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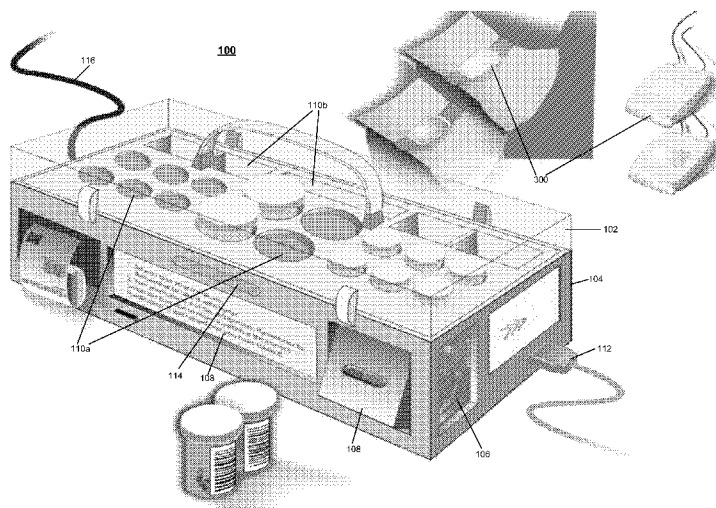


FIGURE 1

(57) Abstract: A self medication management system and method comprising at least a plurality of receptacles, a scanner, a display screen, and a processor to acquire medication information from a medication container, determine whether the medication information exists in a first database, if the medication information does not exist in the first database, associate the medication information with a location information comprising a receptacle and store the medication information and the location information in the first database, indicate the location information, and confirm placement of the medication container in the associated receptacle, notify a user to administer the medication held in the medication container, and request the user to scan the medication container of the notified medication, detect retrieval of an incorrect medication container from the plurality of receptacles, and issue a warning of the detection, and provide instructions for administering the medication.



HOME MEDICATION MANAGER

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims benefit of U.S. Provisional Application No. 61/783,798, filed March 14, 2013, and U.S. Provisional Application No. 61/888,764, filed October 9, 2013, the entire contents of both of which are incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates generally to medication management, and in particular to a home self medication management method, system and apparatus which monitors medication administration including dosage and timing.

BACKGROUND

[0003] Often it is difficult for a patient to remember to take prescribed medication. This can be especially true for patients who are prescribed multiple medications that need to be taken at different frequencies and times of day. This problem can be compounded by patient confusion, reduced short-term memory, etc. Missing a dose of medication, accidentally taking a pill twice, and/or adverse interaction between prescribed medications are all significant causes of adult visits to emergency rooms. For example, according to data reported by Medicare, heart failure patients were prescribed an average of twelve (12) medications, and some were prescribed as many as thirty (30) different types of medication. With half of these medications taken 2 or 3 times per day, this amounts to over 100 pills per day, all needing to be coordinated to be taken at specific times and following specific instructions, such as taken with meals, with water, while fasting, etc. In the year 2000, the costs of medication-related morbidity in ambulatory care setting exceeded \$177.4 billion. Moreover, lack of medication compliance after discharge from the hospital is a primary reason for patients being re-admitted.

[0004] Because of these issues and others, it is imperative that today's technology provide appropriate clear directions on when a particular medication is needed and how it is to be taken (e.g. with food and/or water). Hence there is a need for medication reminders, medication dispensers and devices that combine the informing and dispensing functions that

can help patients manage their medications and reduce the risk that a patient will miss taking his medication or will take his medication twice, which increases the possibility of adverse effects caused by the medication.

SUMMARY OF THE DISCLOSURE

[0005] A novel system, method and apparatus, e.g., “home medication manager”, for medication management is presented. The inventive apparatus can serve as a home base medication manager and also can be transported anywhere at any time simply by unplugging it. The home medication manager can provide both verbal and visual instructions for accurate self medication management. In one embodiment, the home medication manager can obtain all the necessary information and/or instructions for daily consumption of an individual’s medication from a descriptive barcode provided on the original container supplied by the pharmacist (local or mail order). In another embodiment, information can be obtained from user input. One embodiment comprises a variety of medication holders, for example a total of twenty (20), that accommodate different sizes of original medication containers including containers for pills, for liquids and/or foil containers, e.g., blister packs.

[0006] An embodiment of the present invention includes a system comprising: a base comprising a plurality of receptacles, each receptacle having a sensor, a visual indicator, and a securing mechanism, the system further comprising a scanner, a display screen, a power source, a memory device, a storage device, and a hardware processor coupled to the memory device and couple-able to the storage device, the processor configured to acquire, using the scanner, medication information from a medication container holding a medication, the medication information comprising at least an administration time; the processor further configured to determine whether the medication information exists in a first database residing on the storage device, if the medication information does not exist in the first database, to associate the medication information with a location information comprising at least a receptacle and store the medication information and the location information in the first database, to indicate, using the receptacle visual indicator, the location information, and confirm, using the receptacle sensor, placement of the medication container in the associated receptacle in accordance with the securing mechanism, notify a user to administer the medication held in the medication container based on the administration time, and request the user to scan, at the scanner, the medication container of the notified medication, to detect,

based on the scan of the medication container, retrieval of an incorrect medication container from the plurality of receptacles, and issue a warning of the detection, and to provide instructions on the display screen for administering the medication, the instructions based on the medication information.

[0007] An embodiment of the present invention performs the steps of: acquiring medication information from a medication container holding a medication, the medication information comprising at least an administration time, determining whether the medication information exists in a first database residing on a storage device, if the medication information does not exist in the first database, associating the medication information with a location information comprising at least a receptacle having at least a visual indicator, a sensor and a securing mechanism, and storing the medication information and the location information in the first database, indicating, using the receptacle visual indicator, the location information, and confirming, using the receptacle sensor, placement of the medication container in the associated receptacle in accordance with the securing mechanism, notifying a user to administer the medication held in the medication container based on the administration time, and requesting the user to scan, at the scanner, the medication container of the notified medication, detecting, in accordance with the scanner, retrieval of an incorrect medication container, and issuing a warning of the detection, and providing instructions on the display screen for administering the medication, the instructions based on the medication information.

[0008] A computer readable storage medium storing a program of instructions executable by a machine to perform one or more methods described herein also may be provided

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings wherein:

[0010] FIG. 1 illustrates an embodiment of the present invention.

[0011] FIG. 2 illustrates a block representation of an embodiment of the present invention.

[0012] FIG. 3 illustrates a receptacle for original medication containers in an embodiment of the present invention.

[0013] FIG. 4 is a flow diagram of a process executed by an embodiment of the present invention.

[0014] FIG. 5-8 illustrate aspects of embodiments of the present invention.

[0015] FIG. 9 illustrates a block representation of an embodiment of the present invention.

[0016] FIG. 10-12 illustrate additional aspects of embodiments of the present invention.

DETAILED DESCRIPTION

[0017] FIG. 1 illustrates an embodiment of the present invention in which a home medication manager **100** comprises a portable medication storage and management apparatus. FIG. 2 illustrates a block representation of an embodiment of the home medication manager **100**. The home medication manager **100** includes a locking lid **102** and a base housing **104**. A barcode reader or scanner **106** is provided on an outside surface of the base housing **104**. Additionally, the base housing **104** includes at least one display screen **108** on an outside surface. A top surface of the base housing **104** can be formed into a plurality of medication holders or receptacles **110**. The base housing can further include at least one speaker **114**, which can be used to provide voice prompts from the home medication manager to remind a patient to take medication.

[0018] The scanner **106** may be configured to read one or more of Universal Product Code indicia (UPC), Quick Response (QR) code, high capacity color barcode (HCCB) from a medication container. In another embodiment, the scanner **106** can be configured to read unpowered near-field communication (NFC) tags provided on a medication container. The UPC indicia may be used to identify the individual medication held within the medication container. The more data-dense indices, such as QR, HCCB and NFC tags, may contain medication related information, such as dosage instructions, expiration date, remaining refills, and interaction information. In one embodiment, the scanner **106** can be a barcode reader which will be capable of reading both three-dimensional and two-dimensional barcodes. When a patient receives a new medication or a refill/renewal, the patient will scan the barcode located on the original medication container of the new or refill medication. The

home medication manager **100** can determine from the scanned barcode information whether the original medication container contains a new medication or a refill. Then the home medication manager **100** can assign a new receptacle **110**, e.g., location, if it is a new medication or the same receptacle, e.g., location, as the previous original medication container if the medication is a refill or renewal.

[0019] The display screen **108** may be a liquid crystal display (LCD), an e-paper/e-ink display, or an organic LED (OLED) display, or other displays as known to one skilled in the art. The display screen **108** can function to provide usage instructions to the patient, as well as alerts, such as time to take a medication, expiration of a medication, warnings, etc. The display screen **108** can also be equipped with a touch sensitive interface that enables user interaction between the home medication manager **100** and the patient. For example, the patient/user can input information related to a scanned medication by way of the touch interface when prompted on the display screen **108**. In one embodiment, a second display screen **1001**, as shown in FIG. 10, can be placed on an outer surface of the base housing **104**. This second display screen **1001** can be a high density color LCD display capable of displaying a color image of the medication, e.g., a pill, that the patient is scheduled to take, so that the patient can be assured that he is taking the correct pill. For example, the patient is notified that it is time to take medication. The slot containing the medication due to be taken is illuminated or otherwise indicated. The patient removes the bottle of medication and removes one of the pills, and the image of the pill is displayed on the color LCD screen. The patient is directed to compare the pill in hand with the pill on the screen to assure it is the same pill. The direction to the patient can be given audibly and/or visually on the display screen **108**.

[0020] The receptacles **110** can hold the various original medication containers. Some of the receptacles can be designated as bottle receptacles **110a** and dimensioned to receive standard sizes of pill bottles, liquid dropper bottles, and the like. Other receptacles can be designated as blister pack receptacles **110b**, which are dimensioned to receive pills housed in a blister pack. An individual medication bottle holder receptacle or slot **110a** can contain a securing mechanism, such as spring loaded sides **301**, as shown in FIG. 3. These spring loaded sides **301**, for example, can apply tension to the original medication container and keep it tightly fitted in the slot **110a** and greatly decrease the chances that the original medication container

falls out of the slot during movement and/or transport of the home medication manager **100**. Other mechanisms for securing the original medication container in the slot can also be used.

