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(54) Title: A CASSETTE FOR CONTAINING AND DISTRIBUTING ONE OR MORE DOSES OF CONTENT, A DISPENSER FOR

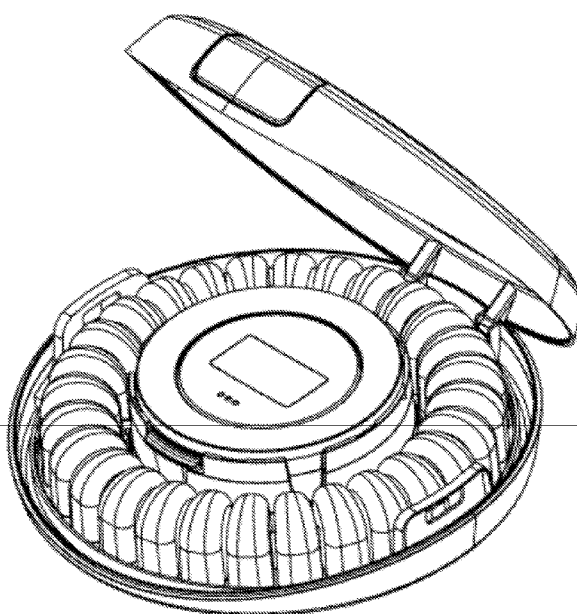


Fig 9C

(57) Abstract: The disclosure relates to a the cassette (10, 10') comprise one or more cells (14) for containing the content, the cells (14) being arranged circumferential, and each cell (14) comprises a bottom (15) and side walls (16), and an open end (17), wherein the circumferentially arranged cells (14) have at least one blind space (18) between two adjacent cells (14) with a width corresponding at least to the width of one cell (14), the cassette (10, 10') being substantially circular and having an inner circular opening (19) around which the cells (14) are arranged, and the inner circular opening (19) is provided for being arranged over a corresponding circular shaped motor house (50, 50'), the cassette (10, 10') further comprise a rotationally connected cassette lid disc (11, 11') covering the open end (17) of the cells (14), wherein the cassette lid disc (11, 11') is rotatable relative the cassette (10, 10'), and the cassette lid disc (11, 11') further comprise at least one lid aperture (12) having a size and form substantially corresponding to or larger than the open end (17)



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of at least one of the cells (14). The disclosure further relates to a dispenser (20, 20') for monitoring and dispensing doses of content, a filling device for filling a cassette (10, 10'), a system for operating a dispenser (20, 20') and a method for operating a dispenser (20, 20').

A cassette for containing and distributing one or more doses of content, a dispenser for monitoring and dispensing doses of content, a filling device for filling a cassette, a system for operating a dispenser and a method for operating a dispenser

Technical field

5 The present disclosure relates to a cassette for containing and distributing one or more doses of content, a dispenser for monitoring and dispensing doses of content, a filling device for filling a cassette, a system for operating a dispenser and a method for operating a dispenser. More specifically, the disclosure relates to a cassette for containing and distributing one or more doses of content, a dispenser for monitoring and dispensing doses of content, a
10 filling device for filling a cassette, a system for operating a dispenser and a method for operating a dispenser as defined in the introductory parts of claim 1, claim 11, claim 29, claim 31 and claim 32.

Background art

15 In one advantageous embodiment of present invention, a cassette container and dispenser system for distributing and dispensing medical substances such as prescribed medicine for personal consumption is provided.

 Prior art dispensers comprise static matrix-based containers wherein the user pulls open a lid for accessing a dose cell, and can fill/retrieve a content of the cell in the matrix cassette.

20 Automatic dispensers have lately been seen in the market. Such medical dispensers are typically provided with a cassette of cells in a blister type package, in many known solutions the cells are provided in a matrix or circular cell-based cassette. The cassette is introduced into an apparatus that can be operated to open the blister and pour out the content. In some cases, this opening is automated.

25 A further improved dispenser has been published wherein the cassette is rotated to automatically distribute the content of the next cassette cell. Rotating operation may be time controlled.

 A problem with the solutions of the prior art is that the doses must be defined by the producer. If the user need a different dose, or a variety of products from different vendors,
30 more than one cassette must be used.

For the manually filled cassettes there is problems in that the filling process is manual and error prone, and the regime for actually open a cell and use the content/doses are user dependent, and error prone.

Using a blister packed cassette has several challenges in that the blister must be broken to access the content, and the flexibility of varying the doses and mixing medication vendors are non-existing.

The automatic dispensing devices of prior art are cumbersome to use, and require at least a two hand operation, which introduces challenges for persons not fully abled to synchronize the retrieval of medicine from the devices. And even more cumbersome it becomes for disabled people lacking full arm/hand functionality.

Typically the prior art dispensers need to select the correct cell to expose, and then the user needs to turn the dispenser upside down to get the content out of the exposed cell interior. This requires that the user needs to be able to both hold the dispenser and catch the content as it falls out of the dispenser. Sounds simple, but is very difficult for many medicine dispenser users. And very often some of the content is spilled. This is by some prior art solutions solved by delivering pre sealed bags of medicine dosage. Thus a "bag" of pills are dropped out of the dispenser, and this is easier to catch, but one problem remains for the user, the bag must be opened, and this may also be a hard challenge for many dispenser users.

A challenge for all prior art dispensing systems are that the users and/or the caretakers, often the users next of kin, lack the ability to avoid misuse. The result is that persons frequently experiencing wrongly dosed medication, too much or too little, often with fatal consequences.

Other problems with prior art dispensers are that they cannot dispense from an arbitrary cell at any time, for example for dispensing PRN-(pro re nata) medication.

There is thus a need for an improved cell-based cassette, an improved distribution device for using such improved cell-based cassette that may be safely operated with minimum handling of user, and which can output a dose of medicine into a cup or hand without having to turn the dispenser while operated, and a system and method for use and surveillance of these.

Summary

It is an object of the present disclosure to mitigate, alleviate or eliminate one or more of the above-identified deficiencies and disadvantages in the prior art and solve at least the above mentioned problem. According to a first aspect there is provided a cassette for containing and distributing one or more doses of content, the cassette comprise one or more
5 cells for containing the content, the cells being arranged circumferential, and each cell functioning as a "jar" type container comprising a bottom and side walls, and an open end for filling or disposing the content, the cassette being substantially circular and having an inner circular opening around which cells are arranged , and the inner circular opening is provided for being arranged over a corresponding circular shaped motor house, the cassette further
10 comprise a rotationally connected cassette lid disc covering the open end of the cells, wherein the cassette lid disc is rotatable relative the cassette, and the cassette lid disc further comprise a lid aperture having a size and form substantially corresponding to or larger than the open end of at least one of the cells.

Thus, a cassette may be distributed independent of whether a content is prefilled or
15 not, since all the cells are locked in the open end by the attached lid, and the lid is provided with a lid aperture that may be rotated to access any of the cells. A blind space is provided to enable the lid aperture of the lid to be arranged in a position where the lid aperture is not arranged directly above a cell opening, avoiding exposing the internal of a cell unintentionally.

According to some embodiments, the cassette has one or more cassette rotating
20 operator connector facing the inner circular opening.

The opening in the cassette provides for arranging a motor, or driving device, and the cassette rotating operator connector provides for access of a connecting device to operate the positioning of the cassette.

According to some embodiments, the cassette lid disc further comprises a lid inner
25 circular opening corresponding to the inner circular opening of the circumferentially arranged cells of the cassette, the cassette lid disc has a rotating operator connector facing the lid inner circular opening.

The opening in the lid and the cassette provides for arranging a motor, or driving device, and the rotating operator connector provides for access of a connecting device to
30 operate the rotation of the lid relative the cassette.

According to some embodiments, the cassette has installed a data chip, containing a data storage and a communication module for wireless communication.

A variety of features may be facilitated by providing the cassette with data storage and/or communication means, both for content administration, status account,
5 communication and authentication of cassette relative user and distribution device used. Thus, facilitating reuse, refilling, safe and secure distribution and more.

According to some embodiments, the data chip data storage is programmed to contain data related to one or more of; unique cassette id, content type in the cells, content volume in the cells, expiry date of the cell contents, distribution pattern, and identity of recipient.

10 According to some embodiments, the data chip is arranged in one of a blind spot of the cassette or a recess in the cassette lid.

A predefined regime for placement of chip facilitates for easy installation and verification of cassette in any type of distribution device having corresponding communicating means.

15 According to some embodiments, the cassette and the cassette lid disc are substantially made in a recyclable, recoverable or compostable material.

Providing a cassette with properties for refilling and reuse is environmentally desirable. Having a chip inside each cassette uniquely identifying each cassette enables further monitoring of use and dispose status.

20 According to some embodiments, the cassette comprises one or more tamper evidence identifiers for identifying whether the cassette lid disc has illegally been attempted removed or rotated.

Any distribution of sensitive material, medical content, drugs and the like may be target for unauthorized access, and it will be a need to provide certificate of the quality of the
25 content of the cells in the cassette. Various tamper evident seals are thus providing to ensure that no one has tampered with the content or accessed any of the cells between authorized access to the same.

According to some embodiments, the cells have cell sizes of two or more sizes, and wherein the pattern of the cell size around the circumference of cells is predefined in accordance with distribution requirements.

5 Having the ability to vary the content volume and number of the cells in the cassette provides the possibility to have a flexible distribution regime.

According to some embodiments, the number of cells is one of 28, 14, 10 or 7.

10 Typical distribution is fitted to four weeks one cell content a day, one week 4 cells a day, one week 2 cells a day, one week one cell a day , or 1 week one cell a day and 3 extra cells. Any other number may be custom made without deviating from the inventive concept of present invention.

15 According to a second aspect there is provided a dispenser for monitoring and dispensing doses of content comprising: base part comprising an underside/bottom and a circumferential side wall, and a top part comprising a removable dispenser lid, an inner circular motor housing having a smaller diameter than the circumferential side wall, wherein a circumferential room is provided between the outer diameter of the motor housing and the inside of the circumferential side wall for receiving a cell based distribution cassette, a power source, such as a chargeable battery, and one or more motors for rotation of rotational means comprised in the motor housing, the rotational means having contacting elements outside, or embedded in the outer sidewall of the motor housing, such that when a cell based cassette
20 with an inner circular opening is arranged in the dispenser, a conduit may be established into the cell based cassette.

Thus, providing a secure environment for holding a cell-based cassette and wherein the dispenser additionally comprise means for arranging each cell in a position for emptying its content through a conduit of the dispenser.

25 According to some embodiments, the outer diameter of the motor housing is adapted to fit inside the inner circular opening of the cassette, and the motor housing has a cassette rotating means embedded being driven by a motor, and the cassette rotating means is further connected with the cassette via the contacting element for rotating the cassette.

30 Rotating the cassette inside the dispenser is part of being able to manage a complex content distribution regime.

According to some embodiments, the rotating means is adapted to rotate the cassette in two directions.

5 A novel feature relates to the ability to close all cells and rotate cassette inside the dispenser freely, forward, backward, and more than one cell position at a time, which increase the ability to provide an even more flexible distribution regime.

According to some embodiments, the motor housing has a cassette lid disc rotating means embedded being driven by a motor, and the cassette lid disc rotating means is further connected via a contacting element with a cassette lid disc for rotating the cassette lid disc independent of the cassette.

10 Rotating the lid independent of the cassette provides the ability to choose which of, and when to open the access to the content of, a cell being arranged over the dispenser conduit, and in the event a cassette with variable size cells is used, the independently rotatable lid enables the conduit into a cell to be individually adapted to the size of the opening of the individual cell.

15 According to some embodiments, the cassette is a cassette as described for the first aspect above.

It is envisaged that the dispenser according to present invention may be used with any cassette being designed according to a minimum feature specification, but most advantageously a cassette according to present invention is used.

20 According to some embodiments, the motors and rotational means are controlled to rotate and arrange a cell of the cassette containing content over the conduit, and further rotate the cassette lid disc into a position such that a lid aperture in the cassette lid disc is aligned with the cell and the conduit such that the content of the cell can be poured out of the cell and the dispenser.

25 An advantageous feature of the present invention is the ability to arrange a cell of the cassette in position for distribution, and when user is ready for dispensing the content of the cell rotate the cassette lid to open the conduit into the dispenser and cell so the content can exit the cassette cell and dispenser.

According to some embodiments, the dispenser comprises: a dispenser locking device for securely holding the base part and top part together when a cassette is arranged in the dispenser.

Secure operation and prevention of unauthorized access is maintained by a secure
5 lock. In some embodiments this locking feature is strictly monitored and administrated. Other use regimes may be facilitated for non-regulated (for example not prescription regulated) content.

According to some embodiments, a first element of the dispenser locking
device is pivotally hinged in the motor housing and pivotally controlled by one or more
10 lock solenoids or a rotational locking connector arranged
inside the motor housing such that the first element of the dispenser locking device can be pivoted between a locking position connected to a second element of the dispenser locking device and an opening position wherein the connection is released.

Various embodiments for securing the lock mechanism is provided as examples of
15 controlling access to the internal of the dispenser. Other mechanisms providing the same feature is considered to be covered by the inventive concept of the present invention.

According to some embodiments, the dispenser comprises: a controller for controlling the motors and the embedded rotational means.

20 Having a controller facilitates for easy adaptability to a variety of content distribution patterns, also comprising the ability to provide a cell refilling/filling regime.

According to some embodiments, the dispenser comprise: a communication means for communicating with a remote computing means for sending and receiving data and status of the dispenser.

25 An even further flexibility may be achieved by being able to communicate with the controller and configure the distribution regime of the dispenser and cassette in real time.

According to some embodiments, the dispenser comprises: a reader device for communicating with a data chip installed in the cassette.

Thus, the cassette itself may be part of the configuration of the use mode of the dispenser when the chip inside the cassette may comprise data related to user, dispenser id, content of individual cells, and even for example distribution pattern according to a specific prescription.

5 According to some embodiments, the reader device is arranged aligned with the protrusion such that when a cassette is first arranged in the dispenser the reader device is aligned with the data chip arranged in the cassette.

 According to some embodiments, the dispenser comprises: a de-jamming device for creating a movement pattern of the cell of the cassette when in position and in mode for
10 outputting content such that any stuck content is released by vibration/oscillating movement caused by the de-jamming device.

 A frequent challenge with cell-based cassettes, regardless of vendor, is the possibility of the content being stuck/jammed inside the cell when user tries to empty the cell. This may lead to faulty doses retrieved from the cell. Thus, a feature of present invention may be to
15 facilitate a “woodpecker”/vibration feature to ensure less occurrence of jammed/stuck content.

 According to some embodiments, the dispenser is self-sustained wherein communication means in the dispenser supports communication with remote computing resources via network services such as LAN, WAN, cellular network, radio network, cloud
20 based computing or other, and the power source is a battery providing some or all features of the dispenser with power in a standalone operation mode. Further interface for direct communication and power charging with a standalone dispenser may be provided.

 Being mobile is any persons wish, and a novel feature of the dispenser of present invention is to be able to easily and quickly remove the dispenser from its place of operation,
25 and operate it disconnected but with remote communication abilities. This is enabled based on the internal power storage and communication means enabling the dispenser to be connected either alone or via a computing means, such as a smart phone, to a back-office service, such as a cloud-based server solution.

According to some embodiments, the dispenser comprises: a dispenser stand having an elevated dispenser floor for holding the dispenser in an elevated position in order for content to be outputted from the dispenser can fall directly into a content cup or box.

5 Having a stand and a content collector such as a cup enables the dispenser to be operated without the need to grab and turn it to get access to the content of the cell.

According to some embodiments, the dispenser stand comprise a wireless charging pad for wireless charging of battery in the dispenser.

A stand may comprise power charging means, such as inductive charge feature, cable free charging, communication means, computing means, and other.

10 According to some embodiments, the dispenser comprises: a display, being one or more of a touch screen display, passive display, inductive/capacitive sensor, and a led matrix.

Display, switches and diodes may be used to guide the user in dispensing/filling processes, and to communicate signals and commands between the user and services.

15 According to some embodiments, the dispenser comprises: an audio device for performing one or more of: outputting audio messages, outputting alarm/warning sound, inputting voice messages, and 2-way audio communication with back end services connected to the dispenser.

20 According to a third aspect there is provided a filling device for filling a cassette, comprising: a cassette according to the first aspect, and one or more of: a cassette tamper evidence identifier removal device, a semiautomatic or automatic cell filler, a programming unit for updating data components associated with a data chip inside a cassette, and a cassette tamper evidence identifier refitting device.

25 A cassette may thus be provided for being filled, refilled or replenished, by an authorized user, and distribution of content may be supported much closer to the end user than in any existing distribution regimes today.

According to some embodiments, the filling comprises: a multi content storage magazine for filling a mixture of content in the cassette cells.

According to a fourth aspect there is provided a system for operating a dispenser according to the second aspect, comprising: a back office server application, such as a cloud based services, the services providing one or more of the services: transmitting reminders to dispenser, transmitting reminders to next of kin to dispenser user, alarm services for users, alarm services for tampering activities to cassette or dispenser, server for APPs running to serve users of and next of kin to the users of the dispenser, managing the prescriptions of the users, managing and transmitting prescriptions to filling stations, such as filling device according to the third aspect, database storage of users and historical data related to use and prescriptions, and subscription services for content delivery, information and back office services.

Thus, having a concept being communicative in all stages and elements provides for a much more diversified service offering.

According to a fifth aspect there is provided a method for operating a dispenser according to the second aspect, comprising the following steps: providing a dispensing/filling regime for the cassette cells, dispensing/filling a cell content according to a provided regime, and when all intended cell contents has been dispensed: opening the dispenser top part, replacing the cassette with a new prefilled content or start a filling regime, when all intended cell contents has been filled: start dispensing regime.

