(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
4 February 2016 (04.02.2016)

WIPO | PCT

(10) International Publication Number
WO 2016/019076 A1

(51) International Patent Classification:
A61J 7/04 (2006.01) *G06Q 50/22* (2012.01)
G06F 19/00 (2011.01)

(21) International Application Number:
PCT/US2015/042762

(22) International Filing Date:
30 July 2015 (30.07.2015)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
14/448,104 31 July 2014 (31.07.2014) US

(71) Applicant: **THE RESEARCH FOUNDATION FOR THE STATE UNIVERSITY OF NEW YORK** [US/US]; 35 State Street, Albany, New York 12207 (US).

(72) Inventors: **LEHMANN, Craig**; 106 Jacob's Place, Aquebogue, New York 11931 (US). **BRITTELLI, John**; 4 Shields Court, Brookhaven, New York 11779 (US).

(74) Agent: **GROLZ, Edward W.**; Scully, Scott, Murphy & Presser, 400 Garden City Plaza, Suite 300, Garden City, New York 11530 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

— *with international search report (Art. 21(3))*

(54) Title: HOME MEDICATION MANAGER

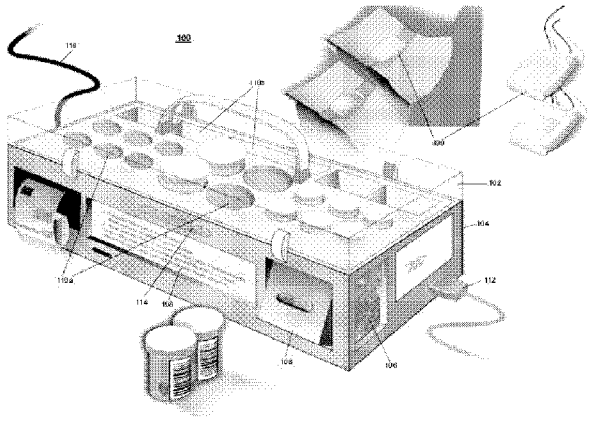


FIGURE 1

(57) Abstract: A portable self medication management system and method comprising at least a plurality of receptacles, a scanner, a display screen, a housing for a compact electronic box, a compact electronic box 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.

WO 2016/019076 A1

HOME MEDICATION MANAGER

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims benefit of U.S. Patent Application No. 14/448,104, filed July 31, 2014, which is a continuation in-part of PCT/US2014/025479, filed on March 13, 2014, which 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 disclosure 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. More specifically, certain aspects of the instant disclosure describes a home medication management system and apparatus, which includes a compact electronic box component that enables a user to transport certain doses of medication, in lieu of traveling with a larger home medication management device.

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, accidently 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 portable home medication reminders, medication dispensers and devices that combine informing and dispensing functions that can help patients manage their medications and reduce the risk that a patient will miss taking his medication in the home or while traveling. Moreover, home medication management systems that provide guidance and maintain the integrity of the original packaging will limit the potential for a user to take a prescribed medication inadvertently, which may increase the possibility of adverse effects caused by such a medication.

SUMMARY OF THE DISCLOSURE

[0005] A novel system, method and apparatus, e.g., "home medication manager" or "home medication management system", for medication management is presented. The instant apparatus can serve as a home base medication manager and also can be transported anywhere at any time simply by unplugging it. Additionally, in certain aspects of the present disclosure a patient can take a necessary amount of prescribed medication while traveling outside the home by using the compact electronic medication box component of the home medication manager. In certain embodiments, 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 disclosure 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 disclosure 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] In one aspect of the present disclosure, the medication management system integrates a small (e.g., 2.5 x 5 inch or 2 x 3 inch) portable, compact electronic box, which allows an individual to travel with needed medication (e.g., four-six doses) over a 24 hour period. In certain embodiments, the home medication manager can prompt the user to separate needed medication into at least four (4) different time periods by illuminating those medications that will need to be taken at each time period. For example, the home medication manager can direct the individual to place particular pills in compartment "A" and set the "A" timer alarm for a given time, e.g., the initial time of the "A" time period. All of the medications for compartment "A" will be lit and, after the required medications are removed from their respective containers and the containers placed back in the system, the light and/or notification will shut off. This process is repeated for any additional compartments, e.g., compartments "B, "C" and "D". Once all individual compartments have been populated with the appropriate medication(s), the time alarms are set for each compartment and the individual can go out. When it is time to take pills in the compact electronic box, the individual compartment (e.g., A, B, C, D, E) can illuminate, vibrate or provide notification to the user and/or the wrist band and/or pendant can alert the user that it is time to take the prescribed medication(s). The process repeats until all time periods have passed.

[0009] A computer readable storage medium storing a program of instructions executable by a machine to perform one or more methods described herein also is also provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] 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:

[0011] FIGURE 1 illustrates an embodiment of the present disclosure.

[0012] FIGURE 2 illustrates a block representation of an embodiment of the present disclosure.

[0013] FIGURE 3 illustrates a receptacle for original medication containers in an embodiment of the present disclosure.

[0014] FIGURE 4 is a flow diagram of a process executed by an embodiment of the present disclosure.

[0015] FIGURES 5-8 illustrate aspects of embodiments of the present disclosure.

[0016] FIGURE 9 illustrates a block representation of an embodiment of the present disclosure.

[0017] FIGURES 10-13 illustrate additional aspects of embodiments of the present disclosure.

[0018] FIGURE 14 illustrates a specific embodiment of the home medication manager containing a compact electronic box component.

[0019] FIGURES 15-16. illustrate block representations of certain embodiments of the present disclosure, which include the compact electronic box element.

DETAILED DESCRIPTION

[0020] FIGURE 1 illustrates an embodiment of the present disclosure in which a home medication manager **100** comprises a portable medication storage and management apparatus. FIGURE 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 and microphone element **114**, which can be used to provide voice prompts and/or notifications to or from the home medication manager.

[0021] A 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.

[0022] A 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 FIGURE. 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 or LED panel capable of displaying at least an 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. In certain embodiments, the second display screen **1001** will provide the user with an image of the medication and unique indentifying characteristics of the medication that the patient is scheduled to take; so that the patient can be assured that they are taking the correct medication. In certain non-limiting examples, such identifying characteristics

include shape of the medication (e.g., oval), color (e.g., white, orange, blue), markings (i.e., the letter V, the number 3, etc.).

[0023] In a specific embodiment of the present disclosure, the patient is notified by the home medication manager 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. Concurrently and the image of the pill is displayed on the a display screen **1001** and/or **108**. Concurrently, the other display screen **1001/108** directs the patient to compare the pill in hand with the pill on the display screen to assure it is the same pill. In yet another embodiment, the direction to the patient can be given audibly via speaker **114**.

[0024] 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 non-traditional receptacles **110b**, which are capable of receiving, for example, blister packs, or boxes of medication. An individual medication bottle holder receptacle or slot **110a** can contain a securing mechanism, such as spring loaded sides **301**, as shown in FIGURE 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 including, but not limited to, a locking clasp that secures the medication (not shown), or a liner overlaying the innermost surface of slot **110a** that securely contacts the outermost surface of the medication bottle, thereby creating friction capable of holding the medication bottle in the slot **110a** during transport.

[0025] In one embodiment, the home medication manager **100** can be powered by an AC power source **112** or rechargeable battery **202** as shown in FIGURE 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.

[0026] 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, as well as a wrist band and/or pendant **300,** and/or a compact electronic box **1401**.

[0027] 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 **108/1001**. 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 from, for example, interaction with a pharmacy database, or cloud based network of remote servers ("cloud database") 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 on a pharmacy database, if applicable.

[0028] A controller **206** can also select an available receptacle **110** to receive new or refill original medication container(s) and can indicate the selection by illuminating a light (e.g., LED) **210**, as set forth in Figure 2, which is 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.

[0029] The controller **206** may indicate a time for taking a medication by referring to inputted information by the patient/user, or based on information obtained from a pharmacy database, 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.

[0030] When it is time for a medication to be taken, the patient is notified by a notification means such as a buzzer **216**, which in certain embodiments may provide a vibrating alert to the user, or short range wireless communication provided by a wireless communication circuit **218**, such as Bluetooth, in communication with a portable electronic device

including, for example, a paired bracelet, e.g., wrist alert, or fob, which can be worn, for example, as a pendant **300** , a cell phone, smart phone, tablet or software application thereof, or any other Bluetooth or wi-fi compatible device know to one of ordinary skill in the art. eIn one specific embodiment, the notification can occur when the bracelet or pendant **300** lights up and/or vibrates. In a specific embodiment, the notification to take a medication occurs when the home medication management system communicates through wi-fi or Bluetooth to a cell phone, tablet or smart phone, causing the cell phone or smart phone to ring and/or vibrate. 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 improper 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**.

[0031] 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 administration. Scanning the barcode of the refrigerated original medication container prior to administration allows the controller **206** to verify that the correct medication is being taken.

[0032] 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, such as a pharmacy database. In one embodiment, the data can be stored on an external device, such as a server, cloud database, and/or portable electronic device (e.g., cell phone, tablet and/or smartphone).

[0033] 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 a display screen **108**, and/or a wrist alert, or fob, which can be worn, for example, as a pendant **300**, a cell phone, smartphone, tablet or software application thereof.

[0034] 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 (e.g., pharmacy database or cloud database) 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. In a specific embodiment, the controller shares stored data related to the amount of a particular medication being managed by the home medication device with a pharmacy database or other external database (e.g., cloud database).

[0035] 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 doctor, pharmacist, etc.

[0036] 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.

[0037] 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.

[0038] 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.

[0039] At S409, the updated medication information can be acquired from an external database (e.g., pharmacy database or cloud) via wireless circuit **218**. For example, when a new medication is prescribed information is acquired and added to the database remotely. In another example, when a change in the frequency or dosage of a medication is made, such information can be acquired and updated in a 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.

[0040] At S414, whether or not the correct medication has been dispensed is verified. For example, an image of the proper medication will be displayed on display screen 108 for comparison the medication removed by the user. If the medication displayed by the home medication manager (100) matches the medication removed by the user, (S414=YES), dispensing of the correct medication is recorded and the tracking can resume at S411.

[0041] If it is not determined that the correct medication has been dispensed (S414=NO), the process returns to step S413.

[0042] If it is not time (S412=NO), tracking continues at S411.