[0021] In one embodiment, the home medication manager **100** can be powered by an AC power source **112** or rechargeable battery **202** as shown in FIG. 2. A power supply / charging circuit **204** can be coupled to the AC power source **112** and the battery **202**. The power supply / charging circuit **204** can control charging of the rechargeable battery when the home medication manager **100** is plugged into an AC power source **112**. Additionally, the power supply / charging circuit **204** can condition the output power from the AC power source **112** or rechargeable battery to provide appropriate voltages and currents to the various components of the home medication manager **100**. The home medication manager **100** can accept 12V, 110V, 220V power input, but is not limited to this. Whenever any external power sources are available, the home medication manager **100** can be powered by this available external source and in addition the internal rechargeable battery, such as a Lithium-Ion battery, can charge. If external power is lost, there can be a seamless switch over to the internal battery and when external power is restored there can be a seamless switchover back to the external power and the internal battery can begin charging.

[0022] The home medication manager **100** can have a hardware processor or controller **206**, such as a microcontroller or Field Programmable Gate Array (FPGA), which can perform various operations. The controller **206** can execute instructions as described below. These instructions can be stored, for example, on a memory device and/or computer readable medium, such as a computer readable storage device **208**. The computer readable media may be any available non-transitory media that is accessible by computer system, and it may include both volatile and non-volatile media, and removable and non-removable media, such as random access memory (RAM) and/or cache memory or others. A hardwire network connection can be provided to the controller to allow for data transfer and/or software upgrades. In addition, or in the alternative, wi-fi can be included to enable the controller to connect with one or more external sources. In one embodiment, the controller can communicate with smartphones and/or tablets.

[0023] The controller **206** can control scanning of the original medication container by the scanner **106** and can provide instructions and/or alerts through the one or more display screens **108**. Additionally, when scanning an original medication container, the controller **206**

can determine whether the medication is a new medication or a refill by referencing information stored in the memory / storage device **208**. In one embodiment, a database of current managed medications, which is discussed in more detail below, is stored in the memory / storage device **208**. New medication can be added to this database or to other data stored in the memory / storage device **208**. Additional information regarding the scanned medication, such as usage instructions, number of refills and expiration date can be acquired either from the indicia scanned from the original medication container, if available, or through interaction with the patient / user via the display screen **108**. This information can be stored in the database of current managed medications as well.

[0024] The controller can also select an available receptacle **110** to receive the new or refill original medication container and can indicate the selection by illuminating an LED **210** associated with the selected receptacle **110**. A sensor **212**, such as photodiode and LED assembly, disposed inside each of the receptacles **110** can be triggered when the original medication container is received by the selected receptacle **110**. Other sensors, as known to one skilled in the art, can also be used. The trigger of the sensor is received by the controller **206** which verifies that the original medication container has been placed in the correct receptacle **110**. The controller can associate the receptacle assignment, e.g., location, with the medication held in the original medication container and stored in the assigned receptacle, e.g., location, in the database of current managed medications.

[0025] The controller **206** may indicate a time for taking a medication by referring to inputted information by the patient / user or based on known interactions with other prescribed medications under management. For example, if medication A and medication B should not be taken together, the controller **206** will adjust administration times accordingly. In one embodiment, time can be tracked by a clock circuit **214**. Moreover, the controller **206** may adjust the timing of medication administration so that a patient is not alerted to take the medications during preset sleep hours, for example between 11PM and 8AM, or other time intervals set by the patient.

[0026] When it is time for a medication to be taken, the patient is notified by a notification means such as a buzzer **216** or short range wireless communication provided by a wireless communication circuit **218**, such as Bluetooth, in communication with a paired bracelet, e.g.,

wrist alert, or fob, which can be worn, for example, as a pendant **300**. In one embodiment, the notification can occur when the bracelet or pendant **300** lights up and/or vibrates. Other notification means can also be used. Additionally, the controller **206** can activate the LED **210** corresponding to the receptacle **110** holding the medication to be taken. If the patient inadvertently retrieves a medication from the incorrect receptacle **110**, the controller **206** can detect the occurrence by way of the sensor **212** associated with the receptacle **100** and can display a warning message on the display screen **108** and/or can sound an alert by way of the buzzer **216** and/or the speaker **114**.

[0027] In the case where the medication must be refrigerated, and thus not held in one of the receptacles **110**, the controller **206** can provide instructions on the display screen **108** to retrieve the medication from the refrigerator and can scan the barcode of the original medication container prior to administering. Scanning the barcode of the refrigerated original medication container prior to administering allows the controller **206** to verify that the correct medication is being taken.

[0028] Retrieval of the correct medication from the indicated receptacle **110** can be detected by the controller **206** by way of the sensor **212** as well. The controller **206** can record the time and date of the dosing in a database stored in the memory / storage device **208**. This database can be the same as the database of current managed medications or can be a separate database. In one embodiment, the data can be stored on an external device.

[0029] The controller **206** may provide further instructions, such as instructing the patient to take a certain number of pills or amount of liquid medication, to take the medication with food, or refrain from eating for a period after taking the medication. The instructions can be provided via the speaker **114** and/or the display screen **108**.

[0030] The wireless circuit **218** can include multiple communication protocols, such as Bluetooth, 802.11a/b/g/n, and CDMA, GSM and 3G/4G/4G LTE mobile phone communication protocols. 802.11a/b/g/n and mobile phone communication protocols can be utilized by the controller **206** to contact a medication database service for retrieving medication information relating to drug interactions, administering information, etc. In one embodiment, a cable, such as network cable with a RJ45 connector **116**, can be used to communicate to devices external from the home medication manager **100**. The wireless

circuit **218** and/or the cable can allow the controller **206** to contact a treating health organization to relay medication compliance information and other related information for the patient's health records. The controller **206** can be configured to provide encryption and decryption when sending or receiving personal health-related information in order to maintain patient privacy; in one embodiment the data will be HIPAA (Health Insurance Portability and Accountability Act) compatible. In one embodiment, the controller **206** can allow sharing of data regarding compliance, errors, device malfunction; in addition, the controller can perform updates and changes to the current therapy.

[0031] As mentioned above, the home medication manager **100** can have one or more databases in the memory / storage device **208**. In one embodiment, one database includes only data from current medication management, such as data obtained when scanning the original medication container, such as name of medication, name of manufacturer of medication, image of the medication, dosage instructions, administration instructions, e.g., frequency, administration time, storage instructions, expiration date, remaining refills, interaction data, special instructions, etc., and data indicating in which receptacle the original medication container resides, and one or more additional databases comprising information regarding patient data for the user of the home medication manager, data regarding medication interactions, compliance information, etc. In one embodiment, one database comprises all of the data and information for the patient, the medications, compliance, prescribing physician, etc. In one embodiment, the database can comprise at least a list of medications the patient is receiving along with the frequency and dosage of that medication. Using the inventive home medication manager, patient compliance can be monitored to assure the patient is adhering to the proper drug frequency, and this monitoring information can be stored in the database.

[0032] Figure 4 is a flow diagram of the inventive method. In step S401, an original medication container is scanned to obtain indicia or usage medication related information, such as medication name, manufacturer's name, dosage instructions, administering times, expiration date, remaining refills, storage instructions, interaction information, etc. In one embodiment, the medication is accepted into the system via a barcode placed on the medication container by the pharmacist. In step S402, a determination is made, based on the obtained storage information, whether or not the medication needs refrigeration. If

refrigeration is needed (S402=YES), then at S403 an instruction is given to place the medication container in the refrigerator, and processing continues at S409.

[0033] If refrigeration is not needed (S402=NO), then at step S404, a determination is made as to whether or not the medication is new or is a refill. If the medication is new (S404=NEW), then at step S405, an unoccupied receptacle, e.g., location, is identified. At step S406, an indicator associated with the identified receptacle is activated. For example, in one embodiment, the receptacle is lit to indicate the identified, activated receptacle. At step S407, an instruction is issued to the user to insert the original medication container into the identified receptacle. This instruction could be, for example, displayed on the display screen and/or issued through the speaker. The process continues at S409.

[0034] If the medication is a refill (S404=REFILL), then at S408, the receptacle holding the previous medication container is identified. This identification could be done by lighting up the receptacle, by displaying a message on the display screen, by issuing a message using the speaker, by a wrist or fob alert message, or any combination thereof.

[0035] At S409, the updated medication information can be acquired. For example, when a new prescription is prescribed, this information is acquired and added to the database. In another example, when a change in the frequency or dosage of a medication is made, this information can be acquired and updated in the database. At S410, the medication information associated with the location of the medication is stored. At S411, administering times are tracked. At S412, whether or not it is time for a medication to be taken is determined. If it is time (S412=YES), an alert is issued at S413, the receptacle containing the medication to be taken is indicated and instructions for taking the medication are provided. The receptacle can be indicated by lighting up the receptacle, by displaying a message on the display screen, by issuing a message using the speaker, by a wrist or fob alert message, or any combination thereof.

[0036] At S414, whether or not the correct medication has been dispensed is verified. If so (S414=YES), dispensing of the correct medication is recorded and the tracking can resume at S411.

[0037] If it is not determined that the correct medication has been dispensed (S414=NO), the process returns to step S413.

[0038] If it is not time (S412=NO), tracking continues at S411.

[0039] One embodiment of the home medication manager **100** can be an apparatus about the size of a shoe box, can weigh less than two pounds and can have a lock down top with a carry handle and a rechargeable battery system. In one embodiment, the present invention has a display screen and voice over IP that reminds the individual what to take, e.g., food and/or water, or not take, with his or her medication. This reminder information can be retrieved from an internal or external database. When the medication is not stored in the inventive apparatus, for example because the medication has to be refrigerated, the display screen can provide the instruction “YOUR MEDICATION IS IN YOUR REFRIGERATOR”.

[0040] Additionally, individuals being monitored by a home health agency that belongs to a Regional Health Information Organization/Health Information Exchange system can have their medication information and medication compliance added to the individual’s Electronic Health Record and sent to the health care provider and/or the emergency room by way of a wireless internet or mobile communication. The wireless technology in the present invention can remove many of the potential errors that are associated with self medicating, and offers family members, home health agencies, primary care physicians, etc., access a patient’s compliance. The system can also alert a pharmacy when the medication needs to be refilled.

[0041] FIGs. 5-8 illustrate aspects of embodiments of the present invention. FIG. 5 illustrates the power sources of the rechargeable battery and the electric cord, as well as wireless technology which can be used to communicate with the wrist band and/or pendant **300**.

[0042] FIG. 6 illustrates indicating a receptacle, e.g., lighting up the receptacle, to direct the user/patient to the correct medication container. As shown in the embodiment of FIG. 6, the user is notified to administer a medication by illuminating a receptacle and displaying instructions on the display screen. In the embodiment shown in FIG. 6, the message reminds the patient that it is time to take your medicine, reminds the patient to take the medication with water, to get the medication from the refrigerator where it is stored and to swipe the original medication container barcode to make sure the correct medication is being taken.

The inventive system can record that the patient has taken, e.g., swiped, the correct medication.