According to some embodiments, the method further comprises the steps: when an approved operator will change cell content: identifying by the dispenser that operator is a valid operator, provide the dispenser with a new filling regime, or open the dispenser top part, refilling, replenish or replacing the content of the cells according to the new filling regime, or replacing the cassette with a prefilled content, and restarting distribution regime.

Effects and features of the second through fifth aspects are to a large extent analogous to those described above in connection with the first aspect. Embodiments mentioned in relation to the first aspect are largely compatible with the second through fifth aspects.

The present disclosure will become apparent from the detailed description given below. The detailed description and specific examples disclose preferred embodiments of the disclosure by way of illustration only. Those skilled in the art understand from guidance in the detailed description that changes and modifications may be made within the scope of the disclosure.

Hence, it is to be understood that the herein disclosed disclosure is not limited to the particular component parts of the device described or steps of the methods described since such device and method may vary. It is also to be understood that the terminology used herein is for purpose of describing particular embodiments only, and is not intended to be limiting. It should be noted that, as used in the specification and the appended claim, the articles "a", "an", "the", and "said" are intended to mean that there are one or more of the elements unless the context explicitly dictates otherwise. Thus, for example, reference to "a unit" or "the unit" may include several devices, and the like. Furthermore, the words "comprising", "including", "containing" and similar wordings does not exclude other elements or steps.

The invention relates to a dispenser, a cassette for use in a dispenser, a system and method for such devices, and the embodiments described herein all describes dispensing of prescribed medicine for personal consumption. It should however be understood that other use of the invention falls under the scope of the invention. Distribution of other types of goods may well advantageously make use of the inventive concept of present invention. Brief examples are mentioned in the following text without being discussed in detail. All embodiments may use any number or combination of features discussed.

Brief descriptions of the drawings

The above objects, as well as additional objects, features and advantages of the present disclosure, will be more fully appreciated by reference to the following illustrative and non-limiting detailed description of example embodiments of the present disclosure when taken in conjunction with the accompanying drawings.

Fig. 1A shows an exploded view of one embodiment of the cassette of present invention having a first cassette lid fastening means

Fig. 1B shows an exploded view of one embodiment of the cassette of present invention having a second cassette lid fastening means

Fig. 1C shows mounted oblique view from below of one embodiment of the cassette of present invention having the second cassette lid fastening means

Fig. 1D shows mounted oblique view from above of one embodiment of the cassette of present invention having the second cassette lid fastening means

Fig. 2A shows a dispenser with open lid from a first angle

Fig. 2B shows a dispenser with open lid from a second angle

Fig. 2C shows a closed dispenser from below

Fig. 2D shows a closed dispenser from above

5 Fig. 2E shows the dispenser in an exploded view

Fig. 3A shows the dispenser stand

Fig. 3B shows a cross section of the dispenser stand

Fig. 4A shows a side view of the dispenser in the dispenser stand

Fig. 4B shows a side view cross section of the dispenser in the dispenser stand

10 Fig. 4C shows a second embodiment of the dispenser in the dispenser stand

Fig. 4D shows the second embodiment of the dispenser in the dispenser stand with an open lid

Fig. 4E shows a cross section of the second embodiment of the dispenser in the dispenser stand

15 Fig. 5 shows a system overview of various use scenarios of the dispenser and filling regimes.

Fig. 6A shows a further embodiment of the dispenser in an exploded view

Fig. 6B shows a detailed view of the novel antenna

Fig. 7A and 7B shows the cassette lid disk and the dispenser lid locking device

20 Fig. 8A shows an exploded view of the further embodiment of the cassette assembly 250, 250'

Fig. 8B shows the further embodiment of a cassette assembly 250, 250' form above

Fig. 8C shows the further embodiment of a cassette assembly 250, 250' form below

Fig. 9A and 9B shows the further embodiment of the dispenser in an open state from two angles

Fig. 9C shows the further embodiment of the dispenser with an open lid and a cassette assembly 250, 250' arranged inside

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Fig. 10 A and 10B shows the further embodiment of the dispenser in a closed state from above and below respectively

Fig. 11A and 11B shows the further embodiment of the dispenser in a further embodiment of a stand seen from the front and oblique side view from above respectively.

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Detailed description

The present disclosure will now be described with reference to the accompanying drawings, in which preferred example embodiments of the disclosure are shown. The disclosure may, however, be embodied in other forms and should not be construed as limited to the herein disclosed embodiments. The disclosed embodiments are provided to fully convey the scope of the disclosure to the skilled person.

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Figure 1 shows first embodiment of the cassette of present invention.

The first aspect of this disclosure shows a cassette assembly 250, 250' for containing and distributing one or more doses of content, the cassette assembly 250, 250' comprise a cassette 10, 10' comprising one or more containment cells 14, the cells 14 being arranged circumferential, and each cell 14 comprises a bottom 15 and side walls 16, and an open end 17, wherein the circumferentially arranged cells 14 have at least one blind space 18 between two adjacent cells 14 with a width corresponding at least to the width of one cell 14, the cassette 10 being substantially circular and having an inner circular opening 19 around which the cells 14 are arranged, and the circular opening is provided for being arranged over a corresponding circular shaped motor house 50, the cassette assembly 250, 250' further comprise a rotationally connected cassette lid disc 11 covering the open end 17 of the

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containment cells 14, wherein the cassette lid disc 11 is rotatable relative the cassette 10, and the cassette lid disc 11 further comprise a lid aperture 12 having in an advantageous embodiment a size and form substantially corresponding to or larger than the open end 17 of the cells 14. Smaller sizes may be provided for custom needs.

5 The cells are described as having a bottom 15 and an open end 17, but the cassette can be viewed as being arranged with the opening 17 both upward and downward, depending on which mode the cassette operates in, dispensing or filling/replenish mode. In dispensing mode the cassette may be placed with the opening 17 downwards, and the cassette lid disc 11 being rotated to arrange the lid aperture over a cell 14 to expose the content of the cell. When a
10 cell 14 is to be filled or replenished, the cell opening 17 may be pointing substantially upwards.

 The lid disc 11 is rotationally connected to the cassette 10 by a disc connecting means 28, 29, 29' as seen in figure 1A. These disc connecting means may be formed as a lid holding disc 80 with a partially or completely continuous gripping circumventing outer flange 28 and a
15 partially or completely continuous gripping circumventing inner flange 28' wherein the inner and outer flange is radially connected by ribs 128 and/or solid flange elements 128', but comprising at least one holding disc aperture 12' corresponding with the at least one aperture 12 of the lid disc. The inner and outer flange is further, by clip on fastening or other means 28'', 228''128, gripping around the lid disc and connects with gripping members 228, 228' of
20 the cassette holding the lid disc arranged closely over the openings of the cells of the cassette, and to permit a rotary movement of the lid disc relative the cassette.

 In an even further embodiment the lid holding disc 80 may be independently rotatable by a lid holding disk rotating member (not shown).

 A further embodiment is shown in Figure 1B and 1C shows a fastening method using to
25 individually arranged radial collar locks 29, 29'. These may be cold welded or fastened by other means such that an outer collar lock 29 is arranged and fixed radially around and outside a cassette outside collar 228, and the collar lock further grips around the outer circumference of the cassette lid disc and holds the cassette lid disc close to the cassette and at the same time in a manner allowing rotary movement of the lid disc relative the cassette. A similar
30 connection is made by an inner collar lock 29' being arranged to attach the cassette lid disc to the cassette wherein the inner collar lock 29' is arranged and fixed radially around and inside a

cassette inside collar 228', and the inner collar lock 29' further grips around the inner circumference of the cassette lid disc and holds the cassette lid disc close to the cassette and at the same time in a manner allowing rotary movement of the lid disc relative the cassette.

In one embodiment of present invention the cassette 10 has a cassette rotating operator connector 13' facing the inner circular opening 19. The cassette rotating connector 13' is provided for enabling a rotating movement of the cassette cells when arranged in a tool for operating the cassette.

The cassette lid disc 11 may further comprises a lid inner circular opening 49 corresponding to the inner circular opening 19 of the circumferentially arranged cells 14 of the cassette 10, the cassette lid disc 11 has a rotating operator connector 13 facing the lid inner circular opening 49. The rotating operator connector 13 of the cassette lid disc 11 is provided for rotational movement of the cassette lid disc 11 relative the cassette 10, such that the inside of an individual cell may be accessed through the lid aperture 12 and the open end 17 when being overlapping arranged.

In a further embodiment the cassette assembly 250, 250' may have a data chip 18' installed, wherein the data chip 18' may contain a data storage and/or a communication module for wireless communication.

The data chip 18' data storage may further be associated with, or programmed to contain, data related to one or more of; unique cassette 10 id, content type in the cells 14, content volume in the cells 14, expiry date of the cell contents, distribution pattern, and identity of recipient. A variety of data parameters may be associated with and/or stored and written to/read from the data storage of the data chip 18'. Thus the data associated with the cassette may be used to control the operation of a usage of the cassette, when a device is provided able to read and/or communicate with the data chip 18'. Association of the data related to the cassette may be stored in the data chip itself, in a storage in a container, or remotely in back office services. In the latter, it is provided a communication interface providing a communication path between a unique id stored in the cassette data chip, via a processing unit in the dispenser, and to a back office service. The back office service may manage the cassette inventory, and may manage the distribution regime via communication to the a dispenser device. It is also provided an embodiment wherein a distribution device processing unit maintain an inventory of a mounted cassette, and thus may be enabled to

maintain operation and content distribution in accordance with a predefined distribution regime. Thus, this embodiment may operate as a standalone device not connected to a back office service for periods at a time, for example as long as the distribution device maintain sufficient power resources. Further standalone interface 67 for direct connecting a communication line and/or power charging cable with the standalone dispenser may be provided. The standalone interface 67 may be incorporated in the dispenser base such that the dispenser cannot be arranged in a dispenser stand when cables are connected in the standalone interface 67.

The data chip 18', 233 may be arranged in a predefined position, such as a blind spot 18 or a recess 233', of the cassette assembly 250, 250'. In this manner the cassette may be easier to install and oriented in a position where the data chip 18' may be easily read by a communication module in a use device for accessing the cassette cells, for example using an NFC protocol or other communication protocol.

The cassette assembly 250, 250'. 10' and/or the dispenser 20, 20' may further comprise one or more environment sensors 181 for logging for example temperature, humidity, movement and other. The environment sensors 181 may comprise storage for storing sensed data, and further comprise communication means for communicating the stored /sensed data to a network service 180.

In a first embodiment, the cassette 10 and lid disc 11 is made of a material that is easily recycled/recovered, and future embodiments may even be made of compostable materials.

The content of a cassette may be sensitive or restricted, such as prescription drugs or the like. Thus, the cassette may comprise one or more tamper evidence identifiers 47,47' for identifying whether the cassette lid disc 11 has illegally been attempted removed or rotated.

In a further embodiment it is provided one or more tamper resistant devices able to destroy or alter the content of the cells in a manner that will render the content harmless.

In one embodiment of present invention the cells 14 have cell sizes of two or more sizes, and wherein the pattern of the cell size around the circumference of cells is predefined in accordance with distribution requirements. Thus it is for example possible to provide a cassette 10 cell configuration wherein every third cell is twice as big as the two following cells

14. A typical need for this is when number of pills needed to be taken by a person in the morning is higher than on the next two intervals during the day.

Although any number of cells may be used, there is a special use for cassettes having the number of cells 14 being one of 28, 14, 10 or 7. The numbers typically reflects a persons
5 need to take medication one, two, three or four times a day, and changing cassette every one, two, three or four week. For advanced use of present invention may exploit the possibility to rotate the cassette any way and any number of cell widths as discussed below, the cells of a cassette may be arranged to have one size for a portion of the cells, where all cells of same size are arranged side by side, and further portions of the cells, also arranged side by side in
10 groups of same size fills up the rest of the cell positions. Thus one portion of the cells may contain one type of content, and other portions containing other type of content. The distribution may access any cell at any time to exploit and distribute its content. Thus, a more flexible and efficient filling and dispensing may be provided.

The second aspect of this disclosure, as exemplified in some embodiments of a
15 dispenser in figure 2A-D, and in an exploded view in figure 2E, and a dispenser 20 on a dispenser stand 30 in figure 4A to E shows the dispenser 20 for monitoring and dispensing doses of content comprising: base part 27 comprising an underside/bottom 65 and a circumferential side wall 27', and a top part comprising a removable dispenser lid 26, an inner circular motor housing 50 having a smaller diameter than the circumferential side wall 27',
20 wherein a circumferential room 48 is provided between the outer diameter of the motor housing 50 and the inside of the circumferential side wall 27' for receiving a cell based distribution cassette assembly 250, 250', a power source 55, such as a chargeable battery, and one or more motors 56 for rotation of rotational means 57,58 comprised in the motor housing, the rotational means 57, 58 having contacting elements 83, 113 outside, or
25 embedded in the outer sidewall 54 of the motor housing 50, such that when a cell 14 based cassette 10 with an inner circular opening 19 is arranged in the dispenser, a conduit 23 may be established into the cell 14 based cassette assembly 250, 250' when the cassette lid 11 is rotated to have the lid aperture 12 in a position exposing the internal of intended cell 14 over the conduit 74 of the dispenser underside/bottom 65. In one embodiment the dispenser is
30 formed with a protruding oval form 21, 22, with an optional partially transparent look to allow a see through feature, for allowing a larger protected space around the conduit 23.

The dispenser lid 26 and the dispenser base part 27 may be connected via a hinge 164 arranged to enable pivotally opening up the dispenser lid 26 to exchange/supply/retrieve a cassette in the dispenser. A further locking element 163 may be provided on the dispenser lid for interlocking with a locking device 63 comprised in the motor housing 50.

5 The dispenser 20 is self-contained in that it may operate off the power grid, in a battery use mode, and being wirelessly connected to a back office service, or running in a preprogrammed time mode. Thus the dispenser 20 may be able to operate and distribute content of cassette according to a predefined dispensing regime. Once the dispenser 20 is reconnected to back office services the dispensing regime may be updated. The dispenser may
10 comprise a processing resources arranged on for example a PCB 53. The processing resources typically comprising one or more of, but not limited to battery controlling circuits, micro processing unit, communication unit, antenna 59, display controller, and motor controlling units. The processing resources may be used to control sensors and communication with a cassette data chip, smart phone apps, and other remote computing and/or server resources.

15 As seen in the figures the outer diameter of the motor housing 50 may be adapted to fit inside the inner circular opening 19 of the cassette assembly 250, 250', and the motor housing 50 has a cassette rotating means 58 embedded being driven by a motor 56, and the cassette rotating means 58 is further connected with the cassette 10 via a contacting element 113 for rotating the cassette 10. Thus, when installed in the dispenser 20, the cassette 10 may
20 be rotated in one or two directions, clock wise and anti-clockwise, as required by a distribution regime defined for the cassette and controlled by one of the data preloaded on the cassette data chip, the processing means of the dispenser, or as controlled by an application running on a remote host which is in communication with the dispenser.

 Typically the cassette and the dispenser has guiding means to ensure that the cassette
25 is mounted in correct starting position (rotational) wise in the dispenser. In one embodiment of the invention the motor housing 50 is provided with a longitudinal running recess 113' for receiving the guiding means 13' of the cassette when mounting the cassette assembly 250, 250' over the motor housing 50. The recess is also continued down to the contacting element 113 of the cassette rotating means 58, and when cassette assembly 250, 250' is completely
30 installed in the dispenser, the inner circumference of the cassette 10 with the cassette guiding means 13' and the contacting element 113 of the cassette rotating means 58 are interlocked, and when cassette rotating means 58 is rotated, the cassette 10 rotates with it.

The rotation of the cassette 10 is thus enabled with rotating means fully encapsulated by the motor housing, and no moving parts are interacting with the cassette. The cassette rotating means 58 are fixedly connected to the inner circumference of the cassette. In one embodiment as seen in the figures and in detail explained by the figure 2E it is seen that the cassette rotating means 58 has internal gear teeth for interacting with an internally arranged motor 56 gear. The outer surface of the cassette rotating means forms a rotating portion of the motor housing, which rotates with the connected cassette.

Further control of the cassette orientation may be embedded in the cassette rotating means 58 and the motor controller (not shown). Typically the motors is of an accurate type of stepper motors, and the motor controller may be provided with means to accurately estimate position and orientation of the cassette and the individual cells to enable correct dispensing of cell according to the defined dispensing/filling regime. Since the starting point is defined by the guiding means 13', 113 it is then possible to maintain full control of the cassette orientation throughout the use.

The stepper motor may also be provided with an alarm handling feature, that will raise an alarm if misuse or external force tries to rotate the cassette and/or disc lid is detected.

Similar alarm procedures may be implemented if the dispenser lid is unauthorized opened.

Any alarms may be transmitted immediately to back office services and/or stored in the dispenser processing unit for later handling. For example can a cassette content be invalid after an intrusion or attempt for such is detected.

The motor housing 50 may further have a cassette lid disc rotating means 57 embedded being driven by a motor 56, and the cassette lid disc rotating means 57 is further connected with a cassette lid disc 11 attached to the cassette assembly 250, 250' for rotating the cassette lid disc 11 independent of the cassette 10. The cassette lid disc rotating means 57 are fixedly connected to the inner circumference of the cassette lid. In one embodiment as seen in the figures and in detail explained by the figure 2E it is seen that the cassette lid disc rotating means 57 has internal gear teeth for interacting with an internally arranged motor 56 gear. The outer surface of the cassette lid disc rotating means 57 forms a lid disc contacting element 83 which interact with the rotating operator connector 13 of the cassette lid disc 11 which then can be rotationally controlled independent of the cassette 10. The rotation of the

cassette lid disc 11 is thus also enabled with rotating means fully encapsulated by the motor housing, and the lid disc contacting element 83 is fixedly connected to the inner circumference of the cassette lid disc 11 rotating operator connector 13.

