耗品的分配有关的数据提供给外部设备，例如接口20。可以通过网络16，例如互联网、云、局域网(LAN)等，借助无线网桥14使用无线通信，例如Bluetooth、WiFi等，将数据从附件12发送到接口20。但如本领域技术人员会意识到的，如果附件12被配置为使用有线连接代替无线连接，通过网络16通信，系统10就不必包括无线网桥14。从附件12传送到接口20的数据可以可任选的以存储在存储器10并从其发送的数据来补充，例如人22的健康记录数据(例如人22的完整电子健康记录(EHR)、人名、人的年龄、人

的医疗记录号、人22服用的任何药物或其他消耗品、人22的保健提供者的身份、人22的医疗诊断、由附件12在前发送的人22的数据、人22的地理家庭地址等)和环境数据(其可以有助于分析哮喘和其他呼吸疾病的数据),例如天气数据、交通数据、灰尘数据和花粉数据。类似地,发送到存储器18的数据可以存储在其中,以便与已经存储在存储器18中的记录相关联,例如添加到存储在存储器18中的人的EHR的由附件12收集的数据。接口20可以被配置为分析从附件12接收的数据,并可以被配置为在用户界面(未示出)上提供接收的数据和/或分析的结果,用于由一个或多个用户回顾,例如人22和与人22相关的用户24,例如人22的家庭成员,人22的朋友,或者人22的医疗保健提供者(医生、护士、临床试验指导者等)。在示例性实施例中,可以基于访问接口20的用户的身份定制用户界面。

[0053] 任意的各种用户都可以从任意各种地点访问、交互、控制等用户界面。例如,如图2中所示的实施例中所示的,可以从在任意数量的地点的任意数量的客户站102通过网络100(例如借助云计算通过互联网)访问用户界面,地点例如医疗机构104(例如医院、手术室(OR)、护士站、医疗设备分发机构、医疗设备公司、医院的消毒、记录或收费部门等)、家庭基站106(例如人的家庭或办公室、外科医生的家庭或办公室等)、移动地点108等等。客户站102可以通过到网络100的有线和/或无线连接访问用户界面,以使得用户界面显示在其显示器屏幕上,例如LCD(液晶显示器)、ePaper、触摸屏等。在示例性实施例中,至少一些客户站102可以无线地访问用户界面,例如通过WiFi连接,其可以有利于从几乎世界上任何地点访问用户界面。可以使用诸如802.11的现有协议或专有协议,例如对于特定使用比现有协议更多地优化了功率、数据和范围的协议,无线地发送数据。如图2所示的,医疗机构104包括平板电脑和计算机触摸屏形式的客户站102,家庭基站106包括具有触摸屏的移动电话和台式计算机形式的客户站102,移动地点108包括平板电脑和移动电话形式的客户站102,但医疗机构104、家庭基站106和移动地点108可以包括任意数量和任意类型的客户站。在示例性实施例中,可以经由网络地址和/或客户应用(本文也称为“app”)由接口访问用户界面。

[0054] 会意识到,可以使用一个或多个安全特征访问用户界面,以便可以基于用户的身份和/或用户访问用户界面的地点确定用户界面对于任何特定用户可访问的方面。为此,每一个用户都可以具有唯一用户名、密码和/或其他安全证书以便于访问用户界面。可以针对授权用户的数据库检查接收的安全参数信息,以确定是否授权用户及允许用户与用户界面交互、查看存储的信息到何种程度,等等。可以允许访问用户界面的用户的示例包括患者、潜在的患者、重要他人、朋友和患者或潜在患者的家庭成员、外科技师、成像技师(例如x射线技师、MRI技师等)、外科医生、护士、医院管理者、外科设备制造商雇员、保险提供者和手术室指导者。

[0055] 本文公开的设备、系统和分发可以使用一个或多个计算机系统来实施,其如上所述本文也称为接口和客户站。

[0056] 图3示出了计算机系统200的一个示例性实施例。如所示实施例所示的,计算机系统200可以包括一个或多个处理器202,其可以控制计算机系统200的操作。处理器202可以包括任意类型的微处理器或中央处理单元(CPU),包括可编程通用或专用微处理器和/或任意各种专有或可在市场上购买的单或多处理器系统。计算机系统200还可以包括一个或多个存储器204,其可以为要由处理器执行的代码或者为从一个或多个用户、储存设备和/或数据库获取的数据提供暂时储存。存储器204可以包括只读存储器(ROM)、闪存、一种或多种

随机存取存储器(RAM)(例如静态RAM(SRAM)、动态RAM(DRAM)或同步DRAM(SDRAM))和/或存储器技术的组合。

[0057] 计算机系统200的多个元件可以耦合到总线系统212。所示的总线系统212是抽象的,表示由适当桥接、适配器和/或控制器连接的任意一条或多条分离的物理总线、通信线/接口、和/或多点或点对点连接。计算机系统200还可以包括一个或多个网络接口206、一个或多个输入/输出(I/O)接口208及一个或多个储存设备210。

[0058] 网络接口206可以使得计算机系统200能够通过网络与远程设备通信,例如其他计算机系统,并可以例如是远程台式机连接接口、以太网适配器和/或其他局域网(LAN)适配器。I/O接口208可以包括一个或多个接口组件,用以将计算机系统200与其他电子设备连接。例如,I/O接口208可以包括高速数据端口,例如通用串行总线(USB)端口、1394端口、Wi-Fi、Bluetooth等。另外,用户可以访问计算机系统200,因而I/O接口208可以包括显示器屏幕、扬声器、键盘、指示设备和/或多个其他视频、音频或字母数字接口。储存设备210可以包括任意常规单元和介质,用于以非易失性和/或非瞬时性方式存储数据。储存设备210因而可以以持久状态保存数据和/或指令,即尽管到计算机系统100的供电中断也可以保留数值。储存设备210可以包括一个或多个硬盘驱动器、闪存驱动器、USB驱动器、光驱动器、各种介质卡、磁盘、光盘和/或其任意组合,并可以直接连接到计算机系统200或者远程连接到其,例如通过网络。在示例性实施例中,储存设备可以包括实体或非暂时性计算机可读介质,被配置为存储数据,例如硬盘驱动器、闪存驱动器、USB驱动器、光驱动器、介质卡、磁盘、光盘等。

[0059] 图3中所示的元件可以是单一物理机的部分或全部元件。另外,并非全部所示的元件都需要位于相同的物理机上或中。示例性计算机系统包括常规台式机、工作站、微计算机、笔记本电脑、平板电脑、个人数字助理(PDA)、移动电话等。

[0060] 计算机系统200可以包括网络浏览器,用于取回网页或其他标记语言流,呈现这些页面和/或流(视觉地、听觉地或其他方式)、执行这些页面/流上的脚本、控制或其他代码、接受用户相对于这些页面/流的输入(例如为了完成输入字段)、相对于这些页面/流发出超文本传输协议(HTTP)请求或其他的(例如用于向服务器提交来自完成的输入字段的信息)等等。网页或其他标记语言可以是超文本标记语言(HTML)或其他常规形式,包括嵌入的可扩展标记语言(XML)、脚本、控制等等。计算机系统200还可以包括网络服务器,用于产生和/或传递网页到客户计算机系统。

[0061] 在示例性实施例中,计算机系统200可以作为单一单元来提供,例如作为单一服务器、作为包含在单一外壳中的单一塔等。本文公开的系统和方法因而可以作为单一单元提供,被配置为提供各种模块、显示各种用户界面和捕获本文所述的数据。单一单元可以模块化,以使得其各个方面可以按照需要换入和换出,例如用于升级、替换、维护等,不必中断系统的任何其他方面的功能。单一单元因而还可以借助作为希望的和/或改进的现有模块的附加模块和/或附加功能要添加的能力扩展。

[0062] 尽管本文所述的一些实施例在网页的语境中,但会意识到,在其他实施例中,一个或多个所述功能可以在不使用网页的情况下和/或由除了网络浏览器软件以外的其他的来执行。计算机系统还可以包括任意各种其他软件和/或硬件组件,包括例如操作系统和数据库管理系统。尽管本文示出并说明了示例性计算机系统,但会意识到,这是为了普遍性和方

便。在其他实施例中，计算机系统可以在架构和操作上与本文所示的和所述的不同。

[0063] 再次参考图1的系统10，无线网桥14可以具有各种尺寸、形状和结构。无线网桥14可以包括基站38和路由器40，如所示实施例中的。但本领域技术人员会意识到，无线网桥14可以包括这些和/或其他组件，以便于电子通信，类似于以上相关于网络接口32所述的。如上所述的基站38和/或路由器40可以作为附件12的部分包含或者可以远程设置，例如在患者的家、患者的学校、患者的办公室、患者的医生的办公室、患者的日托中心等。附件12可以被配置为仅与一个基站38通信，或者与多个预先批准或预先注册的基站38通信，这可以有助于确保与患者22有关的数据不发送到未授权区域。在2013年6月25日提交的题为“Devices,Systems,And Methods For Adherence Monitoring And Patient Interaction”的国际申请No.PCT/US13/047507(国际公开No.WO 2014/004437)中进一步论述了无线网桥的实施例，其借以通过参考整体上并入本文。

[0064] 如上所述，任意各种用户都可以访问、交互、控制等用户界面，可任选地为一类特定用户定制用户界面，例如任意一个或多个的用户与人22的关系(例如患者、患者的家庭成员。患者的保健提供者等)、用户的性别和用户的年龄。用户界面可以提供与系统的任意一个或多个方面有关的数据，包括附件、与附件相关的消耗品和与消耗品相关的人。除了将数据提供给用户以外，用户界面可以被配置为接受用户输入，例如经由I/O设备，由用户输入的数据可以存储在任意一个或多个存储器中。例如，用户界面可以被配置为响应于有助于解释任何异常情况的关于消耗品给与的提问提示用户输入数据，例如询问当给与急救药物是患者在做什么或感受到什么的提问(例如运动、睡觉、上课、遭受过敏反应等)等，询问为何错过消耗品服药的提问等。附件的处理器和/或远离附件的处理器可以被配置为分析输入回答，以便“学习”患者行为，并将“学习”的行为包含到例如关于患者的治疗计划和患者将来行为的预测的建议中。系统可以被配置为使用来自附件的数据产生并提供报告，其提供分析的结果，这可以有助于人22和/或一个或多个人的保健提供者(例如医生、家庭成员等)评估人的消耗品使用，有利于针对人的特定历史定制的提问的形成，和/或有利于人的消耗品使用与临床趋势的比较。在前述国际申请No.PCT/US13/047507中更详细说明了可以被配置为与包括附件的系统一起使用的用户界面的实施例。

[0065] 系统10作为整体可以与一个或多个外部设备集成，例如肺功能设备/峰流表。由外部设备提供的数据可以与由系统10收集的数据，例如由附接到消耗品分配器的附件12收集的数据，组合以提供人的状况的更全面的描述，执行另外的分析等等。

[0066] 附件12可以具有各种尺寸、形状和结构。通常，附件12可以是机械的，例如物理组件，包括机器和/或电元件。附件12可以被配置为可移除且可替换地附接到分配器，以便允许附件12附接到人的现有分配器和/或从空的分配器移除，并附接到另一个分配器。附件的示例包括盖子，被配置为附接到分配器的末端，带或条，被配置为至少部分地缠绕分配器，和盒子，被配置为附接到分配器的表面。如上所述，作为替代，附件12可以整体附接到分配器，例如借助在顾客接收分配器之前在分配器的制造过程中与之整体形成。

[0067] 附件12可以包括任意一个或多个启动部件26、传感器28、执行器30、网络接口32、处理器34和电源36。启动部件26、传感器28、执行器30、网络接口32、处理器34和电源36的每一个都可以具有各种尺寸、形状和结构。

[0068] 启动部件26可以被配置为在从分配器分配消耗品时启动，在一些实施例中，启动

部件26可以被配置为在分配消耗品时自动启动。换句话说，按照其普通方式分配的消耗品可以启动启动部件26，以使得分配器的用户不必执行任何特定动作以启动启动部件26。启动部件26因而可以集成到分配器的功能中，这有助于附件12收集关于消耗品的数据，如下进一步论述的。例如，启动部件26可以位于呼吸吸入器的末端，可以被配置为由用户下推以下推药罐并从呼吸器释放定量剂量的呼吸药物，以使得即使没有附接于其的附件12，药罐都可以被配置为由用户下推以从呼吸器释放定量剂量的呼吸药物。启动部件26因而可以被配置为当分配呼吸药物时移动。

[0069] 启动部件26可以包括可按压部件。例如，可按压部件可以包括按钮，例如按钮开关，但可按压部件可以是另一种形式，例如可按压开关或力敏电阻器。推压附件12，例如推动吸入器以从其释放消耗品，可以自动启动启动部件26，并导致释放消耗品。

[0070] 启动部件26的另一个示例包括动敏部件，例如运动传感器，被配置为感测附件12的运动。例如，动敏部件可以位于呼吸吸入器(例如哮喘吸入器)的末端，并可以被配置为由用户移动以移动吸入器的药罐而从吸入器释放定量剂量的呼吸药物，以使得即使没有附接于其的附件12，药罐都可以被配置为由用户移动以从呼吸器释放定量剂量的呼吸药物，以致于当下推附件12时动敏部件可以感测运动。对于另一个示例，第一动敏部件可以位于呼吸吸入器(例如哮喘吸入器)的外部塑料容器上，第二动敏部件可以位于至少部分由外部塑料容器包围的药罐上，并在分配药物时可以相对于其移动。由两个动敏部件检测的运动的差异可以指示分配消耗品。对于另一个示例，第一动敏部件可以在第一位置耦合到消耗品分配器，第二动敏部件可以在第二不同位置耦合到消耗品分配器。两个动敏部件可以被配置为感测分配器的不同区域的运动，它们可以共同提供感测数据，指示分配了消耗品，例如由耦合到瓶盖的第一动敏部件感测的运动和由耦合到瓶盖可释放地附接的瓶子主体的第二动敏部件感测的运动。

[0071] 在启动启动部件26时，从而指示分配了消耗品，启动部件26被配置为启动或“唤醒”处理器34。启动部件26因而可以被配置为触发由处理器34收集的数据。启动部件26可以被配置为以各种方式“唤醒”处理器34，如本领域技术人员会想到的，例如借助启动部件26被配置为致使启动信号发送到处理器34。启动信号可以使得处理器34执行结合消耗品分配的一个或多个功能。例如，启动部件26可以被配置为当启动部件26处于按下位置时使得电路闭合。当启动部件26处于非按下位置时电路可以相应地断开。电路的闭合可以使得启动信号被发送到处理器34和/或闭合处理器34内的电路。

[0072] 启动部件26的启动足以使得处理器34执行结合消耗品分配的功能。但在一些实施例中，处理器34可以被配置为响应于仅基于分配消耗品的二次确定而接收启动信号来执行结合消耗品分配的功能。换句话说，处理器34可以被配置为检查错误判断。传感器28可以被配置为有助于二次确定。例如当分配器在背包或其他袋子中，并相对于袋子的一侧震动以致于无意地移动启动部件26(例如部分地按下启动部件26，推挤启动部件26以致于记录了动力学运动等)，即使实际上没有分配消耗品，也启动或“唤醒”处理器34时，传感器28可以帮助消除错误判断。

[0073] 传感器28可以具有各种尺寸、形状和结构。传感器28可以被配置为感测表示从分配器分配消耗品的至少一个条件。传感器28可以被配置为将关于其感测的参数的数据发送到处理器34，处理器34可以被配置为分析接收的感测数据，以帮助确定是否从分配器分配

消耗品。通常，处理器34可以被配置为确定感测的参数是否高于或低于感测的参数的预定阈值量，并基于该确定推断感测的参数是否指示分配了消耗品。

[0074] 附件12可以包括任意数量的传感器28。如果附件12包括多个传感器28，传感器28就可以被配置为感测至少两个不同参数，以便提供多个不同因素来帮助处理器对是否分配了消耗品的二次确定。例如，附件12可以包括压力传感器和运动传感器。可替换地，如果附件12包括多个传感器28，每一个传感器28都可以被配置为感测相同的参数，以便提供参数的多个测量值，它们可以相互比较以评估是否分配了消耗品。例如，附件12可以包括多个运动传感器。