[0043] 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, display screen **108** can provide the instruction "YOUR MEDICATION IS IN THE REFRIGERATOR" and display an image of the medication for guidance.

[0044] 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/or sent to the health care provider, pharmacy, and/or the

emergency room by way of a wireless, internet, or mobile communication. The wireless technology in the home medication manager can remove many of the potential errors that are associated with self medicating, and offers family members, home health agencies, primary care physicians, pharmacists, etc., access a patient's compliance. The system can also alert a pharmacy when the medication needs to be refilled.

[0045] FIGURES 5-8 illustrate aspects of embodiments of the present invention. FIGURE 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 a wrist alert, or fob, which can be worn, for example, as a pendant **300**, a cell phone, tablet, smartphone or software application thereof.

[0046] FIGURE 6 illustrates indicating a receptacle, e.g., lighting up and/or vibrating the receptacle, to direct the user/patient to the correct medication container. As shown in the embodiment of FIGURE 6, the user is notified to administer a medication by illuminating and/or vibrating a receptacle and displaying instructions on the display screen 108, which may include an image of the medication contained within the indicated receptacle. In the embodiment shown in FIGURE 6, the message reminds the patient that it is time to take your medicine, reminds the patient to take the medication with water, the location of the medication (i.e., to get the medication from the refrigerator where it is stored) and/or to swipe the original medication container barcode to make sure the correct medication is being taken. The home medication management system can record that the patient has taken, e.g., swiped, the correct medication and store or transmit such information to a database.

[0047] FIGURE 7 illustrates that the pharmacy can be alerted when renewal for a medication is needed or coming due (i.e., 10 to 30 pills remaining in a 1 month or 3 month supply of medication). In the embodiment shown in FIGURE 7, the wireless circuit **218** and/or the cable of the home medication manager can allow the controller **206** to contact a treating health organization or pharmacy to relay medication compliance information and other related information for the patient's health records and/or to alert a patient's health care provider or pharmacist that renewal for a medication is coming due.

[0048] FIGURE 8 illustrates a lockable carry cover for one embodiment of the invention, both attached to the base (top) and detached from the base (bottom).

[0049] In another embodiment, as shown in FIGURE 9, the home medication manager **900** includes all the elements described with respect to FIGURE 2 above. Elements of the present embodiment that correspond to like elements in the embodiment of FIGURE 2 are assigned like reference numerals in FIGURE 9. In addition to the features of the embodiment of FIGURE 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.

[0050] The memory card slot **902** allows removable storage on a memory card (not shown) of a patient's medical information relating to the administration of prescribed medication. For example, the memory card inserted into the memory card slot **902** may contain a list of prescribed medications provided by a pharmacist, which includes dosages, amount of medication provided in a particular prescription (e.g., 1 to 2 week supply, 1 month supply or 30 pills, 3 month supply or 90 pills, etc.) and frequency of administration that is entered by a pharmacist or other medical professional, or written to a removable storage component via an external database using wireless circuit **218** and/or the cable of the home medication manager and controller **206**. 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. In certain embodiments, memory card slot **902** enables a user to write and/or store patient data relating to a patient's prescribed medications, which can then be transported and provided to a pharmacist or health care provider by removing the removable media (e.g., SD card or USB) from memory card slot **902**.

[0051] In one embodiment, the memory card can allow for software upgrades, and can allow data to be imported into various Apple-based ®, Linux-based, and/or Windows®-based programs to improve monitoring of patient care.

[0052] 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, amount of medication remaining in a prescription, etc.

[0053] 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. In a specific embodiment, a wired network interface **906** connects the home medication manager to a LAN by way of the controller **206**, which enables communication between the home medication manager **900** and a smartphone, tablet and or database. In another embodiment, wireless circuit **218** communicates (e.g., connects to a wi-fi signal or wireless network), which enables communication between the home medication manager **900** and a smartphone, tablet and or database (e.g., pharmacy or health care provider network).

[0054] In one embodiment, the home medication manager will contain both a speaker and a microphone **114** for the purpose of communicating with the user 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 **1301** and/or on the pendant **1302**, and/or a voice prompt) as shown, for example, in FIGURE 13, 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.

[0055] 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 **1201**, as shown in FIGURE 12. 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?" User responds "7 AM" using microphone/speaker element **114**. The home medication management system then responds by confirming, "you said 7 AM, is this correct?" User responds "YES", and this information can be saved or stored by the home medication manager system via database or stored in the memory/storage device **208**. The home medication manager then responds "what time would you like to take your medication in the evening?" User responds "6 PM". The home medication manager responds "6 PM, is this correct?" User then responds "YES" using microphone/speaker element **114**, and this information is saved in the system via database or stored in the memory/storage device **208**.

[0056] In one aspect of the instant disclosure, the medication management system integrates a smaller, compact electronic box **1401/1401a**, which enables an individual to take medication remotely (i.e., away from the home or home medication manager) without taking the home medication management system **100/900**, for up to 6 doses over a 24 hour period, as shown in FIGURE 14. Figure 15 shows one embodiment of the instant disclosure whereby a compact electronic box **1401a** is housed within compartment **1402**

of the home medication manager **1500**. When compact electronic box **1401a** is housed within compartment **1402** of the home medication manager system **1500** the compact electronic box will securely lock into place via locking element **1404**, as shown in FIGURE 15. To release the compact electronic box **1401a** from the home medication manager system the user need only to depress locking element **1404**, which will enable the user to easily remove the compact electronic box from within compartment **1402**.

[0057] In one embodiment of the instant disclosure, when compact electronic box **1401a** is housed within compartment **1402** it is coupled to the home medication management via a connection (not shown) that enables communication with the home medication manager's controller **206**, memory/storage component **208**, clock **214** and power supply/charger **204**, as shown in FIGURE 15. While in compartment **1402**, a battery/charger element **1405** located within compact electronic box **1401** is charged through its connection to power supply/charger **204** of the home medication management system **1500**. In certain embodiments, when compact electronic box **1401a** is housed within compartment **1402** it is connected to controller **206**, which can execute instructions as described below or communicate stored instructions, i.e., instructions stored on a memory device and/or computer readable medium **902** or computer readable storage device **208** of the home medication manager **1500,** to a controller **1406** located on compact electronic box **1401**, as shown in FIGURE 16. Further in a specific embodiment, the compact electronic box **1401** contains a clock **1409**, memory/storage device **1408** and a buzzer **1407,** which are connected to a controller element **1406**, and can be used to store and/or transmit information between the home medication manager **1500** and the compact electronic box **1401**, as shown in Figure 16. In addition, in certain embodiments, a hardwire or wi-fi network connection can be provided to controller **1406** to allow for data transfer (e.g, from an external database) and/or software upgrades on the compact electronic box **1401** (not shown).

[0058] In certain embodiments, compact electronic box **1401** has (four) 4 compartments labeled A, B, C, D, which permits a user to take their medication at 4 different times during a 24 hour period. In this embodiment, if an individual wants to be out for the day or part of the day, he/she goes to the home medication management system **1500** and

enters the number of hours he/she will be away from home (e.g., 1-24) using display screen **108**. The home medication manager will then process the information provided by the user and identify medications, which are stored within the home medication management system and then illuminate those medications that will need to be taken during the time in which the user is away from home. For example, the home medication manager can direct the individual to put particular medications in compartment "A" and set the "A" timer alarm to the given time, e.g., the initial time of the "A" time period. All of the medications for compartment "A" will illuminate and, after the medications are removed from their respective containers and the last of the previously illuminated containers placed back in the home medication management system, the lights will shut off. This process is repeated for compartments "B", "C" and "D". Once medications are loaded by the user into compartments 1403 of compact electronic box **1401a** the time alarms are set for compartments A, B, C and D, and the user can go out.

[0059] In certain embodiments, compact electronic box **1401** has (six) 6 compartments labeled A, B, C, D, E and F which permits a user to take their medication at 6 different times during a 24 hour period. In this embodiment, if an individual wants to be out for the day or part of the day, he/she goes to the home medication management system **1500** and enters the number of hours he/she will be away from home (e.g., 1-24) using display screen **108**. The home medication manager will then process the information provided by the user and identify medications, which are stored within the home medication management system and then illuminate those medications that will need to be taken during the time in which the user is away from home. For example, the home medication manager can direct the individual to put particular medications in compartment "A" and set the "A" timer alarm to the given time, e.g., the initial time of the "A" time period. All of the medications for compartment "A" will be lit and, after the medications are removed from their respective containers and the last of the previously illuminated containers placed back in the home medication management system, the lights will shut off. This process is repeated for compartments "B", "C", "D", "E" and "F", if necessary. Once medications are loaded by the user into compartments **1403** of compact electronic box **1401a** the time alarms are set for the necessary compartments **1403**, and the user can go out.

[0060] In yet another embodiment, when an individual wants to be out for the day or part of the day, he/she goes to the home medication management system **1500** and using speaker/microphone element **114** says "On the Go". The home medication manager will then prompt the user to recite the number of hours he/she will be away from home (e.g., 1-24) using voice over IP and speaker/microphone element **114**. The home medication manager will then process the information provided by the user and identify medications, which are stored within the home medication management system and then illuminate those medications that will need to be taken during the time in which the user is away from home. For example, the home medication manager can direct the individual to put particular medications in compartment "A" and set the "A" timer alarm to the given time, e.g., the initial time of the "A" time period. All of the medications for compartment "A" will be lit and, after the medications are removed from their respective containers and the last of the previously illuminated containers placed back in the home medication management system, the lights will shut off. This process is repeated for compartments "B", "C" and "D", if necessary. Once medications are loaded by the user into necessary compartments **1403** of compact electronic box **1401a** the time alarms are set for the necessary compartments (e.g.) A, B, C and D, and the home medication management system will inform the user via voice over IP that the user can go out.

[0061] When it is time to take the medications stored in the compact electronic box, the user is notified via illumination of an LED or series of LED **210** and/or vibration of a buzzer element **1407** of the compact electronic box **1401**, and/or via the wrist band and/or pendant **300**. When the individual opens the compact electronic box **1401**, the individual compartment **1403** will be illuminated by the corresponding LED **210** indicator, which notifies to the user that the medication located in the illuminated compartment should be consumed. The process repeats until all time periods have passed or the medications in each compartment **1403** have been consumed.

[0062] 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 medication in hand with the picture on the screen **1001**, as shown in FIGURE 10, to verify that this is the correct pill. After a predetermined time, e.g., one to three 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 visual

notice can be generated by the home medication manager, 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 provided by illuminating the proper receptacle **110**.