Thus, a cell in the cassette may independently be opened or closed by the rotation of the cassette lid disc 11, and the control may be according to a regime defined by one of the data preloaded on the cassette data chip, the processing means of the dispenser, or as controlled by an application running on a remote host which is in communication with the dispenser.

Using a cassette 10 as described above, the cassette lid disc 11 have one lid aperture 12 at least as big as the largest open end 17 of a cell in the cassette 10.

In one embodiment of the invention the dispenser may dispense, fill or replenish a content of a cell 14 by the motors 56 and rotational means 57,58 being controlled to rotate and arrange a cell 14 of the cassette 10 containing content directly over the conduit 23. When the cassette is rotated the lid aperture 12 is controlled and rotated such that it will not be arranged in line with the conduit 23. Thus all the open ends 17 of the cells 14 will be closed off by either the cassette lid disc 11 or by the inward facing surface of the base part 27 of the dispenser 20. When the cassette cell 14 that is to be accessed is in position with the conduit 23, a separate command may be given by the user, for example by pressing a push sensitive element 24 to identify that a rotation of the cassette lid disc 11 to a position such that a lid aperture 12 in the cassette lid disc 11 is aligned with the cell 14 and the conduit 23. Now the cell 14 containment space may be accessed for example by a content being poured out of the dispenser. In one embodiment the dispenser may be arranged to just let the content fall out of the cell and for example into a containment jar or the like.

When using a provided routine for filling or replenish cells 14 of the cassette 10 inside a dispenser 30, there may be provided a fixed or mountable funnel collar 73 to be arranged on the underside/bottom of the dispenser around the conduit 23, with the expanding diameter of the funnel collar 73 pointing away from the conduit 23. Thus using this funnel collar 73 may make it easier for content to be poured into the cell space, and avoid spilling content over the side.

If a cassette comprise a variation of cell sizes, the lid aperture 12 should be at least as large as the open end 17 of the largest cell 14. When dispensing the content of a cell of lesser

size, the lid aperture 12 may be arranged partly across the aperture opening of the open ends 17 of the lesser sized cell 14, and the remaining opening of the lid aperture being reaching over a side portion of the underside/bottom 65 of the base part 27, and thus in effect the lid aperture exposing only a fraction equal to the open ends 17 of the lesser sized cell 14 that is to be accessed.

The dispenser may comprise a dispenser locking device 63, 163 for securely holding the base part and top part together when a cassette assembly 250, 250' is arranged in the dispenser. The ability to ensure that the dispenser is not easily opened by unauthorized persons are specifically important in cases when the cell content is medicine, and often essential medicine for the user.

A first element of the dispenser locking device 63 may be pivotally hinged in the motor housing and pivotally controlled by one or more lock solenoids 62 or a rotational locking connector 62' arranged inside the motor housing such that the first element of the dispenser locking device (63) can be pivoted between a locking position connected to a second element of the dispenser locking device (113) and an opening position wherein the connection is released. Different means for operating and securing the dispenser locking device 63 may be implemented, and the device shown in the figures shall be understood as examples of such.

A controller for controlling the motors 56 and the embedded rotational means 57, 58 may be provided in the processing unit of the dispenser, or may reside in a remote computing resource connected via a communication module in the dispenser. The controller may operate according to a predefined dispensing regime, or may be individually controlled to dispense content of a cell outside the predefined dispensing regime.

The dispenser may thus comprise a communication means for communicating with a remote computing means for sending and receiving data and status of the dispenser.

The dispenser may comprise a reader device 53 connected with an antenna 59 for reading and/or communicating with a data chip 18' installed in the cassette assembly 250, 250'. Typically the data chip 18' contains a unique id, and the dispenser computing and communication resource may verify whether the cassette is a valid cassette identified by the unique id. Once the unique id is established being a valid unique id, distribution may commence according to a dispensing regime decided and controlled by either preprogrammed regime in the dispenser processing device, or as controlled by a back office service in

communication with the distribution device. Communication may be of an NFC (Near Field Communication) type, an RFID (Radio Frequency Identification) type or other.

The reader antenna 59 may be arranged aligned close to the conduit 23 such that when a cassette assembly 250, 250' is first arranged in the dispenser 20 the data chip 18' arranged in the cassette assembly 250, 250' is aligned with the reader device antenna.

The dispenser may further comprise a de-jamming device for creating a movement pattern of the cell 14 of the cassette 10 when in position and in mode for outputting content such that any stuck content is released by vibration/oscillating movement caused by the de-jamming device. The operation of the de-jamming device may be linked to operation of the cassette lid rotation when dispensing a cell content, or it may be controlled by an activation command given by the user. The activation command may be given by pressing a push sensitive element 24 or a different button/key (not shown) arranged for this purpose in the dispenser.

The push sensitive element 24 may comprise several further modes of operation, for example a first mode is associated with regular prescription medicine output, and a second mode is associated with PRN-medication. A third and fourth mode may be a delayed dispensing of the first and second mode feature enabling for example one hand operation of the dispenser when used as a standalone dispenser without a dispenser stand. A fifth mode may be to provide a "snooze"-feature if time-based medication is required to wait until user is ready for medicine output. This may be useful if user is in middle of a meal, being indisposed, or other. Having a flexible dispenser may enable utilization of more complex distribution policies, thus increasing medication adherence.

The push sensitive element 24 may comprise LED/light devices, audio or tactile in/output devices 51 or the like for signaling operation of between the dispenser and user.

In a further embodiment it is provided a smart phone app 70 or the like that may offer user features such as activation of a de-jammer, where an instruction is received by the app and communicated to the dispenser which then activates the de-jamming device.

The dispenser 20 may be self-sustained wherein communication means in the dispenser supports communication with remote computing resources 70, 90, 100 via

communication services 180 such as LAN, WAN, cellular network, radio network, cloud based computing or other, and the power source is a battery providing some or all features of the dispenser 20, 20' with power in a standalone operation mode.

5 The dispenser may further comprise a dispenser stand 30 having an elevated dispenser floor 32 for holding the dispenser 20, 20' in an elevated position in order for content to be outputted from the dispenser 20, 20' can fall directly into a content cup or box 40.

The dispenser stand 30 may further have a dispense path recess 33 arranged to be positioned between the conduit 23 and a content cup or box 40 receiving the content of a cell when distribution of the content is executed.

10 The dispenser stand 30 may comprise a power transfer unit 66 for connecting via a stand connector 64 to a power connector 64' arranged in the dispenser connected to a power store/source in the dispenser, such that a power source in the dispenser stand or remote can feed power to the dispenser 20, 20' for operation or for charging a power source 55 in the dispenser, such as a chargeable battery. The dispenser stand may be formed with a recess 60
15 for receiving a corresponding dispenser protruding form 60', and further for making sure the orientation of the placement of the dispenser on a stand the recess and protrusion may have unique guiding areas 61, 61' in the recess and protrusion.

The dispenser may further comprise a display 52, being one or more of a touch screen display, passive display, inductive/capacitive sensor, and a led matrix.

20 Even further the dispenser may comprise: an audio device for performing one or more of: outputting audio messages, outputting alarm/warning sound, inputting voice messages, and 2-way audio communication with back end services connected to the dispenser.

The third aspect of present invention comprises a filling device for filling a cassette as described in the first aspect, comprising: a cassette assembly 250, 250' according to the first
25 aspect, and one or more of: a cassette tamper evidence identifier removal device, a semiautomatic or automatic cell filler, a programming unit for updating the data content associated with the unique id in a data chip 18' inside the cassette assembly 250, 250', and a cassette tamper evidence identifier refitting device.

The filling device is in one aspect provided by a predefined filling regime using the
30 dispenser 20, 20' as a filling machine and/or a remote service may be in communicating

contact with the dispenser 20 during filling to monitor and provide directions for the filling process. Typically the display or a connected smart phone app is used to guide the filling process to ensure correct user handling of the cassette and dispenser during filling process.

In a future version there is provided a fully automatic filling device, wherein the dispenser 20 or the cassette 10 is inserted, and the complete filling process is performed without further interaction with a person. Such an automatic filling device is not presented in detail, other than indicated in the system overview in figure 5. Such automatic filling device will advantageously be comprising one or more of: a mobile casing for easy transport, communicating means for maintaining contact with a back office service during operation, means for holding content to be filled into a cassette, multiple content types capabilities, alarm handling, power source inline or external connector, interaction interface to dispenser and/or cassette, authentication verification procedures for establishing authorized operation by users and devices, dispenser 20, 20' and/or cassette 10.

A tamper evidence identifier may also be provided in the form of a tamper evident tape is arranged over the cassette lid aperture 12' (not shown), and thus a user know that if the tape is intact, the cassette is safe to install into the dispenser.

An even further feature might be to provide the cassette with a more sophisticated tamper evident seal, that interacts with the dispenser, and is not removable unless the cassette is correctly installed in the dispenser. The tamper evident mechanism may even be connected to the back office services, and the seal may be implemented as a sensor detectable seal read by the dispenser processor, or a dedicated seal sensor (not shown), and the back office services may handle a broken seal as an alarm situation, and not allow further use of the cassette.

The fourth aspect of this disclosure shows a system for operating a dispenser according to the second aspect comprising: a back office server application 100, such as a cloud based services, the services providing one or more of the services: transmitting 71 reminders to dispenser 20, 20', transmitting 71 reminders to next of kin to dispenser user, alarm services for users, alarm services for tampering activities to cassette assembly 250, 250' or dispenser 20, server for APPs 70, 90, 100 running to serve users of and next of kin to the users of the dispenser, managing the prescriptions of the users, managing and transmitting prescriptions to filling stations 90, such as filling device according to the third aspect, database storage 91,

101 of users and historical data related to use and prescriptions, and subscription services for content delivery, information and back office 100 services.

The fifth aspect of this disclosure shows a method for operating a dispenser according to the second aspect, and may comprise one or more of the following steps: providing a
5 dispensing/filling regime for the cassette cells 14, dispensing/filling a cell content according to a provided regime, and when all intended cell contents has been dispensed: opening the dispenser top part, replacing the cassette assembly 250, 250' with a new prefilled content or start a filling regime, when all intended cell contents has been filled: start dispensing regime.

The method may further comprise the steps: when an approved operator will change
10 cell content: identifying by the dispenser 20, 20' that operator is a valid operator, provide the dispenser 20, 20' with a new filling regime, or open the dispenser top part, refilling, replenish or replacing the content of the cells 14 according to the new filling regime, or replacing the cassette assembly 250, 250' with a prefilled content, and restarting distribution regime.

An even further embodiment of the dispenser 20' according to present invention is
15 shown in figure 6A to figure 10B.

The key features that now may be comprised in this further embodiment comprise: an improved cassette lid disk 11', a cassette lid rotating operator connector 314 cooperating with cassette lid rotational means 57', a dispenser lid locking device 63', a cassette assembly 250, 250' and operating modes. These and more features will now be discussed.

20 The goal for this embodiment is to even better provide a dispenser that may be operated securely and with ease to dispense exact dose of medicine or other to user. At the same time enable a prefilled cassette to be safely distributed without possibility for any unauthorized person to tamper with the content of the cassette before installing into the dispenser.

25 By providing a double lid 11', 252 feature of a cassette assembly 250, 250' as explained below comprising a cassette 10' comprising a circumferentially arranged plurality of cells 14, a cassette lid disk 11' arranged between the side with the open end of the cells 14 of the cassette 10', and a cassette lid 252. Both the cassette lid disk 11' and the cassette lid 252 comprise an aperture 12, 12'. The cassette lid 252 is arranged to cover the cassette lid disk 11' and the open end of the cells 14 of the cassette 10', and is rotationally connected to the
30

cassette 10', such that when the cassette assembly 250, 250' is installed in a dispenser 20', the cassette lid 252 is locked in a non-rotating manner with the aperture 12' aligned with the aperture 74 of the dispenser bottom 65, and the cassette 10' is rotatable relative the cassette lid 252. The cassette lid disk 11' is individually rotated independent of the cassette 10' and the cassette lid 252. The cassette lid disk 11' may only be rotated when installed in the dispenser, and locking/unlocking elements comprised in cassette locking device(s) 230 is activated as explained below. When not installed in the dispenser, the cassette lid disk 11' aperture 12 is locked in a position sideways rotated from the cassette lid aperture 12' such that it is not possible to access any of the compartment 14 of the cassette outside the dispenser without actually destroying/breaking the cassette. Thus the cassette assembly 250, 250' is tamper evident.

In the exploded view of the dispenser, as seen in the figure 6A, it is seen that the cassette rotating means 58 has internal gear teeth for interacting with an internally arranged motor 56 gear 204. The outer surface of the cassette rotating means forms a rotating portion of the motor housing, which enables rotation of an installed cassette assembly 250, 250', being locked to the cassette assembly 250, 250' via locking means 313.

Further control of the cassette orientation may be embedded in the cassette rotating means 58, 313 and the motor 56 controller comprised in for example a printed circuit board 53/main PCB as shown. Typically two motors 56, 56' are electrically connected to the main PCB 53 via connectors 203, 203', and may be stepper motor or other type motor with required accuracy for driving and positioning/rotating cassette and cassette lid disk. In the embodiment shown in figure 6A there are provided two motors, a first motor 56 for controlling an rotating the cassette 10', and a second motor 56' for rotating the cassette lid disk 11' when a cassette assembly 250, 250' is arranged in the dispenser. The motor controllers may be provided with means to accurately estimate position and orientation of the cassette 11', the cassette lid disk 11', and the individual cells 14 to enable correct dispensing of any cell according to the defined dispensing/filling regime. Since the starting point is defined by the guiding means 313, 313', 313'', 114, 114', 247, 247' it is possible to maintain full control of the cassette orientation throughout the use. This is achieved also by alignment and in situ calibration enabled by stop sensors 231, 231' as discussed below.

Guiding elements 247 may be arranged on the inner circumference of the cassette lid 252 which engage with recesses 247' on the lower portion of the motor housing. A lower

portion of the motor housing 248 is a fixedly arranged portion which ensures that the cassette lid 252 remains stationary when cassette 10' and cassette lid disk 11' are individually rotated. Typically two guiding elements 247 are comprised on the inner circumference of the cassette lid 252 corresponding to two recesses 247' on the lower portion of the motor housing 248 as is shown in figure 8C and figure 9B. Other number of such guiding elements 247 may be implemented. The guiding elements 247 and corresponding recesses 247' also contributes to the alignment of the cassette assembly 250, 250' when installing a new cassette into the dispenser.

The cassette 10' comprise inward facing rotating operator connectors 313''. The cassette rotating connectors 313'' is provided for enabling a rotating movement of the cassette independent of the other assembly parts of the cassette assembly 250, 250'. When arranged in the dispenser, the rotating operator connectors 313'' engage with contacting elements 313 of the cassette rotating means 58.

When cassette assembly 250, 250' is completely installed in the dispenser, the inner circumference of the cassette 10' with the cassette guiding means 313'' and the contacting element 313 of the cassette rotating means 58 are interlocked, and when cassette rotating means 58 is rotated, the cassette 10' rotates with it. In the embodiment shown in figure 8B and 9A/B typically the cassette have three cassette guiding means 313'' and the motor housing have corresponding three cassette rotating means 58, but other numbers may be chosen.

The motor housing 50' may further comprise a cassette lid disc rotating means 57' being driven by a motor 56', and the cassette lid disc rotating means 57' is further arranged to engage with a cassette lid disc 11' comprised in the cassette assembly 250, 250'. The cassette lid disc rotating means 57' engage for rotating the cassette lid disc 11' independent of the cassette 10'. In one embodiment as seen in the figures and in detail explained by the figure 7A it is seen that the cassette lid disc rotating means 57' has internal gear teeth for interacting with a motor 56' and gear 204' arranged inside the motor housing. The outer surface of the cassette lid disc rotating means 57' comprise a lid disc contacting element 314' which may engage with a rotating operator connector 314 of the cassette lid disc 11' such that the cassette lid disc 11' can be rotationally controlled independent of the cassette 10'. The rotation of the cassette lid disc 11' is thus also enabled with rotating means fully encapsulated by the motor housing as seen in figure 9A, and the lid disc contacting element 314' is fixedly

engaging with the rotating operator connector 314 on the inner circumference of the cassette lid disc 11'.

Thus, any cell 14 in the cassette 10' may independently be accessed by individual rotation of the cassette 10' and the cassette lid disc 11', and the operation may be controlled according to a regime defined by one of: data preloaded on the cassette data chip, processing means of the dispenser, or as controlled by an application running on a remote host being in wireless communication with the dispenser via a comprised wireless communication controller. Thus, this enables for example PRN-medication to be dispensed, and also for mixed prescription based and PRN-based medication to be enclosed in the same cassette, but different cells. The cassette may be rotated any direction, clockwise and anti-clockwise.

The cassette lid disc rotating means 57' further comprises a dispenser lid locking connector 211, which cooperates with the dispenser locking device 63' which again engages with locking element 163 of the dispenser lid. The dispenser locking device 63' may be biased to closed position, and a resilient hinged attachment (not shown) to the dispenser allow a controlled movement between locked and unlocked mode. In one embodiment the alignment of a new cassette assembly 250, 250' will allow insertion of the cassette only in a position so that the locking element 163 is remaining in the biased position, and will resiliently move to allow closing the dispenser lid, and then snap into locked position when lid is completely closed. In one embodiment as seen in the figures, when the cassette lid disk 11' is rotated 211'' all the way to the outer clockwise position, the dispenser lid locking connector 211, 211' moves 211''' the dispenser locking device 63' between a locked and unlocked position. If the cassette lid disk 11' thereafter is rotated 211'' in an anti-clockwise position, the dispenser lid locking connector 211, 211' moves 211''' the dispenser locking device 63' between an unlocked and locked position. Thus the lid disc rotating means 57' may control both the lid open mode and the position of the lid aperture 12 relative the holding disc aperture 12' of the cassette lid 252 and the conduit 74 of the dispenser underside/bottom 65.