[0075] 传感器28可以被配置为连续感测数据，或者传感器28可以被配置为基于启动部件26的启动零星地感测数据。传感器28连续感测数据可以帮助确保每一次处理器34由启动部件26启动时传感器28具有足够的数据可用。连续感测数据可以帮助处理器34随着时间的过去“学习”分配器、附件12和/或消耗品的周围环境条件，这可以帮助处理器34更好地区分错误判断于分配消耗品的真实实例。传感器28可以被配置为借助由处理器34触发开始感测而零星地感测数据。处理器34可以被配置为当处理器34由启动部件26启动时提供这个触发。零星地感测数据消耗的功率少于连续感测数据，这可以帮助延长附件12的寿命。

[0076] 传感器28的示例包括运动传感器、PH传感器、温度传感器、压力传感器、音频传感器、气压传感器和地理位置传感器。在前述国际申请No.PCT/US13/047507中说明了传感器28的多个实施例。通常，运动传感器(例如加速度计、陀螺仪、磁场传感器等)可以被配置为感测附件12的运动(例如移动、冲击、振动、定向等)，PH传感器可以被配置为感测在从分配器分配消耗品的位置的PH，温度传感器可以被配置为感测温度和/或湿度的变化，例如分配器的温度和/或湿度的变化，压力传感器可以被配置为感测施加于其上的重力或压力，音频传感器(例如话筒等)可以被配置为感测消耗品分配的声音，地理位置传感器(例如全球定位系统(GPS)传感器等)可以被配置为感测地理位置。

[0077] 在一些实施例中，外部设备(例如智能电话等)可以包括地理位置传感器，其可以提供地理位置信息，该信息可以结合由附件的传感器28感测的数据来帮助处理器34确定是否从附件耦合到的分配器分配了消耗品。例如，如果从附件12的运动传感器感测的动力学运动指示表示消耗品分配的运动，来自外部设备的地理位置信息指示人22通常分配消耗品的预定位置(例如人的家，就餐地点，例如人的处方，人的学校自助食堂、饭馆等)，那么处理器34就可以被配置为确定分配了消耗品。相反，如果来自外部设备的地理位置信息指示通常不分配消耗品的预定位置(例如高速公路，地铁线路等)，处理器34就可以被配置为确定尽管运动数据指示可以表示分配消耗品的运动，但没有分配消耗品，例如由于分配器在运输过程中被挤压。

[0078] 在一些实施例中，附件的传感器28可以包括压力传感器，其可以在重力或压力施加到分配器以分配消耗品的位置附接到消耗品分配器。换句话说，施加以分配消耗品的重力或压力也施加到压力传感器。如果压力传感器感测的重力或压力高于重力或压力的预定阈值量，处理器(例如附件上机载的处理器34和/或与附件通信的远程处理器)可以被配置为确定从耦合到毒箭的分配器分配了消耗品，因为施加到压力传感器上的重力或压力增大到足以指示分配了消耗品，例如下推药罐以便分配消耗品。重力或压力的预定阈值量可以基于分配器而改变，因为不同分配器需要不同量的用户导致的运动以从分配器分配消耗

品。对于附件的压力传感器的一个示例，压力传感器可以位于包含呼吸药物的药罐的底部，下推药罐以从其分配消耗品，从而在布置在药罐下面的压力传感器上施加压力。压力传感器的这个位置在图21的实施例中示出，下面将进一步论述，其中，包括压力传感器的附件1306位于罐1302的底部。对于附件的压力传感器的另一个示例，压力传感器可以位于药瓶的盖子上，例如在其内表面上，可以被配置为当从瓶子移除盖子时，例如拧开盖子，打开盖子等，从瓶子移除。从瓶子移除盖子可以释放由瓶子施加到盖子上的压力。在其他实施例中，附件的压力传感器可以位于药瓶上，代替在盖子上，以使得盖子从瓶子的移除可以释放从而施加在压力传感器上的压力。

[0079] 对于附件的压力传感器的另一个示例，压力传感器可以位于在不使用分配器时消耗品分配器通常搁在桌子、架子或其他表面上的部分。当搁在表面上时，重力或压力会连续施加到压力传感器。如压力传感器感测的重力或压力减小了预定阈值量的重力或压力，处理器(例如附件机载的处理器34和/或与附件通信的远程处理器)就可以被配置为确定分配了消耗品，因为去除了由表面施加到压力传感器上的重力或压力，例如从附件耦合到其底部的、在不使用瓶子时通常搁在表面上的药瓶中去除了一个或多个药丸。重力或压力的预定阈值量可以基于分配器而改变，因为不同消耗品可以具有不同重力，且因为不同处方会需要一次分配不同量的消耗品。这个位置例如在图19的实施例中示出，下面会进一步论述，其中，附件1100包括位于盖子1104的压力传感器，在不使用管子1102时，管子1102通常搁在盖子1104上。

[0080] 在一些实施例中，传感器28可以相邻于分配器的开口布置，通过开口分配消耗品。可以由传感器28检测与开口相邻的状况的变化，从而指示分配了消耗品。例如，传感器28可以相邻于消耗品分配器的出入口布置，例如呼吸吸入器的出入口，消耗品可以通过出入口离开分配器以便被分配。在示例性实施例中，传感器28可以布置在分配器内的通道内，消耗品在离开分配器之前通过该通道。因而保护传感器28免于暴露于分配器外而受到无意的损坏和/或不太可能检测的到分配器外的周围环境条件，其会导致分配消耗品的错误判断的记录。这个位置例如在图22的实施例中示出，下面将进一步论述，其中，附件1400相邻于消耗品通道1406内的出入口1402设置。

[0081] 被配置为感测表示从分配器分配了消耗品的至少一个条件的传感器的一个示例是气压传感器。在从分配器分配消耗品时，一些类型的消耗品可以导致相邻于消耗品离开分配器的区域的气压暂时变化。气压传感器可以相邻于消耗品离开区域而设置，以使得在从分配器分配消耗品时消耗品借以和/或由此通过。例如通过药物分配器的出入口给与的呼吸药物可以导致从其分配药物时在出入口的气压暂时变化，例如增大。气压传感器因而可以相邻于出入口设置。这个位置例如在图22的实施例中示出，其中，附件1400相邻于消耗品通道1406内的出入口1402设置。

[0082] 如果由气压传感器感测的气压在预定气压范围外，高于预定气压温度，和/或变化大于预定阈值量，处理器(例如附件机载的处理器34和/或与附件通信的远程处理器)就可以被配置为确定从附件耦合到的分配器分配了消耗品，因为改变的气压足以指示分配了消耗品。例如，从吸入器分配的至少一些呼吸药物可以导致分配器出入口内的气压暂时变化，例如气压增大。气压传感器因而可以有利于确定从分配器分配了药物。对于另一个示例，一些消耗品分配器是加压的，例如呼吸吸入器的罐子，在受损时气压变化，例如如果罐子破裂

或者打破，气压减小。气压传感器可以通过检测气压中的减小而有利于确定分配器受损，因为这个减小通常仅表示错误，例如分配器受损。

[0083] 被配置为感测表示从分配器分配了消耗品的至少一个条件的传感器的另一个示例是温度传感器。在从分配器分配消耗品时，一些类型的消耗品可以导致相邻于消耗品离开分配器的区域的温度暂时变化。温度传感器可以相邻于消耗品离开区域设置，以使得在从分配器分配消耗品时消耗品借以和/或由此通过。类似于以上相关于气压传感器所述的，如果由温度传感器感测的温度改变大于预定阈值量，处理器就可以被配置为确定从附件耦合到的分配器分配了消耗品，因为改变的温度足以指示分配了消耗品和/或诸如分配器受损的错误发生。例如，在从其分配药物时通过药物分配器的出入口给与的呼吸药物可以导致相邻于出入口的温度在出入口暂时变化，例如减小。温度传感器因而可以相邻于出入口设置，这个位置例如在图22的实施例中示出，其中，附件1400相邻于消耗品通道1406内的出入口1402设置。

[0084] 在一些实施例中，被配置为感测表示从分配器分配了消耗品的至少一个条件的传感器可以包括运动传感器。附件的动力学运动中的变化，及因此的附件附接的分配器的动力学运动中的变化，可以指示从分配器分配了消耗品。例如，运动传感器附接到药盒，且运动传感器感测盒子倾斜了，与运动传感器通信的处理器(例如附件机载的和/或外接于附件设置的)就可以推断从药盒分配了消耗品。另外，如本文论述的，处理器可以被配置为考虑一个或多个附加数据，其可以用于进一步确认或反驳分配了消耗品，例如来自附接到药盒的第二传感器的信息。运动传感器可以被配置为全方向的，例如感测每一个方向上的运动。在示例性实施例中，运动传感器可以是三维的，例如感测三个方向上的运动，例如沿x、y和z轴。如果由运动传感器感测运动高于运动的预定阈值量，处理器(例如附件机载的和/或外接于附件设置的)就可以被配置为确定分配了消耗品，因为包括传感器的附件的移动足以导致从附件附接的分配器分配消耗品。运动的预定阈值量可以基于分配器而改变，因为不同分配器会需要不同量的用户导致的运动以从分配器分配消耗品。包括运动传感器的附件例如在图14－20和23－26的实施例中示出，下面会进一步论述。

[0085] 在一些实施例中，运动传感器可以被配置为感测运动(例如倾斜、摇动、旋转、摇晃等)并感测定向。如果运动传感器被配置为感测定向，处理器(例如附件机载的和/或外接于附件设置的)就可以被配置为确定感测的定向是否匹配表示分配器的消耗品分配位置的预定定向。例如，在分配药物时，通常在竖直位置握住呼吸吸入器以便手舒服地握住分配器，分配器的出入口在人的嘴部。感测到这个定向的运动传感器因而可以表示分配了消耗品。在一些实施例中，在至少预定的最小时间量中感测到这个定向的运动传感器可以表示分配了消耗品，而在少于预定的最小时间量中感测到这个定向的运动传感器可以不考虑，因为不表示分配了消耗品，例如由于分配器在放入人的钱包中时仅短暂的处于该定向。对于另一个示例，感测的一类运动可以表示是否分配了消耗品，例如小振动通常不表示分配，但感测的对应于升高分配器，随后倾斜分配器，随后将分配器放回其原始位置的运动通常指示分配。

[0086] 在一些实施例中，运动传感器可以位于消耗品分配器的外表面上，例如可以缠绕分配器的外表面的条或带。包括运动传感器的附件因而可以是对现有消耗品分配器的改型，无需分配器的任何修改(除了附件到其的简单附接)。

[0087] 在一些实施例中，运动传感器可以作为被配置为附接到消耗品分配器的条或带的部分而包含，条或带可以被配置为感测一个或多个环境因素(例如温度、湿度、振动、一天的时间等)。感测的关于一个或多个环境因素的数据可以用于帮助确定由运动传感器检测的运动是否实际表示从分配器分配了消耗品。

[0088] 执行器30可具有各种尺寸、形状和结构。执行器30可以被配置为向用户，例如向人22、人22的保健提供者等，指示出现预定条件。预定条件可以反映需要用户的动作，例如患者22使用消耗品(例如服用药丸、涂抹药膏、服用一剂药物等)，由于其中剩余大量消耗品而替换分配器，或者由于其中没有剩余消耗品而替换分配器。预定条件可以在无任何用户动作的情况下出现，例如没有服用预定剂量的消耗品，将数据从附件12发送到无线网桥14。处理器34可以被配置为响应于处理器34检测到预定条件的出现而启动一个或多个执行器30，如下进一步论述的。执行器30的示例包括被配置为照明的灯(例如LED、荧光材料等)，被配置为输出可听见的声音的扬声器，被配置为振动以便引起附件12和/或分配器的可触知的和/或可听见的振动的振动元件，被配置为暂时加热和/或冷却以便引起附件12和/或分配器温度中可触知的变化的变温元件，和被配置为向用户显示作为消息的文本和/或图像的显示器屏幕。如果执行器30包括灯，附件12就可以包括在被配置为使得从附件12的所有有利位置都可以见到灯的位置的执行器30。例如，执行器30可以包括多个灯，布置在附件12的整个周边周围，例如等距离地围绕周边布置。

[0089] 附件12可以包括任意数量的执行器30，例如0、1、2、3等。如果附件12包括多个执行器30，在示例性实施例中，每一个执行器30都可以被配置为提供与至少一个其他执行器30不同类型的通知，例如多个执行器30包括至少一个灯和至少一个扬声器，以便允许附件12在消耗品时间到时提供多个不同通知，和/或基于不同类型预定条件提供不同类型的通知，用于消耗品时间到的第一颜色的灯和一个振动元件，用于分配器中消耗品快用完的第二颜色的灯，和用于分配器中消耗品耗尽的第二颜色的闪烁灯，在遗漏服药时的闪烁灯，和将例如电子邮件、文本消息或电话(其可以是现场电话或者自动电话，可以包括留下语音邮件或其他记录的消息)的通知发送到远离分配器的位置，指示遗漏了服药等。

[0090] 代替或除了借助在分配器的执行器30提供通知，附件12可以被配置为导致通知发送到远离分配器的位置。提供远程通知可以有利于人22的监管和/或人的治疗计划的管理，例如，如果人22是儿童，在出现特定事件时通知与人22相关的用户24是有益的，以帮助使得用户24获知人的状况，因而用户24可以实时和/或稍后采取任何适当的措施。

[0091] 对于另一个示例，如果消耗品的服药时间到，处理器34可以被配置为导致经由在分配器的执行器30将第一通知提供给人22，并导致将第二通知提供给用户24，他可以在远离人22的位置。用户24随后可以决定是否独立地联系人22作为辅助提醒来服用消耗品。

[0092] 对于再另一个示例，如果处理器34确定在人的预定时间表之外分配了消耗品，处理器34就可以被配置为导致诸如电子邮件、文本消息或电话的通知提供给用户24，假定消耗品的这个非典型使用的情况下，他可以是人的保健提供者或者能够联系人的保健提供者，如人的父母或监护人。如果检测到多个计划外服用，人的保健提供者就可以选择联系人22(或者如果人22是儿童，就联系人22的成人联系人)以讨论对人的健康和/或对人的治疗计划的可能的变化。

[0093] 对于再另一个示例，如果处理器34确定消耗品快用完，处理器34就可以被配置为

导致诸如电子邮件、文本消息或电话的通知提供给用户24，例如人的医生或药剂师，他可以在患者的当前消耗品用完之前开始为人22处理新的消耗品供应。

[0094] 对于另一个示例，如果在指示消耗品预定服药时间到的通知提供之后的预定时间期间内没有分配消耗品，处理器34就可以被配置为导致将遗漏服药通知保存在附件的存储器中，无线网桥14可以被配置为将存储的遗漏服药通知无线地发送到外部设备，例如数据库18。遗漏服药通知可以作为在用户界面上提供的遵守度数据和/或鼓励数据的部分而被包含，下面进一步论述。外部设备，例如接口20，可以被配置为在处理器34没有提供其任何通知的情况下确定遗漏服药，例如借助外部设备被配置为检测没有进行预期的服药的通知，例如在外部设备没有从附件20接收到在时间表中的日期/时间分配消耗品的通知。

[0095] 在一些实例中，人22可以具有多个消耗品分配器，每一个分配器都具有包含于其中的相同消耗品。例如，人22可以具有相同消耗品的多个容器，每一个都保存在不同位置，例如家、办公室、汽车等，以便在需要使用消耗品时易于获得。多个消耗品分配器的每一个都可以具有耦合到其的附件。每一个附件都可以作为彼此的复制品归类的系统10中，以便与人22相关的关联在一起，用于特定消耗品，例如用于特定处方药物。因而，当按照预定服药时间表消耗品服药时间到时，可能不从包含消耗品的每一个分配器分配该剂药。反而可能仅从一个分配器分配该剂药，或者如果遗漏服药，没有一个分配器分配。如果具有耦合到其的“复制的”附件的任意一个分配器分配预定剂量，就可以认为按照时间表使用了该剂药。如果没有一个具有耦合到其的“复制的”附件的分配器分配预定剂量，就可以认为遗漏了服药。系统10因而不太可能记录遗漏的服药的错误实例和/或在实际上分配了该剂药时，不太可能向人22和/或其他人发送遗漏服药的通知。