[0043] FIG. 7 illustrates that the pharmacy can be alerted when renewal for a medication is needed. FIG. 8 illustrates a lockable carry cover for one embodiment of the invention, both attached to the base (top) and detached from the base (bottom).

[0044] In another embodiment, as shown in FIG. 9, the home medication manager **900** includes all the elements described with respect to FIG. 2 above. Elements of the present embodiment that correspond to like elements in the embodiment of FIG. 2 are assigned like reference numerals in FIG. 9. In addition to the features of the embodiment of FIG. 2, the present embodiment further includes a memory card slot **902** configured to read from and write to a standard memory card, such as multimedia cards (MMC), secure digital (SD) cards – including SD high capacity (SDHC) and SD extended Capacity (SDXC) cards, memory stick, CompactFlash, Smart Media, and xD cards. Alternatively, the memory card slot **902** can be replaced with a universal serial bus (USB) connector capable of reading from and writing to a flash memory drive, commonly referred to as a flash thumb drive.

[0045] The memory card slot **902** allows removable storage on a memory card (not shown) of a patient's medical information relating to the administering of the prescribed medication. For example, the memory card inserted into the memory card slot **902** may contain a list of prescribed medications, dosages and frequency of administering that is entered by a pharmacist or other medical professional. This allows the medication information to be entered into the home medication manager **900** of the present embodiment more efficiently by not requiring manual entry of the information by the patient.

[0046] Additionally, the memory card slot **902** can enable writing and/or storing of patient data relating to when the patient takes each prescribed medication in order to track compliance with the prescribed dosage and frequency of each prescribed medication. In one embodiment, the memory card can allow for software upgrades, and can allow data to be imported into various Windows®-based programs to improve monitoring of patient care.

[0047] The home medication manager **900** also includes a printer **904** disposed within the housing of the home medication manager **900**. The printer **904** can be configured to provide a hardcopy report of a patient's medication usage and or prescription compliance. In addition, the printer **904** may be configured to allow a medical professional to provide written instructions to the patient by way of either the wireless circuit **218** or a wired network interface **906** using any of the protocols defined under the IEEE 802.x family of standards. Such written instructions may include changes to administering instructions as well as a new prescription to be presented to a pharmacist for fulfillment. In one embodiment, the printer **904** can print out one or more preformatted reports such as medication compliance, histograms, doctor visit summary, time to reorder notice, etc.

[0048] The wired network interface **906** allows connection of the home medication manager **900** to connect to a local area network (LAN) and/or a wide area network (WAN), such as the Internet, or through the Internet using an Internet Service Provider, for example. In one embodiment, communication with smartphones and/or tablets can be enabled.

[0049] In one embodiment, the present invention accepts the medication into the system via a barcode placed on the medication bottle by the pharmacist. When scanned by the barcode reader, the home medication manager directs the patient, for example, by voice over IP and screen display, to place the medication bottle in the illuminated slot **1101**, as shown in FIG. 11. This can be followed by the system naming the medication, describing the dosage and stating when to take the medication. This can be followed by voice over IP and a screen display message; "You need to take this medication once in the morning and once in the evening. What time would you like to take this medication in the morning?" Patient responds "7 AM". System responds "You said 7 AM, is this correct?" Patient responds "YES", and this information can be saved in the system. System responds "What time would you like to take your medication in the evening?" Patient responds "6 PM". System responds "6 PM, is this correct?" Patient responds "YES", and this information can be saved in the system.

[0050] In one embodiment, the home medication manager will contain both a speaker and a microphone for the purpose of communicating with the patient via voice recognition software. These devices can be located in the base housing, for example, just above the main LCD screen. The speaker can duplicate in voice what the screen is displaying. This will give

the patient two ways of receiving instructions. Third party voice recognition software can be used. For example, when it is time to take the medication, the home medication manager can remind the patient (via the vibrating and or a blinking light on the wrist band **1201** and/or on the pendant **1202**, and/or a voice prompt) as shown, for example, in FIG. 12, to go to the medication manager. Upon arrival at the medication manager, the patient sees that a particular receptacle or holder is indicated; this receptacle holds the original medication container, or bottle, containing the medication the patient is reminded to take. If the patient removes the wrong bottle, an alert tells the patient that the wrong medication is being removed.

[0051] In one embodiment, when the correct original medication container is removed, the patient is requested either verbally or on the display screen, or both, to compare the pill that is in his hand with the picture on the screen **1001**, as shown in FIG. 10, to verify that this is the correct pill. After a predetermined time, such as three (3) minutes, the patient can be asked to put the original medication container back in the indicated receptacle. If patient places the container in the incorrect receptacle, a verbal and/or written notice can be generated, saying the container has been placed in the wrong receptacle, and requesting that the container be placed in the indicated holder. In one embodiment, indication of the correct receptacle is performed by illuminating the receptacle.

[0052] In one embodiment, the home medication manager can be portable as it has a lock down cover with a handle and rechargeable battery. This portability allows an individual who is travelling to use the home medication management system without losing the information stored therein. In one embodiment, the unit can include a 12V transformer, a 12V battery, 120V AC and 240V AC. In one embodiment, a fully charged Lithium Ion battery will provide power to the home medication management system for one week.

[0053] In one embodiment, the home medication management system can contain a 3" wide thermal printer **904** in the base housing, as shown in FIG. 9. This printer can be programmed to generate specific reports just by pressing a button. For example, when a patient has a doctor's appointment, he can press a button on the base housing and the printer will print out all the medication the patient is currently taking, the dosage, the frequency and whether the patient has been compliant. The printer can also provide information to the

patient, serving as an interface between the patient and the home medication manager, instead of or in addition to a voice recognition interface.

[0054] In one embodiment, the base housing of the home medication manager can contain a Compact Flash Memory Card (not shown), operable in a memory card slot **902**, which will record all activity that the manager performs. This card can be hot swappable and the manager will function with or without it. In one embodiment, the card can hold over a year's worth of data. When the new patient option is selected, the data can be automatically erased.

[0055] In one embodiment, the inventive method described herein may be implemented as hardware on a reconfigurable hardware, e.g., FPGA (Field Programmable Gate Array) or CPLD (Complex Programmable Logic Device), by using a hardware description language (e.g., Verilog, VHDL, Handel-C, or System C). In another embodiment, the inventive method may be implemented on a semiconductor chip, e.g., ASIC (Application-Specific Integrated Circuit), by using a semi custom design methodology, i.e., designing a semiconductor chip using standard cells and a hardware description language.

[0056] The computer system may be any type of known or will be known systems and may typically include a processor, memory device, a storage device, input/output devices, internal buses, and/or a communications interface for communicating with other computer systems in conjunction with communication hardware and software, etc. Portions of the system also may be implemented on a virtual computer system, colloquially known as a cloud.

[0057] Regarding a computer readable storage medium, it may be, for example, a magnetic, optical, electronic, electromagnetic, infrared, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing; however, the computer readable storage medium is not limited to these examples. Additional particular examples of the computer readable storage medium can include: a portable computer diskette, a hard disk, a magnetic storage device, a portable compact disc read-only memory (CD-ROM), a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), an electrical connection having one or more wires, an optical fiber, an optical storage device, or any appropriate combination of the foregoing; however, the computer readable storage medium is also not limited to these examples. Any tangible

medium that can contain, or store a program for use by or in connection with an instruction execution system, apparatus, or device could be a computer readable storage medium.

[0058] The described embodiments of the present invention are intended to be illustrative rather than restrictive, and are not intended to represent every embodiment of the present invention. Various modifications and variations can be made without departing from the spirit or scope of the invention as set forth in the following claims both literally and in equivalents recognized in law.

CLAIMS

What is claimed is:

1. A self medication management system, comprising:

a base comprising:

a plurality of receptacles, a receptacle having at least a sensor, a visual indicator, and a securing mechanism;

a scanner;

a display screen; and

a power source;

a memory device;

a storage device; and

a hardware processor coupled to the memory device and couple-able to the storage device, the processor configured to:

acquire, using the scanner, medication information from a medication container holding a medication, the medication information comprising at least an administration time;

determine whether the medication information exists in a first database residing on the storage device;

if the medication information does not exist in the first database, associate the medication information with a location information comprising at least a receptacle and store the medication information and the location information in the first database;

indicate, using the receptacle visual indicator, the location information, and confirm, using the receptacle sensor, placement of the medication container in the associated receptacle in accordance with the securing mechanism;

notify a user to administer the medication held in the medication container based on the administration time, and request the user to scan, at the scanner, the medication container of the notified medication;

detect, based on the scan of the medication container, retrieval of an incorrect medication container from the plurality of receptacles, and issue a warning of the detection; and

provide instructions on the display screen for administering the medication, the instructions based on the medication information.

2. The self medication management system according to claim 1, the processor further configured to track administering of the medications in a second database residing on the storage device.
3. The self medication management system according to claim 2, the processor further configured to send information from the second database to an external source.
4. The self medication management system according to claim 1, the processor further configured to acquire additional medication information from an external source.
5. The self medication management system according to claim 1, further comprising a lid attachable to the base.
6. The self medication management system according to claim 1, further comprising a power supply couple-able to the power source, the power supply being one of a battery and power receptacle.
7. The self medication management system according to claim 6, wherein the battery is a rechargeable battery.
8. The self medication management system according to claim 1, the base further comprising a buzzer,
wherein one or both of notify and issue a warning is performed using the buzzer.
9. The self medication management system according to claim 1, the base further comprising a speaker,
wherein notification is provided using one or more of the visual indicator, the display screen and the speaker.
10. A self medication management method for managing medications using an apparatus comprising a plurality of receptacles, a receptacle having at least a sensor, a visual indicator and a securing mechanism, a scanner, a display screen, and a storage device, the method comprising:

acquiring, using the scanner, medication information from a medication container holding a medication, the medication information comprising at least an administration time;

determining whether the medication information exists in a first database residing on the storage device;

if the medication information does not exist in the first database, associating the medication information with a location information comprising at least a receptacle and storing the medication information and the location information in the first database;

indicating, using the receptacle visual indicator, the location information, and confirming, using the receptacle sensor, placement of the medication container in the associated receptacle in accordance with the securing mechanism;

notifying a user to administer the medication held in the medication container based on the administration time, and requesting the user to scan, at the scanner, the medication container of the notified medication;

detecting, in accordance with the scanner, retrieval of an incorrect medication container from the plurality of receptacles, and issuing a warning of the detection; and

providing instructions on the display screen for administering the medication, the instructions based on the medication information.

11. The self medication management method according to claim 10, further comprising tracking administering of the medications in a second database residing on the storage device.

12. The self medication management method according to claim 11, further comprising sending information from the second database to an external source.

13. The self medication management method according to claim 10, further comprising acquiring additional medication information from an external source.