The cassette lid disc rotating means 57' further comprises rotation stop means 232, 232' which cooperate with rotation stop sensors 231, 231'. When rotation of lid disc rotating means 57' reaches maximum clockwise movement the rotation stop means 232 connects with the rotation stop sensors 231, and the motor 56' and rotation 211'' is stopped.

When rotation of lid disc rotating means 57' reaches maximum anti-clockwise movement the rotation stop means 232' connects with the rotation stop sensors 231', and the motor 56' and rotation 211'' is stopped.

5 The rotation stop means 232, 232' which cooperate with rotation stop sensors 231, 231' may further be used for in situ calibration of positioning cassette lid disk 11'.

The stepper motor may also be provided with an alarm handling feature, that will raise an alarm if misuse or external force tries to rotate the cassette and/or disc lid is detected.

Similar alarm procedures may be implemented if the dispenser lid is unauthorized opened.

10 Any alarms may be transmitted immediately to back office services via wireless communication means, and/or stored in the dispenser processing unit for later handling. For example can a cassette content be invalid after an intrusion or attempt for such is detected.

15 Bottom board assembly 59' may comprise battery, antenna 59'', wireless charging pad for optional wireless charging of battery, PCB, board connectors 211 connecting with upper PCB in contact element 211', and other supporting components such as battery charging connector/power supply.

20 The antenna is in one configuration a novel design comprised of an elongated flex-PCB device 59'', as seen in figure 6B, being configured to provide an NFC antenna towards a first distal end, and towards a second distal end is configured to provide a 2/3/4/n-G antenna, thus the same antenna provides and enable communication to both, simultaneously NFC devices 70 and mobile phone or network connected 180 devices 79, 90, 100. The flex-PCB may on one side be coated with a glue/tape for attaching to for example the inside of the dispenser bottom 65. The antenna may be provided with separate connectors/wiring 159, 159' for connecting each antenna segment to appropriate antenna drivers (not shown) on the main
25 PCB 53.

Motor housing top lid 201 typically comprise one or more displays 52'. Protective pads 209, protecting glass 210 may be arranged above the display for protecting the display from breakage.

Protecting and anti-skid pad 205 may be arranged unto the dispenser base part 27. Figure 7A and 7B is a view from and above and oblique side view respectively of the cassette lid disk 11', the cassette lid disc rotating means 57', and the dispenser lid locking connector 211, and the arrows 211'', 211''' illustrating movement of the cassette lid disk 11' and the dispenser locking device 63' respectively.

Figure 8A and figure 8B shows the cassette assembly 250, 250' in exploded and assembled mode respectively.

The cassette 10' comprising all the cell compartments 14, wherein the individual cell is open in one end, and the cassette lid disk 11' closes of all the openings of the cells of the cassette 10' in a transport mode. The cassette lid disk 11' comprise an aperture 12 of the size adapted to correspond with the open end of the cell compartments 14, or the biggest cell compartment 14 if a cassette 10' comprise more than one size compartments 14.

Cassette assembly 250, 250' further comprising a cassette lid 252 and an aperture 74. When the cassette lid disk 11' is rotated relative the cassette lid 252, the apertures 12, 74 is partly or completely aligned it provides a conduit into a cell 14 of the cassette 10'. When the cassette 10' comprise cells 14 of different sizes, the cassette lid disk 11' may be rotated to only partially align the cassette lid disk aperture 12 over the cassette lid aperture 74 to expose only the size of the opening of the cell in the conduit.

The cassette lid 252 further comprise holding recess for an electronic identification tab 233. This may be any type of wireless id tag/chip, such as an NFC tag, RFID tag or other.

The cassette lid 252 may further comprise cassette handles 235 for easy handling of the cassette when mounting and dismounting it in the dispenser 20'. The cassette handles 235 may also comprise a cassette locking device(s) 230 for interaction with corresponding locking tap 230' in the dispenser base part 27. In one embodiment the cassette locking device 230 is aligned with and thread over the corresponding locking tap(s) 230' in the dispenser base part 27 when the cassette is arranged in the dispenser. The locking tap 230' will prohibit the cassette to rotate when being in the dispenser, and only the cassette lid disk 11' may be rotated relative the fixed position cassette 10' and cassette lid disk 11'. A further feature of this relationship between cassette locking device(s) 230 and locking tap 230' is that the movement of the cassette lid disk 11' may be prohibited before a physical lock is unlocked by the insertion of the locking tap 230' into the cassette locking device(s) 230. The cassette

locking device(s) 230 may further comprise tamper evident sealing 47, such that when anyone tries to tamper with the cassette locking device(s) 230 it will be evident upon inspection of the cassette locking device(s) 230 before installing the cassette into the dispenser. Further tamper evidence may be implemented with other features as will be obvious by a skilled person.

5 The base of the dispenser 20' may further comprise an input panel 220 for mode control of the dispenser. One embodiment is shown in figure 10B. The input panel may be used for control input, indicator light, alarm output etc. In the shown example there is identified a switch for disabling wireless communication, device on/off control, sound on/off control, communication strength indicator, and status indicator. The form of the base may
10 comprise a protrusion formed to fit into a recess of a dispenser stand 30', and thus enabling easy arranging of the dispenser in a known positions to enable charging and communication and other.

 A charging/communication connector 221 may be comprised for interacting with a corresponding contact device 221'. Typically used for powering or charging a dispenser
15 battery when used as a standalone dispenser without access to dispenser stand 30'.

 In a typical use scenario an alarm, such as buzzer and/or light and/or sound signal, comprised in the dispenser is activated, and the user push confirm button 24, to indicate that the dispenser may output prescribed (programmed) dose from correct cell 14. After a preset time has passed (may be 0), the cassette lid disc 11' is moved to align the aperture 12 of the
20 cassette lid disk 11' with the cassette lid aperture 12' which already is aligned with the dispenser bottom aperture 74 to provide a conduit to the cell content, and the cell content may fall out of the dispenser.

 If user do not perform confirm of dose output, the dispenser may be set up to communicate a warning message to back office services, and thus caretakers may start
25 mitigating activities.

 A further use scenario is the ability for caretaker to remotely control output of medicine to user. Such that if user is in communication with caretaker, and the caretaker diagnose a need for different, further, or additional medication. It may be that a user is unable to operate the dispenser unsupervised, and thus a remotely connected caretaker may use the
30 remote services 180 to operate the dispenser and to allow medicine to be dispensed and for example an alarm to sound.

The person skilled in the art realizes that the present disclosure is not limited to the preferred embodiments described above. The person skilled in the art further realizes that modifications and variations are possible within the scope of the appended claims.

5 Additionally, variations to the disclosed embodiments can be understood and effected by the skilled person in practicing the claimed disclosure, from a study of the drawings, the disclosure, and the appended claims.

1. A cassette assembly (50) for containing and distributing one or more doses of content,

the cassette assembly (250, 250') comprise a cassette (10, 10') comprising one or more cells (14) for containing the content, the cells (14) being arranged circumferential, and each cell (14) comprises a bottom (15) and side walls (16), and an open end (17),

the cassette (10, 10') being substantially circular and having an inner circular opening (19) around which the cells (14) are arranged, and the inner circular opening (19) is provided for being arranged over a corresponding circular shaped motor house (50, 50'),

the cassette assembly (250, 250') further comprise cassette lid disc (11, 11') covering the open end (17) of the cells (14) of the cassette (10, 10'), wherein

the cassette lid disc (11, 11') is independently rotatable relative the cassette (10, 10'), and the cassette lid disc (11, 11') further comprise at least one lid aperture (12) having a size and form substantially corresponding to or larger than the open end (17) of at least one of the cells (14), and

the cassette assembly (250, 250') further comprise a rotationally connected cassette lid (252, 29, 29') covering the open end (17) of the cells (14) of the cassette (10, 10') and the cassette lid disk (11').

2. The cassette assembly (250, 250') according to claim 1, wherein

the cassette (10, 10') has one or more cassette rotating operator connectors (13', 313'') facing the inner circular opening (19).

3. The cassette assembly (250, 250') according to claim 1, wherein

the cassette lid disc (11, 11') further comprises a lid inner circular opening (49) corresponding to the inner circular opening (19) of the circumferentially arranged cells (14) of the cassette (10, 10'), the cassette lid disc (11, 11') has a rotating operator connector (13, 314) facing the lid inner circular opening (49).

4. The cassette assembly (250, 250') according to any one of previous claims, further comprising a data chip (18', 233), containing a data storage and a communication module for wireless communication.

5. The cassette assembly (250, 250') according to claim 4, wherein the data chip (18', 233) data storage is programmed to contain data related to one or more of; unique cassette (10, 10') id, content type in the cells (14), content volume in the cells (14), expiry date of the cell contents, distribution pattern, and identity of recipient.

6. The cassette assembly (250, 250') according to claim 4 or 5, wherein the data chip (18', 233) is arranged in one of a blind spot (18) of the cassette (10) or a recess in the cassette (10') lid (252) .

7. The cassette assembly (250, 250') according to any one of previous claims, wherein the cassette (10, 10') and the cassette lid disc (11, 11') are substantially made in a recyclable, recoverable or compostable material.

8. The cassette assembly (250, 250') according to any one of previous claims, further comprising one or more tamper evidence identifiers (47, 47') for identifying whether the cassette lid disc (11, 11') has illegally been attempted removed or rotated.

9. The cassette assembly (250, 250') according to any one of previous claims, wherein the cells (14) have cell sizes of two or more sizes, and wherein the pattern of the cell size around the circumference of cells is predefined in accordance with distribution requirements.

10. The cassette assembly (250, 250') according to any one of previous claims, wherein the number of cells (14) is one of 28, 14, 10 or 7.

11. A dispenser (20, 20') for monitoring and dispensing doses of content comprising:
base part (27) comprising an underside/bottom (65) with a conduit (74) and a circumferential side wall (27'), and a top part comprising dispenser lid (26),
an inner circular motor housing (50, 50') having a smaller diameter than the circumferential side wall (27'), wherein a circumferential room (48) is provided between the outer diameter of the motor housing (50, 50') and the inside of the circumferential side wall (27') for receiving a cell based distribution cassette (10, 10'),

the motor housing further comprising a power source (55, 59'), such as a chargeable battery, and one or more motors (56, 56') for rotation of rotational means (57, 57', 58) comprised in the motor housing, the rotational means (57, 57', 58) having contacting elements (83, 113, 313, 314') outside, or embedded in, the outer sidewall (62) of the motor housing (50, 50'), such that when a cell (14) based cassette assembly (250, 250') with an inner circular opening (19) is arranged in the dispenser, a conduit (23) may be established into the cell (14) based cassette (10, 10').

12. The dispenser (20, 20') according to claim 11, wherein the outer diameter of the motor housing (50, 50') is adapted to fit inside the inner circular opening (19) of a cassette (10, 10'), and the motor housing (50, 50') has a cassette rotating means (58) embedded being driven by a motor (56), and the cassette rotating means (58) is further connected with a cassette (10, 10') via the contacting element (113, 313) for rotating the cassette (10, 10').
13. The dispenser (20, 20') according to any one of claim 11 or 12, wherein the rotating means (58) is adapted to rotate the cassette (10, 10') in two directions.
14. The dispenser (20, 20') according to any one of claim 11 to 13, wherein the motor housing (50, 50') has a cassette lid disc rotating means (57) embedded being driven by a motor (56'), and the cassette lid disc rotating means (57) is further connected via a contacting element (83, 314') with a cassette lid disc (11, 11') of a cassette assembly (250, 250') for rotating the cassette lid disc (11, 11') independent of a cassette (10, 10') of the cassette assembly (250, 250').
15. The dispenser (20, 20') according to any one of claim 11 to 14, further comprising a cassette assembly (250, 250') as described in one of claim 1 to 10.
16. The dispenser (20, 20') according to any one of claim 11 to 15, wherein the motors (56, 56') and rotational means (57, 57', 58) are controlled to rotate and arrange a cell (14) of the cassette (10, 10') of the cassette assembly (250, 250') containing content over the conduit (23), and rotate the cassette lid disc (11, 11') in a position such that a lid aperture (12) in the cassette lid disc (11, 11') is aligned with the cell (14) and the protected conduit (23) such that the content of the cell (14) can be poured out of the cell (14) and the dispenser (20, 20').
17. The dispenser (20, 20') according to any one of claim 11 to 16, comprising: a dispenser locking device (63, 63', 163, 211, 211') for securely holding the base part and top part together when a cassette assembly (250, 250') is arranged in the dispenser (20, 20').
18. The dispenser (20, 20') according to any one of claim 11 to 17, further comprising: a controller for controlling the motors (56, 56') and the embedded rotational means (57, 57', 58).

19. The dispenser (20, 20') according to any one of claim 11 to 18, further comprising:
a reader device (53) with a connected antenna (59, 59') for communicating with a data chip (18', 233) installed in the cassette assembly (250, 250').

20. (20, 20')(20, 20')(20, 20')The dispenser (20, 20') according to any one of claim 11 to 19, wherein the dispenser (20, 20') is self-sustained wherein communication means in the dispenser supports communication with remote computing resources (70, 90, 100) via network services (80) such as LAN, WAN, cellular network, radio network, cloud based computing or other, and the power source is a battery providing some or all features of the dispenser (20, 20') with power in a standalone operation mode.

21. The dispenser (20, 20') according to any one of claim 11 to 24, further comprising:
a dispenser stand (30) having an elevated dispenser floor (32) for holding the dispenser (20, 20') in an elevated position in order for content to be outputted from the dispenser (20, 20') can fall directly into a content cup or box (40).

22. The dispenser (20, 20') according to claim 25, wherein
the dispenser stand (30) comprise a wireless charging pad (59') for wireless charging of battery in the dispenser. (20, 20')

23. The dispenser (20, 20') according to any one of claim 11 to 22, further comprising:
a display (52, 52'), being one or more of a touch screen display, passive display, inductive/capacitive sensor, and a led matrix.

24. The dispenser (20, 20') according to any one of claim 11 to 23, further comprising:
an audio device for performing one or more of:

- outputting audio messages,
- outputting alarm/warning sound,
- inputting voice messages, and
- 2-way audio communication with back end services connected to the dispenser.

25. A filling device for filling a cassette (10, 10'), comprising:
cassette assembly (250, 250') according to any one of claim 1 to 10, and one or more of:
a cassette tamper evidence identifier removal device,
a semiautomatic or automatic cell filler,
a programming unit for updating data content associated with a data chip (18') embedded in the cassette assembly (250, 250'), and
a cassette tamper evidence identifier refitting device.
26. The filling device according to claim 29, further comprising:
a multi content storage magazine for filling a mixture of content in the cassette cells (14).
27. A system for operating a dispenser (20, 20') according to claim 11 to 24, comprising:
a back office server application (100), such as a cloud (80) based services, the services providing one or more of the services:
transmitting (71) reminders to dispenser (20, 20'),
transmitting (71) reminders to next of kin to dispenser user,
alarm services for users,
alarm services for tampering activities to cassette assembly (250, 250') or dispenser (20, 20'),
server for APPs (70, 90, 100) running to serve users of and next of kin to the users of the dispenser,
managing the prescriptions of the users,
managing and transmitting prescriptions to filling stations (90), such as filling device according to claim 29 to 30,
database storage (91, 101) of users and historical data related to use and prescriptions, and
subscription services for content delivery, information and back office (100) services.

28. A method for operating a dispenser (20, 20') according to claim 15 to 23, comprising the following steps:

providing a dispensing/filling regime for the cassette cells (14),
dispensing/filling a cell content according to a provided regime, and
when all intended cell contents has been dispensed:
opening the dispenser top part,
replacing the cassette assembly (250, 250') with a new prefilled content or start a filling regime,
when all intended cell contents has been filled:
start dispensing regime.

29. The method according to claim 28, further comprising the steps:
when an approved operator will change cell content:
identifying by the dispenser (20, 20') that operator is a valid operator,
provide the dispenser (20, 20') with a new filling regime, or open the dispenser top part,
refilling, replenish or replacing the content of the cells (14) according to the new filling regime, or replacing the cassette assembly (250, 250') with a prefilled content, and
restarting distribution regime.