[0096] 在一些实施例中，为了停止通知(例如停止灯闪烁，停止消耗品分配器振动等)，必须响应于触发通知的预定条件采取预定动作。以此方式，特定用户动作更可能在短时间内发生。例如如果预定条件包括消耗品的服药时间到，通知就可以被配置为被提供(例如灯连续亮灭闪烁，声音响起和停止，灯连续发光等)，直到检测到消耗品的分配。在一些实施例中，在从首次提供通知开始的预定时间量中没有采取预定动作的情况下，通知可以被配置为在预定时间量后停止，这可以有助于省电(例如无需不断点亮灯等)和/或可以补偿人22当前不可能服用消耗品的情形。

[0097] 处理器34可以被配置为控制附件12的一个或多个组件。处理器34可以具有各种尺寸、形状和结构，如上所述的。所示实施例中的处理器34显示为微控制器，但处理器34可以包括任意各种元件，如上所述的。如本领域技术人员会意识到的，处理器34可以包括定时器，被配置为计时和/或存储器，被配置为存储数据。可替换地，定时器和/或存储器可以作为附件12的部分而被包含，但是处理器34的外部组件。

[0098] 处理器34可以被配置为导致收集的数据存储在存储器这，并导致存储的数据发送到外部设备，例如经由无线网桥14跳过网络16无线发送到接口20和/或存储器18。所示实施例中的存储器18包括数据库，但如上所述的，存储器18可以包括任意一个或多个存储器技术。所示实施例中的接口20包括分布式计算机系统形式中的客户站(例如电话、计算机等)，但接口20可以包括任意形式的客户站。

[0099] 处理器34可以被配置为响应于预定条件的出现，和/或响应于从外部设备到处理器34的数据请求信号，按照预定发送时间表将存储的数据发送到接口20和/或存储器18，例

如存储在存储器站并使用定时器跟踪时间的时间表。处理器34可以被配置为响应于已经发送了数据而从存储器中删除发送的数据，这有助于新数据的自由空间，处理器34可以被配置为按照有规律的删除时间表删除发送的数据(例如在每小时开始，一天结束，一周结束，一天两次等)，或者处理器34可以被配置为按照储存空间的需要删除发送的数据。处理器34可以被配置为保存全部数据，直至将数据发送到外部设备，这有助于避免数据丢失。处理器34可以被配置为将存储在存储器中的数据标记为已经发送到外部设备，这有利于清空附件的存储器和/或有助于确保不必不必要地将数据重复发送到外部设备。

[0100] 可以由处理器34接收并存储各类数据。例如，可以接收并存储传感器28感测的数据。对于另一个示例，可以存储关于预定条件出现的数据。预定条件的示例包括消耗品被分配(例如，借助启动部件26的启动而触发的和/或由来自传感器28的数据确认的)，电源36电力低，电源36耗尽，没有按照预定时间表分配消耗品，和设备组件故障。处理器34因此可以被配置为接收、存储并发送患者的消耗品使用和分配器的功能状况及附件12的功能状况的相对完整的描述。由处理器34发送的数据可以由接口20分析和/或在其上查看，如下进一步论述的。

[0101] 处理器34可以被配置为保存从分配器分配的消耗品的总量的流水帐。以此方式，充其量34可以被配置为确定何时分配器的消耗品快用完和/或何时已经从分配器分配了全部消耗品。例如，一些类型的分配器，例如呼吸吸入器，可以被配置为每次从其分配药物时就分配预定量的药物。处理器34可以被配置为每次确定从分配器分配了消耗品时，通过将预定值增加到以前记录的总量，保存从分配器分配的消耗品的总量的流水帐。对于另一个示例，附件12可以被配置为检测分配的消耗品的量，例如通过使用传感器28，并从在前存储的分配器中消耗品总量中扣除测量的量以得到分配器中消耗品当前的总量。

[0102] 处理器34可以被配置为当处理器确定分配器的消耗品快用完时和/或当从分配器分配了全部消耗品时，向用户提供警告。提供关于低/无消耗品剩余的警告可以有助于用户有效地管理消耗品的重新定货和替换。处理器34可以被配置为通过启动执行器30来提供警告。

[0103] 处理器34可以被配置为通过向执行器30发送信号来启动执行器。响应于来自处理器34的触发信号，执行器30可以被配置为向用户，例如患者22，提供可听见和/或可触知的信号，指示一个或多个预定条件。预定条件的一个示例是上述的低消耗品警告，预定条件的另一个示例是同样上述的消耗品耗尽警告。

[0104] 预定条件的另一个示例是当消耗品服药时间到时的通知。换句话说，附件12可以被配置为向用户，例如患者22，提供需要服用消耗品的通知以便遵守预定时间表。提供通知的附件12可以允许分配器自身在人的给药方案中发挥作用，这可以有助于减少对人22、人的家庭、人的医生等维护并监控外部通知系统的需要，例如手表警告，移动设备上的警告，给患者的电话，给患者移动电话的文本消息等。

[0105] 处理器34可以被配置为以各种方式确定消耗品的服药时间到。处理器34可以获得人22的预定时间表，例如存储在包含于附件12中的存储器中，或者存储在经由网络16可访问的外部存储器中，例如存储器18。如本领域技术人员会意识到的，预定时间表可以专门针对人22，按照由人22和/或人的医生或其他保健提供者确定的，或者预定时间表可以由消耗品的制造商规定。附件12可以被配置为例如借助存储器18自己记录何时购买和/或何时附

接到分配器，以便允许将预定时间表例如从存储器18发送到附件12。这个记录可以有利于识别“复制的”附件。附件12可以被配置为检测其与分配器的附接和拆卸，如下进一步论述的，这可以有利于附件12在附接到分配器时的记录。处理器34可以被配置为基于由定时器的计时，按照预定时间表确定何时消耗品时间到。附件12因而可以被配置为自包含的监控单元，能够向用户通知消耗品时间到应服用，不管附件相对于接口20和/或其他外部设备的位置如何。可替换地，或者另外，诸如接口20的外部设备可以被配置为以类似地方式为人22确定何时消耗品的服药时间到，并经由网络16将信号发送到附件12。信号可以使得执行器30启动。允许外部设备触发执行器30可以为处理器34提供备用功能，和/或可以帮助移动外接于附件12的处理资源，这可以帮助减少成本和/或帮助减小附件12的尺寸。

[0106] 预定条件的另一个示例是从附件12经由网络接口32发送数据。向用户提供发送数据的通知有助于解释附件12为何发出蜂音或者发出通常与分配器无关的噪声。类似地，另一个预定条件是经由网络接口32将数据发送到附件12，例如对附件12机载存储的患者预定时间表的更新。

[0107] 如上所述，预定条件可以包括电源36不足，从而指示附件12应该从分配器移除并用另一个附件替换。类似地，另一个预定条件是电源36耗尽可用电力。

[0108] 如上所述，预定条件可以包括附件12的任何组件的故障，例如传感器28或执行器30的故障，从而指示附件12应从分配器移除并用另一个附件替换。处理器34可以被配置为检测附件12的组件的故障，例如借助编程为有规律地查询组件，如本领域技术人员会意识到的，及基于从查询的组件的应答，包括是否接收到应答，确定组件是否适当运行。

[0109] 网络接口32可以被配置为有利于附件12与例如无线网桥14的一个或多个外部设备的电子通信。网络接口32可以具有各种尺寸、形状和结构，如上所述。尽管在所示实施例中将网络接口32示出为无线电设备的且与无线网桥14电子通信，但网络接口32可以是不同于无线电设备的组件，可以被配置为与无线网桥和/或任意数量的其他组件电子通信，以便于通过网络16通信。网络接口32可以被配置为使用使用专有、开源或网格协议的远距离、低频/低功率/低带宽无线电通信进行通信。

[0110] 电源36，例如一个或多个电池，一个或多个太阳能板，一个或多个压电元件，一个或多个感应充电功率元件等，可以具有各种尺寸、形状和结构。电源36可以被配置为向一个或多个附件的组件，例如传感器28、处理器34、无线网桥14、执行器30等供电。在一些实施例中，附件可以没有电源，代之以由外部电源供电，例如经由有线连接连接到附件的电源，或者被配置为在移动到附件附近时遥测供电的电源。在一些实施例中，附件可以包括机载电源，如图1所示的实施例中的，被配置为仅向一部分附件机载组件供电，附件可以被配置为具有由外部电源供电的另一部分附件的机载组件。以外部电源供电有助于减小附件的尺寸和/或为其他组件释放空间。

[0111] 在一些实施例中，电源36可以被配置为在第一状态与第二状态之间移动，在第一状态中，电源36向附件12的组件提供第一电量，在第二状态中，电源36向附件12的组件提供第二更大的电量。电源36因而可以被配置为当第二状态中提供的更大的电量对于附件12的适当运行是不必要的时，借助在第一状态中而省电。在前述国际申请No.PCT/US13/047507中更详细说明了被配置为在第一和第二状态之间移动的电源的实施例。

[0112] 在一些实施例中，附件12可以包括能量采集技术(太阳能、压电等)，被配置为增大

电源36的寿命，例如在电源36包括电池时增大电池的电池寿命。

[0113] 附件12可以包括外壳42，被配置为容纳启动部件26、传感器28、执行器30、网络接口32、处理器34、电源36和无线网桥14。附件12作为包括外壳42及容纳于其中的全部组件的单一单元可以被配置为可移除且可替换地附接到分配器，从而允许单一部件到分配器的简单附接，以便将附件12附接于其。附件12因而可以没有任何必需的用户组件，并易于由成人和至少年长的儿童附接到分配器。

[0114] 外壳42可以具有各种尺寸、形状和结构，可以由一种或多种材料形成。在示例性实施例中，外壳42可以由一种或多种聚合物形成(例如热塑性弹性体(TPE)、丙烯腈－丁二烯－苯乙烯(ABS)等)，并可以是无毒的。外壳42可以是刚性的，或者如所示实施例中的，具有一定程度的弹性，这可以有利于启动部件26的按压，如下进一步论述的。外壳42可以是透明的或者半透明的，以便允许通过其可以见到光，同样如下进一步论述的。外壳42可以是防水的，以便帮助保护容纳于其中的多个组件免受湿气损坏。外壳42可以是永久闭合的或密封的(例如在普通终端用户使用的条件下闭合或密封)，以便帮助防止对容纳于其中的多个组件的篡改和/或不利损坏。外壳42及因此的附件12可以被配置为一次性的，例如丢弃，或者重复利用的。在一些实施例中，附件可以不可移除地附接到分配器，在此情况下，附件可以被配置为与分配器一起处置。

[0115] 外壳42在所示实施例中示出为容纳全部启动部件26、传感器28、执行器30、网络接口32、处理器34、电源36和无线网桥14，但这些组件中的一个或多个可以布置在至少一个其他外壳中，其被配置为附接到分配器，类似于本文相关于外壳42所述的。例如，无线网桥14可以容纳在附件12的第二外壳(未示出)中，这可以有助于与电子通信有关的硬件和/或软件维修和/或升级，其基本上不影响附件12的操作。类似于本文相关于外壳42所述的可以制造、配置和使用第二外壳。

[0116] 附件12可以被配置为以各种方式附接到分配器。附件12可以包括附接机构，被配置为接合分配器且将附件12可移除及可替换地附接于此。附接机构的示例包括磁体，被配置为将附件12磁性附接到包括在分配器中的磁体或者金属材料，Velcro®，形成于附件中的空腔，被配置为以压配合围绕分配器的一部分安装，条或带，被配置为将附件12扎紧固定到分配器，条或带，被配置为将附件12弹性固定到分配器，类似于橡胶带，夹子，被配置为将附件12夹到分配器，和导轨，被配置为在其中滑动容纳一部分分配器。作为磁体的附接机构对于与可受压的分配器一起使用尤其有效，例如呼吸吸入器，其通常是金属容器。借助压配合附接到分配器的附接机构可以帮助防止附件12的分配器的附接错位，因为空腔被配置为借助压配合在一个位置附接到分配器，例如空腔被配置为仅容纳分配器的一个唯一的部分。附件12因而可以键连接到分配器，以便以相对于其的预定定向附接于此，如前述国际申请No.PCT/US13/047507中进一步论述的。附件12可以作为套件的部分被包括，套件包括多个不同尺寸和/或不同形状的部件(例如弹性环，刚性环等)，被配置为选择性地附接到附件12，以便于附件12到特点分配器的压配合。例如，尺寸和形状对应于呼吸吸入器的一端的圆形尺寸的一个部件可以以盖子的形式插入附件的空腔中，以便安置在形成于其中的凹槽中。部件可以被配置为当盖子附接于其时与吸入器构成压配合。是可调部件的附接机构，例如条或带，可以有利于附件12到不同尺寸和/或不规则形状的分配器的附接。在一些实施例中，可调部件可以被配置为动态调整为可调部件附接的分配器的尺寸和形状，例如借助是

弹性部件。在一些实施例中，可调部件可以被配置为手动调整以便牢固地附接到分配器，例如借助类似于具有钩子和释放机构的带子或滑动可调部件是可调的。

[0117] 附接机构可以允许附件12可替换且可移除地附接到分配器，无需由分配器的终端用户或设计者或制造商对分配器的任何修改以容纳附件12。以此方式，附件12可以与几乎任何消耗品分配器一起使用，不管分配器是否是为了与附件12一起使用而制造的。可以允许这种附接的附接机构的示例包括磁体、空腔和条或带。诸如磁体或Velcro®的其他附接机构会需要对分配器的修改以允许附件12附接到其，例如通过使用可自行粘贴粘合剂将磁体或Velcro®附接到分配器。

[0118] 附件12可移除且可替换地附接到消耗品分配器可以被配置为无论附件12是否附接到其都可以分配消耗品。消耗品分配器因而可以由人22使用，即使附件12出现非预期的错误，例如附件12偶尔破裂，人22偶尔忘记将附件12附接到新分配器等，人22不会由于附件错误而遗漏消耗品的任何所需服药。被配置为可替换且可移除地附接到消耗品分配器的附件12可以有利于这个分配器的保留功能。以下进一步论述的图4、7和14－26示出了被配置为耦合到无论附件是否附接到其都可以适当分配消耗品的消耗品分配器的附件的实施例。

[0119] 在一些实施例中，附件12可以包括夹持机构，被配置为有利于附接机构到消耗品分配器的附接。夹持机构可以被配置为当附接机构附接到分配器时变形，这可以帮助在附件12与分配器之间形成牢固的过盈，可以补偿不同尺寸的分配器和/或可以补偿附件12耦合到的不平坦分配器表面。例如，夹持机构可以包括突出部，从形成于附件12中的空腔径向向内延伸，并可以被配置为当分配器安置在空腔中时变形。对于另一个示例，夹持机构可以包括在被配置为接合分配器的外表面的条或带的内表面上质地粗糙的表面。

[0120] 附件可以耦合到的消耗品分配器可以包括物理服药计数器或其他服药计数机构，如本领域技术人员会意识到的。在一些实施例中，物理服药计数器或其他服药计数机构可以连接到或集成于附件。例如，物理服药计数器可以位于分配器的底部，附件可以连接到或集成于物理服药计数器或其他服药计数机构，以便同样位于分配器的底部。如果连接的或集成的附件被配置为可移除且可替换地耦合到分配器，就可以将物理服药计数器或其他服药计数机构移除并以附件替换。在一些实施例中，附件可以是与物理服药计数器或其他服药计数机构分离的元件。在此情况下，附件和物理服药计数器或其他服药计数机构可以位于相对于分配器相同的位置，例如都在其顶部，或者可以位于相对于分配器不同的位置，例如一个在分配器的顶部，一个在分配器的侧面。

[0121] 图4－6示出了附件302的一个实施例。附件302在图4和5中显示为可移除且可替换地附接到分配器304，并在图6中显示为没有附接到任何分配器的独立元件。图4和5的分配器304是呼吸吸入器，其包括外壳312和药罐314，可移除且可替换地安置在分配器外壳312内，并包含用于治疗呼吸疾病的药物，例如哮喘，但如上所述，附件可以被配置为附接到包含不同类型的消耗品的各种不同类型的分配器。

[0122] 附件302的外壳300可以是盖子，如在图4－6的所示实施例中的。盖子可以被配置为可移除且可替换地附接到一部分分配器304，例如包含消耗品的药罐314的末端，并被配置为由用户按压以从分配器分配消耗品。附件302因而可以被配置为被按下以导致从分配器304的出口306分配消耗品，类似于在附件304没有附接到其时如何从分配器304分配消耗品。附件302因而可以相对无缝的集成到人熟悉使用的分配器304中。附件302可以包括印刷