14. The self medication management method according to claim 10, wherein the step of notifying is performed using one or more of a buzzer, a speaker, the display screen and the visual indicator.

15. The self medication management method according to claim 10, wherein the step of issuing a warning is performed using one or more of a buzzer, a speaker, the display screen and the visual indicator.

16. A computer program product for using a self medication management system, the computer program product comprising a non-transitory storage medium readable by a processing circuit and storing instructions run by the processing circuit for performing method steps for dynamic, semi-supervised clustering, comprises:

- acquiring medication information from a medication container holding a medication, the medication information comprising at least an administration time;

- determining whether the medication information exists in a first database residing on a storage device;

- if the medication information does not exist in the first database, associating the medication information with a location information comprising at least a receptacle having at least a visual indicator, a sensor and a securing mechanism, and storing the medication information and the location information in the first database;

- indicating, using the receptacle visual indicator, the location information, and confirming, using the receptacle sensor, placement of the medication container in the associated receptacle in accordance with the securing mechanism;

- notifying a user to administer the medication held in the medication container based on the administration time, and requesting the user to scan, at the scanner, the medication container of the notified medication;

- detecting, in accordance with the scanner, retrieval of an incorrect medication container, and issuing a warning of the detection; and

- providing instructions on the display screen for administering the medication, the instructions based on the medication information.

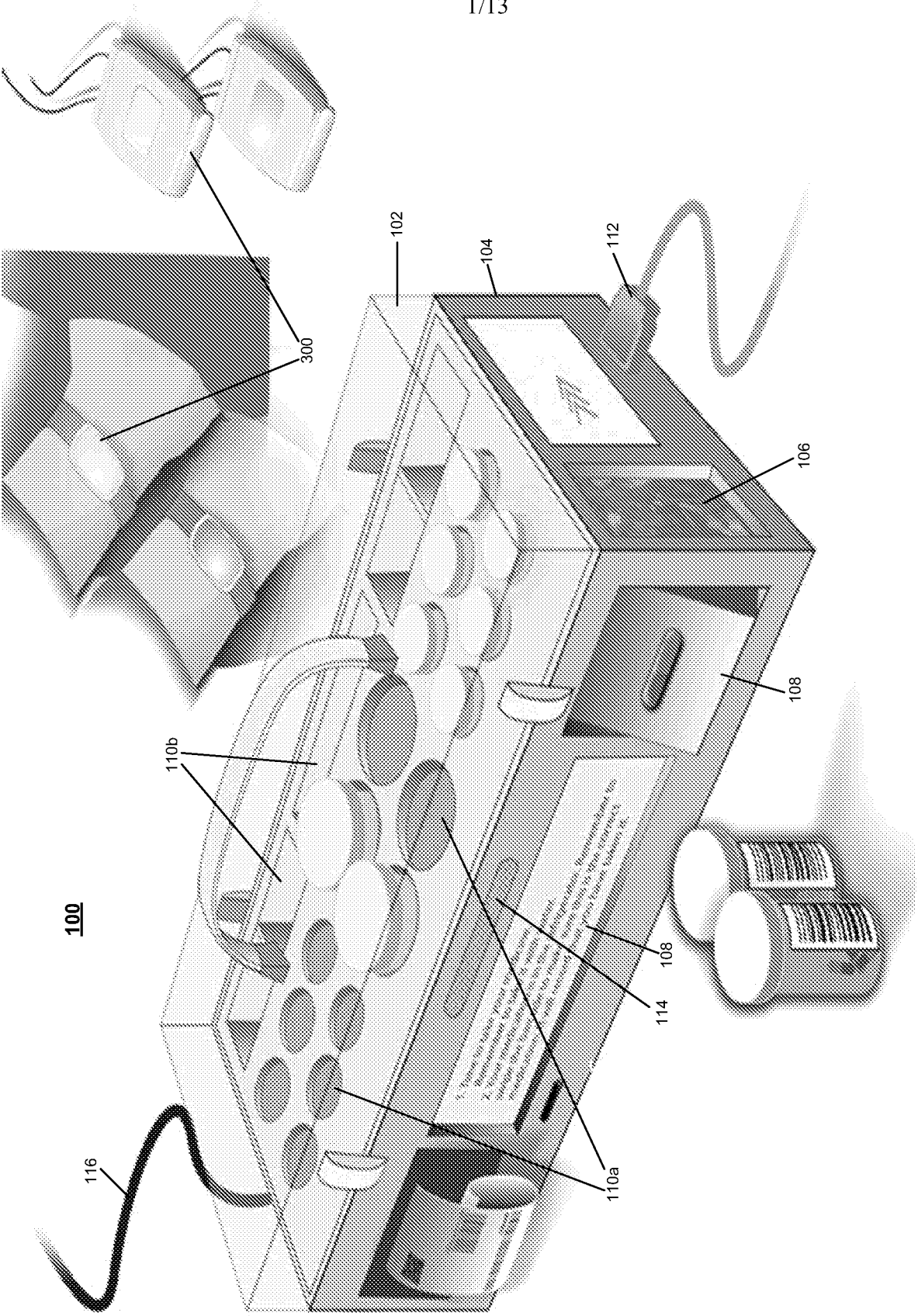
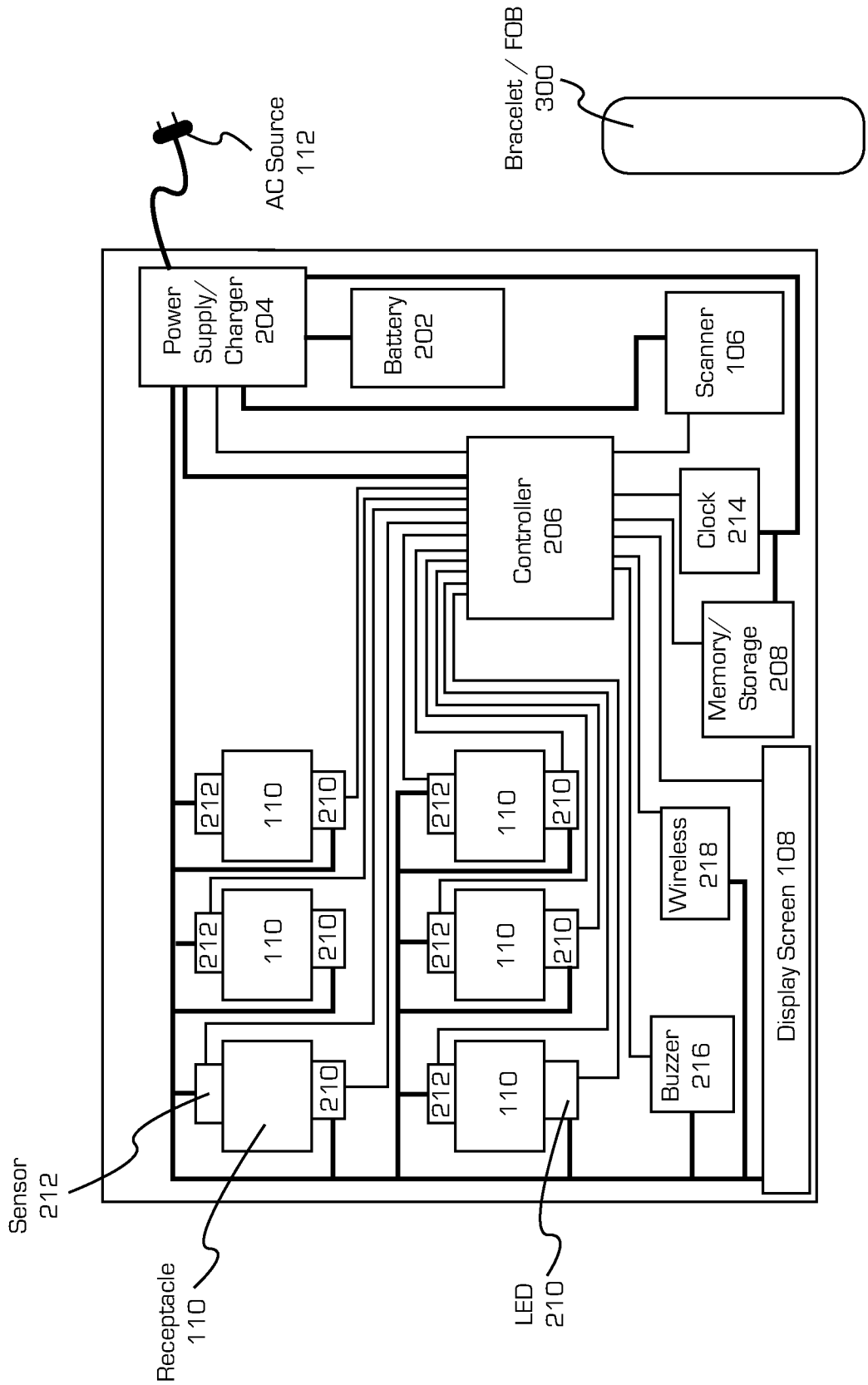