[0063] 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 **202** will provide power to the home medication management system for one week.

[0064] In one embodiment, the home medication management system can contain a thermal printer **904** in the base housing, as shown in FIGURE 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.

[0065] 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.

[0066] 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.

[0067] 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.

[0068] 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.

[0069] 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, wherein said plurality of receptacles are capable of housing individual intact medication containers;

a scanner;

a printer;

at least one display screen;

a power source; and

a housing for a compact electronic box;

a memory device;

a compact electronic box;

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 3, wherein the external source is a pharmacy database or cloud database.

5. The self medication management system according to claim 1, the processor further configured to acquire additional medication information from an external source.

6. The self medication management system according to claim 5, wherein the external source is a pharmacy database or cloud database.

7. The self medication management system according to claim 1, further comprising a lid attachable to the base.

8. 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.

9. The self medication management system according to claim 8, wherein the battery is a rechargeable battery.

10. The self medication management system according to claim 1, the base further comprising a buzzer wherein said buzzer vibrates to provide notification to the user.

11. 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.

12. 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, at least one display screen, a housing for a compact electronic box, a compact electronic box 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.

13. The self medication management method according to claim 12, further comprising tracking administering of the medications in a second database residing on the storage device.

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

15. The self medication management method according to Claim 14, wherein the external source is a pharmacy database or cloud database.

16. The self medication management method according to claim 12, further comprising acquiring additional medication information from an external source.

17. The self medication management method according to Claim 16, wherein the external source is a pharmacy database or cloud database.

18. The self medication management method according to claim 12, wherein the step of notifying is performed using one or more of a buzzer, a speaker, the display screen and the visual indicator.

19. The self medication management method according to claim 12, 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.

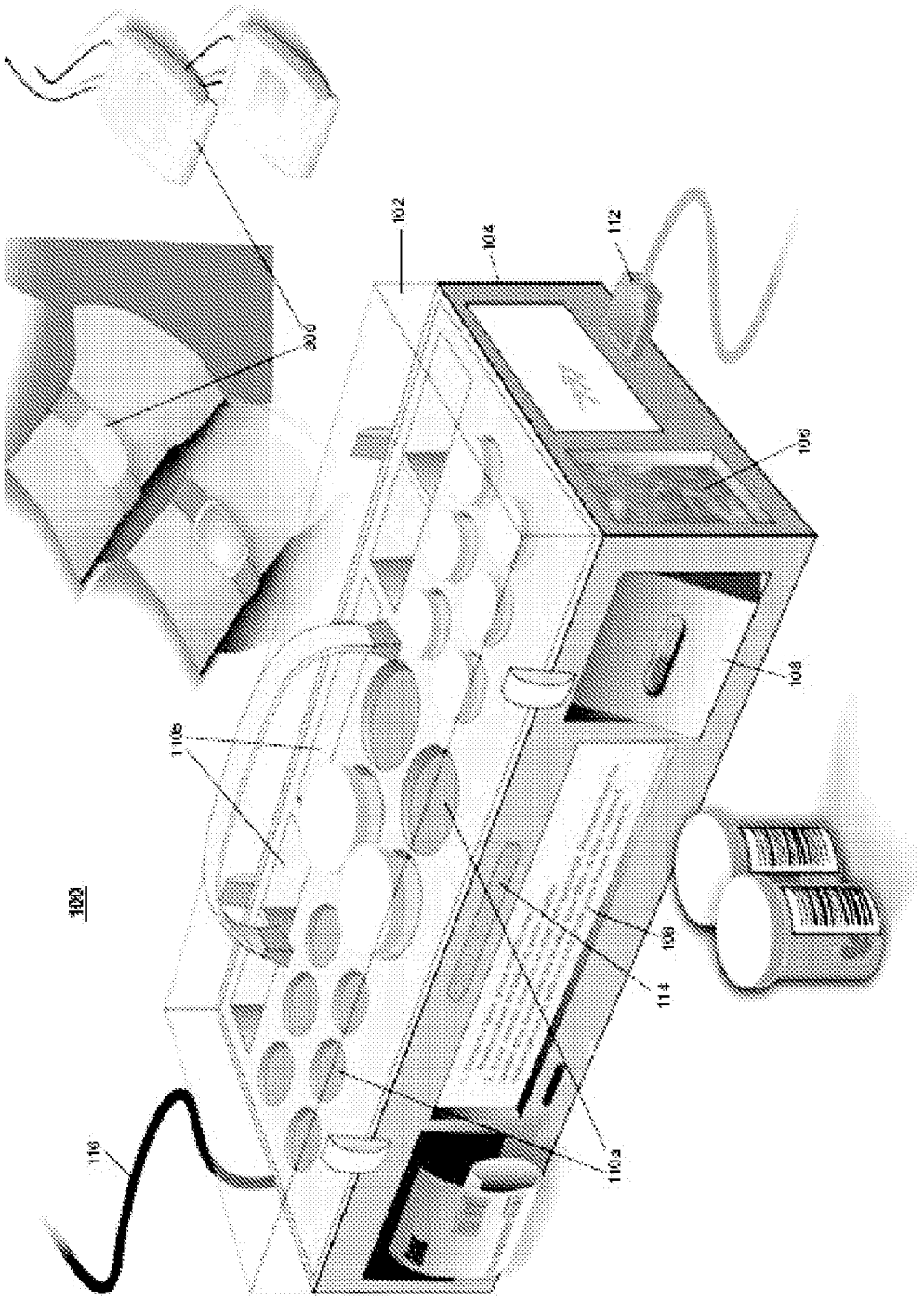


FIGURE 1

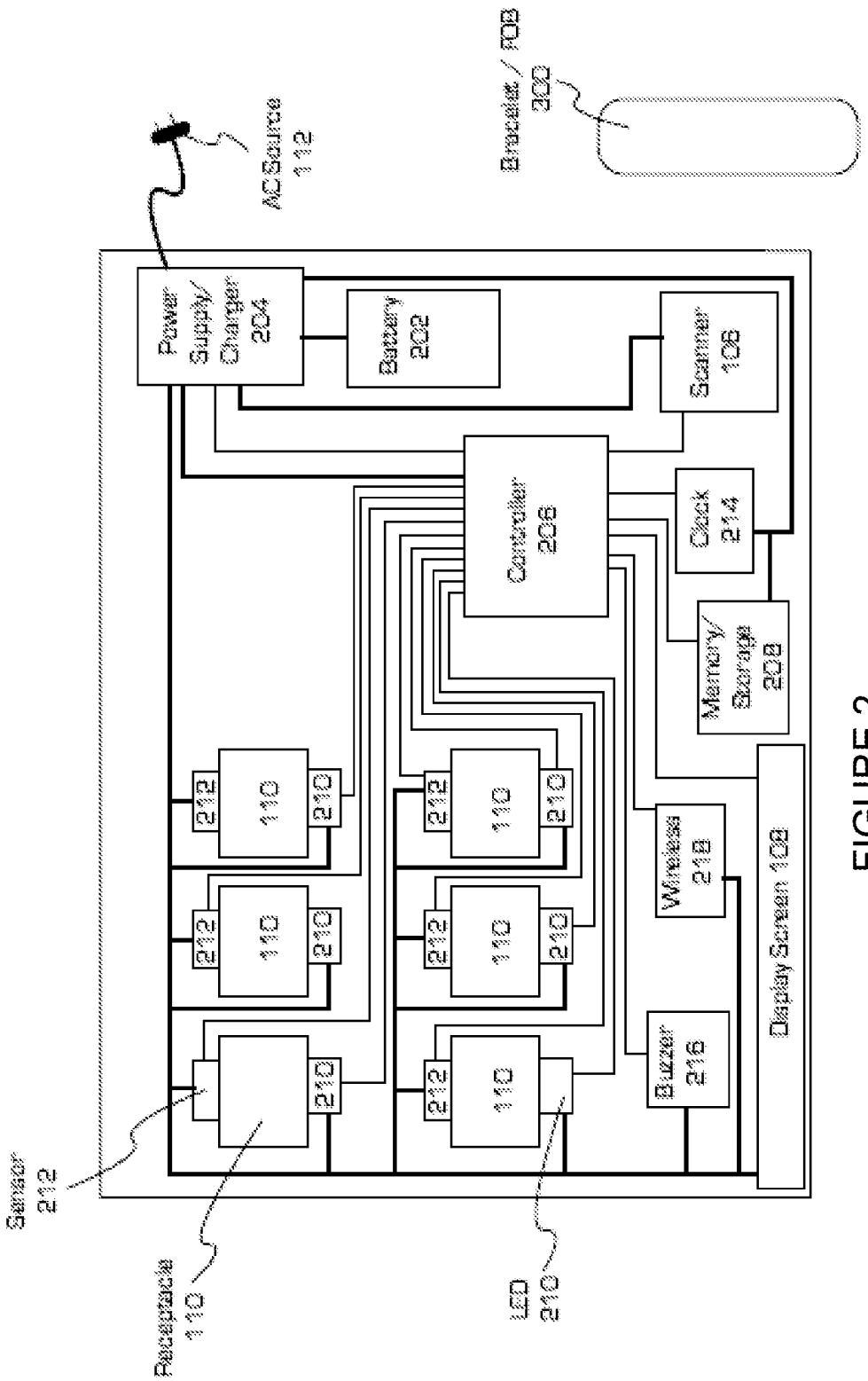

100
Power Supply/ Charger 204
Battery 202
Scanner 106
Controller 206
Clock 214
Memory/ Storage 208
Wireless 218
Buzzer 216
Display Screen 108
AC Source 112
Bracelet / FOB 200
Sensor 212
Receptacle 110
LED 210
212
110
210