电路板(PCB)(未示出),其可以响应于附件302的按压而结合,以便于确定是否从分配器304分配了消耗品,如前述国际申请No.PCT/US13/047507中更详细说明的。通常,PCB可被耦合到附件机载的附件的处理器或PCB可以被配置为与至少一个外接组件合作,例如位于盖子外部的CPU控制存储器(CCS)模块。

[0123] 在所示实施例中,附件302的附接机构包括形成于外壳300中的空腔308。空腔308可以被配置为在其中容纳一部分分配器304,例如分配器304的末端部分。如所示实施例中的,空腔308可以被配置为仅可以附接到该一部分分配器304,这可以有助于确保附件302适当地附接到分配器304并一起使用,因为对于选择将附件302附接到分配器304何处的用户只有一个选项。

[0124] 外壳300可以包括在其上的符号310,例如印刷于其上,作为凹陷形成于其中(如所示实施例中的),作为突出部形成于其上,嵌入其中等。符号310可以包括任意一个或多个数字、字母字符和几何形状、标志及其他符号。尽管在所示实施例中仅示出了一个符号310,但外壳可以在其上包括任意数量的符号。符号310可以标识附件12的制造商,可以标识与附件12一起使用的特定消耗品或消耗品类型,和/或可以是装饰性的(例如,人的名字,人的缩写,卡通人物等)。在所示实施例中,符号310包括加号。前述国际申请No.PCT/US13/047507中进一步说明了用于附件的符号。

[0125] 图7－10示出了盖子形式的附件400的另一个实施例,被配置为可移除且可替换地附接到分配器。附件400在图7－9中显示为独立元件,没有附接到任何分配器,在图10中显示为可移除且可替换地附接到消耗品分配器的罐402。所示实施例中的罐402包含布置于其中的呼吸消耗品,例如呼吸药物,并被配置为安置在外壳(未示出)中,且相对于其移动以通过分配器外壳的出入口(未示出)分配消耗品,如本文所述的。但如上所述,附件400可以被配置为附接到包含不同类型消耗品的各种不同类型的分配器。

[0126] 如在该所示实施例中的,附件400可以包括远端部分404,本文也称为“远端底座”,和近端部分406,本文也称为“近端盖”。近端盖406可以被配置为相对于远端底座404移动,从而导致从分配器分配消耗品,并导致附件404检测分配器的使用,例如检测分配了消耗品。近端盖406和远端部分404每一个都可以具有各种尺寸、形状和结构。

[0127] 如该所示实施例中的,近端盖406可以包括盖子408和偏置元件410。盖子408可以具有各种尺寸、形状和结构。在该所示实施例中的,盖子408包括半球形元件。盖子408可以包括配对元件412,被配置为接合远端底座404的相应配对部件414,以便将近端盖406不可移除地配合到远端底座404。近端和远端部分406、404的这种永久固定可以有助于保护布置于附件400中的任何电子组件。在一些实施例中,近端盖404可以可移除且可替换的配合到远端底座404,这可以允许一个或多个附件的电子组件的替换,例如耗尽的电池的替换,烧坏的灯的替换等。

[0128] 如该所示实施例中的,配对元件412可以包括卡口脚,从近端盖406延伸离开,配对部件414可以包括突出物,从远端底座404延伸,例如从远端底座404的旋转环416。旋转环416也在图11中示出。该所示实施例中的突出物包括四个突出物,从远端底座404的内表面径向向内延伸,一个突出物用于一个卡口脚。在其他实施例中,可以有另一数量的突出物和另一数量的卡口脚。例如可以有一个突出物,被配置为接合每一个卡口脚,例如圆周向围绕旋转环416延伸的一个突出物。对于另一个示例,可以有相等数量的卡口脚和突出物,以使

得每一个卡口脚接合一个突出物。卡口脚可以被配置为响应于按下近端盖406，例如由用户手动下压盖子408，并释放，例如由用户从盖子408手动释放按压，而朝向并远离突出物移动。在其他实施例中，远端底座的配对部件可以包括卡口脚，近端盖的配对元件可以包括突出物。

[0129] 盖子408可以包括朝向远端底座404的按钮418。通常，按钮418可以被配置为在从附件400附接的分配器分配消耗品时，例如从图10的罐402，被压下，如以下进一步论述的。按钮418因而可以被配置为检测分配器的使用。

[0130] 盖子408可以被配置为可以相对于远端底座404在第一位置和第二位置之间移动。在第一位置，盖子408可以在离远端底座404的第一距离处，至少一个配对412元件可以接合至少一个配对部件414(例如卡口脚可以接合突出物，如图8和10中所示的)，偏置元件410可以处于展开结构，按钮418可以不与远端底座404接触。在第二位置，盖子408可以在离远端底座404的第二距离处，其小于第一距离，至少一个配对412元件可以脱离至少一个配对部件414(例如卡口脚可以不与突出物接触)，偏置元件410可以处于压缩结构，按钮418可以相对远端底座404被按压(例如相对于远端底座404的处理器组件420，如下进一步论述的)。第一距离可以限定在按钮418处于非压下位置时在按钮418与远端底座404之间的空隙空间(例如相对于处理器组件)，如图8和10中的。空隙空间可以为按钮418的移动提供一些“给与”空间，这可以有助于防止意外分配了消耗品。

[0131] 偏置元件410可以具有各种尺寸、形状和结构。通常，偏置元件410可以被配置为将盖子408向第一位置偏移，例如将按钮418偏移远离处理器组件420。偏置元件410的示例包括螺旋弹簧、蜗卷弹簧、类似于橡胶带的弹性部件、板簧和波形弹簧。在该所示实施例中，偏置元件410包括波形弹簧。偏置元件410的偏移强度或刚度可以基于一个或多个因素变化，例如卡口脚412的高度，按钮418的高度等。例如，偏置元件419的偏移强度或刚度可以约为26.0lb/in.。偏置元件410的尺寸可以基于一个或多个因素变化，例如按钮418的直径、盖子408的直径等。例如，偏置元件410可以具有约0.526in.的外径，约0.058in.的径向壁厚，和约0.325in.的自由长度。本领域技术人员会意识到，由于一个或多个因素，例如制造公差，偏置元件可以不具有精确测量值，而认为是“约”为该测量值。

[0132] 在示例性实施例中，偏置元件410可以围绕按钮418，例如围绕其圆周向延伸，如该所示实施例中的。借助圆周向围绕被配置为响应于附件400由用户的手动致动，例如由用户在其上下压，而被按压的按钮418延伸，偏置元件410可以被配置为帮助将由用户施加的力均匀地传送到按钮418，从而帮助确保按钮418相对于远端底座404被按压，不管用户按压在盖子408的何处以分配消耗品。例如，如果用户在盖子408的基本上其中心上(例如符号在盖子408上的位置)下压，以便基本上直接在按钮418的顶部上推压，施加的用户力可以有利于按钮418的按压。但用户可以不总是在基本上其中心按压盖子408，和/或可以不总是在盖子408上在按钮418延伸的方向上按压，以致于没有直接向下按压按钮418。如在该所示实施例中的，完全围绕按钮418的偏置元件410可以帮助确保在盖子408上偏离中心的用户压力相对于远端底座404向下按压按钮408。偏置元件的中心可以基本上在按钮的中心，如在该所示实施例中的，这可以帮助确保在盖子408上偏离中心的用户压力相对于远端底座404向下按压按钮408，即使压力远离盖子的中心。

[0133] 如在该所示实施例中的，远端底座404可以包括旋转环416、处理器组件420(图12

中同样示出)、抓握环422、主体424(图13中同样示出)、电源426、电源保护部件428和电源外壳430。旋转环416、处理器组件420、抓握环422、主体424、电源426、电源保护部件428和电源外壳430每一个都可以具有各种尺寸、形状和结构。

[0134] 旋转环416可以包括外部部件432和内部部件434,内部部件被配置为安置在外部部件432中,例如安置在其中心部分中。外部部件和内部部件432、434可以注塑成型。旋转环416,例如外部部件432,可以被配置为安置偏置元件410,以便将偏置元件410夹在旋转环416与盖子408之间。旋转环416可以通过其延伸的具有中心开口436,其中,按钮418可以被配置为在向下方向上向着旋转环416下面的处理器组件420移动,并在向上方向上远离处理器组件420移动。外部和内部部件432、434的每一个都可以具有中心孔432a、434a,其限定了中心开口436。

[0135] 处理器组件420可以包括侧面传感器438、正电源触点440、处理器441、PCB 442、至少一个灯443(例如至少一个LED等)、负电源触点444、被配置为有利于无线通信的天线445和力敏电阻器446。处理器441可以包括存储器(未示出)。正和负电源触点440、444可以被配置为接触电源426的相应的正和负触点,以便于从电源到PCB 442的供电。

[0136] 如上所述,PCB 442可以耦合到附件的处理器,或者PCB 442可以被配置为与至少一个外接组件合作,例如位于附件400外的CPU控制存储器(CCS)模块。如上所述,PCB 442可以被配置为响应于按钮418在力敏电阻器446上的动作(例如通过向远端部分404移动近端部分406),将附件400耦合到的分配器的使用的日期和时间记录在储存单元中,例如包括在PCB 442中的机载存储器。存储的数据可以发送到外部源,例如计算机系统,同样如上所述的。

[0137] 力敏电阻器446可以被配置为有利于检测近端盖406相对于远端底座404的移动,以便有利于检测从附件400附接到的分配器分配消耗品。通常,力敏电阻器446可以被配置为压力传感器,其感测施加于其上的重力或压力。力敏电阻器446可以被配置为在压力施加于其时改变电阻,如本领域技术人员会意识到的。按钮418可以被配置为在旋转环416的中心开口436中移动,并可以被配置为当在向下方向上向着PCB 442及因此向着力敏电阻器446移动时,接触旋转环416下面的力敏电阻器446。力敏电阻器446可以被配置为响应于从按钮418施加于其的压力而改变电阻。以此方式,当向下按压盖子408以便在向下方向上移动按钮418时,按钮418可以将压力施加到力敏电阻器446,从而改变力敏电阻器446的电阻,以指示盖400的动作和消耗品的分配。类似地,当释放盖子408以便向上移动时,按钮408可以向上移动以便减小在力敏电阻器446上的压力,从而再次改变力敏电阻器446的电阻。

[0138] 处理器可以被配置为将力敏电阻器的电阻值与预定阈值电阻值相比较,例如存储在存储器中的值,以便确定是否分配了消耗品。电阻值可以是实际电阻的数值,或者可以是表示实际电阻的值。通过能够比较特定值,以代替仅仅检测传感器的“开”或“关”位置,例如“开”作为压力施加于其,“关”作为无压力施加于其,以确定消耗品的分配,处理器可以有助于消除错误判断。如果力敏电阻器的电阻值等于或超过阈值电阻,那么处理器就可以被配置为确定分配了消耗品,因为已经将特定阈值量的压力施加到附接于包含消耗品的分配器的附件400。例如,如果阈值电阻值对应于20N的压力,但力敏电阻器的电阻值对应于15N的压力(例如从与按钮418无任何接触的0N增大到接触按钮418的15N),那么处理器就可以确定消耗品的分配未发生。换句话说,可以假定没有以足够的力推压盖子408以导致消耗品离

开罐402。对于另一个示例，如果阈值电阻值对应于25N的压力，力敏电阻器的电阻值对应于26N的压力(例如从与按钮418无任何接触的0N增大到接触按钮418的26N)，那么处理器就可以确定动作确实发生。换句话说，可以假定以足够的力推压盖子408以导致消耗品离开罐402。

[0139] 预定阈值电阻值可以取决于附件附接的分配器，例如不同罐会需要不同量的力来从其分配消耗品。存储器可以被配置为存储用于多个罐的阈值电阻值，处理器可以被配置为将力敏电阻器的电阻值与对应于附件400耦合到的罐的一个阈值电阻值相比较。在一些实施例中，用于附件400耦合到的罐的阈值电阻值可以使用无线网桥发送到PCB 442，发送的阈值电阻值可以存储在存储器中，以便稍后与力敏电阻器446的电阻值相比较。通过将标识信息发送到其，可以确定处理器用以与力敏电阻器的电阻值比较的正确阈值电阻值，不论阈值电阻值是预存储在存储器中的，还是发送到附件400的。在前述国际申请No.PCT/US13/047507中更进一步详细说明了标识信息以及其他类型的数据到附件的传送。

[0140] 在示例性实施例中，用户可以经由客户终端借助用户界面输入消耗品时间表信息(例如用于与附件400一起使用的消耗品的处方信息，应服用与附件400一起使用的维生素的进餐时间等)和消耗品标识信息(例如与附件400一起使用的特定消耗品的标识，与附件400一起使用的特定补充剂等)，如本文所述的。用户界面可以被配置为提供消耗品的列表，用户可以从其选择以识别特定消耗品，和/或用户界面可以允许用户输入任何消耗品。客户终端可以被配置为可以访问消耗品的数据库及其相关阈值电阻值，数据库本地存储在客户终端或者客户终端可以远程访问。客户终端可以被配置为从数据库确定哪个阈值电阻值对应于用户识别的消耗品。客户终端可以被配置为与附件400通信，例如经由与附件400之间的无线通信，将消耗品时间表信息、消耗品标识信息和阈值电阻值提供给附件400，其可以将接收的数据存储在存储器中。附件400因而可以被配置为将力敏电阻器的电阻值与适合于附件400耦合到的特定分配器的阈值电阻值相比较。

[0141] 侧面传感器438可以被配置为有利于检测附件与消耗品分配器的附接和移除。检测附件400是否附接到分配器可以有利于附件400到分配器的适当附接和/或有利于附件400的适当使用。如在该所示实施例中的，附件400自身可以被配置为确定附件移除/附接，例如使用侧面传感器438和PCB420。在其他实施例中，外接于附件400的处理器可以被配置为检测附件400相对于消耗品分配器的移除和附接。

[0142] 侧面传感器438可以相邻于附件400的周边设置，以便位于径向向外的位置。侧面传感器438可以被配置为感测压力。当例如诸如罐402的药罐的分配器安置在附件400的空腔448中时，例如主体424的，分配器可以向外将压力施加到附件400上，以便将压力施加到侧面传感器438。侧面传感器438可以被配置为感测直接径向向外的这个压力，从而允许处理器确定分配器附接到附件400，因为侧面传感器438感测到压力增大。类似地，当从空腔448移除分配器时，施加到侧面传感器438上的压力可以减小，处理器可以相应地确定附件400不再耦合到分配器，因为侧面传感器438感测到压力减小。

[0143] 侧面传感器438可以有利于附件400从第一模式移动到第二模式，在第一模式中，附件400不运行，因为没有附接到分配器，在第二模式中，附件400运行，因为附接到分配器。在第一模式中，附件400可以被配置为不或很少使用来自电源426的电力，从而接收资源。在一些实施例中，附件400可以具有第三模式，其中，附件400不运行，因为没有附接到分配器，

且因为从未附接到分配器。第三模式因而可以反映附件400在制造厂和/或在工厂包装中而是“新的”。在第三模式中的附件400可以被配置为不使用电力，且不与外部设备无线或借助有线通信。第三模式因而可以是附件的初始模式。一旦附件400至少一次附接到分配器，附件400就可以被配置为在第一和第二模式之间移动。在附件400不运行的第一模式中，与附件400同样不运行的第三模式相比，附件400可以被配置为使用少量电力以便允许外部设备与附件400通信，例如用以接收存储在附件的存储器中关于附件的以前到分配器的附接的数据，例如附件400最后从分配器移除的日期和时间等。通过在以前附接过的附件400当前没有附接到分配器时，允许外部设备与附件400通信，外部设备更有可能获得最新信息和/或可以使用关于附件从分配器的移除的日期和时间信息，以提示用户借助用户界面指示为何将附件400从分配器移除(例如无意移除、处方改变、附件所有者的变化、附件破裂、分配器破裂等)。