FIGURE 1

FIG. 2

100



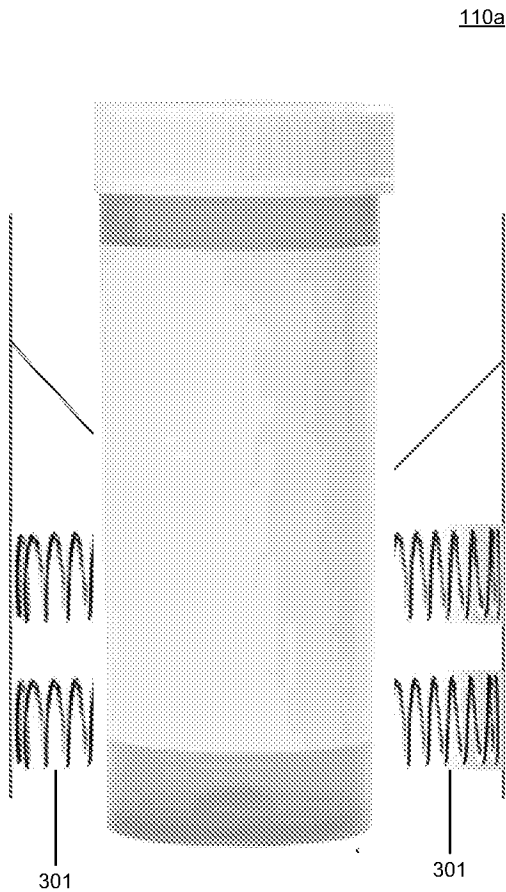


FIGURE 3

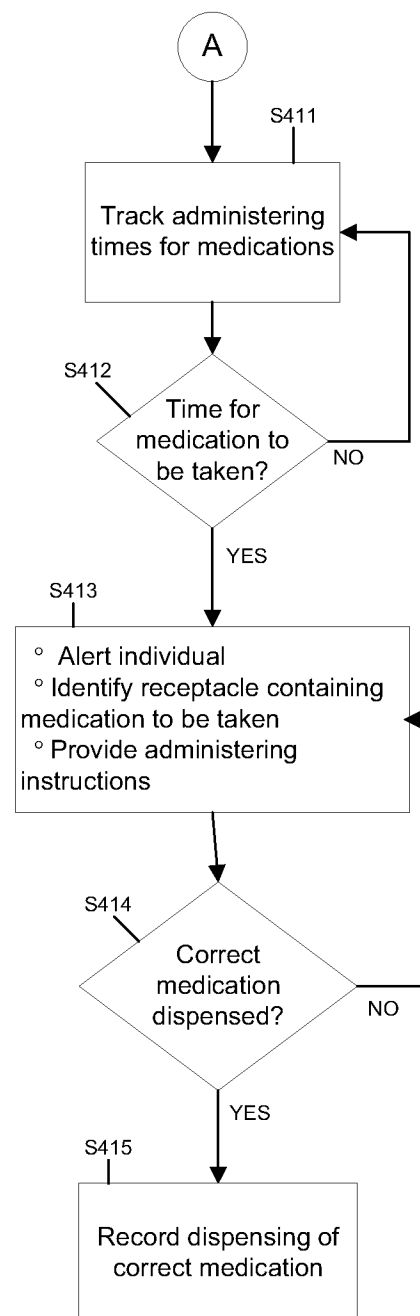
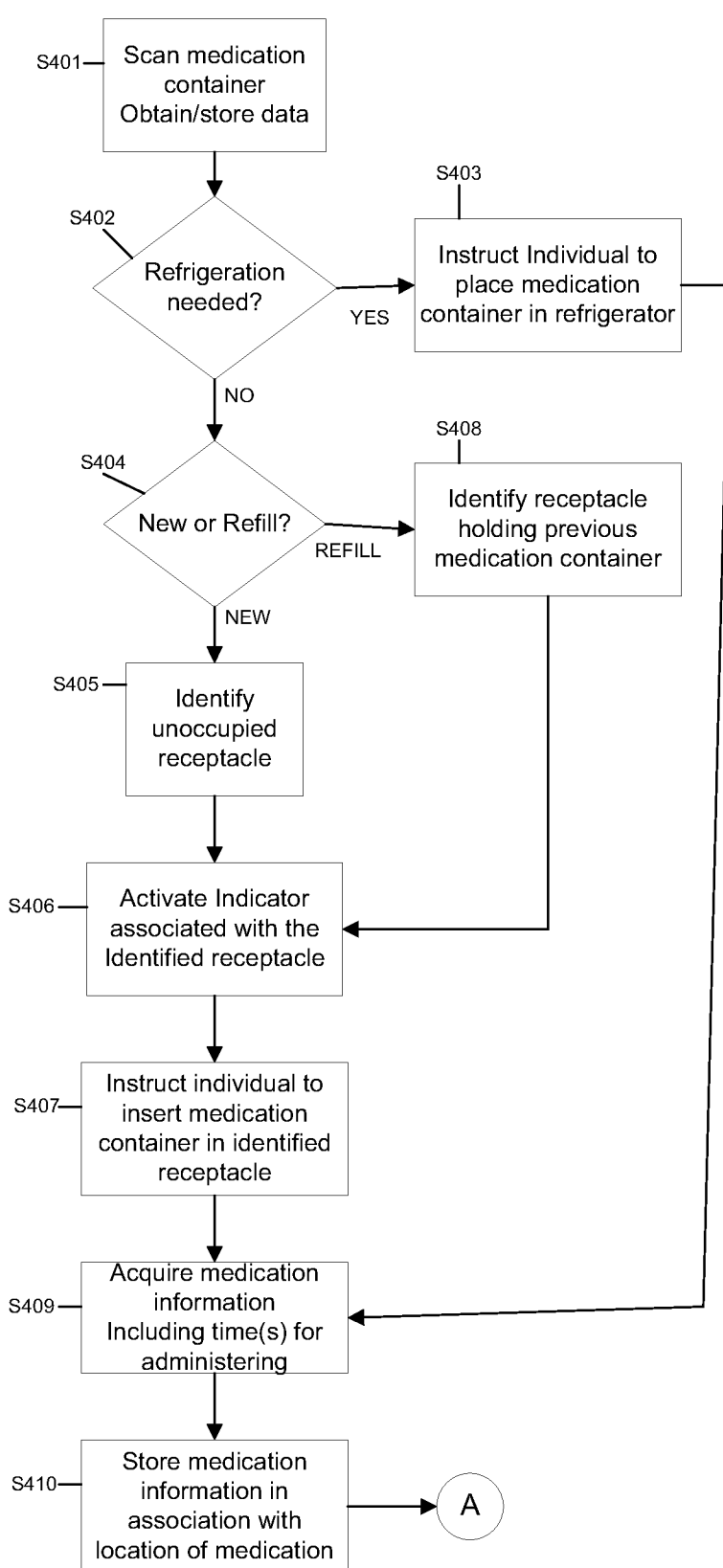
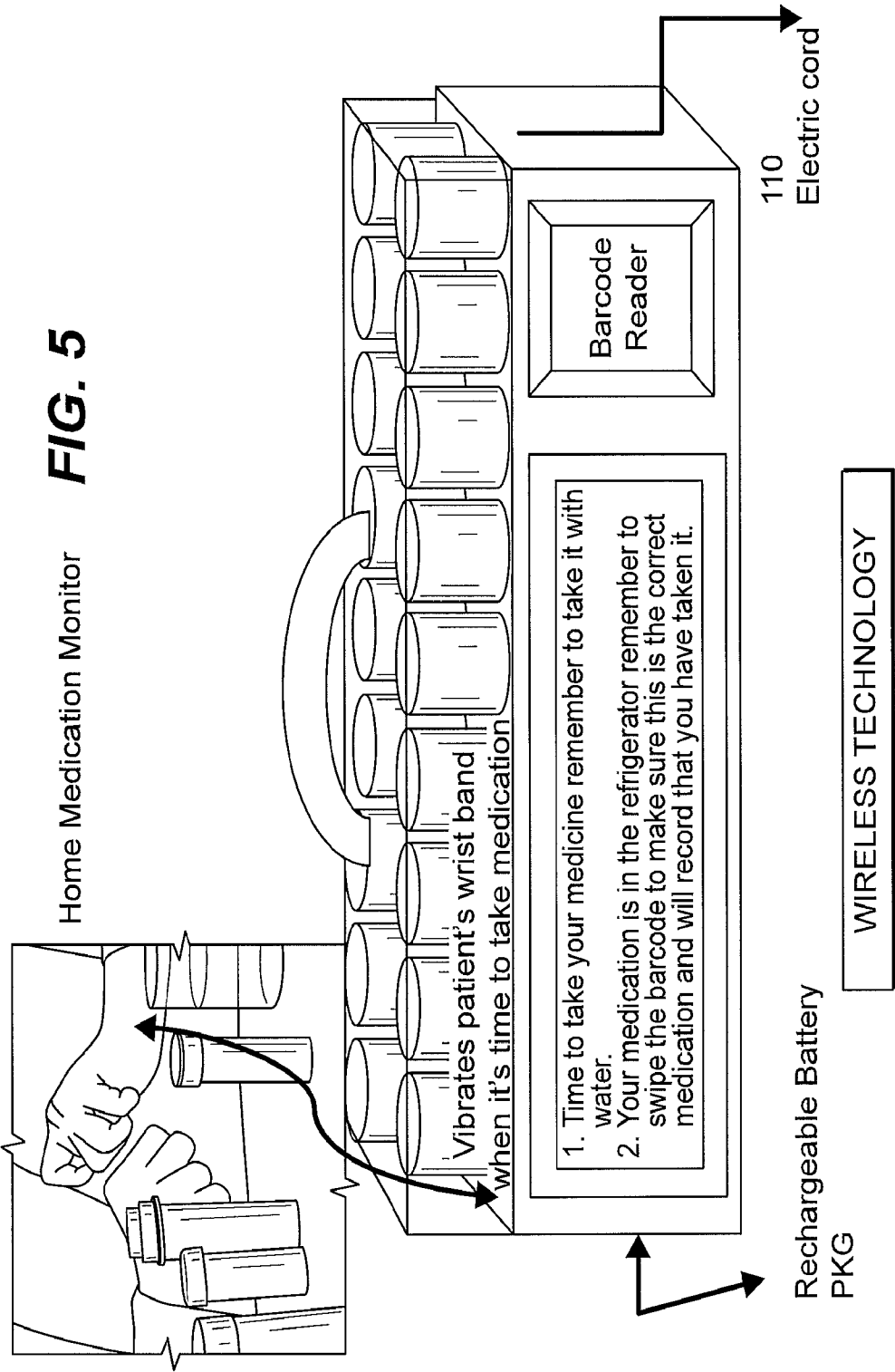