FIGURE 2

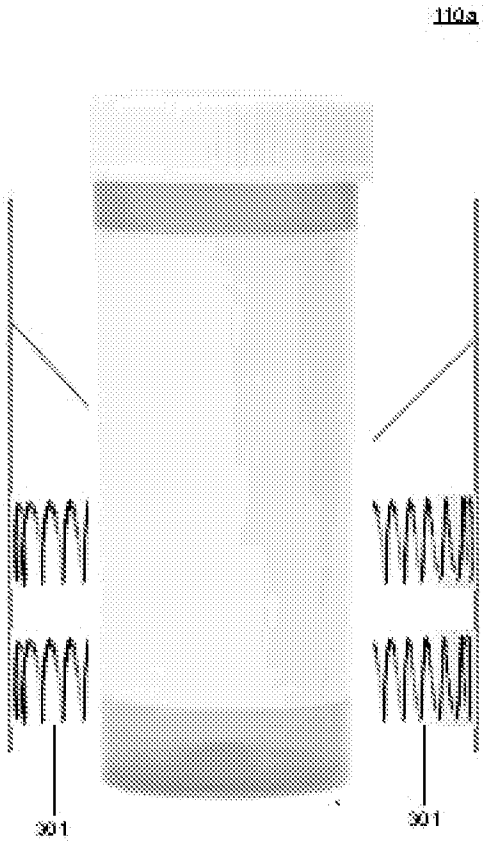


FIGURE 3

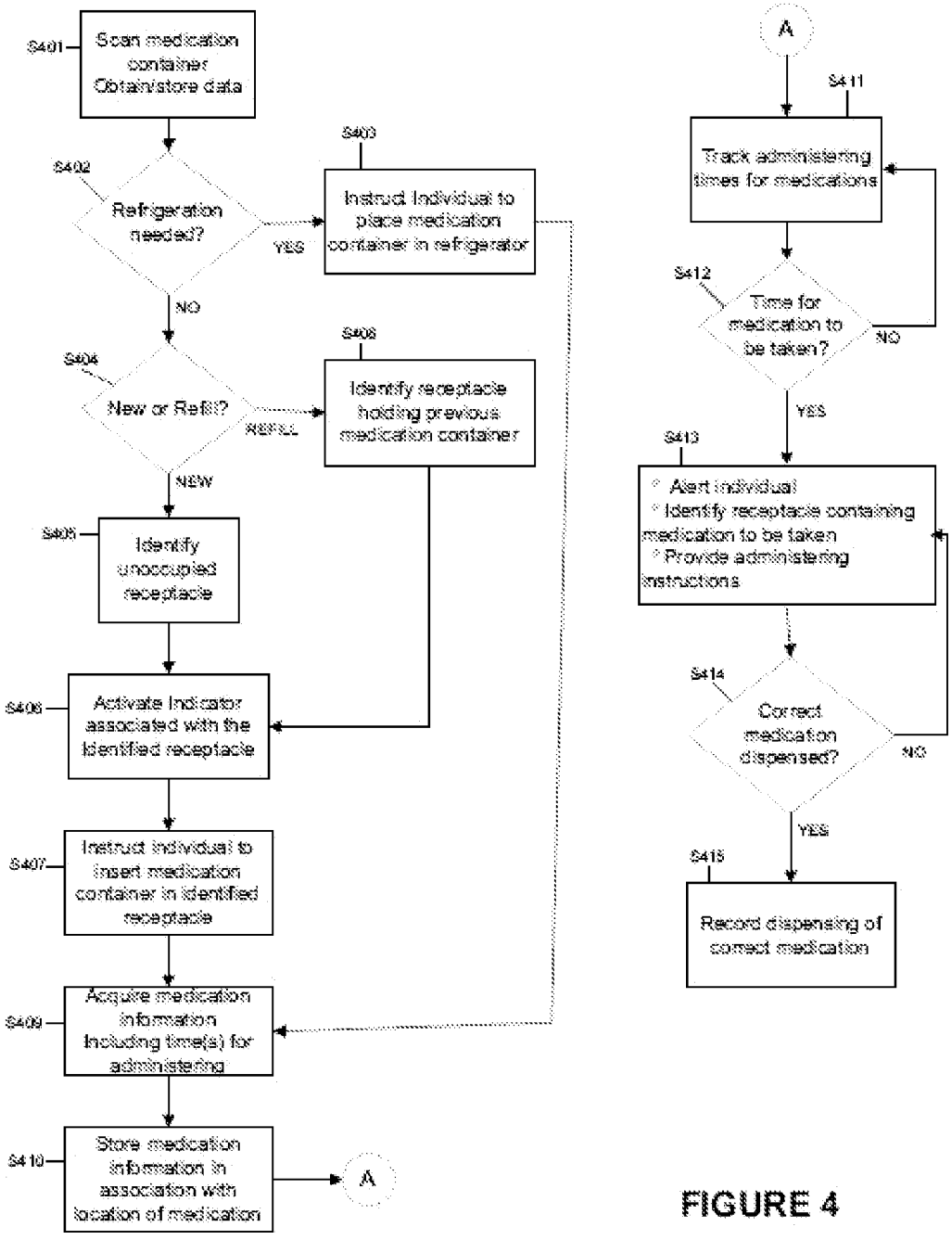

S401
Scan medication container
Obtain/store data
S402
Refrigeration needed?
YES
S403
Instruct individual to place medication container in refrigerator
NO
S404
New or Refill?
REFILL
S406
Identify receptacle holding previous medication container
NEW
S405
Identify unoccupied receptacle
S406
Activate indicator associated with the identified receptacle
S407
Instruct individual to insert medication container in identified receptacle
S409
Acquire medication information including time(s) for administering
S410
Store medication information in association with location of medication
A
A
S411
Track administering times for medications
S412
Time for medication to be taken?
NO
YES
S413
Alert individual
Identify receptacle containing medication to be taken
Provide administering instructions
S414
Correct medication dispensed?
NO
YES
S415
Record dispensing of correct medication

FIGURE 4

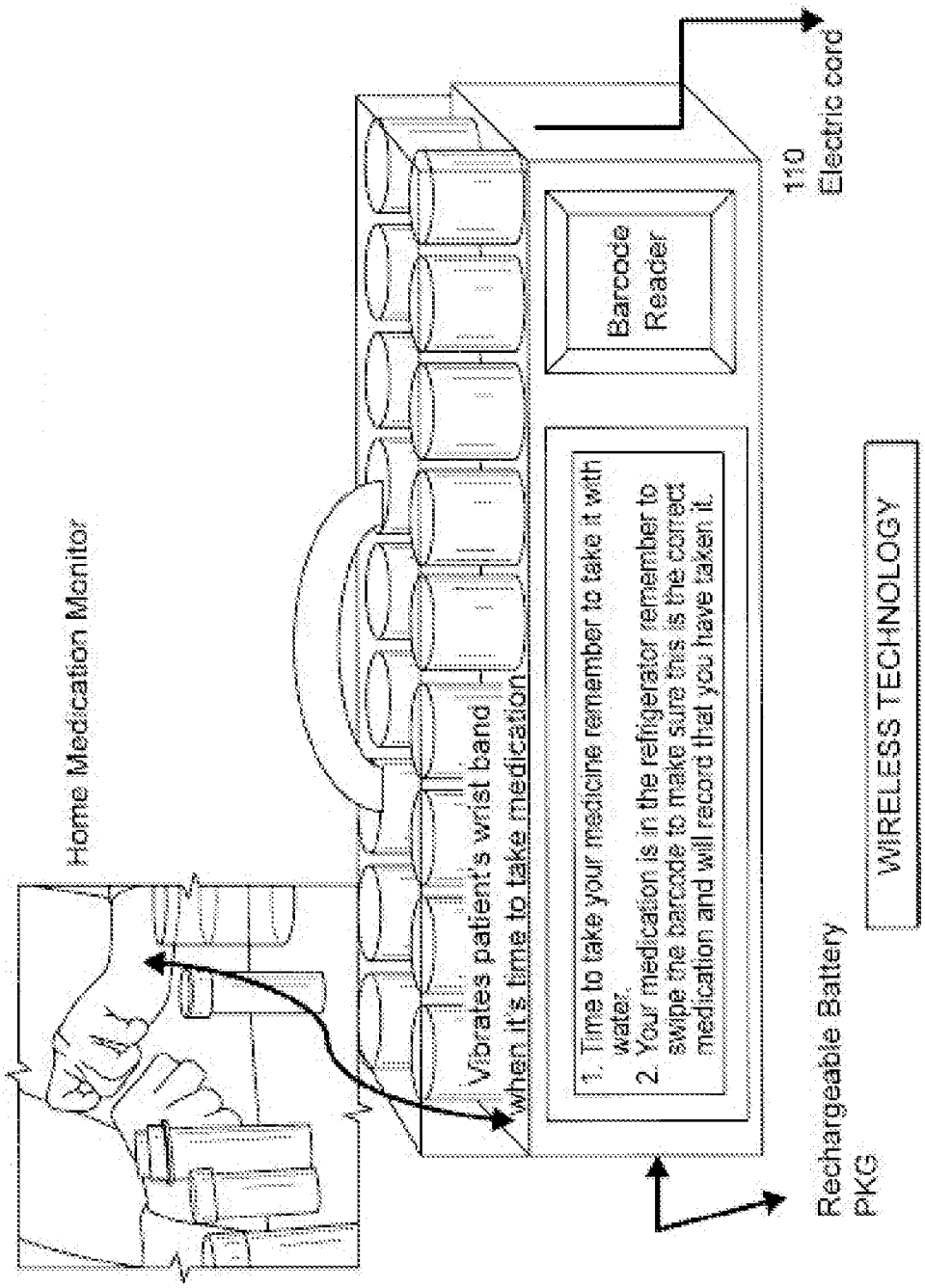

Home Medication Monitor
Vibrates patient's wrist band when it's time to take medication
1. Time to take your medicine remember to take it with water.
2. Your medication is in the refrigerator remember to swipe the barcode to make sure this is the correct medication and will record that you have taken it.
Barcode Reader
110
Electric cord
Rechargeable Battery PKG
WIRELESS TECHNOLOGY