[0144] 附件400可以被配置为向附件400的用户提供通知，有关于与分配器的附件附接和/或附件未附接。PCB 420可以被配置为响应于检测到附接和/或检测到移除而触发通知。可以以任意一个或多个方式提供通知，例如灯(例如，当附件400没有附接到分配器时照明否则就不照明的灯，当附件400没有附接到分配器时闪烁否则就不照明的灯，当附件400没有附接到分配器时以一种颜色照明的灯和当附件400没有附接到分配器时以不同颜色照明的第二个灯等)；振动元件(例如，在附件400附接到分配器后的预定时间长度中振动，否则就不振动的振动元件，响应于附件400没有附接到分配器在预定时间长度中振动，否则就不振动的振动元件，响应于附件400没有附接到分配器交替地在预定时间长度中振动，并在预定时间长度中不振动的振动元件等)；和发送到远离分配器的位置的电子邮件消息、文本消息、图标警告(例如智能电话或计算机上的弹出文本和/或图像等)或电话(其可以是现场电话或者自动电话，可以包括留下语音邮件或其他记录的消息)等。

[0145] 通知可以提示用户动作，例如确认(例如借助用户界面)附件400在以前耦合过的相同分配器上是否放回原处了或者是否耦合到不同分配器。设置在相同或不同分配器上例如出于按时服药的目的是重要的，因为不同分配器可以与不同时间表相关联，例如由于与不同处方相关联，由于药物更浓或更稀的浓度等。动作的另一个示例包括向用户确认附件400适当附接到分配器，因此准备好使用。动作的另一个示例包括在分配器没有将附件400附接于其时通知用户，从而向用户指示分配器在从其分配任何消耗品之前应将附件300和/或其他附件附接于其。因此更有可能检测并分析全部消耗品使用。

[0146] 在其他实施例中，对于侧面传感器可替换的或除了其以外的，例如侧面传感器438，附件可以被配置为通过在附件移除时断开电路且在附件放回原处时闭合电路来识别到/自分配器的移除/重新附接。附件因而可以被配置为指示它是附接到分配器还是没有附接到分配器。附件可以被配置为自身做出这个确定，例如使用机载处理器，被配置为识别附件的移除/重新附接，例如通过检测电路是断开还是闭合。可替换地或者另外，外接到附件的处理器可以被配置为识别这种移除/重新附接。

[0147] 在一些实施例中，对于侧面传感器可替换的或除了其以外的，例如侧面传感器438，附件可以被配置为使用拉伸传感器识别自/到分配器的移除/重新附接，拉伸传感器被配置为响应于被拉伸而改变电气性质(例如电阻)。当拉伸传感器被拉伸时，变化的电气性质可以指示拉伸传感器耦合到的附件耦合到消耗品分配器或从其移除。例如，被配置为耦

合到药瓶的盖子的附件可以包括拉伸传感器，被配置为在盖子附接到药瓶或从其移除时拉伸。

[0148] 抓握环422可以被配置为有利于附件400的操作。抓握环422可以由橡胶和/或其他材料构成，被配置为有利于用手握紧附件400。抓握环422对于在与分配器的附件400的附接和附件400的移除过程中握紧附件400尤其有用。抓握环422可以具有与主体424的颜色不同的颜色，如原色的抓握环422和白色主体424等，这可以有助于改进附件400的审美学和/或可以帮助便于识别附件400附接的分配器，例如具有黄色抓握环的附件附接到人的常规吸入器，具有红色抓握环的另一个附件附接到人的紧急吸入器。在一些实施例中，主体424可以是以类似方式用颜色作标记的，例如不同颜色的主体附接到不同消耗品容器。

[0149] 主体424可以包括近端体450和远端体452。在示例性实施例中，近端和远端以450、452可以流体密封地不可移除地附接在一起，这可以帮助保护包含于主体424内的组件和/或可以帮助防止流体泄漏到附件400中并损坏布置于其中的任何组件。近端和远端以450、452可以注塑成型以构成主体424，并不可移除地附接在一起。近端部分的盖子408和远端部分的主体424可以限定附件400的外壳，如上所述的，其可以具有一定程度的弹性(例如，远端体452的变形)，可以是透明或半透明的(例如至少盖子408，光可以被配置为通过其发光)，可以是防水的，可以是永久闭合的或密封的，和/或可以被配置为是一次性的。

[0150] 近端体450可以包括传感器保护器454，在近端体的侧壁从其延伸离开，例如在近端体450的周边。传感器保护器454可以被配置为使得侧面传感器438相邻于其布置，传感器保护器454可以被配置为保护如此定位的侧面传感器438，和/或被配置为有利于在侧面传感器438和PCB 442之间的电子通信。远端体452可以包括形成于其侧壁中的袋456，袋456被配置为在其中容纳传感器保护器454和侧面传感器438。袋456可以帮助保护侧面传感器438免于施加于其的压力，例如从插入空腔448的分配器径向向外指向的压力。

[0151] 主体424可以限定附件的空腔448，空腔448被配置为在其远端部分中容纳分配器，例如罐，如罐402。主体424可以被配置为响应于分配器到空腔448中的插入而变形。空腔的侧壁可以由远端体452的内表面限定，如该所示实施例中的。远端体452可以由被配置为弯曲活动以便允许变形的材料构成(例如热塑性弹性体等)。近端体450可以由比构成远端体452的材料刚性更大的材料(例如ABS等)构成，这可以帮助为主体424和附件400提供稳定性，但仍允许附件400，例如远端体452，响应于附件400耦合到分配器而变形。附件400的变形，例如主体的远端体452的变形，可以有利于在附件400与附件400耦合到的分配器之间的牢固过盈配合。不同分配器可以具有不同尺寸，借助有利于在附件400与不同尺寸的分配器之间的牢固过盈配合，变形可以使得附件400更为通用。

[0152] 主体424可以包括夹持机构458，如上所述，其可以被配置为有利于附件400到分配器的附接，并可以被配置为在附件400附接到分配器时变形。如在该所示实施例中的，夹持机构458可以包括多个突出部，从空腔448径向向内延伸，例如从限定空腔448的远端体452的内表面。尽管在该所示实施例中附件400包括四个夹持机构458，但附件可以包括另一数量的夹持结构。每一个夹持结构458都可以被配置为响应于由插入空腔448中的分配器施加于其上的压力而径向向外变形。在该所示实施例中，突出部每一个都包括纵向延伸的肋条，其沿着空腔448的整个纵向长度448L延伸，如图8所示的。在该所示实施例中，空腔448的空腔纵向长度448L约为0.32in.，但在其他实施例中空腔448的纵向长度448L可以不同。类似

地，在该所示实施例中附件的纵向长度440L约为1/04in.，附件的宽度440W约为1.28in.，但在其他实施例中，附件400可以具有不同的纵向长度400L和/或不同的宽度400W。在该所示实施例中附件的纵向长度400L和宽度400W的值可以有利于附件400与各种当前可用呼吸吸入器一起使用。

[0153] 电源426可以被配置为向附件400的一个或多个组件供电，例如PCB420的组件。处理器441可以被配置为通过被配置为在第一状态与第二状态之间一定而有利于省电，在第一状态中，电源426向附件400的组件提供第一电量，在第二状态中，电源426向附件400的组件提供第二更大的电量。在该所示实施例中，电源426是硬币电池的形式，仅是单一电池，但在其他实施例中，电源426可以是另一类型的电源(例如另一类型的电池等)和/或可以包括多于一个电源(例如包括电池组等)。

[0154] 电源保护部件428可以被配置为帮助保护电源426免于当分配消耗品时，在附件400的移动过程中受损。电源保护部件428可以具有对应于电源426的尺寸和形状的尺寸和形状，这可以有利于电源的全面保护。在该所示实施例中，电源保护部件428包括衬垫，但在其他实施例中，电源保护部件428可以具有其他结构。

[0155] 电源外壳430可以被配置为在其中安置电源保护部件428和电源426。电源外壳430可以是永久封闭的，以便防止对安置于其中的电源426的接近，如在该所示实施例中的，电源外壳430可以被配置为选择性关闭，以便允许对安置于其中的电源426的接近。允许对电源426的接近可以允许如果电源426耗尽时移除并替换电源426，和/或允许在附件400的处置前出于安全原因移除电源426。电源外壳430可以被配置为以各种方式选择性关闭。例如，如在该所示实施例中的，电源外壳430可以被配置为例如借助扭转而与主体424分离和重新附接。对于另一个示例，电源外壳430可以包括铰链门(未示出)，被配置为允许选择性地手动打开和关闭电源外壳430。

[0156] 附件可以被配置为在相对于分配器的各种不同位置附接到消耗品分配器。在一些实施例中，附件可以被配置为附接到消耗品分配器的顶部，例如包含呼吸药物并被配置为安置在分配器的外壳中的罐，例如呼吸吸入器(例如哮喘吸入器)的外部塑料容器。图4的实施例的附件302，图7的实施例的附件400和图14－21的实施例的附件600、700、800、900、1000、1100、1200和1300时被配置为附接到分配器的顶部的附件的示例。在图14－21的所示实施例中以及本文提供的其他实施例中附件附接到分配器的特定位置是示例，附件可以在多个其他位置附接，例如在分配器的外表面上的不同位置。

[0157] 图14的附件600是盖子，类似于图4的附件302，在图14中显示为耦合到消耗品分配器604的罐602的顶部，消耗品分配器604是呼吸吸入器的形式，类似于图4的分配器304。在该所示实施例中的分配器604还具有耦合到其的第二附件606。在该所示实施例中的第二附件606包括带或条，被配置为缠绕分配器604，例如围绕其外壳608，外壳中安置了罐602，并被配置为在通过分配器的出入口610分配消耗品时用手握住。在该所示实施例中的第二附件606包括运动传感器形式的传感器。

[0158] 在图15的实施例中，附件700耦合到药瓶形式的消耗品分配器702，在附件700耦合到的分配器顶部具有可释放的盖子704。附件700可以包括运动传感器。在该所示实施例中的分配器702还具有耦合到其的第二附件706，它可以包括第二运动传感器。在该所示实施例中的第二附件706布置在包含药丸的分配器702内部。第二附件706可以在分配器702内自

由移动，类似于药物在其中自由移动，如在该所示实施例中的，这可以有利于移除和替换第二附件706。可替换地，第二附件可以耦合到分配器702的内表面，例如其内侧壁，例如借助粘合剂。

[0159] 在图16的实施例中，附件800耦合到药瓶形式的消耗品分配器802，在附件800耦合到的分配器顶部具有可释放的盖子804。在该所示实施例中的分配器802还具有耦合到其的第二附件806。类似于图15的实施例，两个附件800、806每一个都可以包括运动传感器。在该所示实施例中的第二附件806耦合到分配器802的外表面。第二附件806可以以各种形式附接到分配器的外表面，例如通过使用Velcro®条808(如在该所示实施例中的)、粘合剂等。

[0160] 在图17的实施例中，附件900耦合到洗剂瓶形式的消耗品分配器902，在附件900耦合到的分配器顶部具有可释放的盖子904。在该所示实施例中的分配器902还具有耦合到其的第二附件906。类似于图15的实施例，两个附件900、906每一个都可以包括运动传感器。类似于图16的实施例，第二附件906可以耦合到分配器902的外表面。

[0161] 在图18的实施例中，附件1000耦合到药盒形式的消耗品分配器1002，在附件1000耦合到的分配器顶部具有可释放的盖子1004。在该所示实施例中的可释放的盖子1004是靠铰链转动的，但如本领域技术人员意识到的，在其他实施例中的药盒可以具有其他类型的可释放的盖子。在该所示实施例中的分配器1002还具有耦合到其的第二附件1006。类似于图15的实施例，两个附件1000、1006每一个都可以包括运动传感器。类似于图16的实施例，第二附件1006可以耦合到分配器1002的外表面。

[0162] 在图19的实施例中，附件1100耦合到可挤压的乳剂管形式的消耗品分配器1102，在附件1000耦合到的分配器顶部具有可释放的盖子1104。附件1100可以包括压力传感器。在该所示实施例中的分配器1102还具有耦合到其的第二附件1106。类似于图14的实施例，第二附件1106可以包括运动传感器。类似于图16的实施例，第二附件1006可以耦合到分配器1102的外表面。

[0163] 在图20的实施例中，附件2000耦合到圆盘形呼吸吸入器形式的消耗品分配器1202，分配器具有出入口1204，响应于可滑动按钮1026的动作，通过出入口可以分配布置在分配器1202中的消耗品(例如干粉末)。类似于图14的实施例，附件1200可以包括运动传感器。类似于图16的实施例，附件1200可以耦合到分配器1202的外表面。

[0164] 图21中的附件1300是盖子，类似于图4的附件302，在图14中显示为耦合到消耗品分配器1304的罐1302的顶部，消耗品分配器1304是呼吸吸入器的形式，类似于图4的分配器304。在该所示实施例中的分配器1304还具有耦合到其的第二附件1306。在该所示实施例中的第二附件1306耦合到分配器1304的底部，包括压力传感器，压力传感器被配置为检测由罐1302相对于分配器1304的外壳1308的运动而引起的压力变化。

[0165] 在一些实施例中，附件可以被配置为附接到消耗品分配器的底部。例如，附件可以被配置为附接到消耗品分配器的罐的底部，与分配器的出入口相邻，通过出入口可以分配消耗品，罐被配置为由用户压下以将消耗品分发出分配器的出入口。图21和22的实施例的附件1306和1400是被配置为附接到分配器的底部的附件的示例。

[0166] 图22的附件1400在分配器的外壳1410的通道1406内相邻于消耗品分配器1404的出入口1402设置，分配器1404在该所示实施例中包括呼吸吸入器，通过通道1406可以释放包含于分配器的罐1408中的消耗品1412。在该所示实施例中的附件1400包括气压传感器，

被配置为感测气压中的变化。

[0167] 在一些实施例中，附件可以被配置为附接到消耗品分配器的侧面。例如，附件可以被配置为附接到药瓶的侧壁。对于另一个示例，附件可以被配置为附接到分配器外壳的侧壁，外壳被配置为在其中安置药罐。图14－19和23－26的实施例的附件606、706、806、906、1006、1106、1500、1600、1700和1800是被配置为附接到分配器的侧面的附件的示例。

[0168] 在图23的实施例中，附件1500耦合到药瓶形式的消耗品分配器1502，类似于图15的分配器702。类似于图14的实施例，附件1500可以包括运动传感器，并可以借助带和条耦合到分配器702，例如在瓶盖1504下面围绕瓶子的外表面。

[0169] 在图24的实施例中，附件1600耦合到呼吸吸入器形式的消耗品分配器1602，类似于图4的分配器304。类似于图14的实施例，附件1600可以包括运动传感器，并可以借助带和条耦合到分配器1602，例如围绕分配器的外壳1604的外表面。

[0170] 在图25的实施例中，附件1700耦合到呼吸吸入器形式的消耗品分配器1702，类似于图4的分配器304。类似于图14的实施例，附件1700可以包括运动传感器，并可以借助夹子耦合到分配器1702，例如夹紧到分配器的外壳1604的外表面。

[0171] 在图26的实施例中，附件1800耦合到药盒形式的消耗品分配器1802，类似于图18的分配器1002。在该所示实施例中的药盒1802是矩形，而图18的药盒1002是圆形。在其他实施例中药盒可以具有其他形状。类似于图14的实施例，附件1800可以包括运动传感器，并可以借助带和条耦合到分配器1802，例如围绕分配器1802的外表面。

[0172] 在一些实施例中，附件可以被配置为附接到消耗品分配器被配置为由用户手动驱动来从分配器分配消耗品的部分。分配器的部分可以位于各种位置，取决于分配器的结构，例如在分配器的顶部，在分配器的侧面等。例如，附件可以被配置为附接到消耗品分配器的罐的顶部，其可以被配置为由用户压下以将消耗品分发出分配器的出入口。对于另一个示例，附件可以被配置为附接到药瓶盖，药瓶盖可以被配置为从药瓶旋开以允许从药瓶分配消耗品(例如药丸)。图4的实施例的附件310，图7的实施例的附件400和图14－19及21的实施例的附件600、700、800、900、1000、1100和1300是被配置为附接到一部分消耗品分配器的附件的示例，该部分被配置为由用户手动驱动以从分配器分配消耗品。

[0173] 在一些实施例中，消耗品分配器可以具有耦合到其的多个附件。每一个附件都可以耦合到分配器的顶部，每一个附件都可以耦合到分配器的底部，每一个附件都可以耦合到分配器的侧面，每一个附件都可以耦合到消耗品分配器被配置为由用户手动驱动来从分配器分配消耗品的部分，或者每一个附件都可以在不同位置耦合到分配器(例如一个附件耦合到分配器的顶部，另一个附件耦合到分配器的底部，一个附件耦合到消耗品分配器被配置为由用户手动驱动来从分配器分配消耗品的部分，另一个附件耦合到分配器的侧面等)。