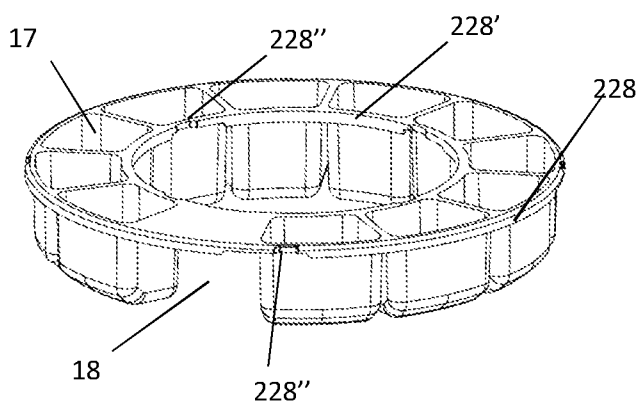
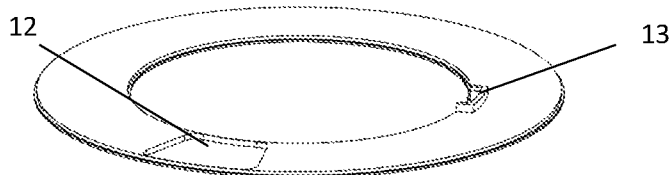
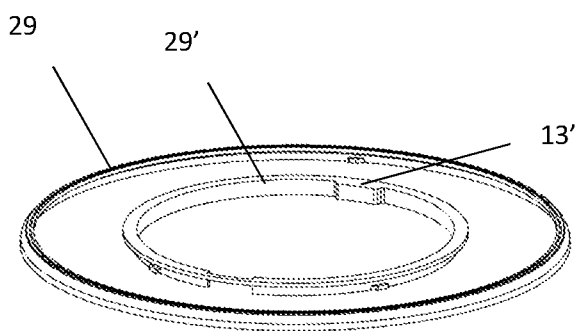
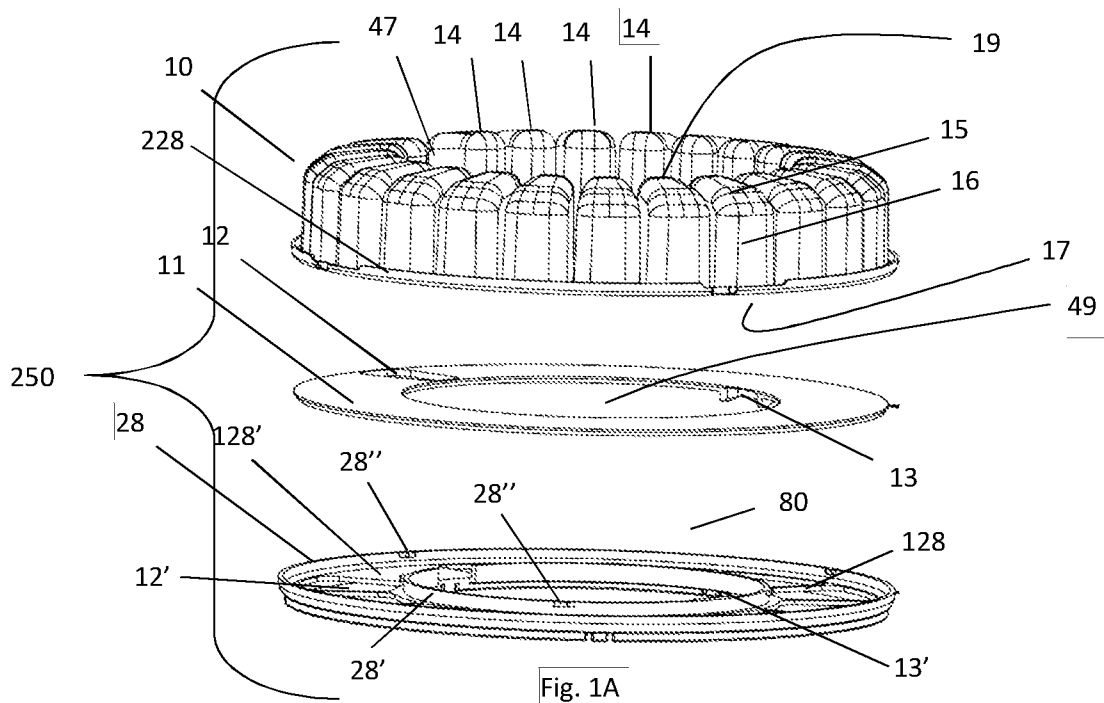


Fig. 1B

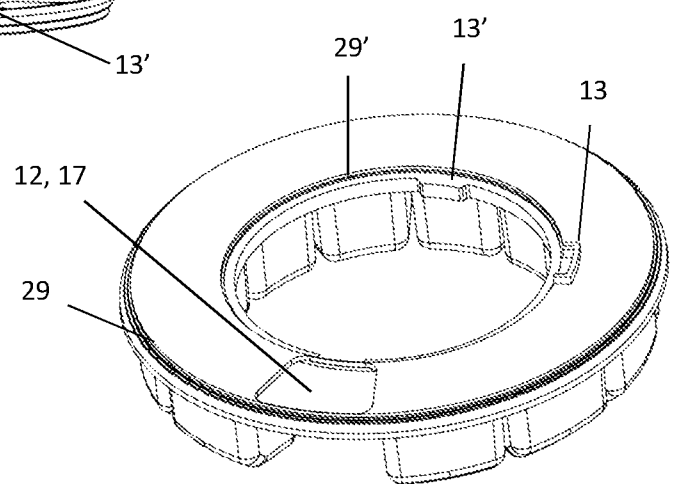


Fig. 1C

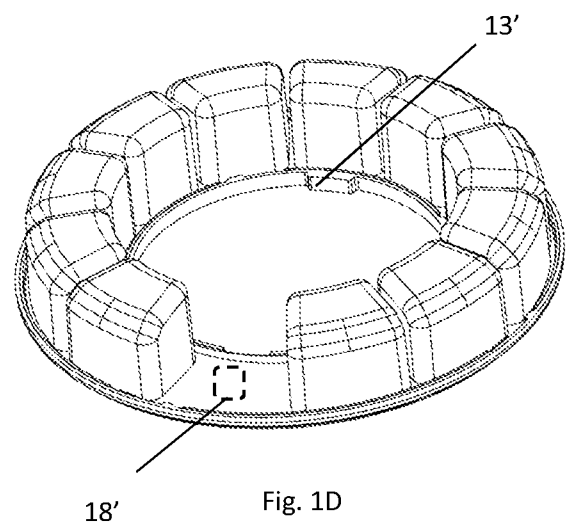


Fig. 1D

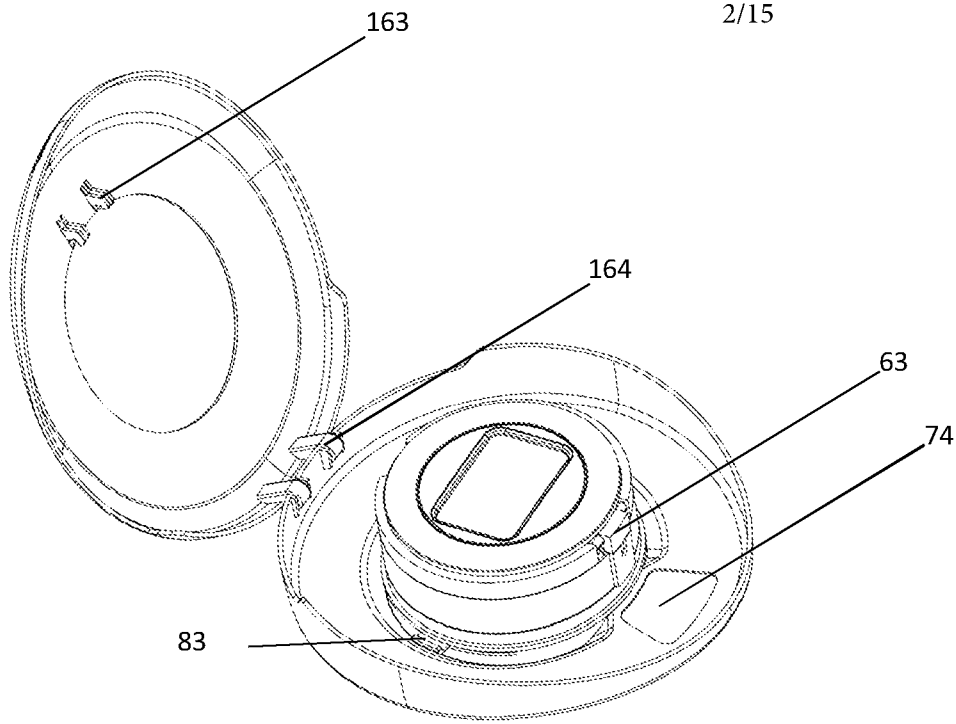


Fig. 2A

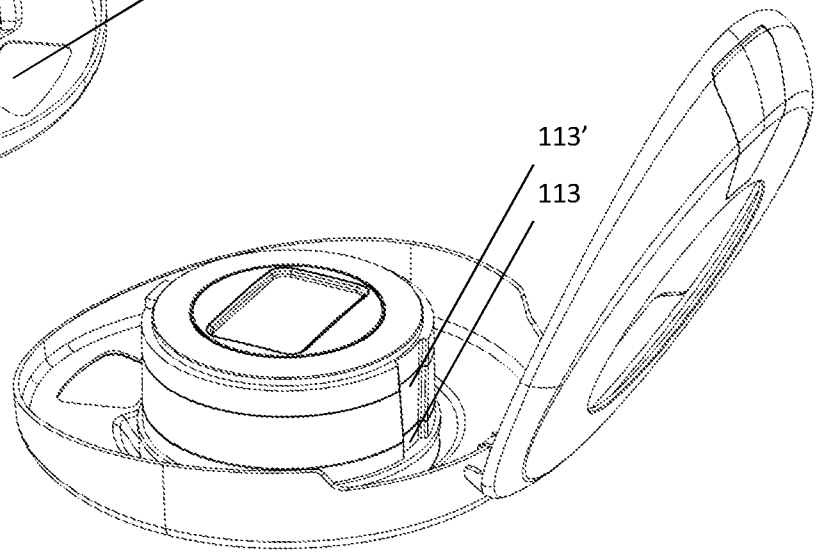


Fig. 2B

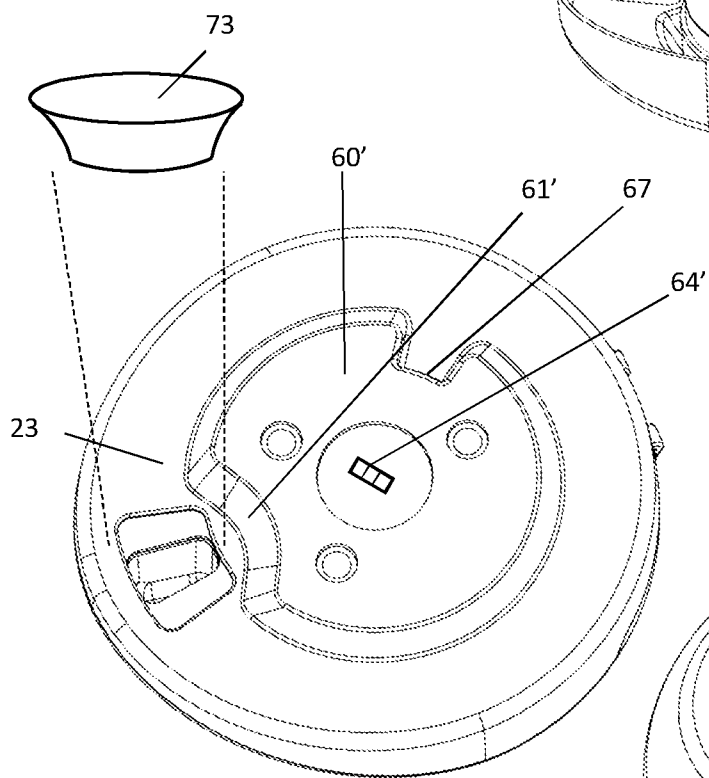


Fig. 2C

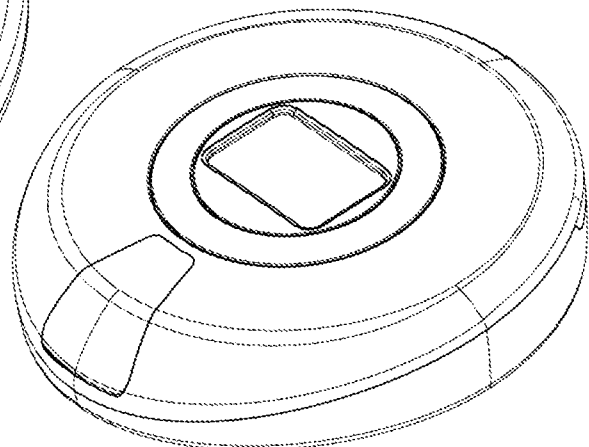


Fig. 2D

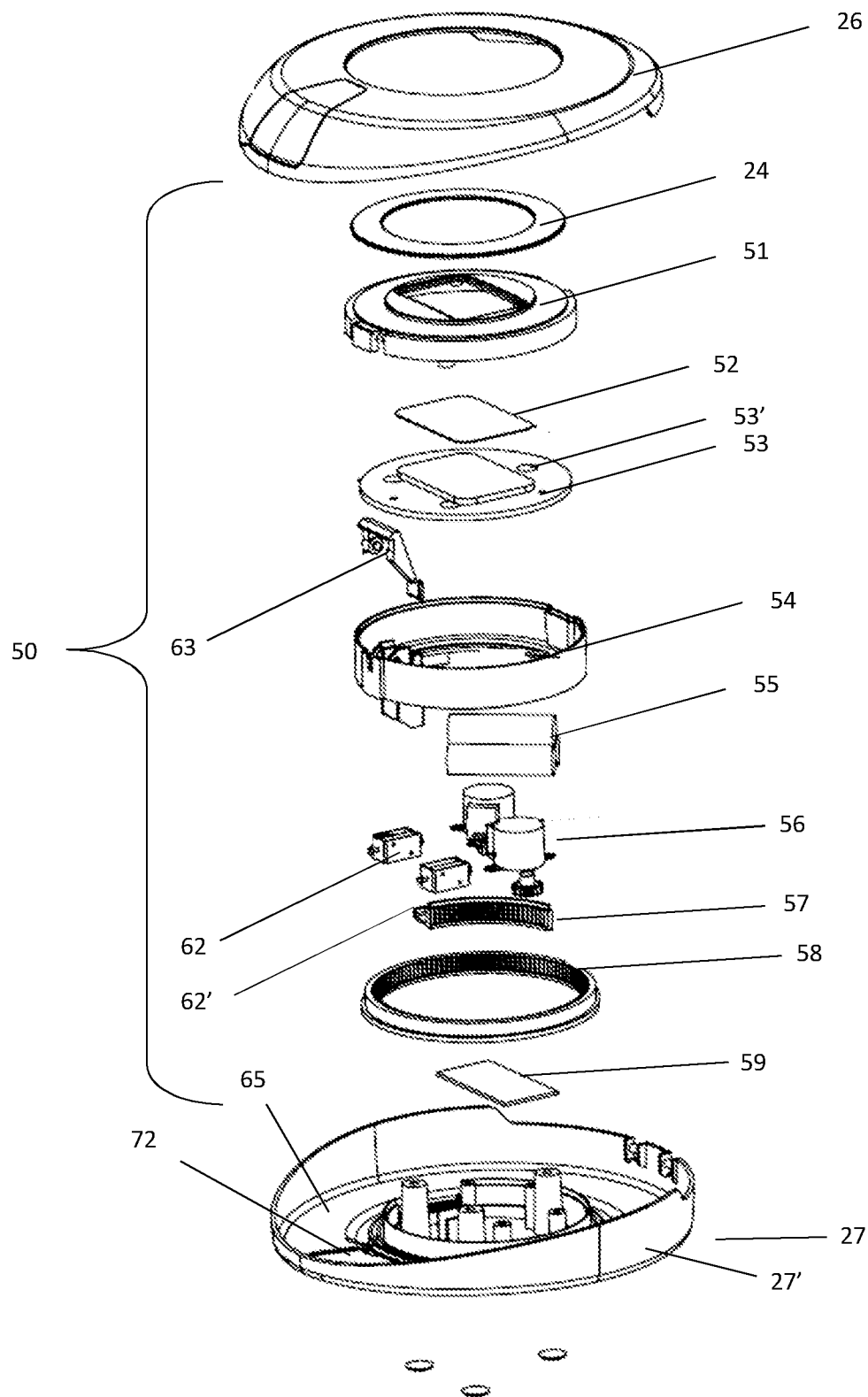


Fig. 2E

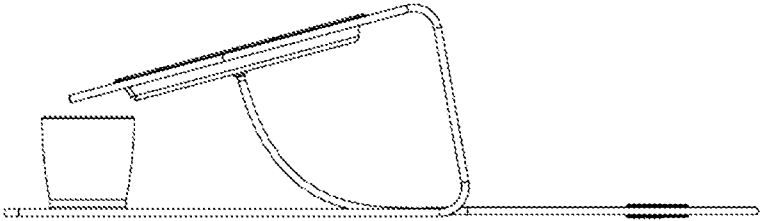
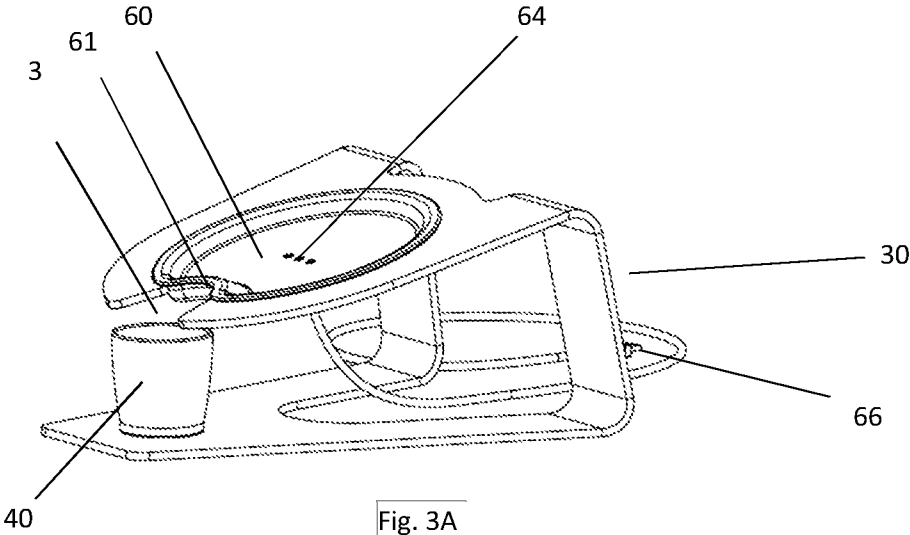