FIGURE 5

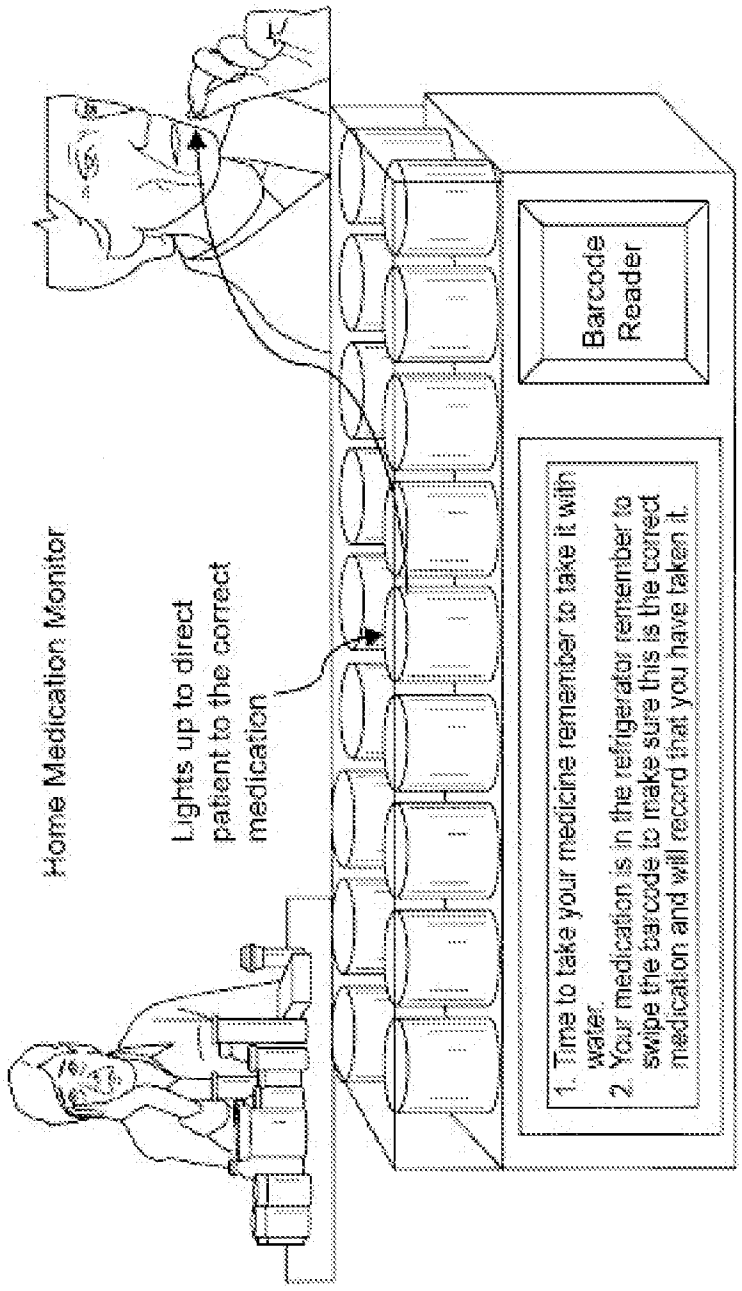

Home Medication Monitor
Lights up to direct patient to the correct medication
Barcode Reader
1. Time to take your medicine remember to take it with water.
2. Your medication is in the refrigerator remember to swipe the barcode to make sure this is the correct medication and will record that you have taken it.

FIGURE 6

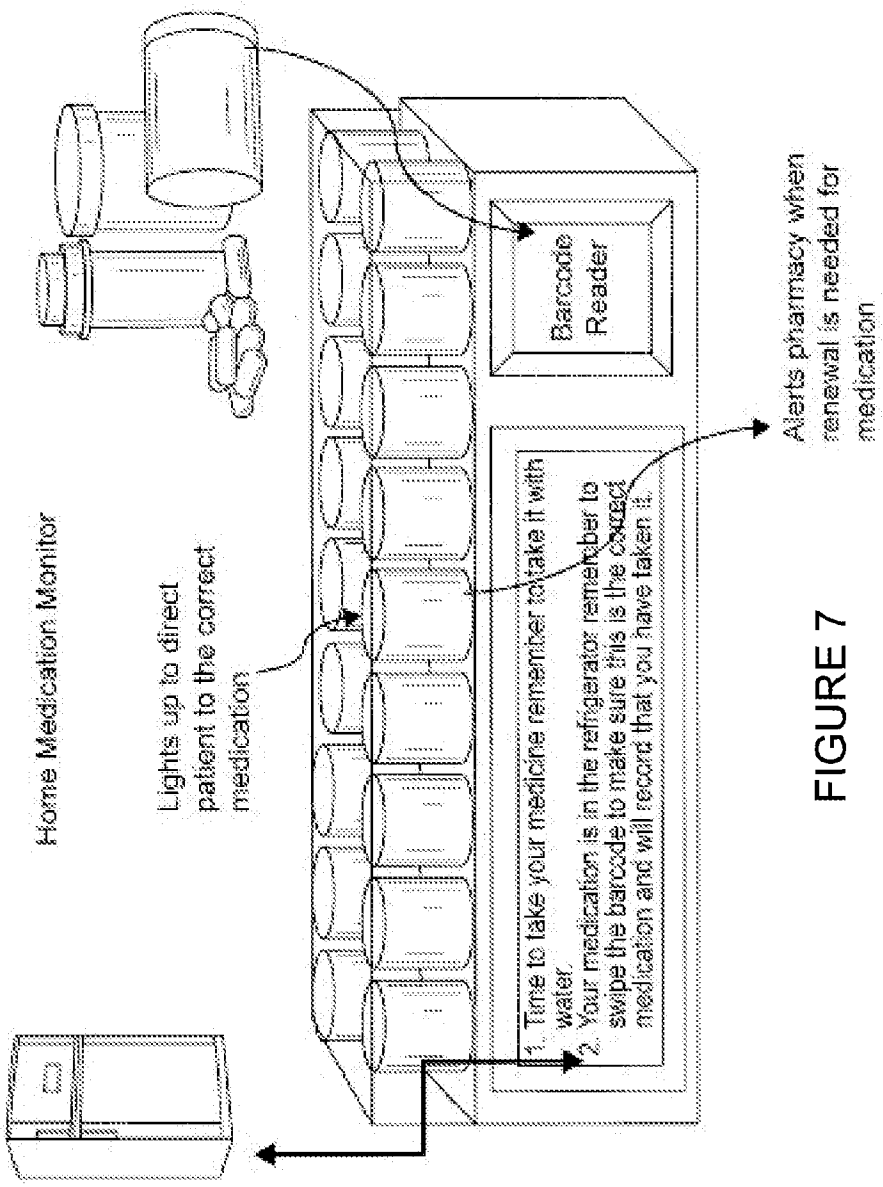

Home Medication Monitor
Lights up to direct patient to the correct medication
Barcode Reader
1. Time to take your medicine remember to take it with water.
2. Your medication is in the refrigerator remember to swipe the barcode to make sure this is the correct medication and will record that you have taken it.
Alerts pharmacy when renewal is needed for medication

FIGURE 7

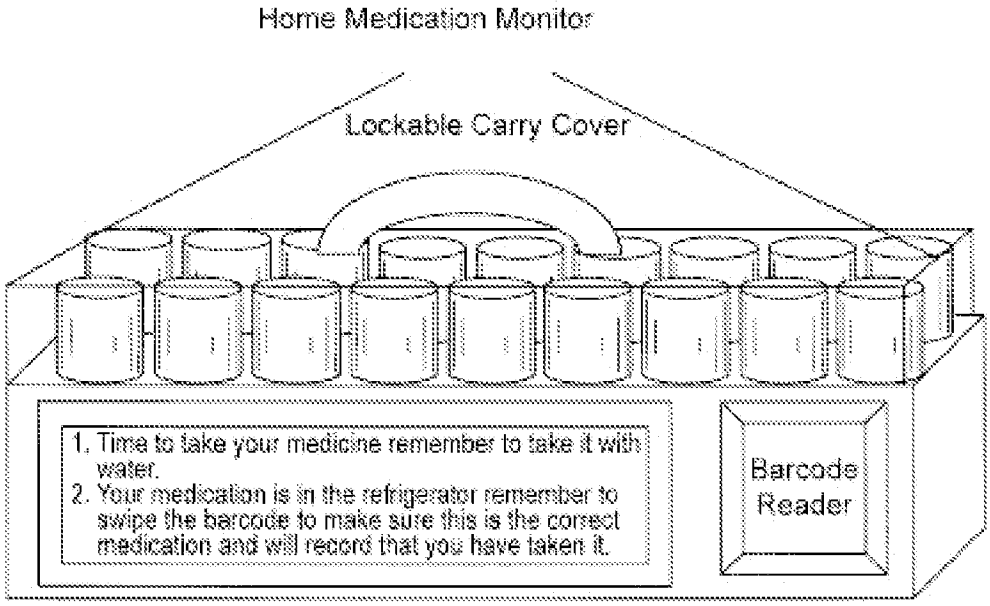
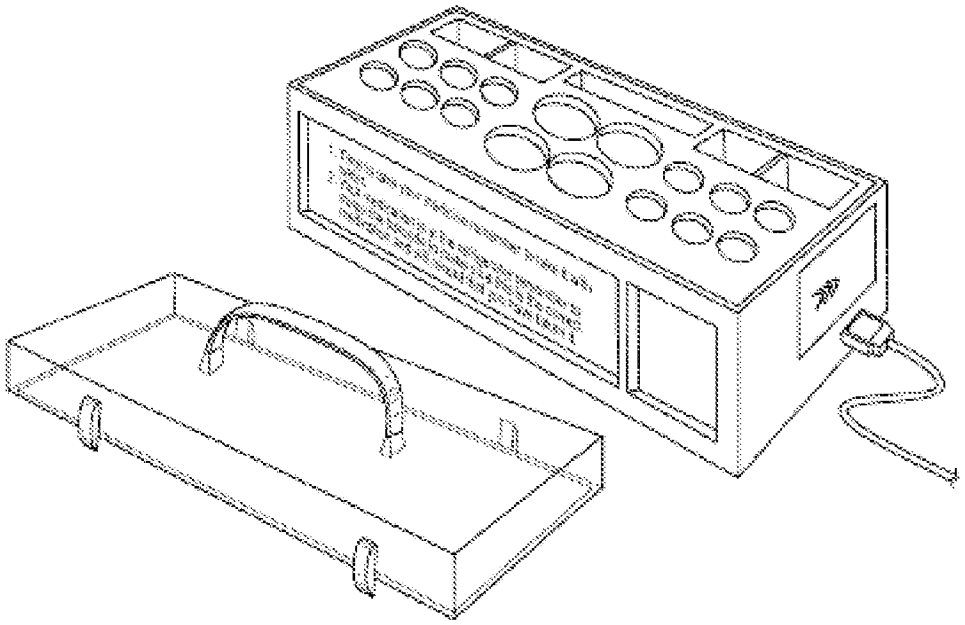

Home Medication Monitor
Lockable Carry Cover
1. Time to take your medicine remember to take it with water.
2. Your medication is in the refrigerator remember to swipe the barcode to make sure this is the correct medication and will record that you have taken it.
Barcode Reader