[0174] 图14－19和21示出了分配器的实施例，每一个都具有耦合到其的多个附件。具有耦合到其的多个附件的分配器可以有助于更好地区分错误判断与分配消耗品的真实实例，因为可以以至少两个方式来验证分配，例如每一个附件都验证一次。与分配器相关的处理器，例如是一个附件的部件的处理器，可以被配置为仅当全部附件都指示分配了消耗品时，才确定分配了消耗品，例如当全部附件都启动时。具有耦合到其的多个附件的分配器可以允许为了维修、替换等从分配器移除一个附件，不必干扰耦合到分配器的其他一个和多个

附件。

[0175] 在示例性实施例中，多个附件中的至少一个可以可移除且可替换地耦合到分配器，多个附件中的至少其他一个可以不可移除地耦合到分配器。以此方式，分配器可以确保始终具有耦合到其的至少一个附件，因为至少一个附件不可移除地耦合到其。因而，如果可移除且可替换的附件/多个附件出现错误，那么考虑到适当附接且适当运行的多个附件中的一个和多个的启动，仍可以由与分配器相关的处理器正确确定消耗品的分配。这种错误的示例包括在使用附件前，人忘记将附件可移除地附接到分配器，附件没有适当地可移除地耦合到分配器，和附件的电池耗尽。

[0176] 在示例性实施例中，多个附件中的至少一个可以被配置为手动操纵以导致消耗品从分配器的分配(例如被按压以分配消耗品，如借助耦合到吸入器罐的盖子形式的附件)，多个附件中的至少其他一个可以被配置为被动感测消耗品的分配(例如是被配置为被动感测参数的传感器，参数例如是运动、pH、温度、噪声或地理位置)。因而相比于如果分配器不具有被动附件或者如果分配器不具有被配置为借助用户操纵其而导致消耗品分配的附件的情况，可以更准确地确定消耗品的分配，因为以不同方式检测到分配。

[0177] 分配器可以包括多个附件，至少两个附件包括动敏部件。如上所述，由至少两个动敏部件检测的运动中的差异可以指示分配了消耗品。在一些实施例中，多个附件中的每一个都可以包括动敏部件，而在其他实施例中，多个附件中的至少两个附件可以包括动敏部件，多个附件中的至少一个附件可以无动敏部件，并被配置为以另一方式检测消耗品的分配，例如借助感测温度，借助被压下等。

[0178] 图27是消耗品分析系统1900的一个示例性实施例的示意性方框图。系统1900可以包括多个模块，其每一个都可以使用上述类型的一个或多个数字数据处理系统来实施，尤其是使用一个或多个网页，其可以使用这种数字数据处理系统来查看、操纵和/或交互。系统1900因而可以实施在单一计算机系统上，或者可以跨多个计算机系统分布。系统1900还包括至少一个数据库，其可以存储在计算机系统上并由计算机系统访问。本领域技术人员会意识到，本文公开的任意模块或数据库都可以细分或与其他模块或数据库组合。

[0179] 系统1900可以包括附件数据输入模块1902、远程数据输入模块1904、遵守度模块1906和消耗品模块1908，及鼓励模块1910。任意附件数据输入模块1902、远程数据输入模块1904、遵守度模块1906和消耗品模块1908，及鼓励模块1910都可以相互独立地使用，并可以与任意一个或多个其他模块1902、1904、1906、1908、1910组合使用。以下依次进一步论述每一个模块1902、1904、1906、1908、1910。尽管每一个模块1902、1904、1906、1908、1910在图27中示出为但组件模块，但每一个模块1902、1904、1906、1908、1910都可以包括任意数量的组件模块，例如1、2、3等，与任意其他模块1902、1904、1906、1908、1910相同或不同。此外，如上所述，本领域技术人员会意识到，任意模块1902、1904、1906、1908、1910及任意其多个组件模块都可以细分或者与其他模块组合，包括图27中示出为在不同的模块1902、1904、1906、1908、1910中的模块。

[0180] 系统1900还可以包括附件数据数据库1912和远程数据数据库1914。附件数据数据库1912可以被配置为可由附件数据输入模块1902访问，并存储与机械附件有关的数据。远程数据数据库1914可以被配置为可由远程数据输入模块1904访问，并存储与个人数据库1916中的个人有关的数据，及与隔离数据库1918中的鼓励有关的数据。每一个数据库1912、

1914都可以包括任意数量的组件数据库，例如1、2、3等，与任意其他数据库1912、1914相同或不同。如上所述，本领域技术人员会意识到，任意数据库1912、1914及任意其多个组件数据库(如果有的话)都可以细分或者与其他数据库组合，包括图27中示出为在不同的数据库1912、1914中的数据库。任意数据库1912、1914的任意部分都可以被配置为有任意一个或多个模块1902、1904、1906、1908、1910及任意额外模块(如果有的话)访问，例如读和/或写。尽管所示实施例中的系统1900在数据库中存储数据，但本公开的任意系统可以在数据库和/或其他存储器(多个存储器)中存储数据。

[0181] 通常，系统1900可以被配置为允许经由附件数据输入模块1902输入个人数据1916，及经由远程数据输入模块1904输入远程数据1914。遵守度模块1916可以被配置为分析输入的个人数据1916和/或输入的远程数据1914，以便输出至少一个个人对预定消耗品时间表的遵守度的指示。消耗品模块1908可以被配置为分析输入的个人数据1916和/或输入的远程数据1914，以便输出对患者的预定消耗品时间表的一个或多个建议的改变，对在服药时间到前由附接到消耗品分配器的附件将消耗品服药通知药多快地提供给人的一个或多个建议的改变，和/或对患者的消耗品的一个或多个建议的改变(例如改变为不同品牌等)。鼓励模块1910可以被配置为分析输入的个人数据1916和/或输入的远程数据1914，以便为至少一个个人输出鼓励数据。在前述国际申请No.PCT/US13/047507中更详细说明了系统1900、其实施例和可以借以提供的用户界面的实施例。

[0182] 尽管参考特定实施例说明了本发明，但本领域技术人员会理解，可以在所述创新概念的精神和范围内做出多个改变。基于上述实施例，本领域技术人员会意识到进一步的特点和优点。因此，本发明并非由具体所示和所述的内容来限定，除了如所附权利要求书中所指示的。本文引用的全部公开文本和参考通过参考在其整体上明确地并入本文中。

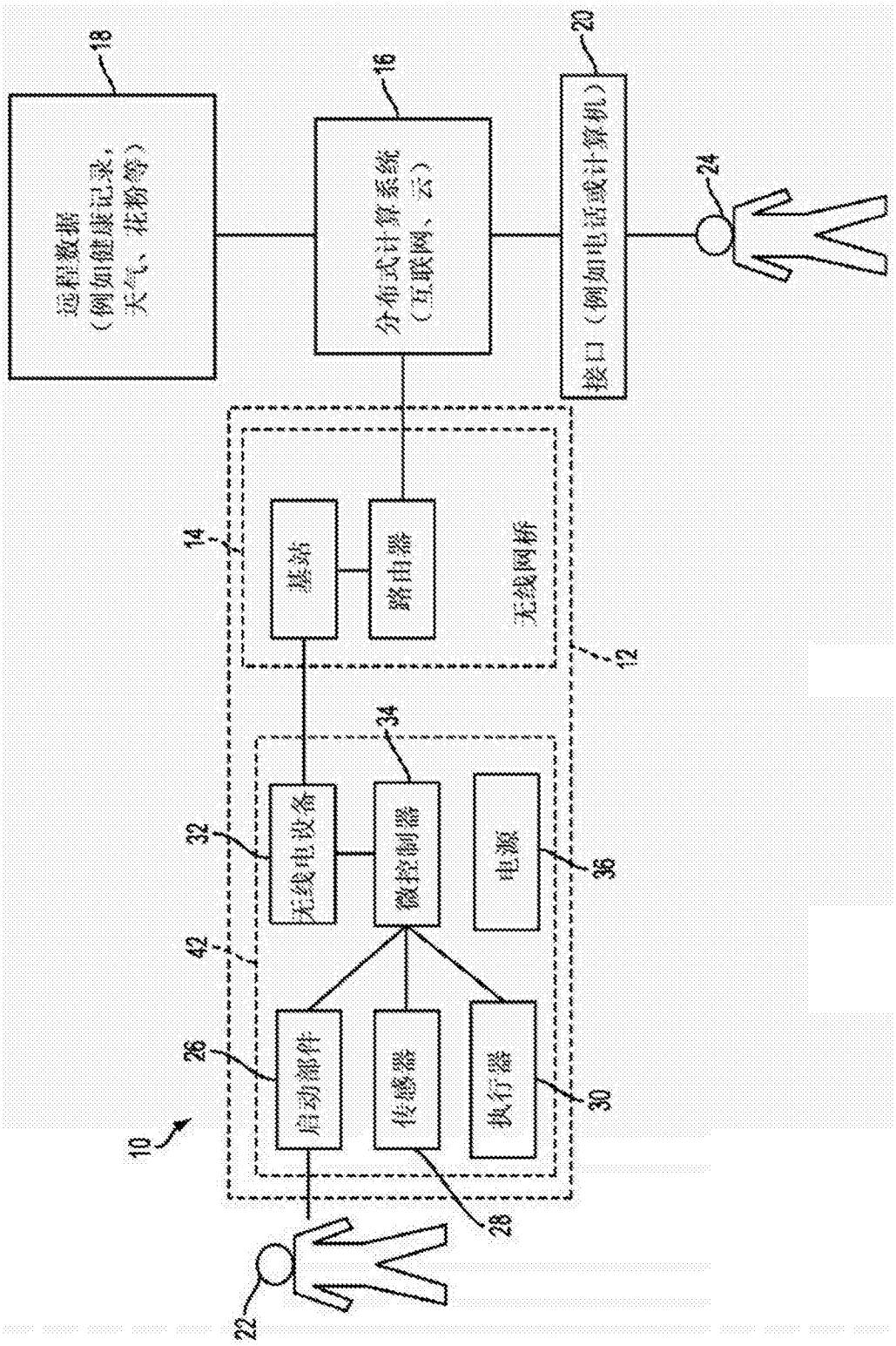

18
远程数据
（例如健康记录，
天气、花粉等）
16
分布式计算系统
（互联网、云）
20
接口（例如电话或计算机）
24
14
基站
路由器
无线网桥
12
34
32
无线电设备
微控制器
电源
36
42
26
启动部件
传感器
执行器
30
10
28
22