Fig. 3B

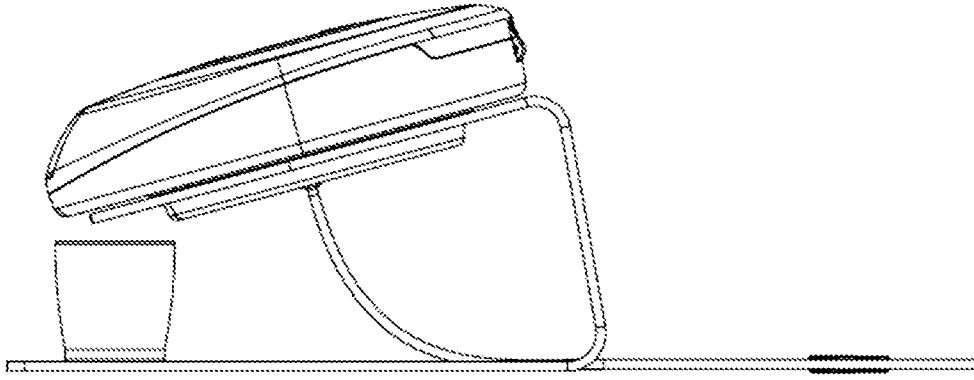


Fig. 4A

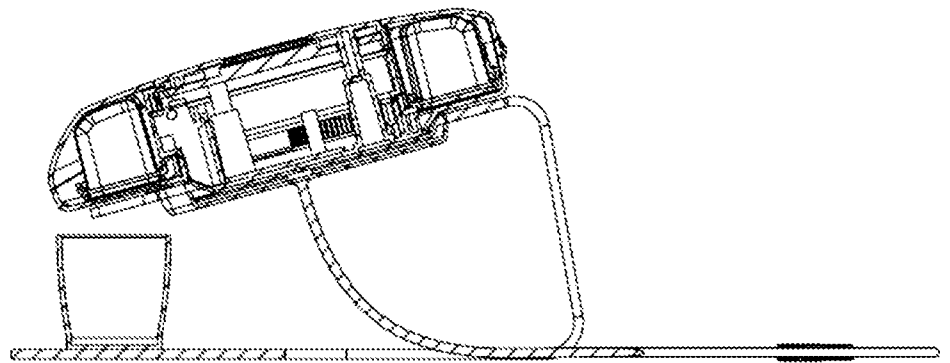


Fig. 4B

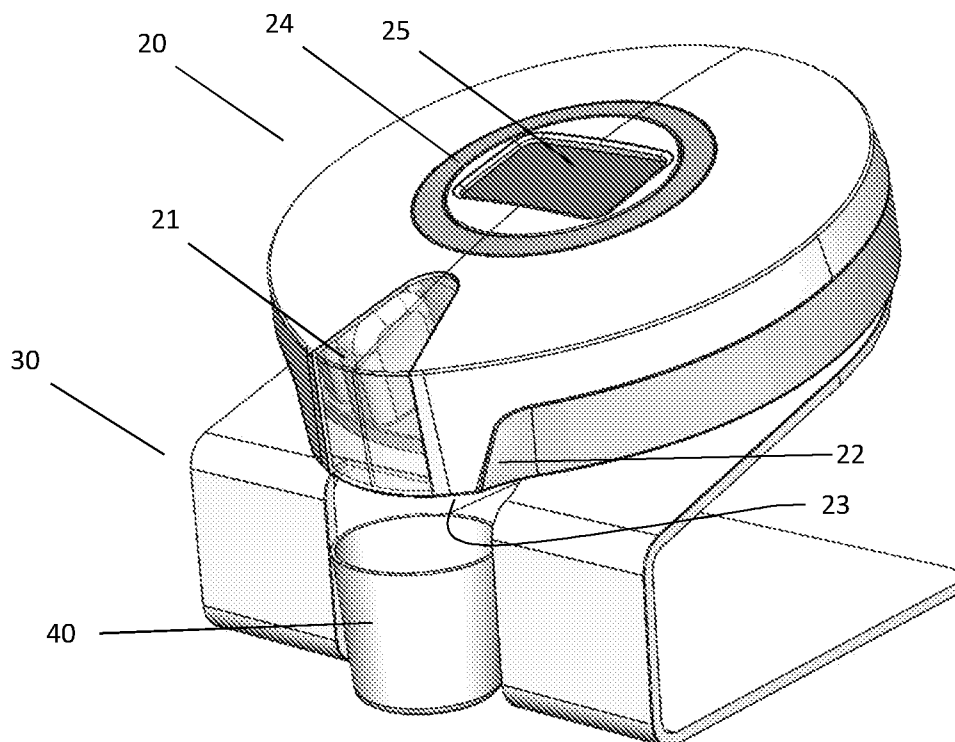


Fig. 4C

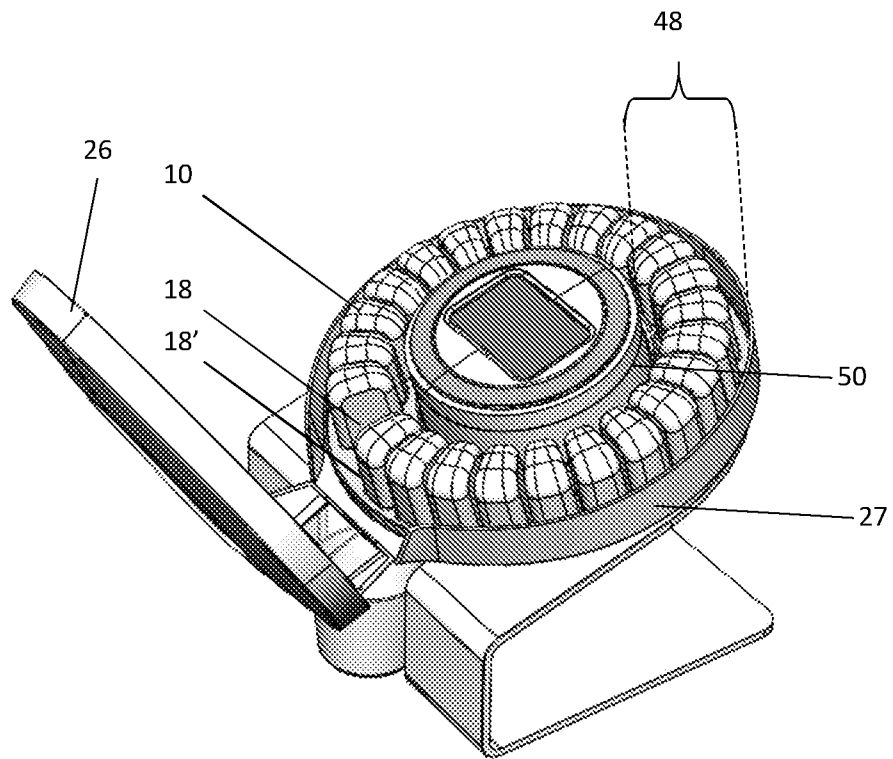


Fig. 4D

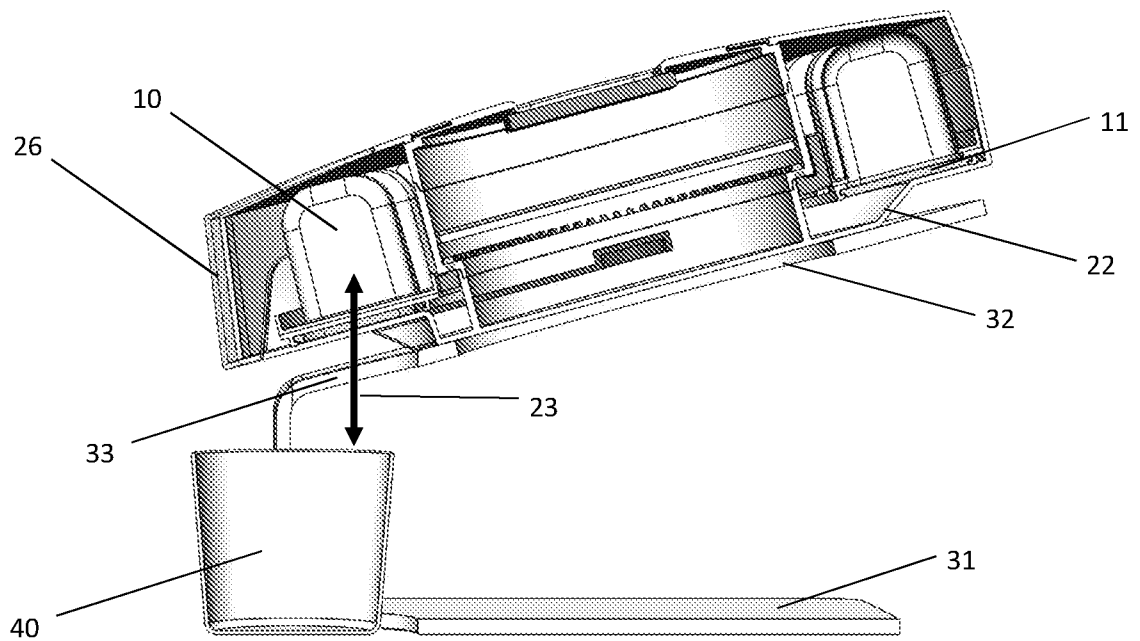


Fig. 4E

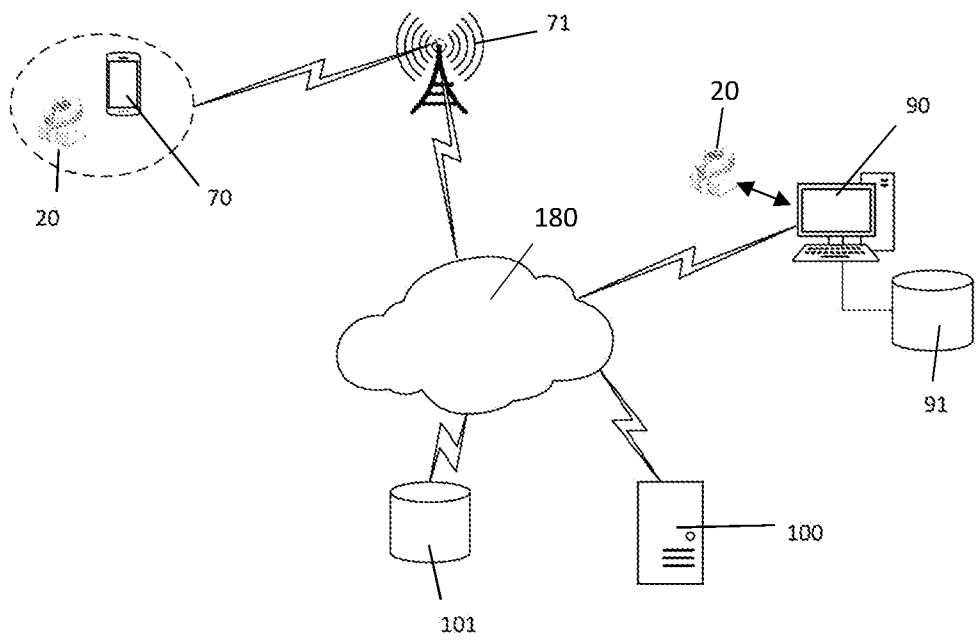


Fig. 5

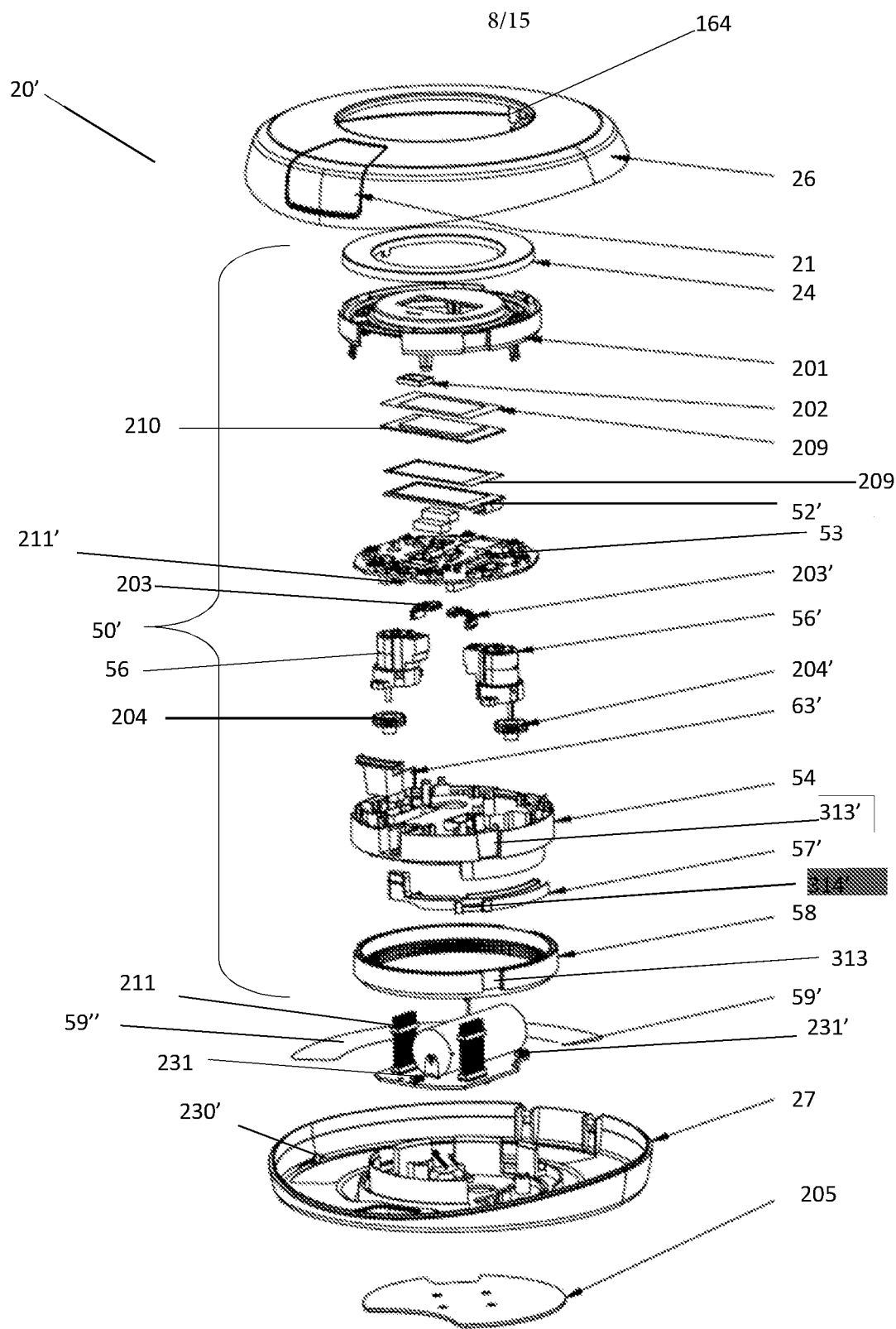


Fig. 6A

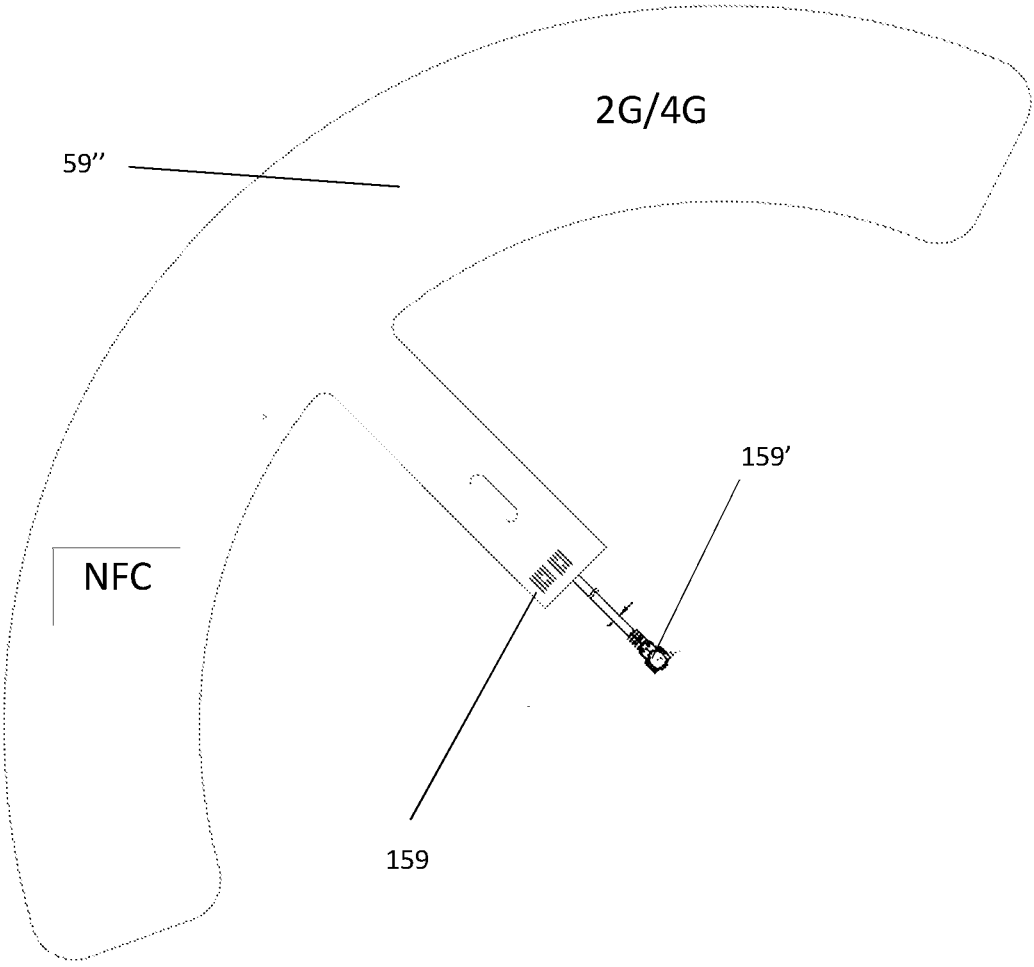
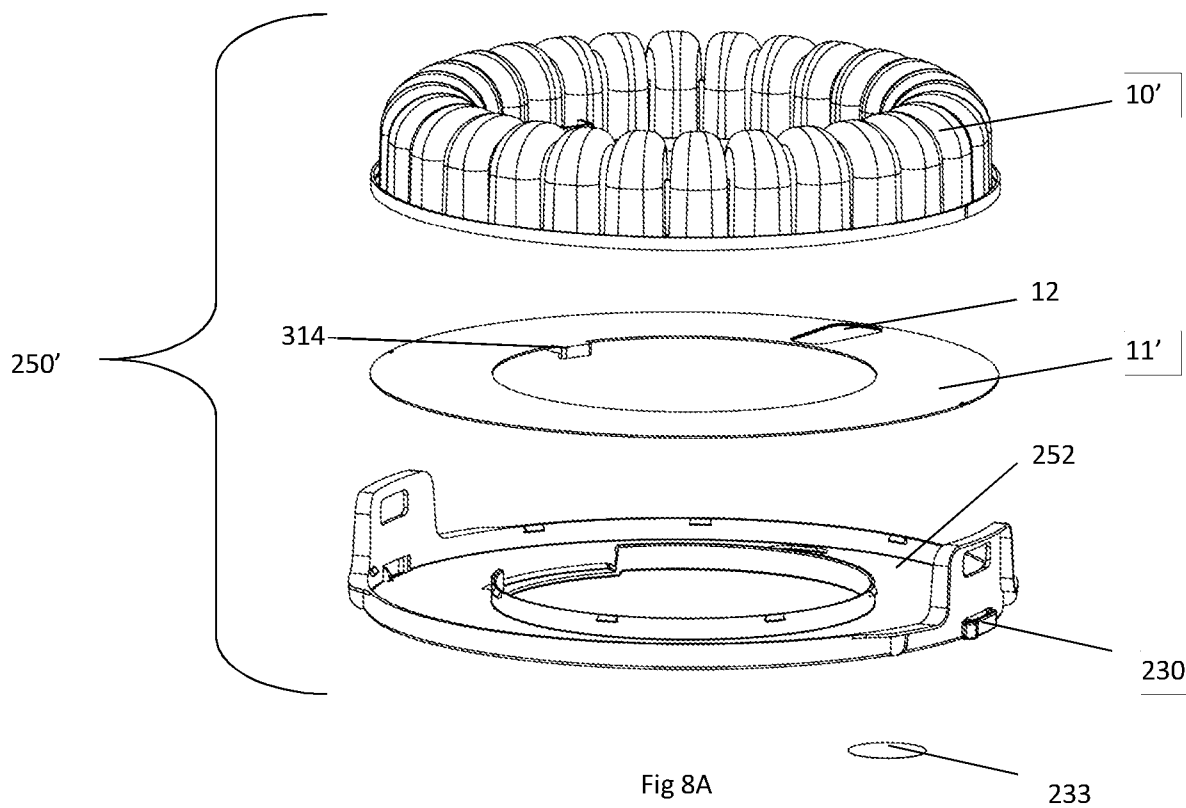
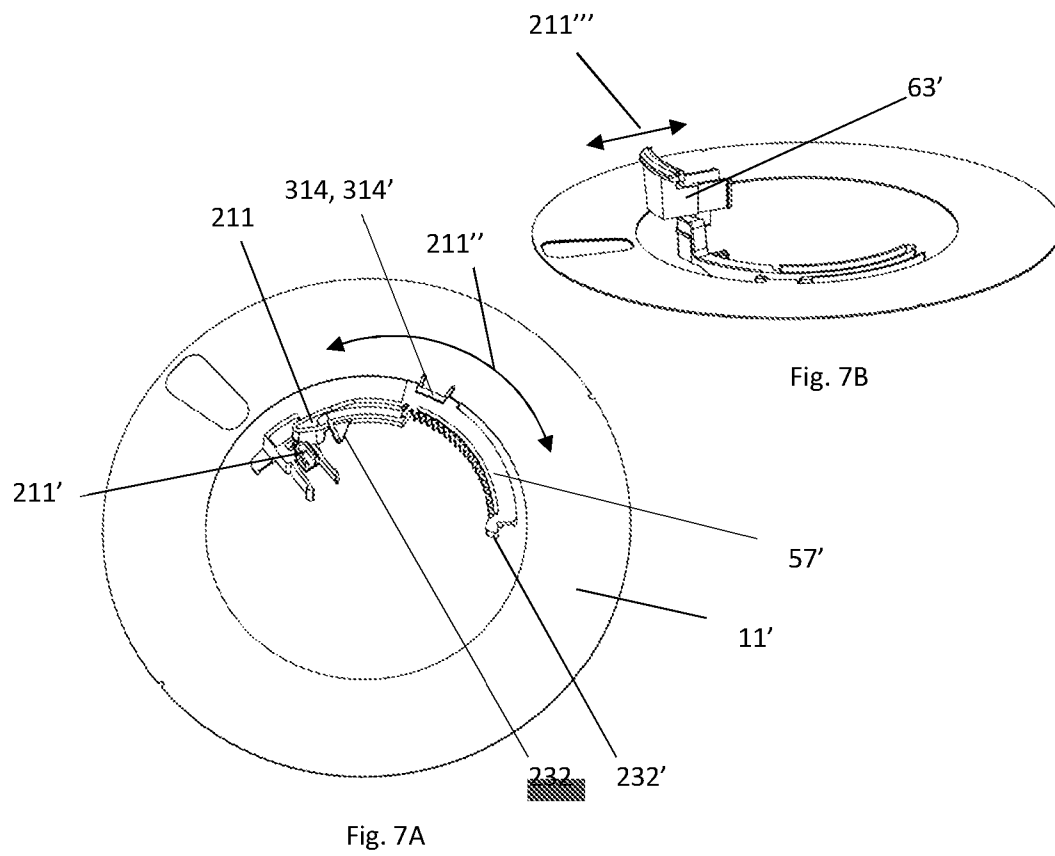