FIGURE 8



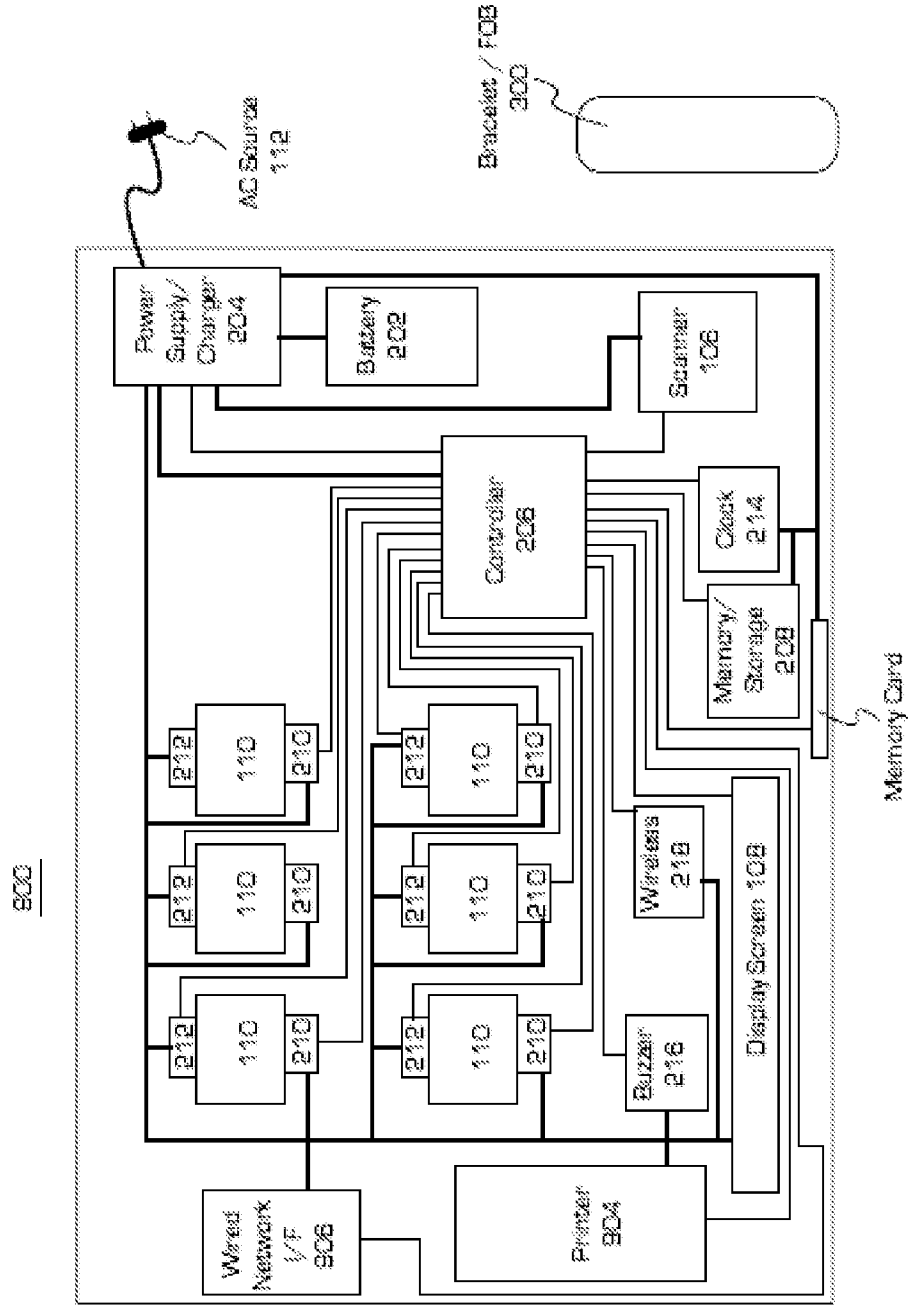

800
AC Source 112
Bracelet / FOB 300
Power Supply / Charger 204
Battery 202
Scanner 106
Controller 206
Clock 214
Memory / Storage 208
Memory Card Slot 802
212
110
210
Wireless 218
Buzzer 216
Display Screen 108
Wired Network I/F 206
Printer 204