FIGURE 4



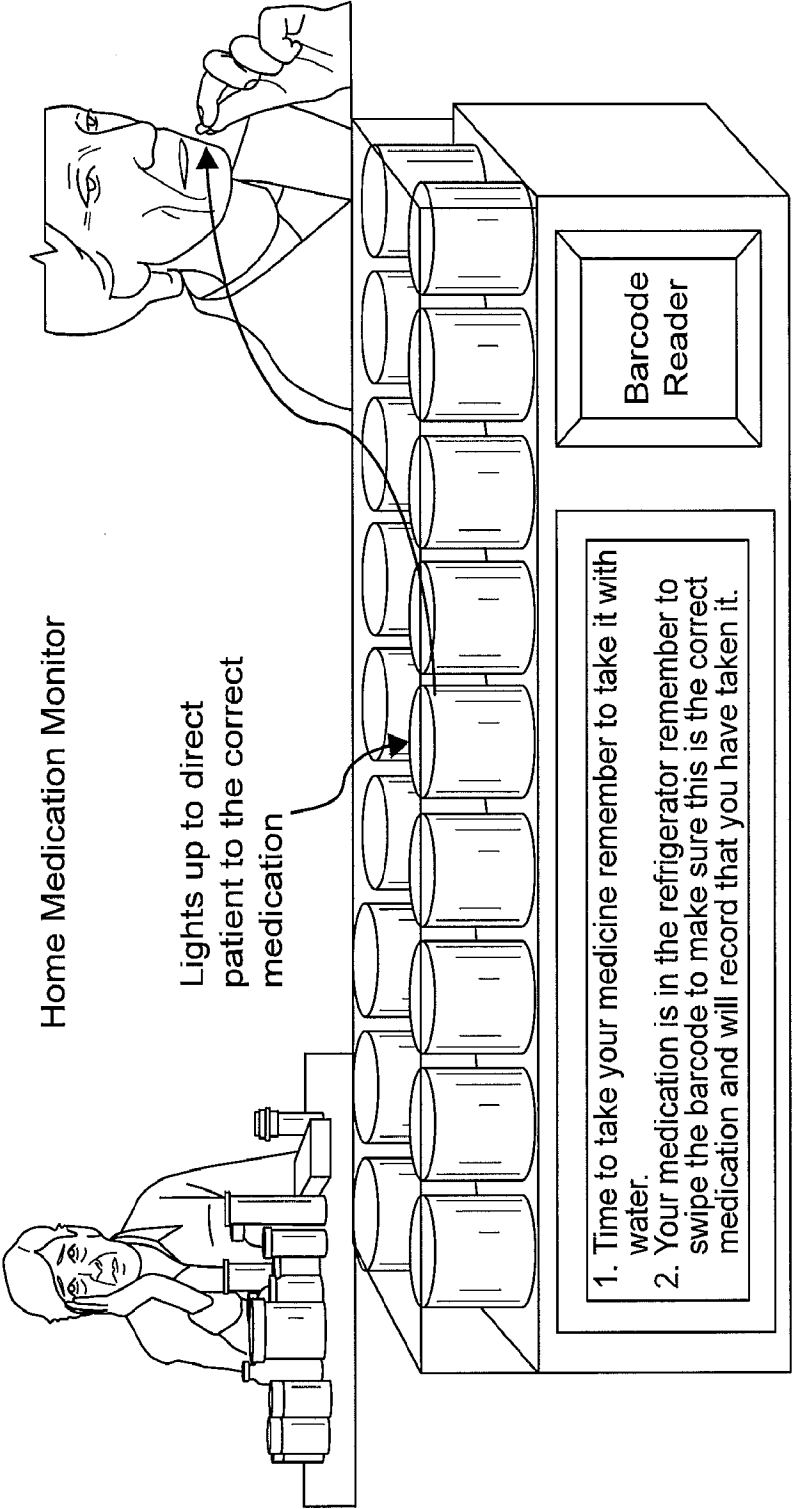


FIG. 6

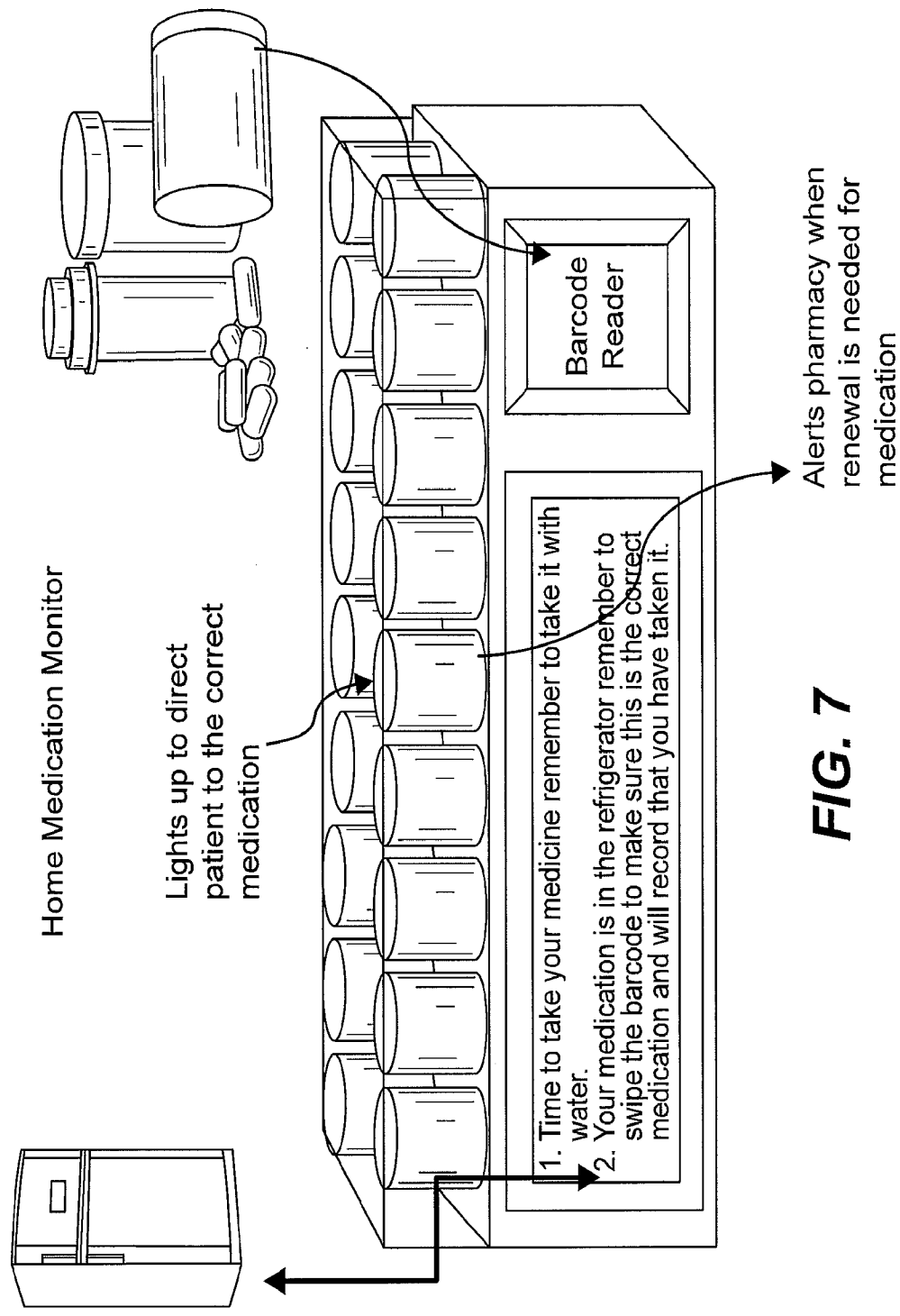


FIG. 7

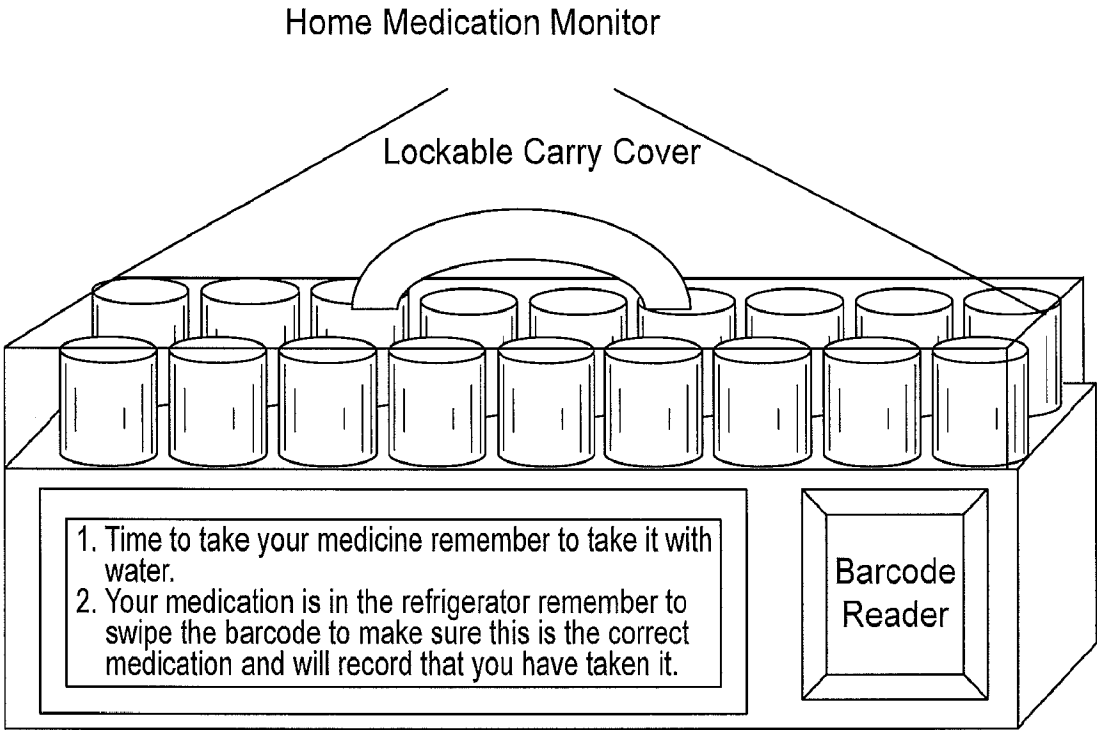