图1

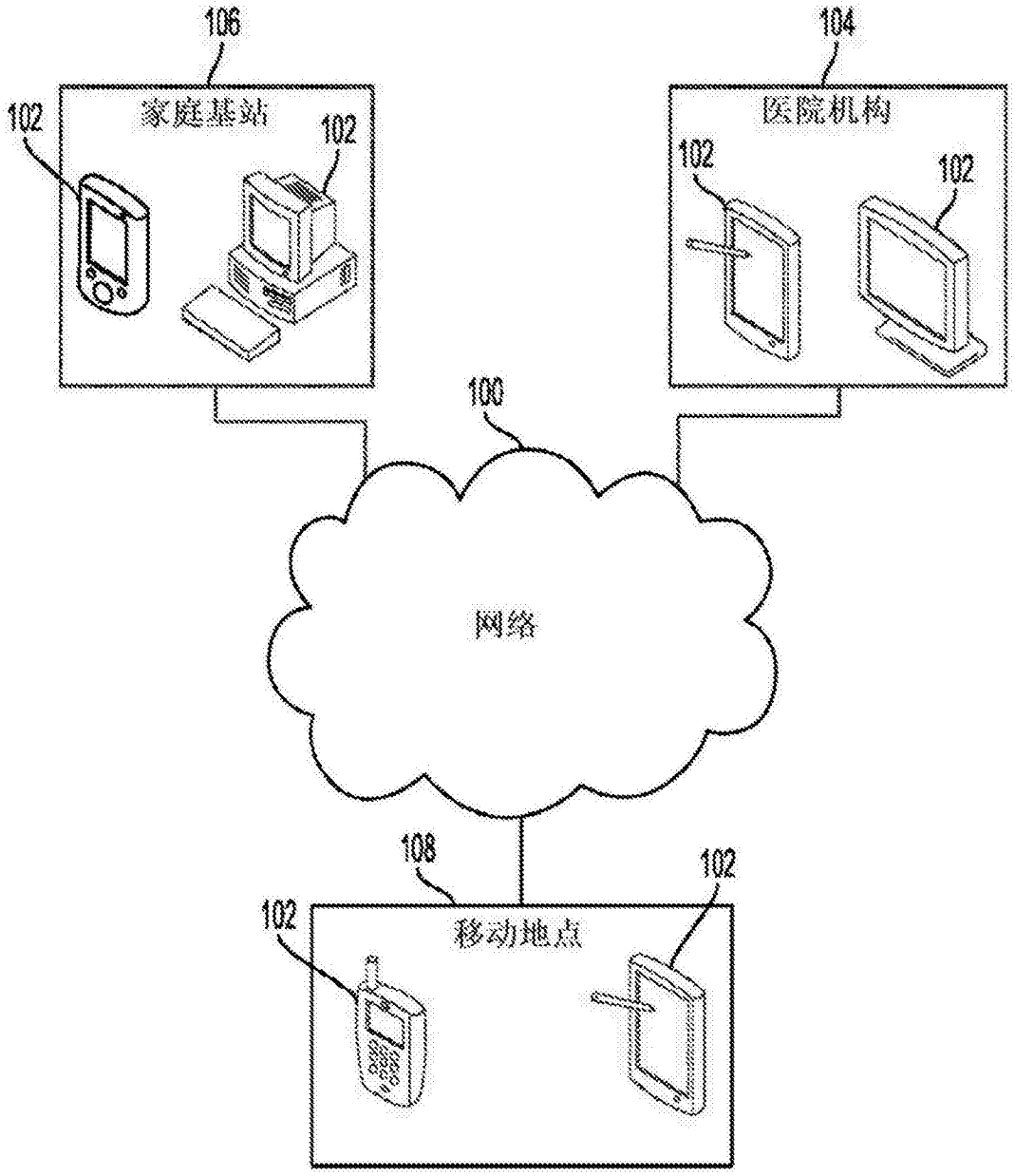


图2

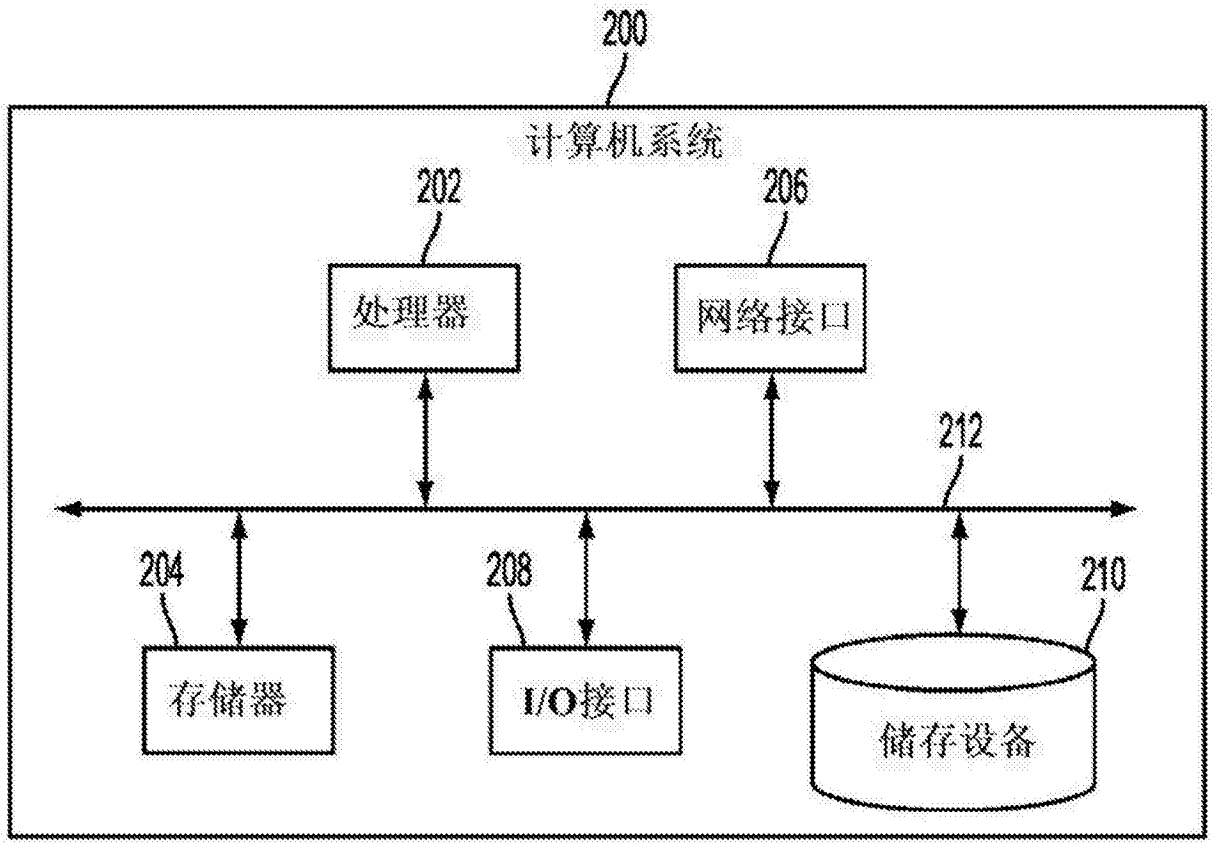
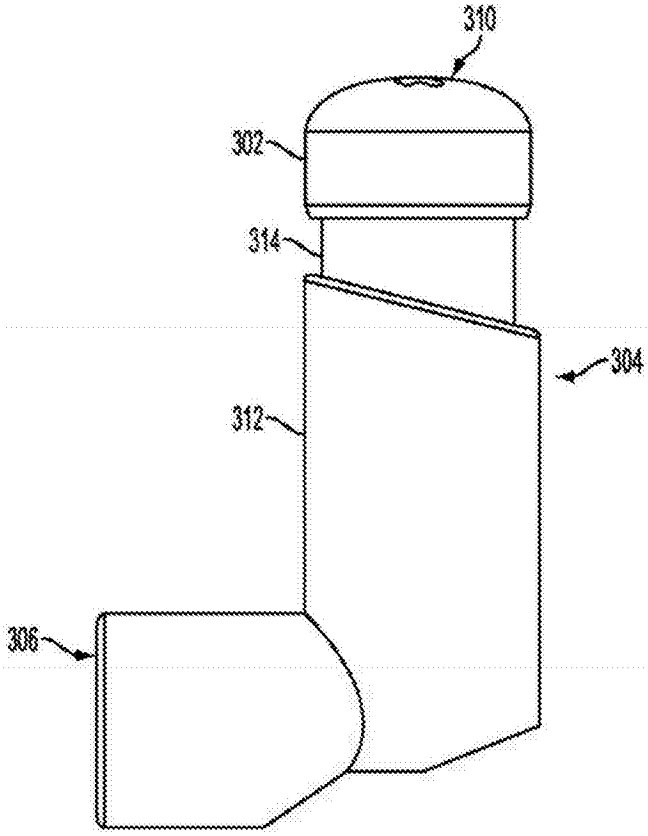


图3



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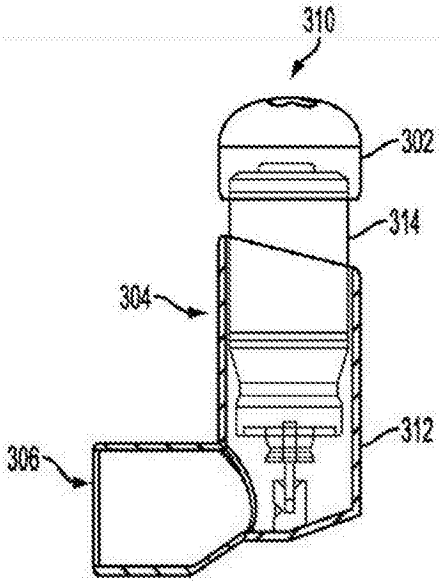


图5

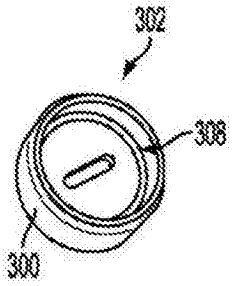


图6

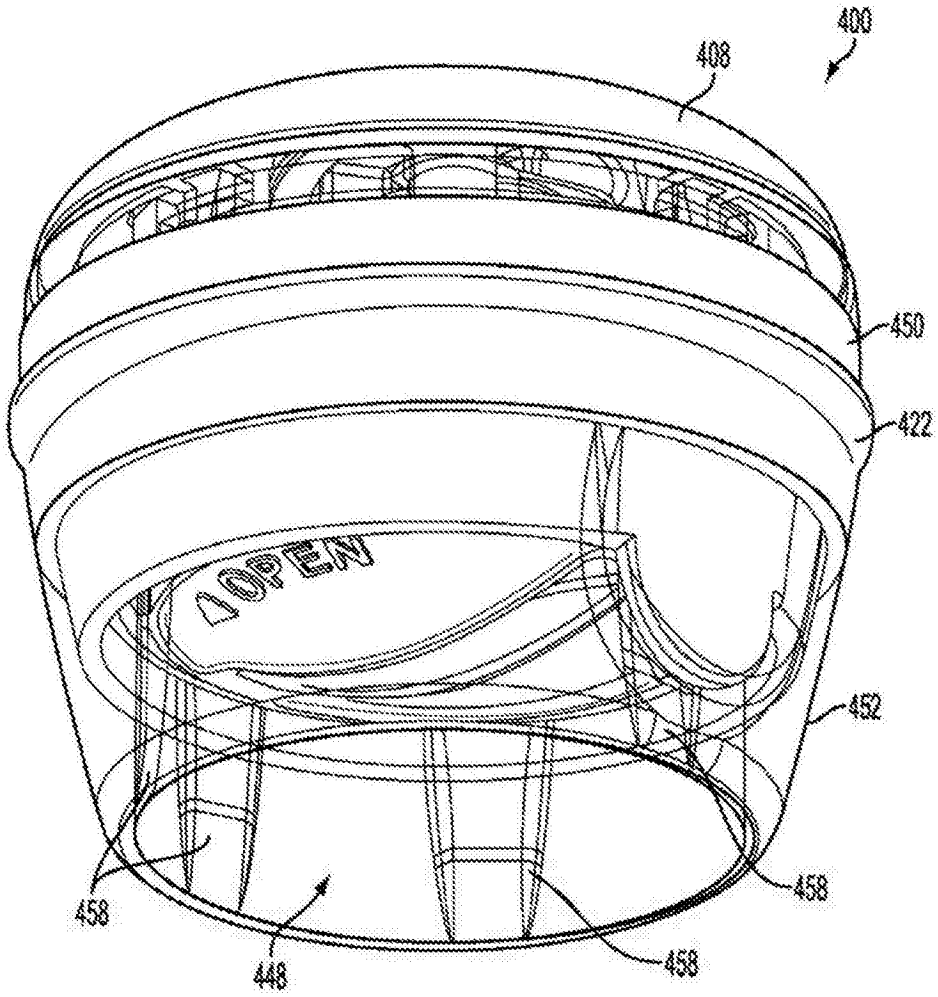
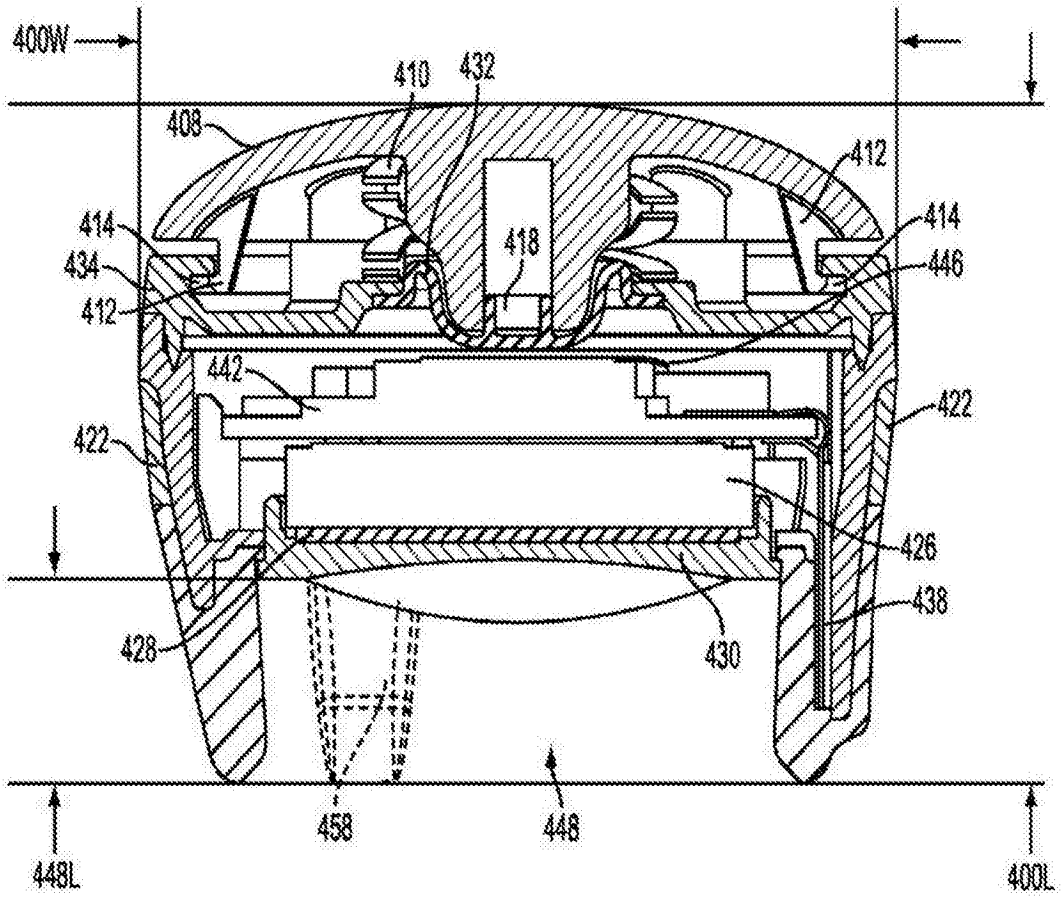


图7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448
448L
400L

图8

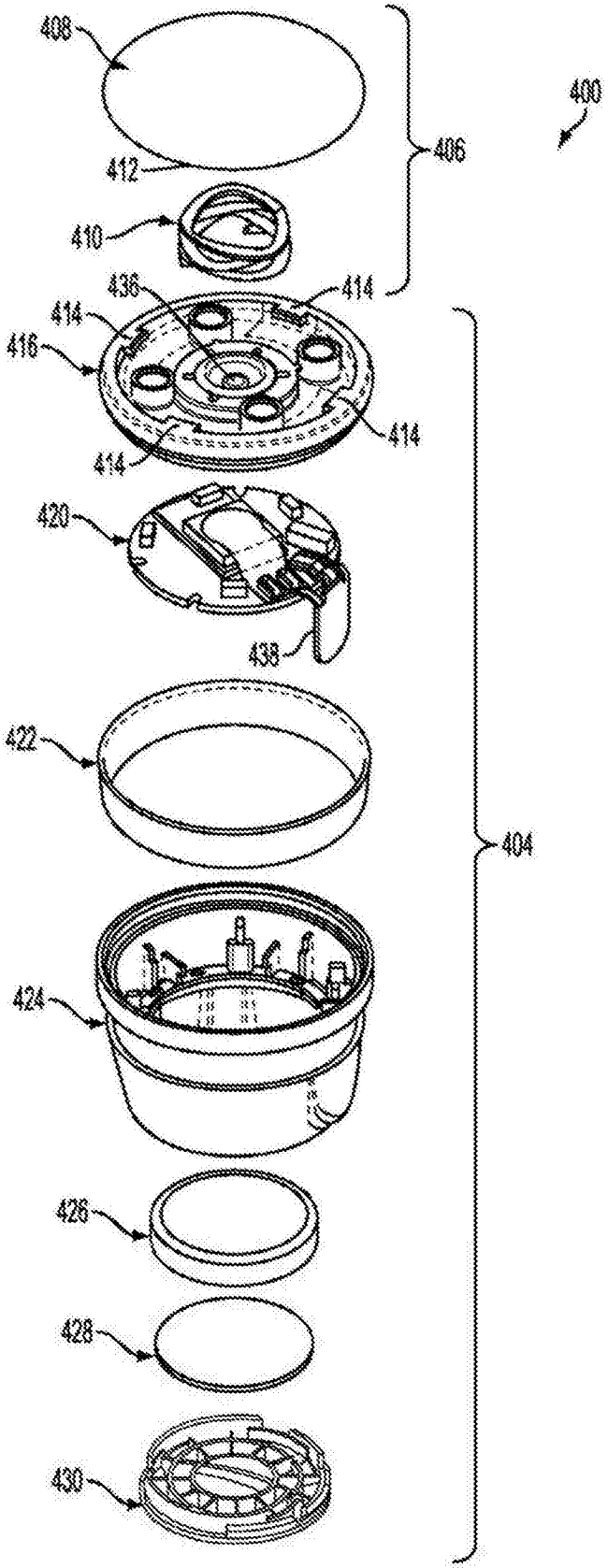
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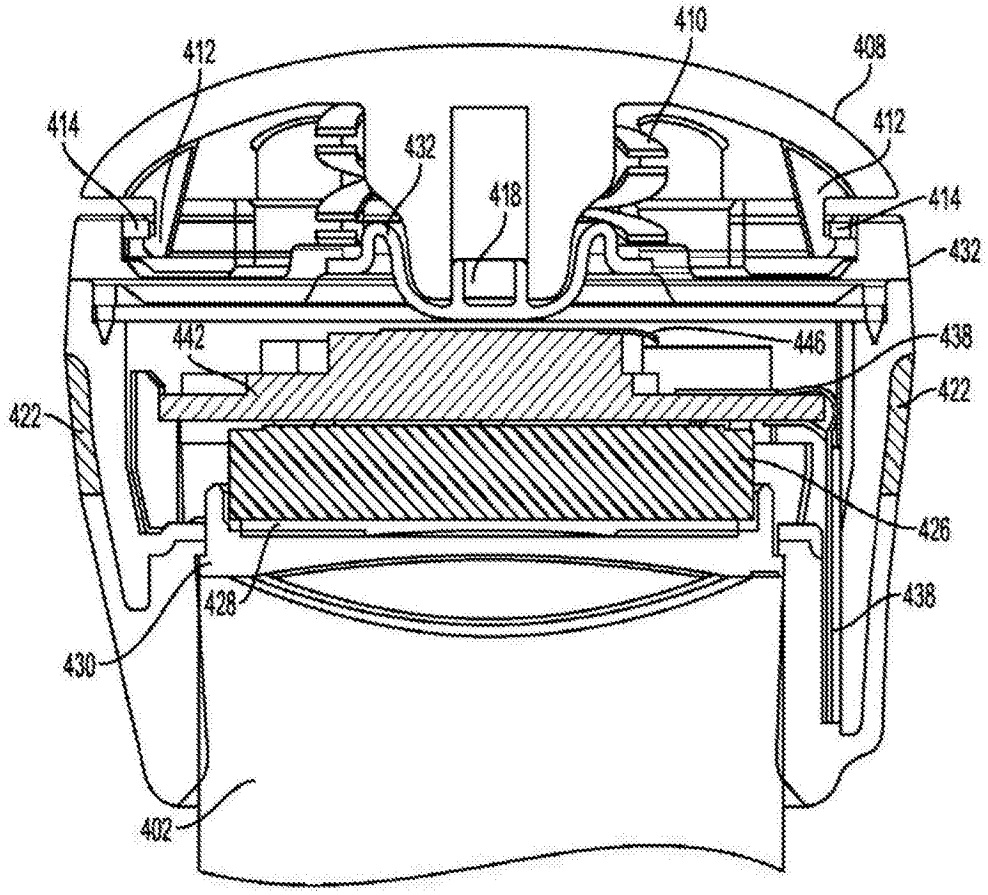
图9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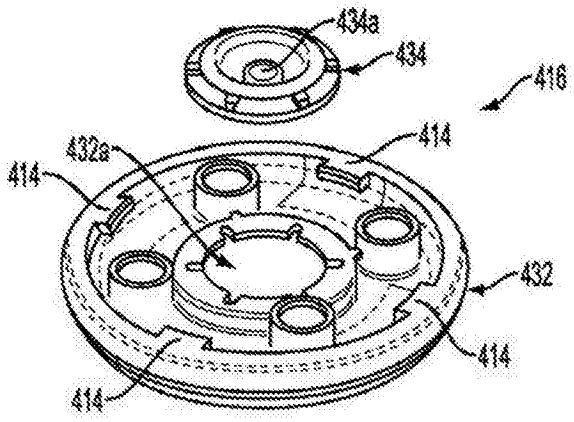
402