FIGURE 9

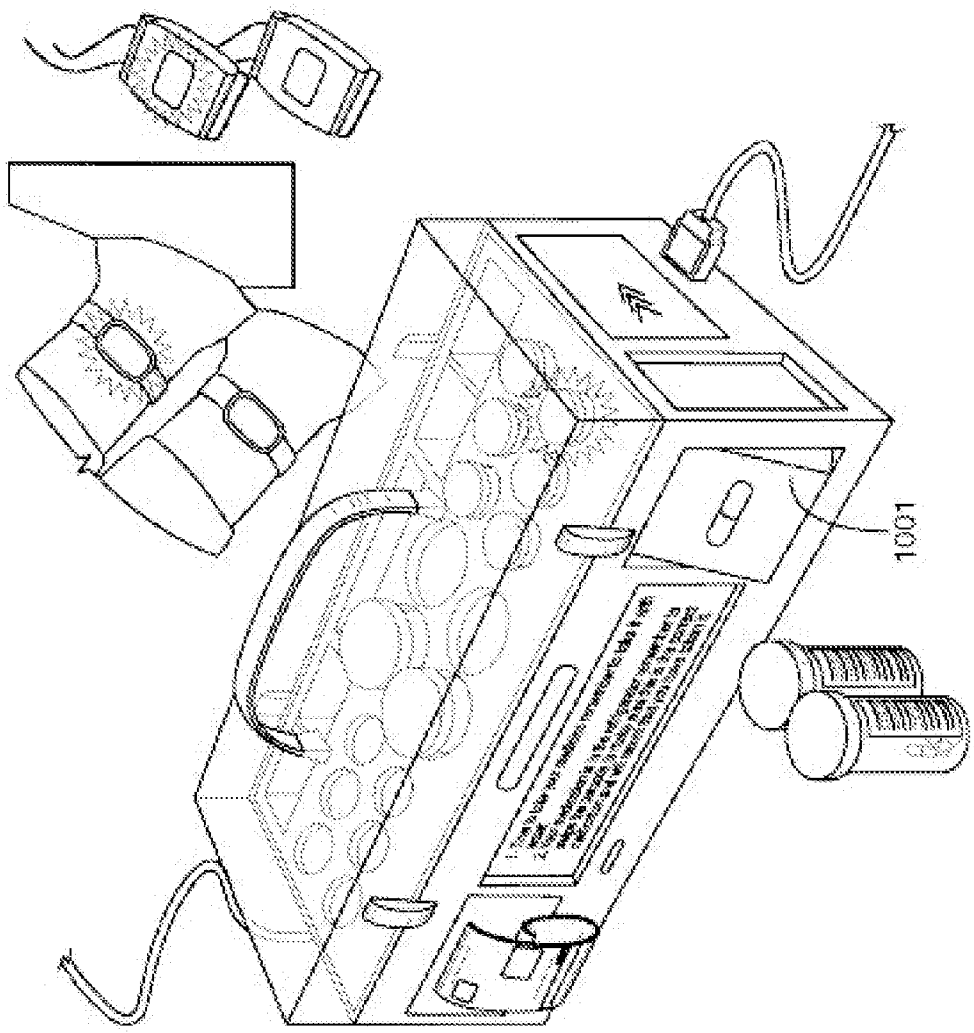


FIGURE 10

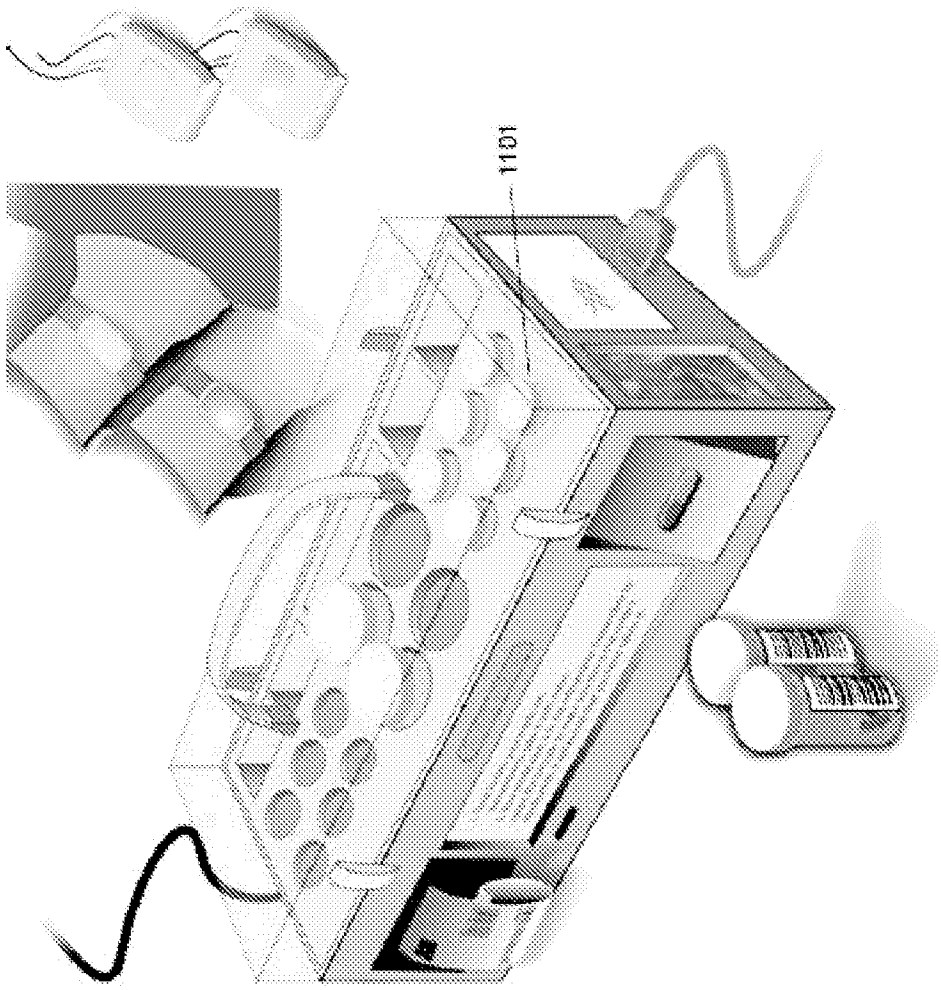


FIGURE 11

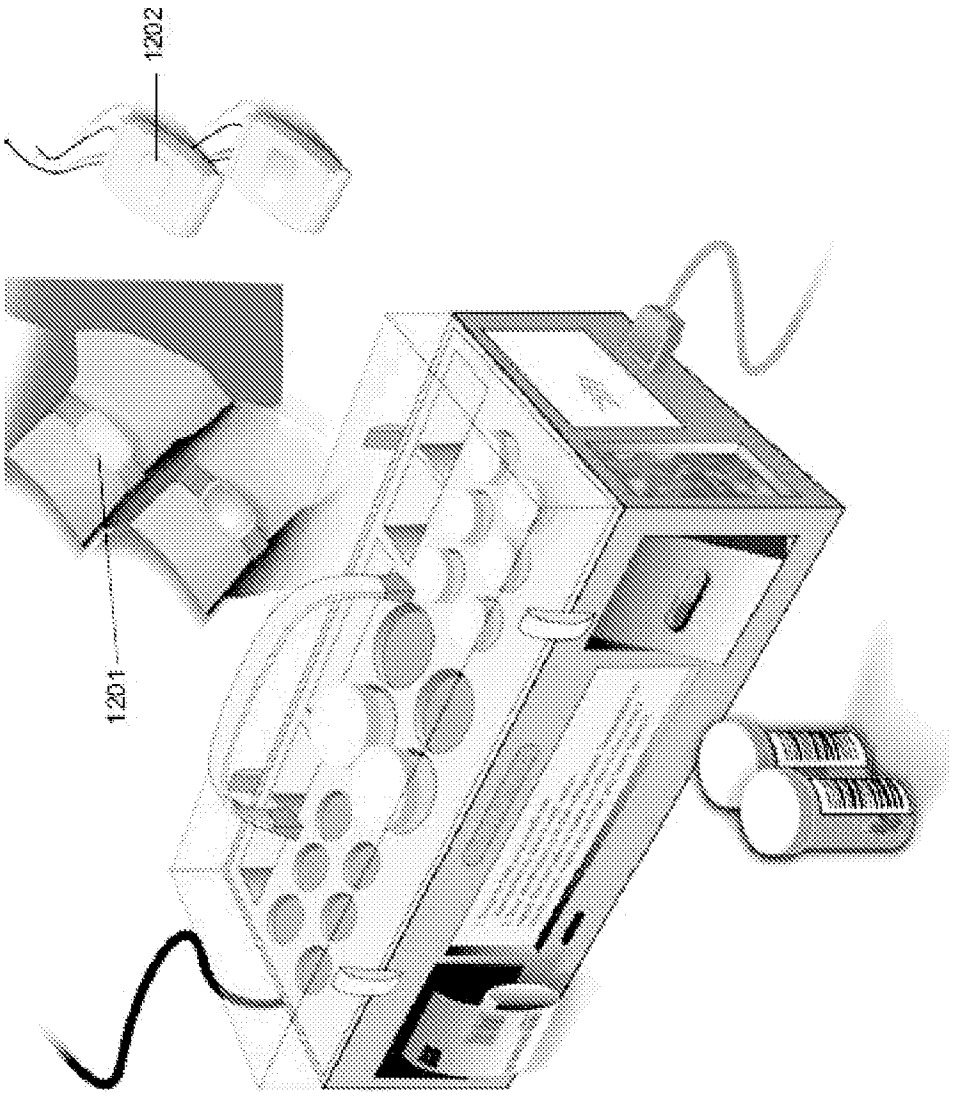


FIGURE 12

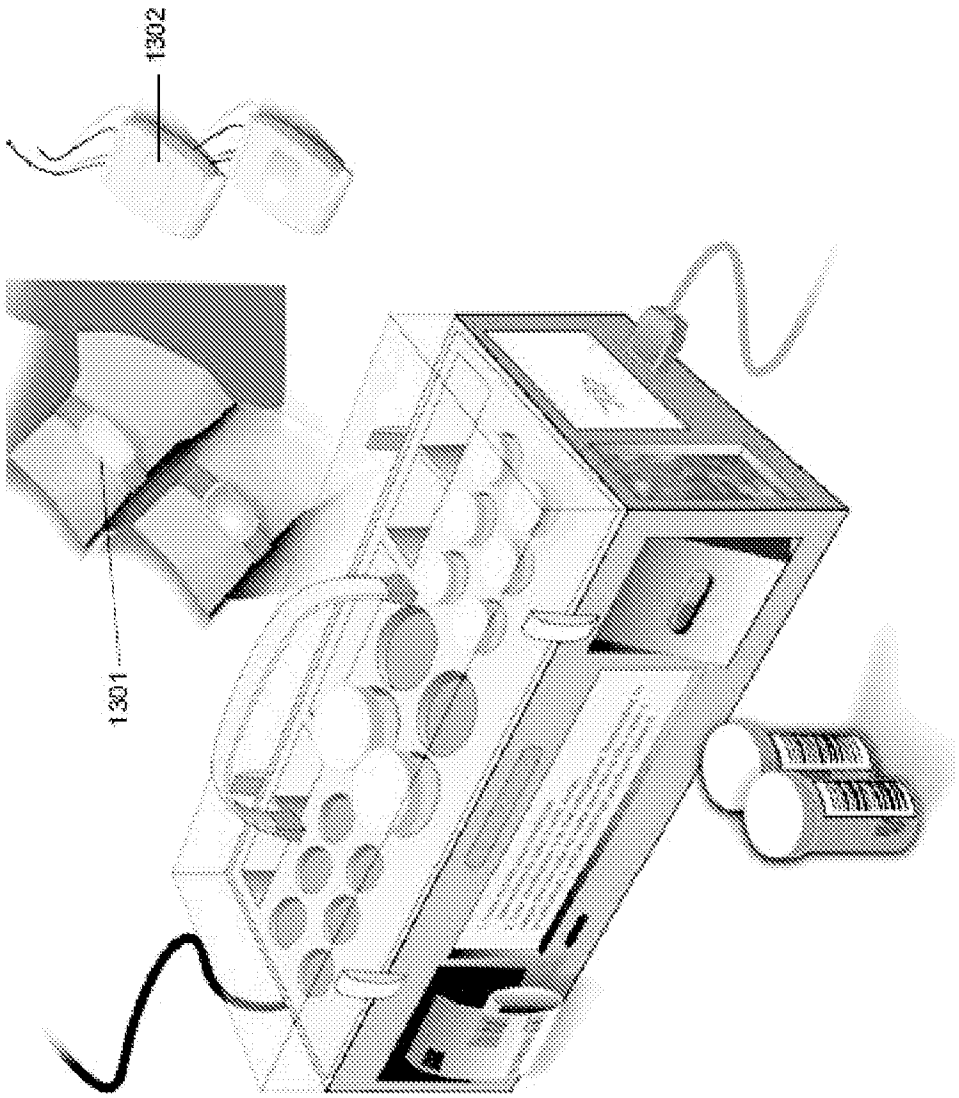


FIGURE 13

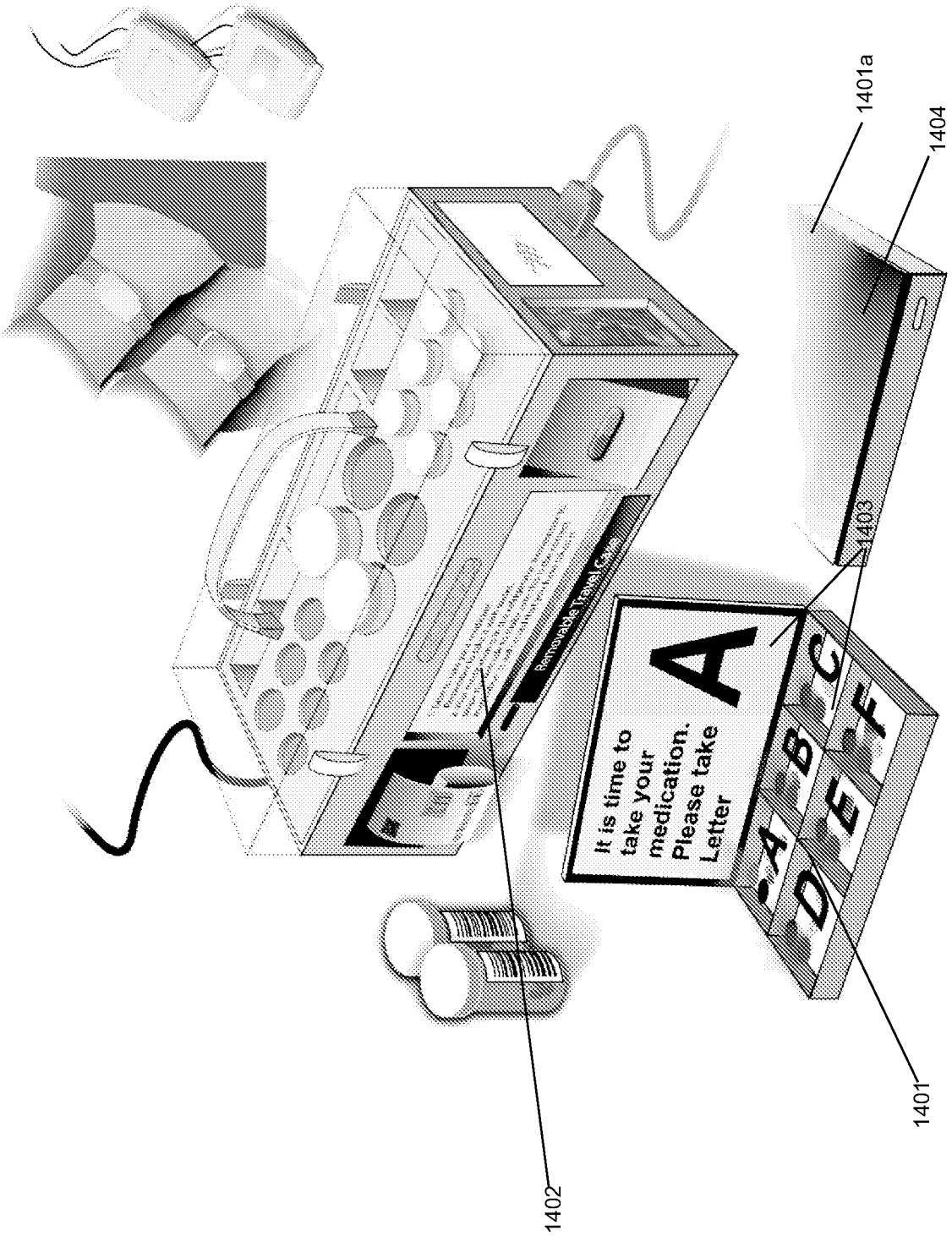

1401a
1404
1403
1402
1401
It is time to take your medication. Please take Letter
A
A B C
D E F