Fig. 6B



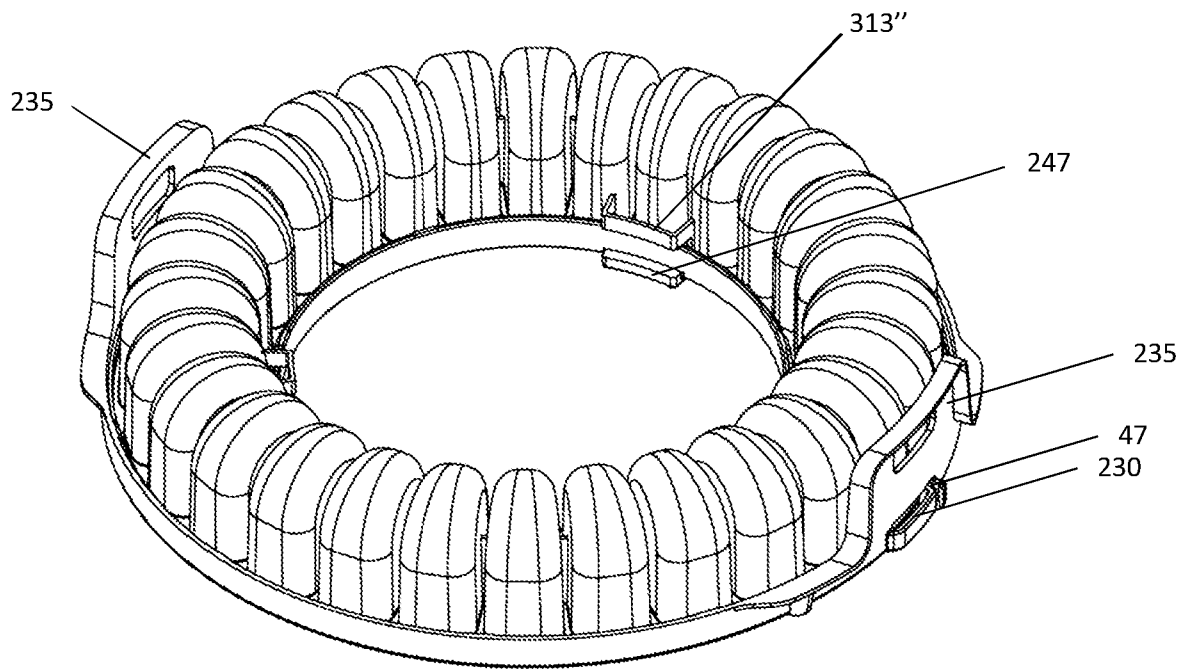


Fig 8B

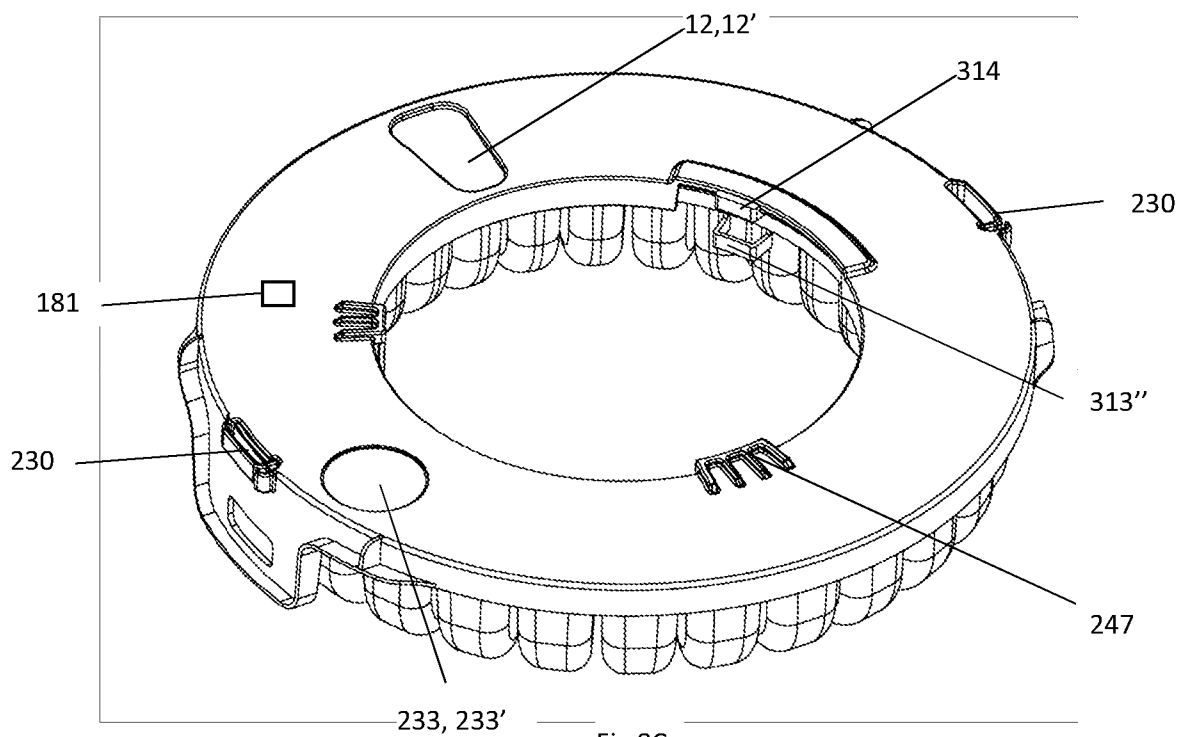


Fig 8C

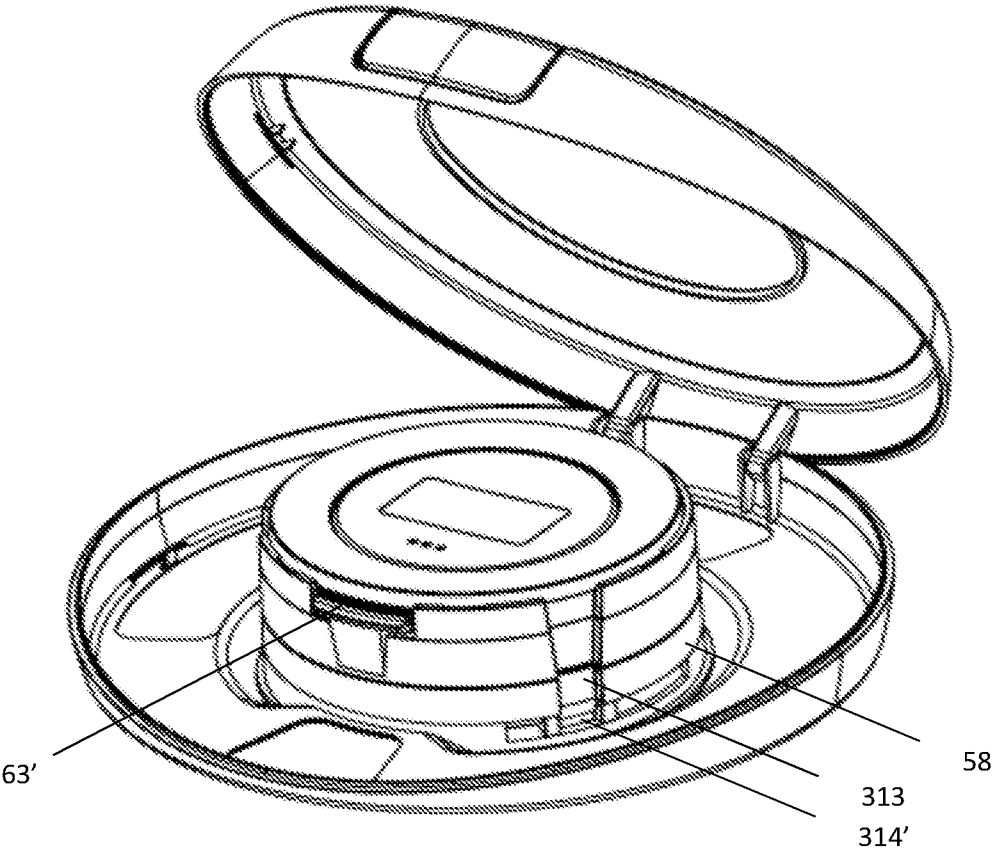


Fig 9A

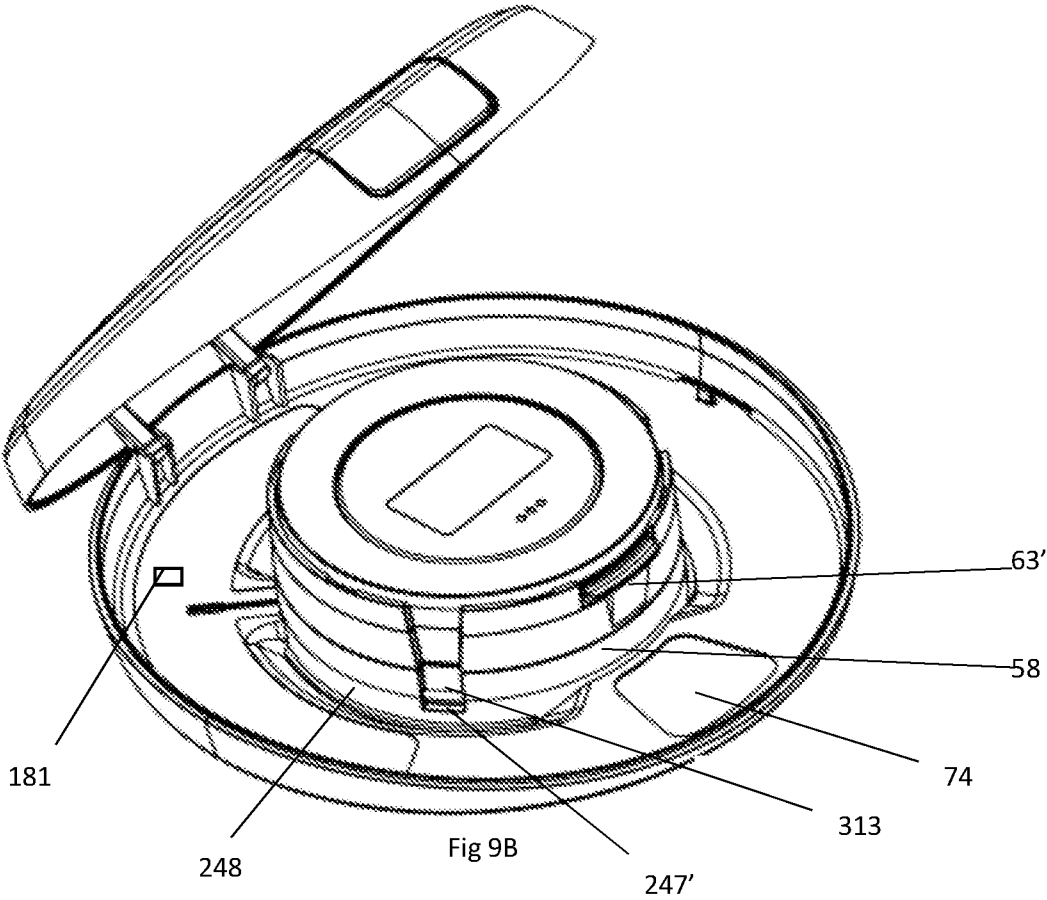


Fig 9B

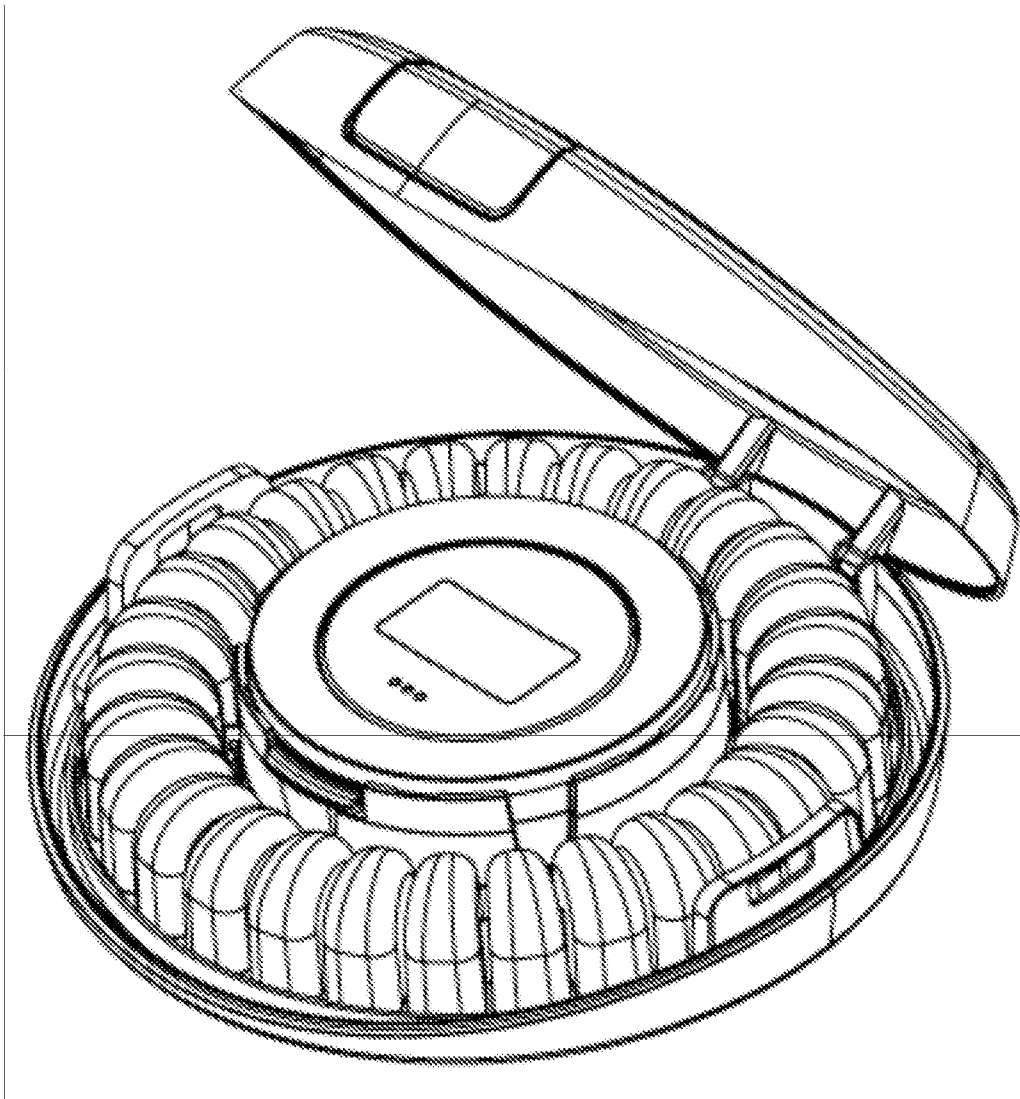


Fig 9C

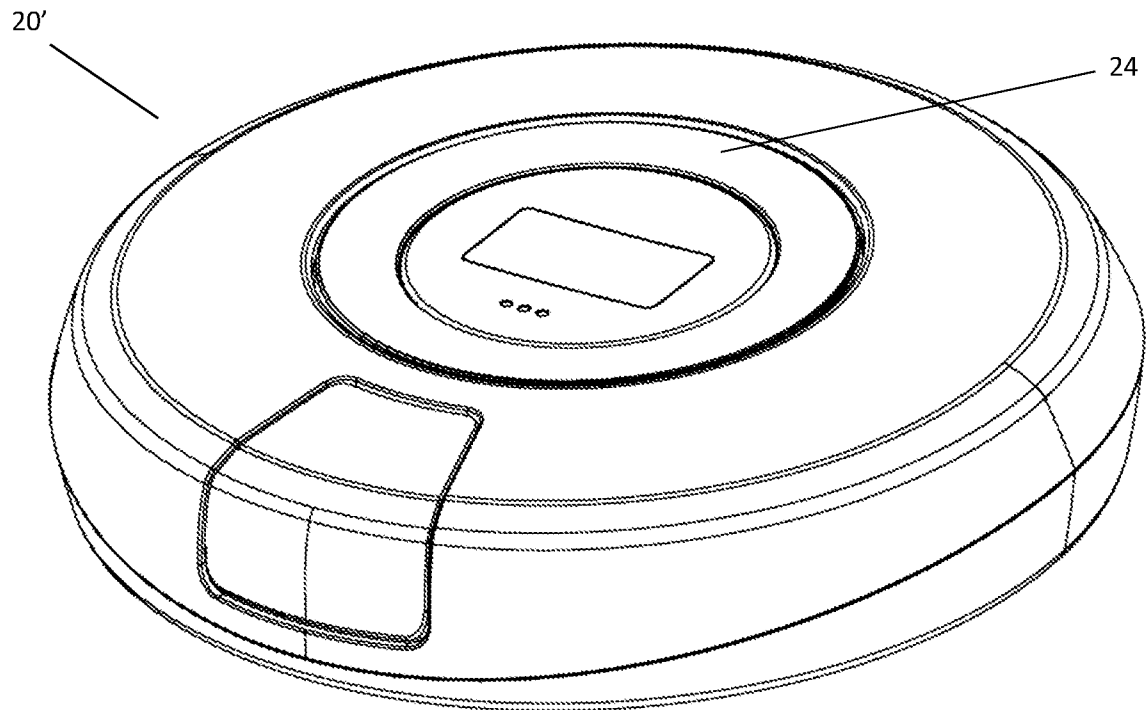


Fig 10A

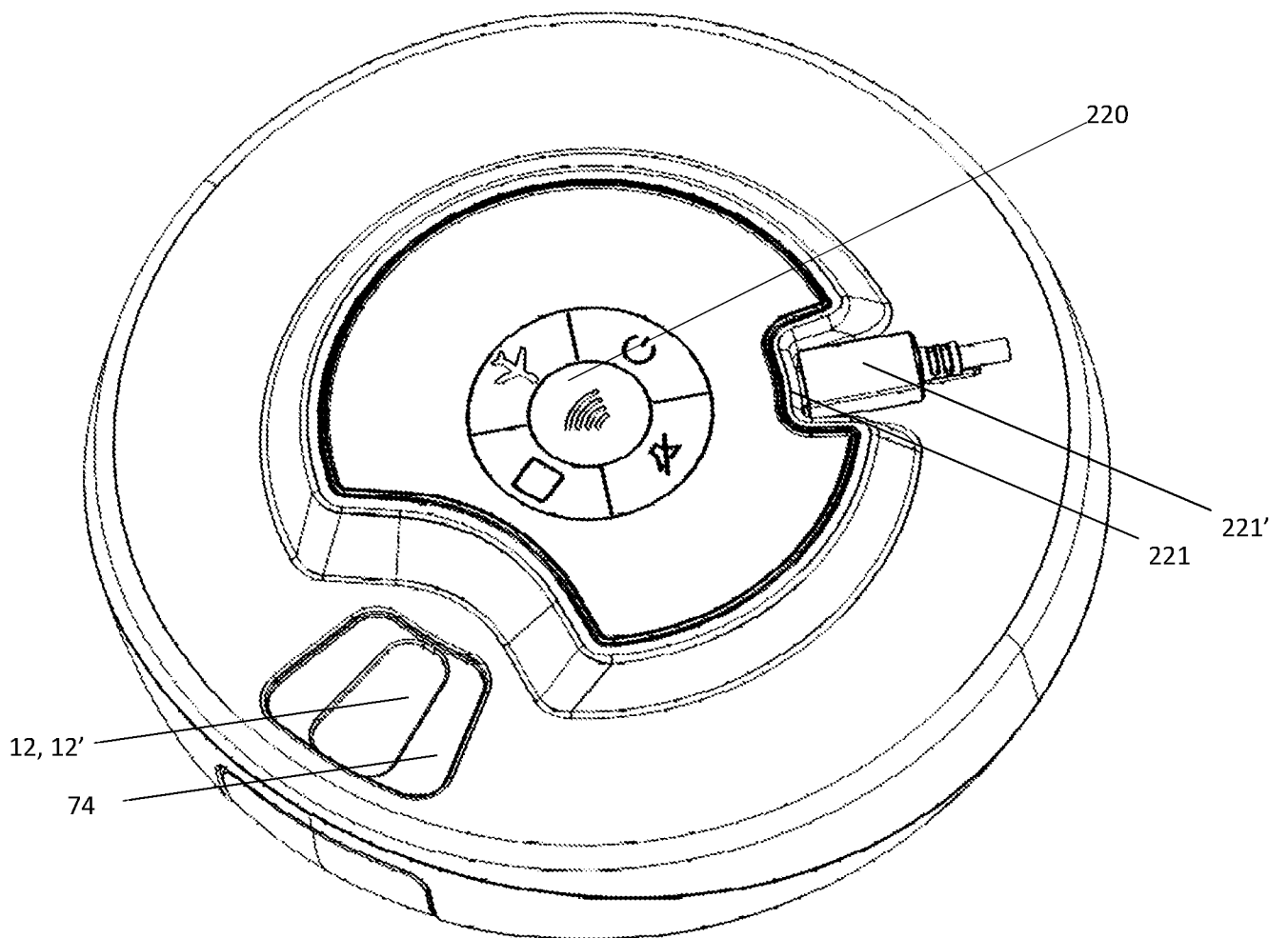


Fig10B

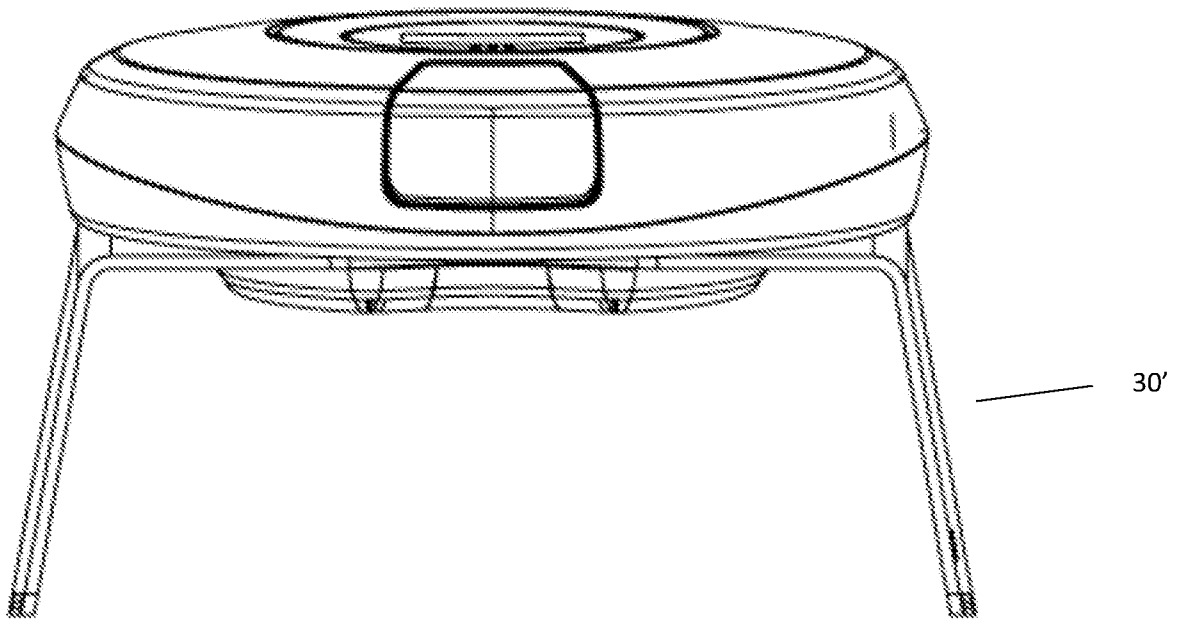


Fig11A

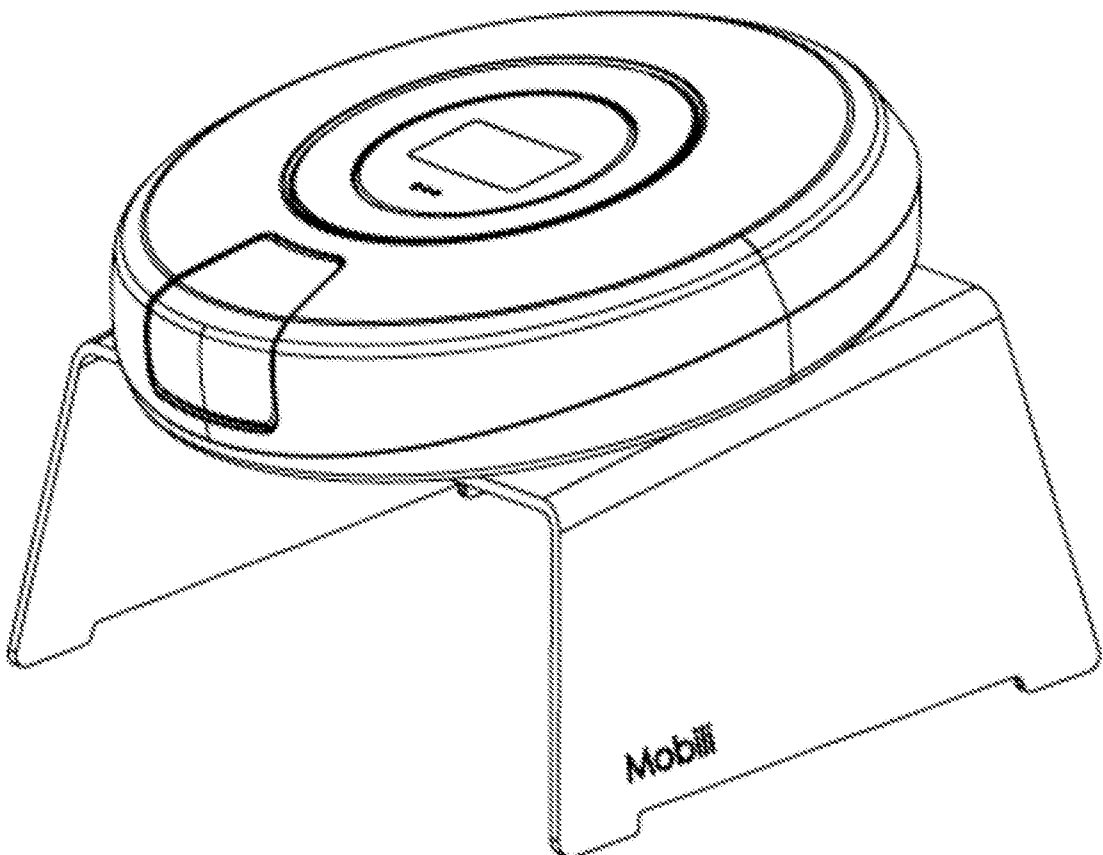


Fig11B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO2021/050164

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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: A61J, B65D, G16H

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

SE, DK, FI, NO classes as above

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

EPO-Internal, PAJ, WPI data, BIOSIS, COMPENDEX, EMBASE, INSPEC, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 20200121560 A1 (THOMAS LEVI DALTON), 23 April 2020 (2020-04-23); paragraphs [0010], [0028]-[0034], [0048]-[0049], [0058]; figure 2A	1-10, 25-26
A	--	11-24, 27-29
X	US 10292906 B1 (GERSHONI DANIEL ET AL), 21 May 2019 (2019-05-21); column 6, line 47 - column 9, line 6; figures 1,2,15b; claim 1	11-24, 27-29
A	--	1-10, 25-26



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
"D" document cited by the applicant in the international application	"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