图10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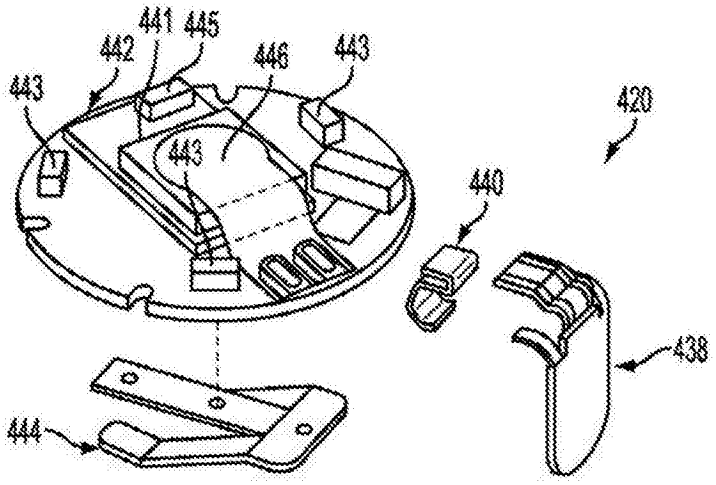
432a
414
432
414
414

图11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438
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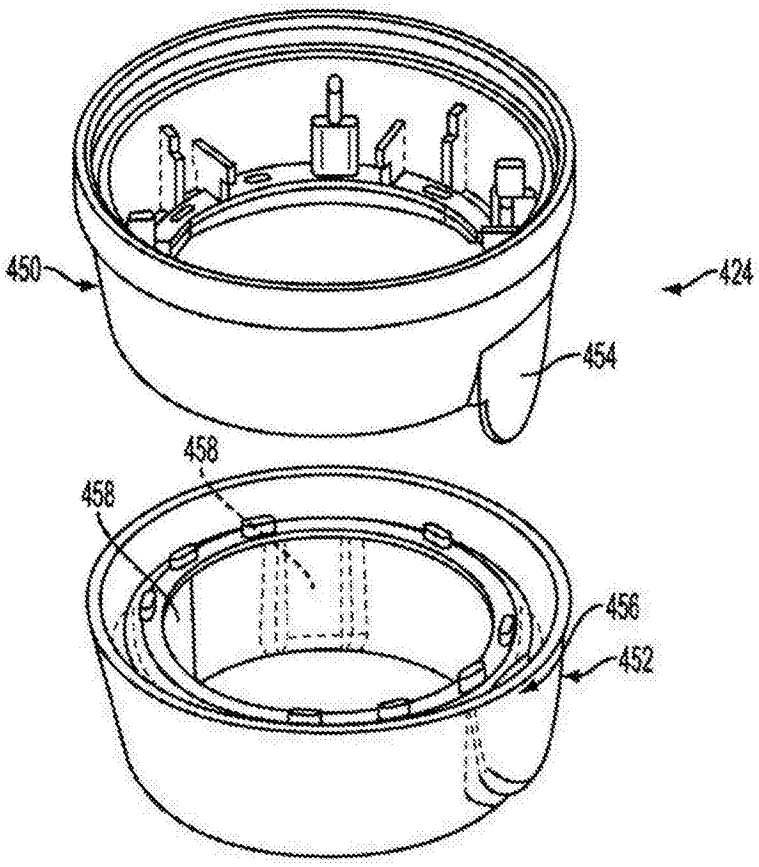
图12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424
454
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458
456
452

图13

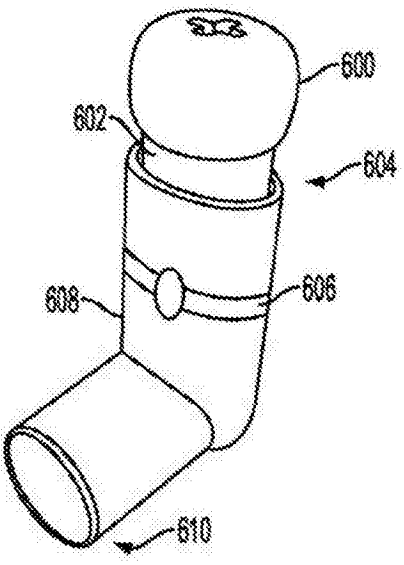
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图14

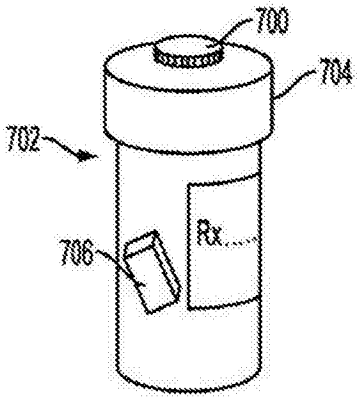


图15

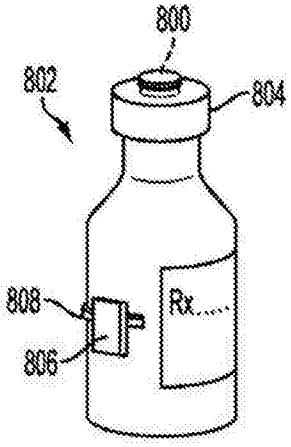


图16

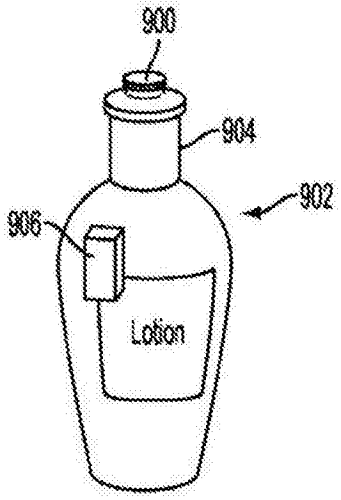


图17

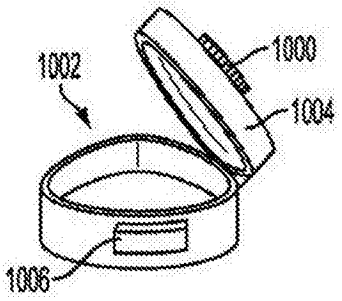
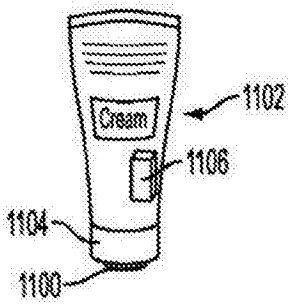


图18



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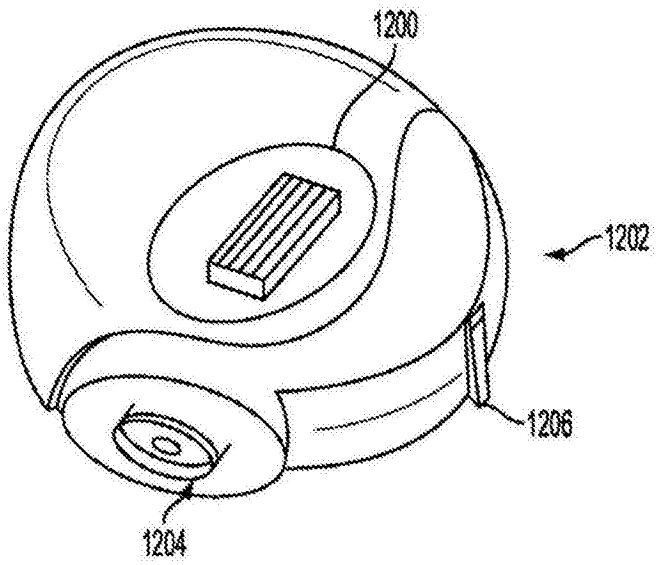


图20

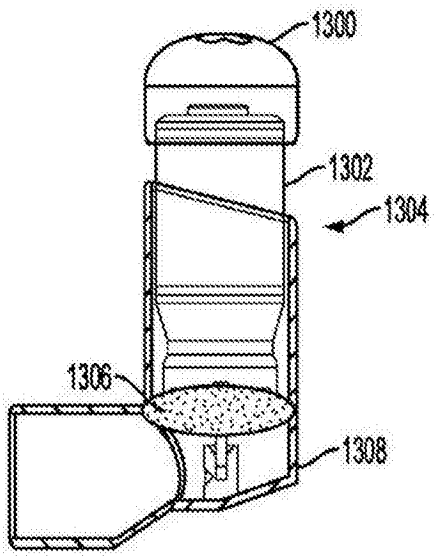


图21

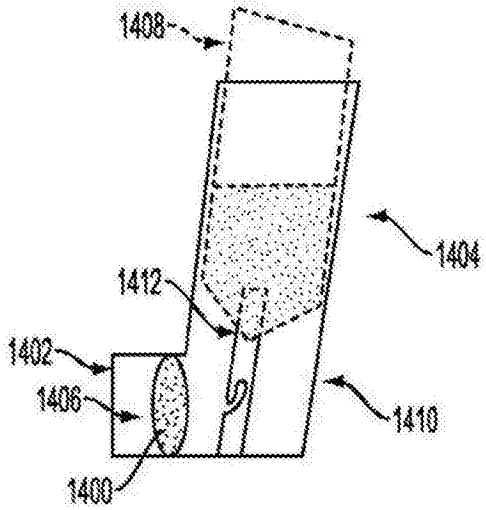


图22

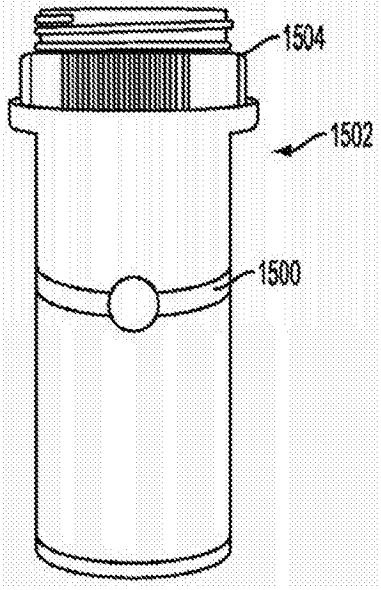
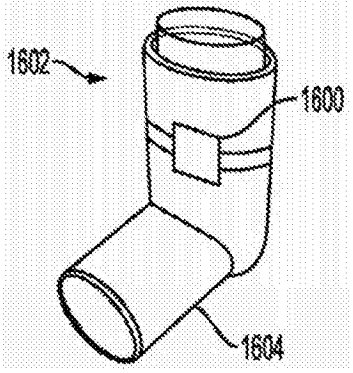


图23



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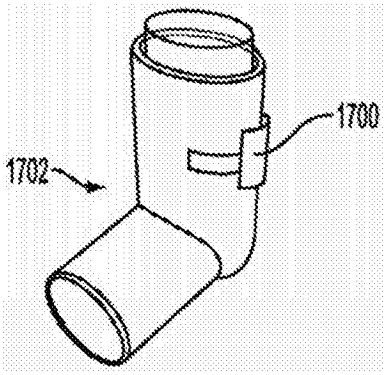

图25

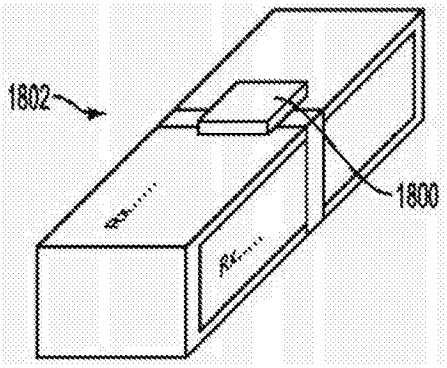

图26

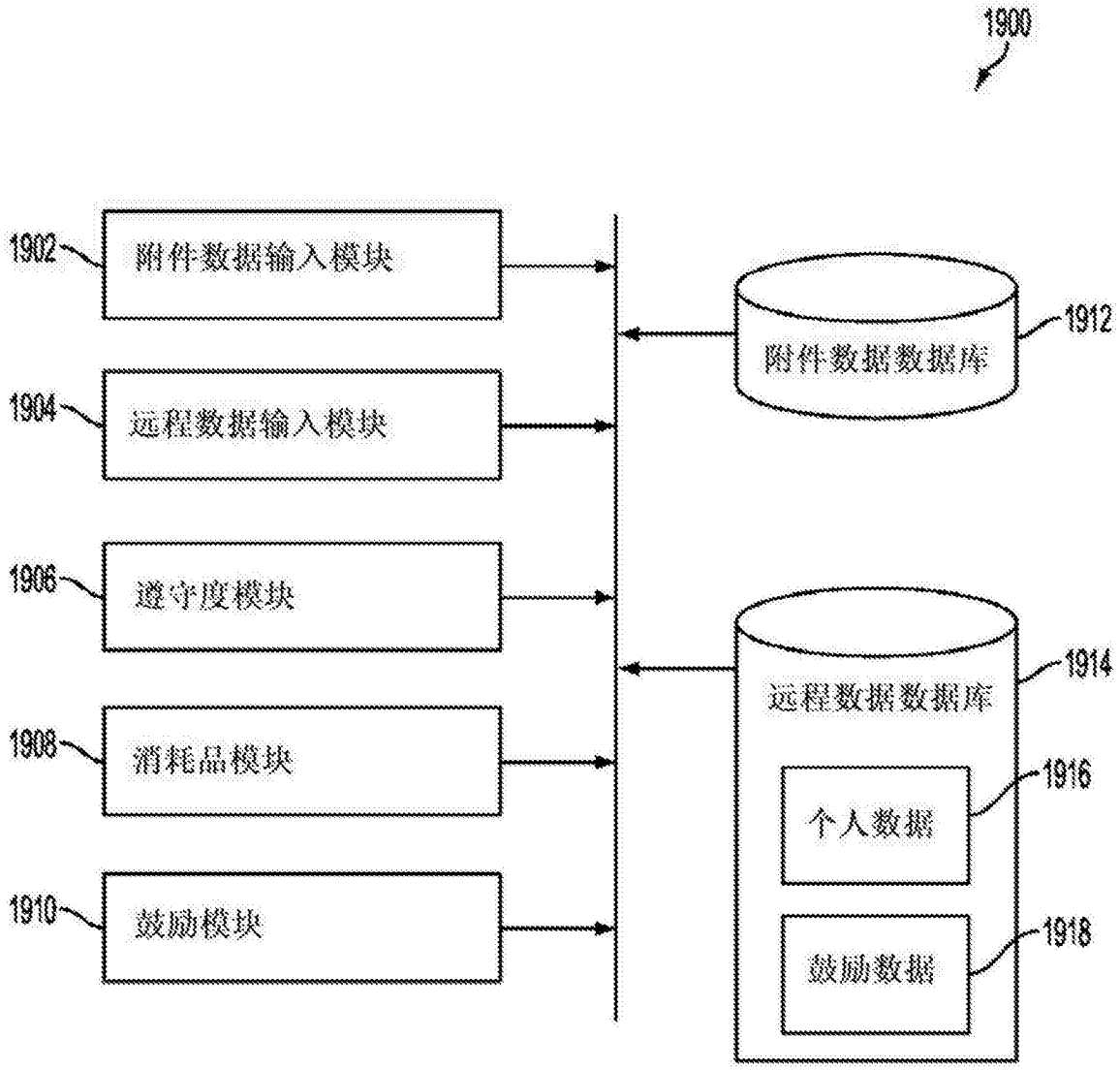
1900
1902
附件数据输入模块
1904
远程数据输入模块
1906
遵守度模块
1908
消耗品模块
1910
鼓励模块
1912
附件数据数据库
1914
远程数据数据库
1916
个人数据
1918
鼓励数据

图27