FIGURE 14

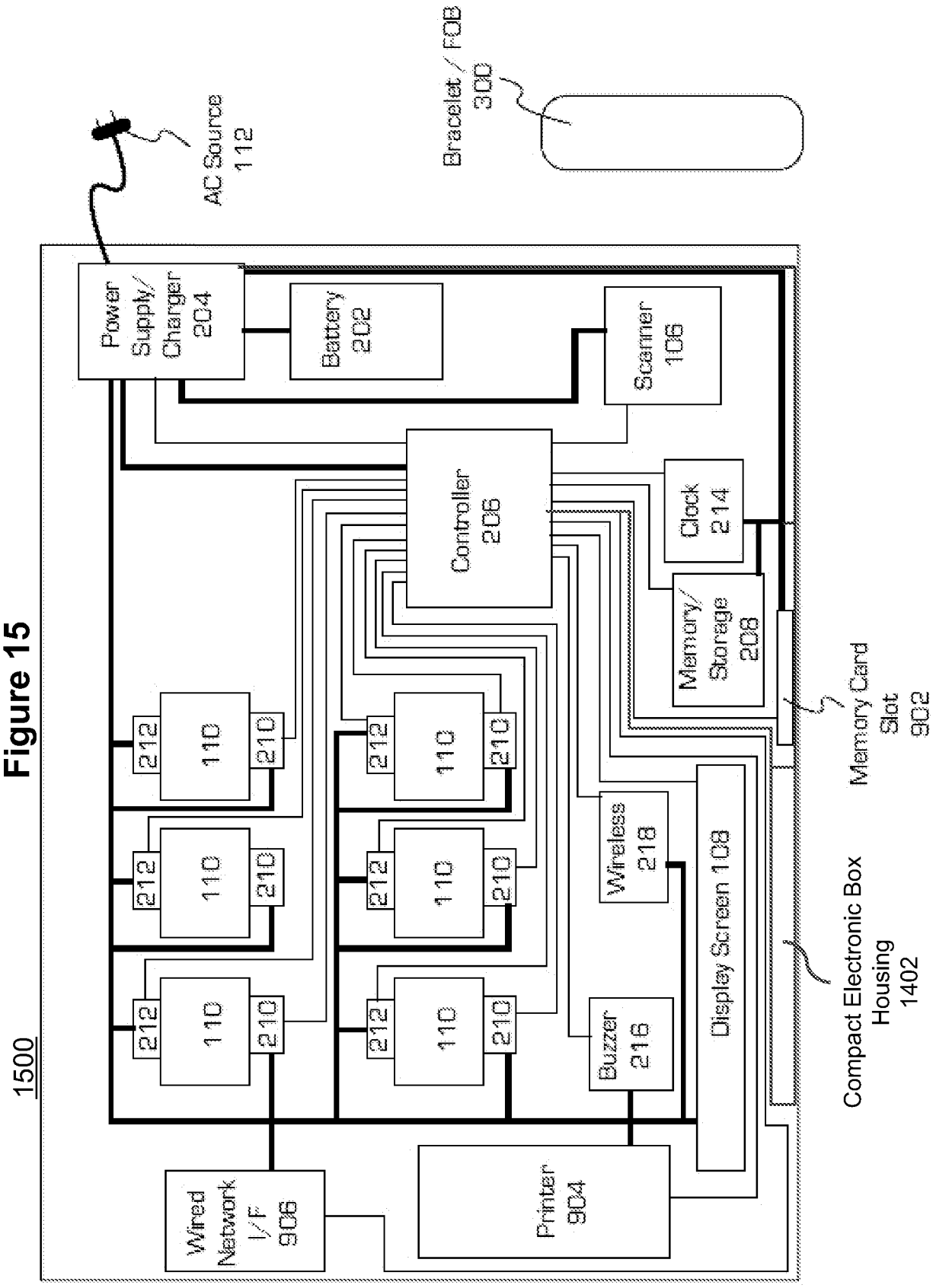

1500
AC Source 112
Bracelet / FOB 300
Power Supply/ Charger 204
Battery 202
Scanner 106
Controller 206
Clock 214
Memory/ Storage 208
Memory Card Slot 902
Compact Electronic Box Housing 1402
Wireless 218
Display Screen 108
Buzzer 216
Printer 904
Wired Network I/F 906
212
110
210

Figure 15

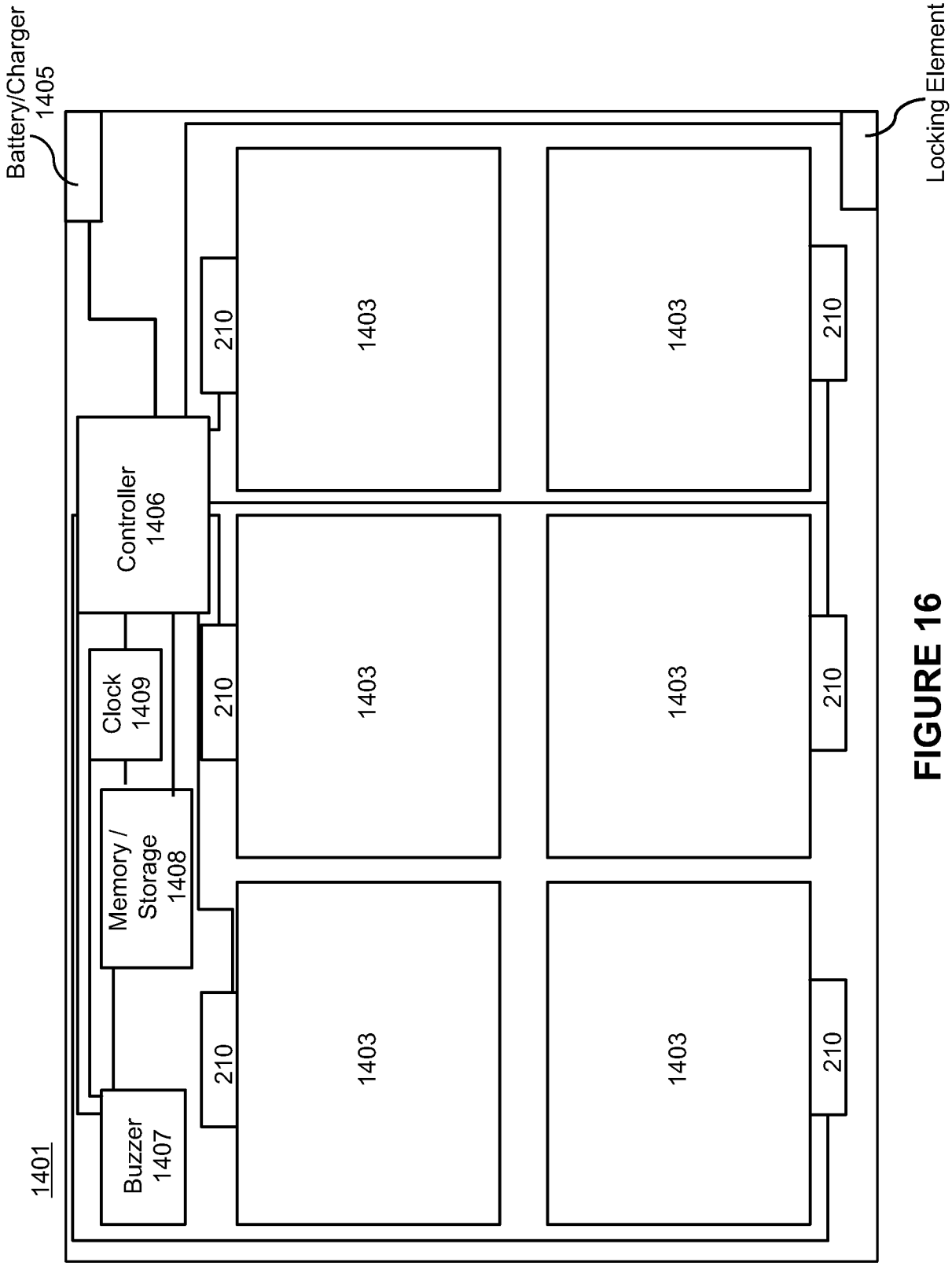

Battery/Charger
1405
Locking Element
1404
Controller
1406
Clock
1409
Memory /
Storage
1408
Buzzer
1407
1401
210
1403

FIGURE 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US15/42762

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A61J 7/04; G06F19/00; G06Q 50/22 (2015.01)
CPC - A61J 7/0436, 7/0481; G06F19/3462; G06Q 50/22
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): A61J 7/04; G06F19/00; G06Q 50/22 (2015.01)
CPC: A61J 7/0436, 7/0452, 7/0454, 7/0481, 7/049; G06F19/3462; G06Q 50/22

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)
PatSeer (US, EP, WO, JP, DE, GB, CN, FR, KR, ES, AU, IN, CA, INPADOC Data); ProQuest; IEEE; Google/Google Scholar; self*, medication*, management*, system* receptacles*, sensor*, visual*, indicator*, medication*, containers*, scanner*, printer*, display*, power*, source*, battery*, administration*, time*, database*, location*, user*, notify*, detection*

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 (BOWERS, B) 24 January 2013, Abstract, Figures 11-13, Paragraphs [0002], [0007], [0009]-[0011], [0050], [0066], [0071]-[0074], [0076], [0082], [0084], [0086].	1-19
A	US 2013/0030566 A1 (SHAVELSKY, E et al.) 31 January 2013, entire document.	1-19
A	US 8108068 B1 (BOUCHER, g et al.) 31 January 2012, entire document.	1-19
A	US 2006/0241355 A1 (HOWELL, T et al.) 26. October 2006, entire document.	1-19
A	US 6294999 B1 (YARIN, P et al.) 25 September 2001, entire document.	1-19

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 September 2015 (30.09.2015)	30 OCT 2015
Name and mailing address of the ISA/ Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Shane Thomas PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (January 2015)