FIG. 8

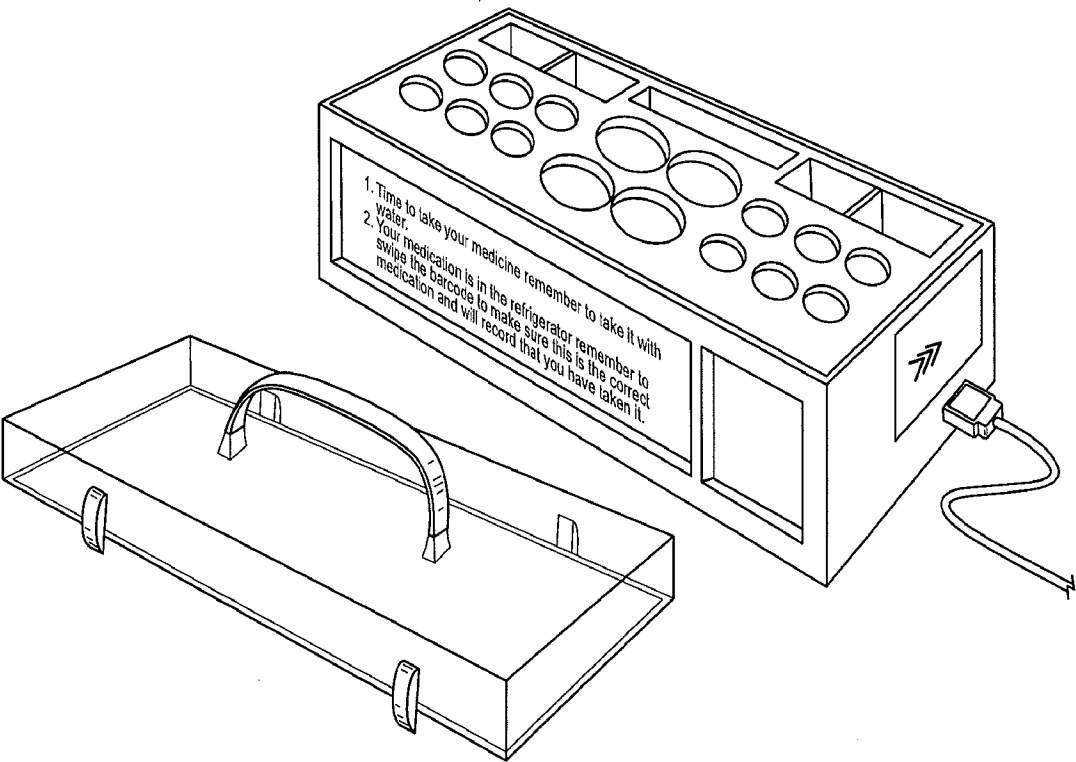
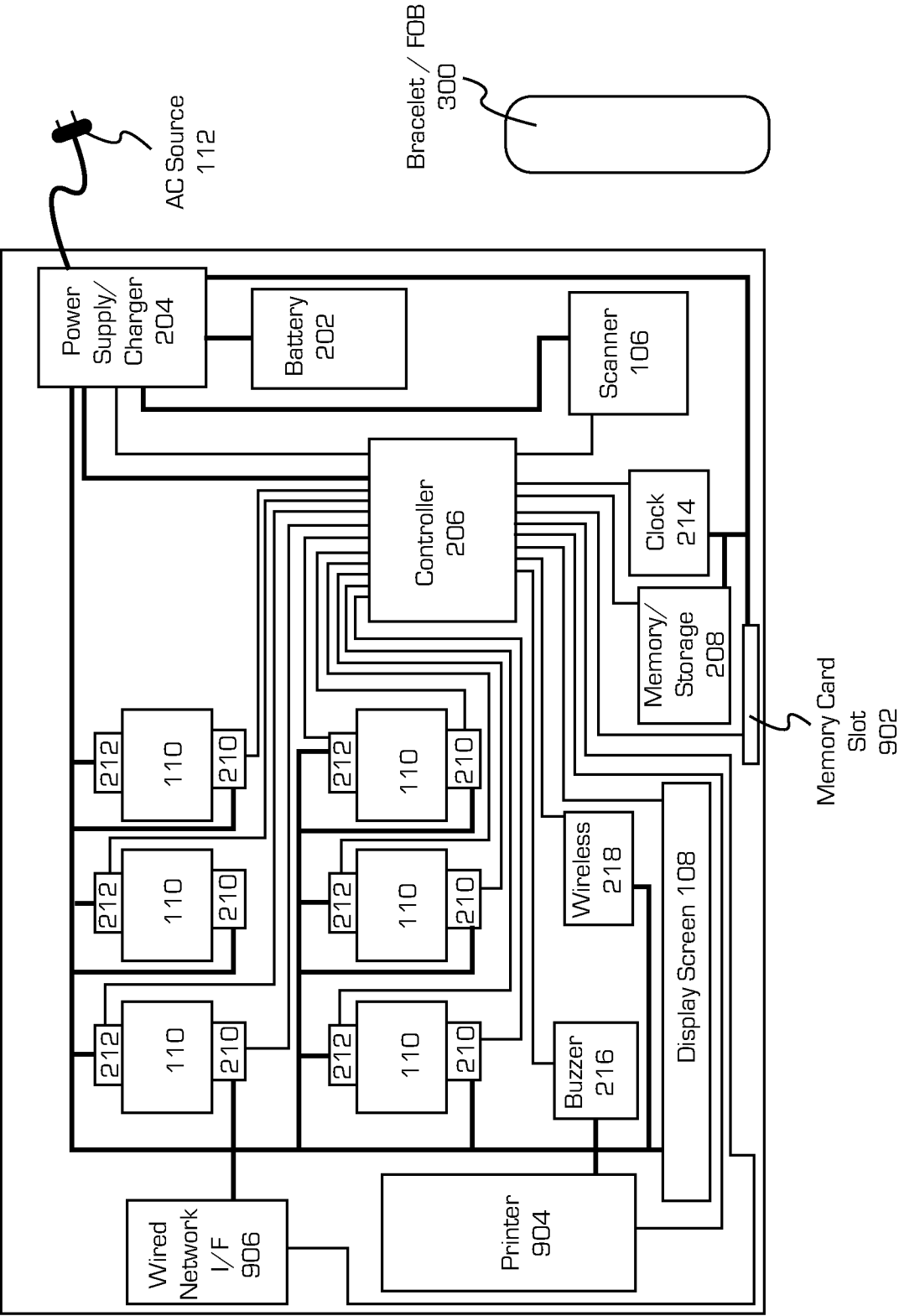
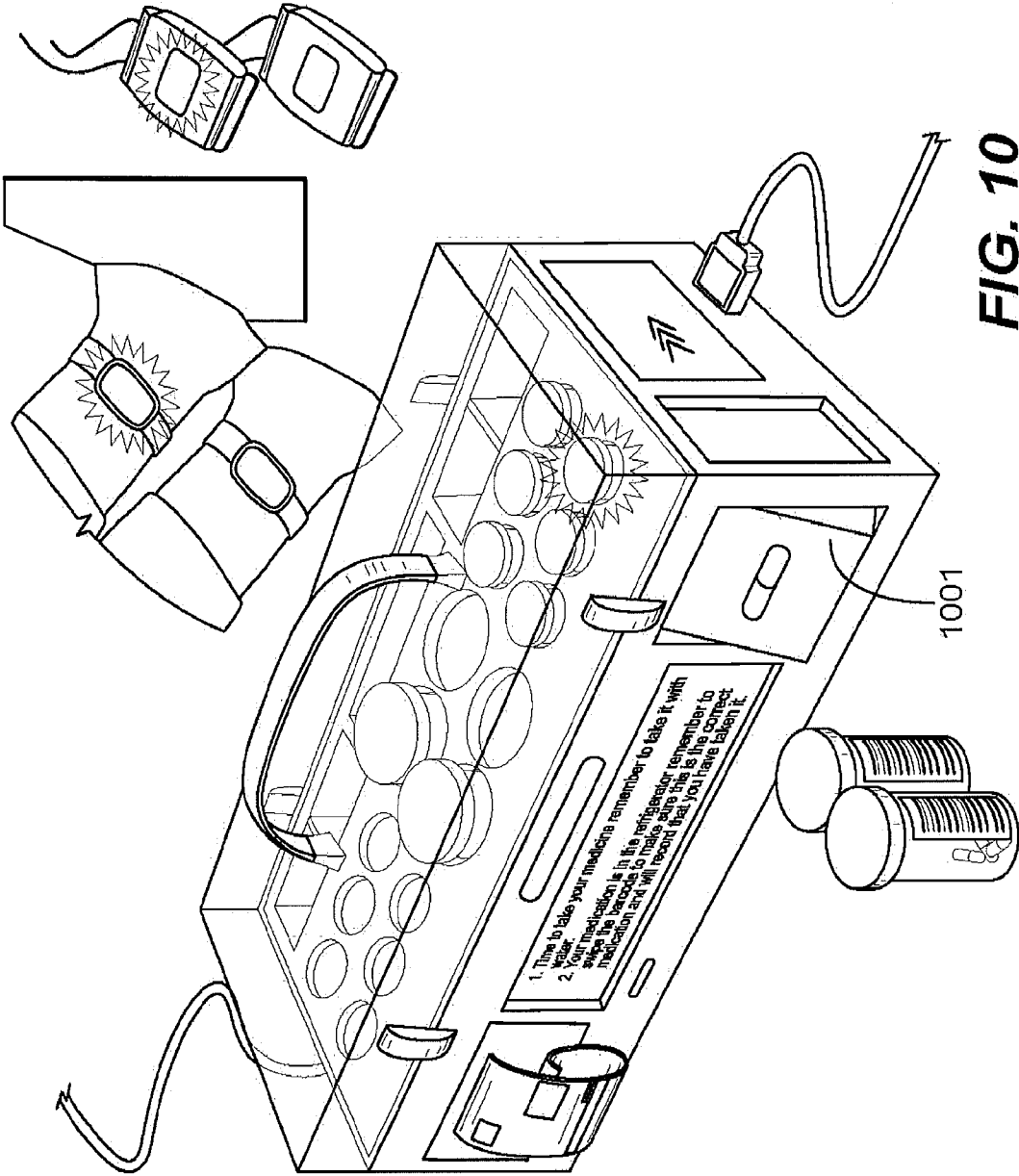


FIG. 9

900





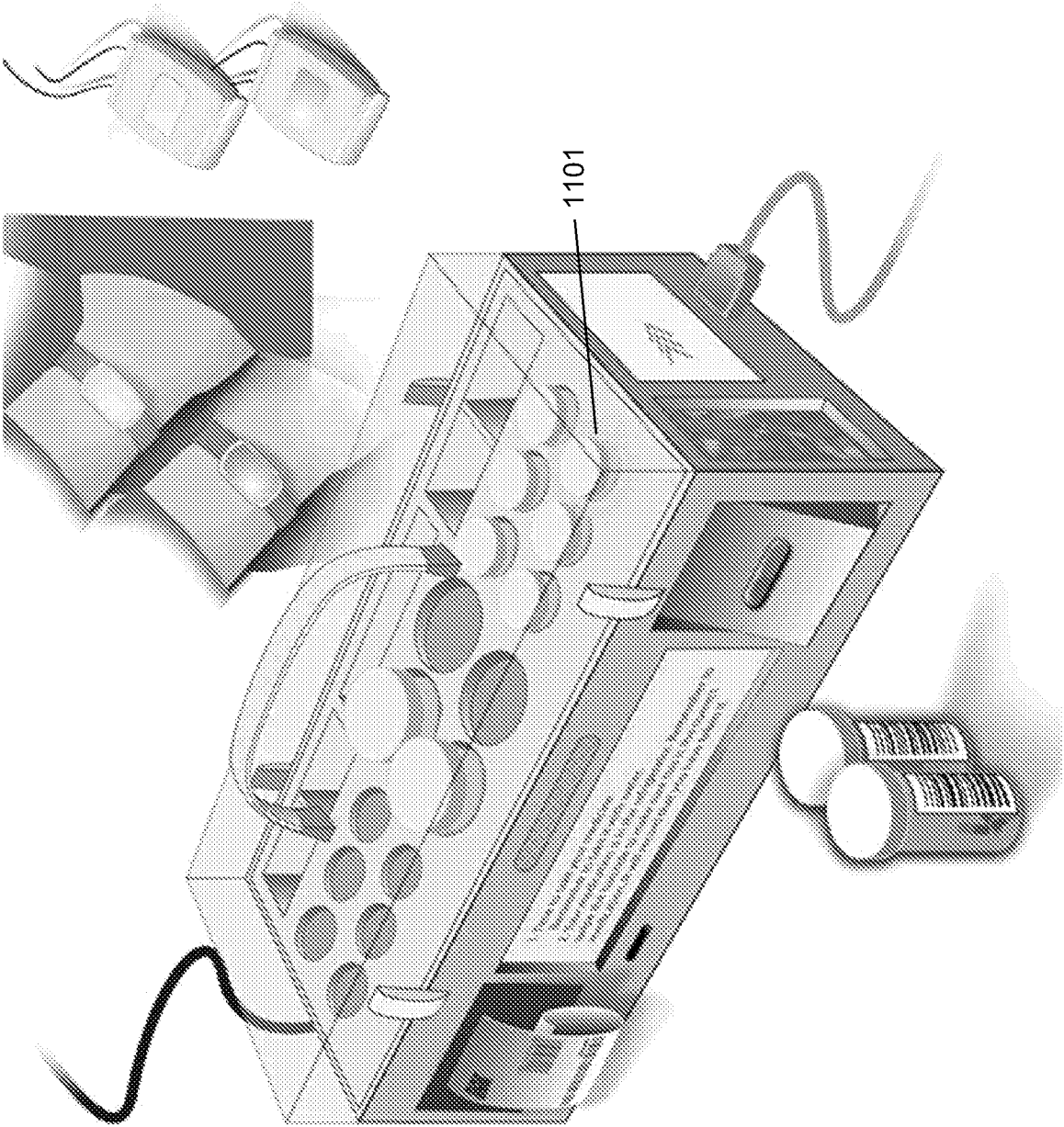


FIGURE 11

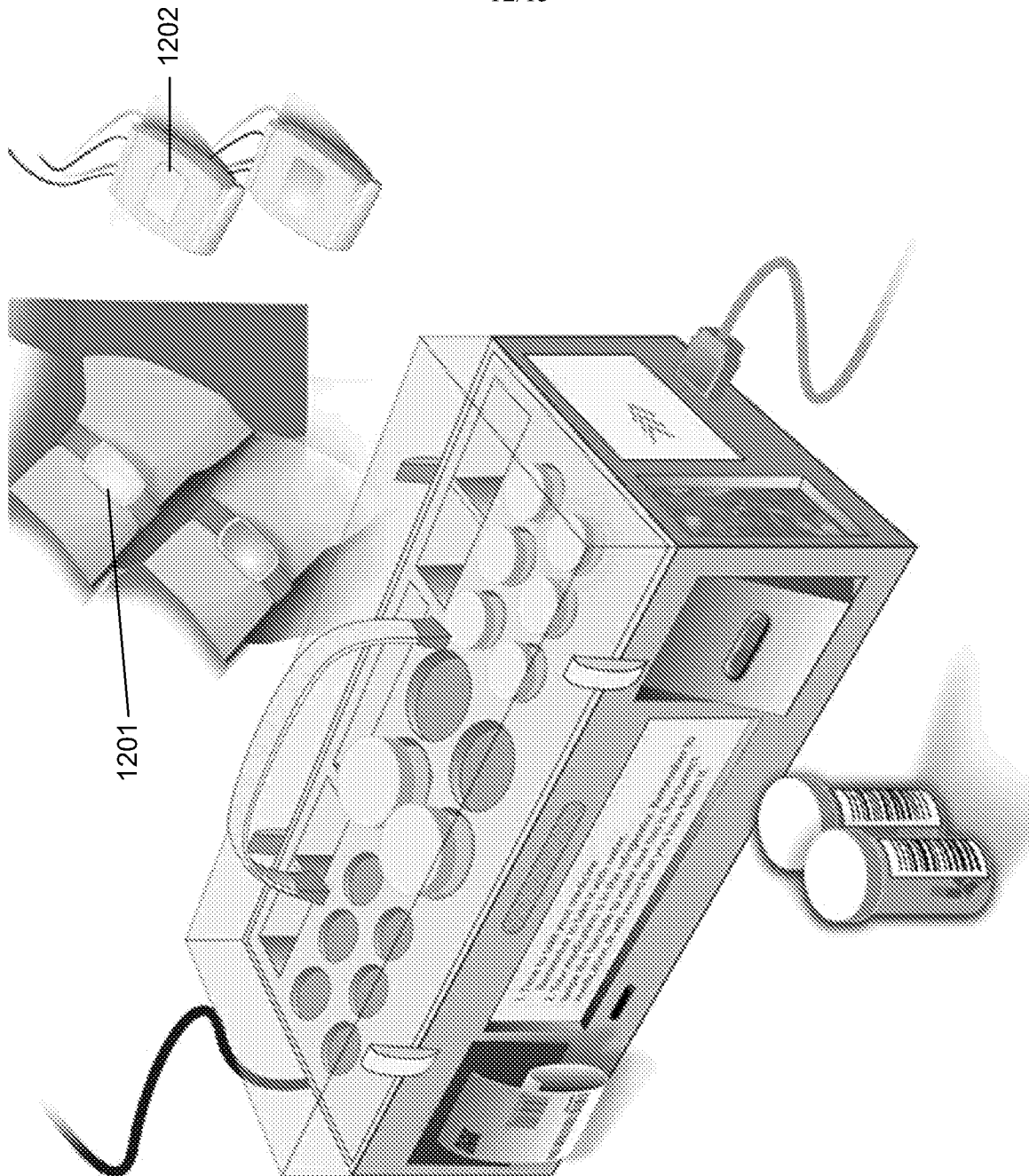


FIGURE 12

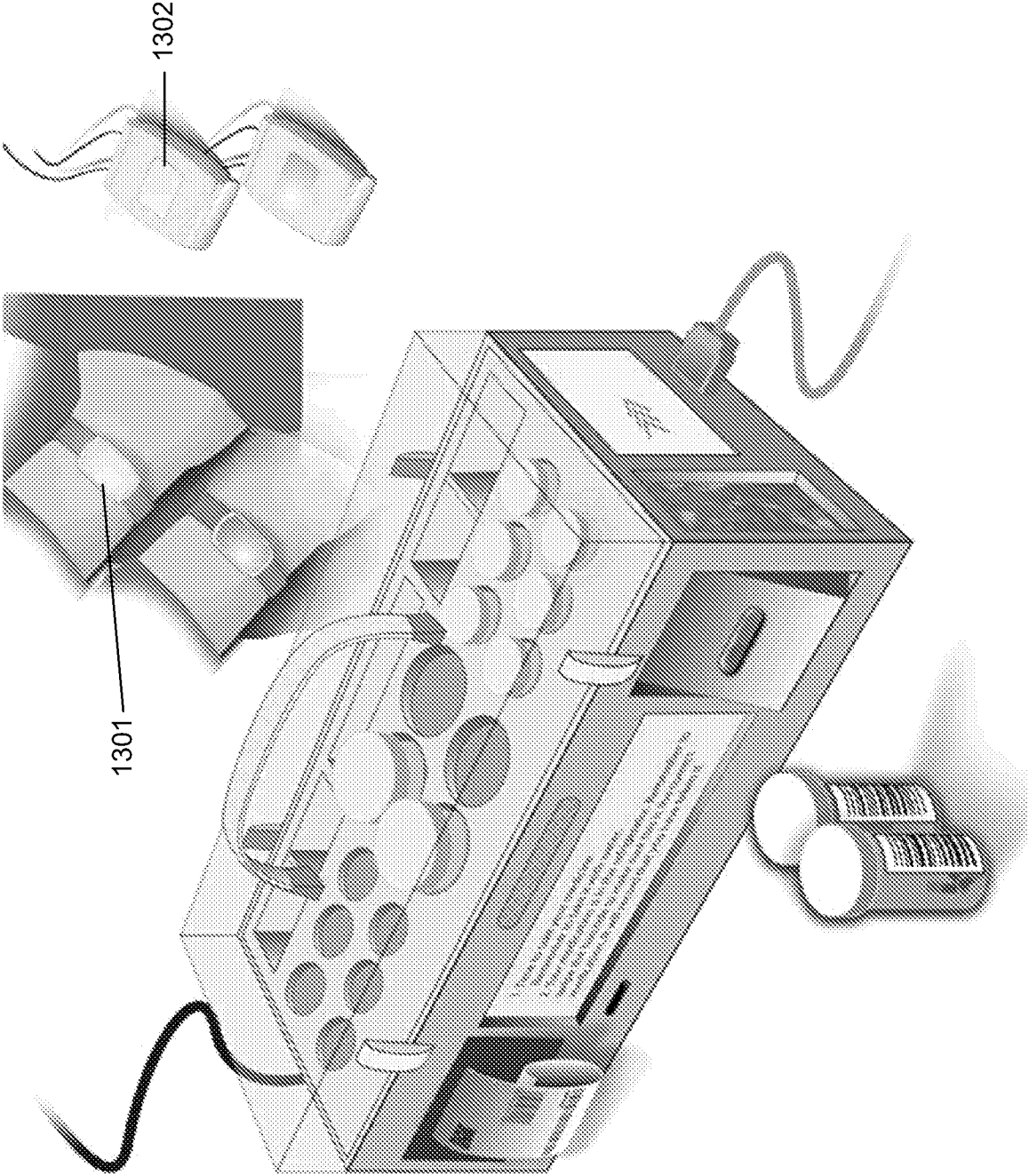


FIGURE 13

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 2014/025479

A. CLASSIFICATION OF SUBJECT MATTER		
G06Q 50/22 (2012.01) A61J 7/04 (2014.01) According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
G06Q 50/22, A61B 5/00, 7/00-7/04, G06F 17/00, A61J 7/04		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
DWPI, Espacenet, K-PION, PAJ, RUPTO, USPTO, Patentscope		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013/0024022 A1 (BETTY L. BOWERS) 24.01.2013, abstract, paragraphs [0002], [0007], [0009]-[0011], [0050], [0066], [0071]-[0074], [0076], [0086], fig. 11, 12, 13	1-16
A	US 8108068 B1 (GARY R. BOUCHER et al.) 31.01.2012	1-16
A	US 2006/0241355 A1 (THOMAS A. HOWELL et al.) 26.10.2006	1-16
A	US 6294999 B1 (BECTON, DICKINSON AND COMPANY) 25.09.2001	1-16
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents:	"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 "A" document defining the general state of the art which is not considered to be of particular relevance "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 "E" earlier document but published on or after the international filing date "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 "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 "&" document member of the same patent family "P" document published prior to the international filing date but later than the priority date claimed	
Date of the actual completion of the international search	Date of mailing of the international search report	
09 July 2014 (09.07.2014)	31 July 2014 (31.07.2014)	
Name and mailing address of the ISA/RU: FIPS, Russia, 123995, Moscow, G-59, GSP-5, Berezhkovskaya nab., 30-1 Facsimile No. +7 (499) 243-33-37	Authorized officer D. Gudilin Telephone No. 8(495)531-64-81	