"E" earlier application or patent but published on or after the international filing date	"&" document member of the same patent family
"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	

Date of the actual completion of the international search

05-10-2021

Date of mailing of the international search report

05-10-2021

Name and mailing address of the ISA/SE

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INTERNATIONAL SEARCH REPORT

 International application No.
 PCT/NO2021/050164

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 20150342829 A1 (SOLVELL STEFAN ERIK), 3 December 2015 (2015-12-03); paragraphs [0018]-[0024]; figures 1,5,7	11-24, 27-29
A	--	1-10, 25-26
A	US 20160008226 A1 (HINES PAUL J ET AL), 14 January 2016 (2016-01-14); abstract; paragraph [0025]; figure 2B	1-29
A	--	
A	US 20040188313 A1 (TEDHAM MARTIN JOHN), 30 September 2004 (2004-09-30); paragraphs [0092]-[0099]; figures 6-12	1-29
A	--	
A	US 3984031 A (THOMPSON GORDON J), 5 October 1976 (1976-10-05); whole document	1-29
A	--	
A	US 3743085 A (RICHERT W), 3 July 1973 (1973-07-03); whole document	1-29
A	--	
A	US 20190046412 A1 (BRADY ROBERT OWEN ET AL), 14 February 2019 (2019-02-14); paragraphs [0042]-[0052]; figures 1-5	1-29
A	--	
A	US 5409132 A (KOOIJMANS KEES ET AL), 25 April 1995 (1995-04-25); whole document	1-29
A	--	
A	US 20200093702 A1 (ALLIEVI UMBERTO), 26 March 2020 (2020-03-26); paragraphs [0024]-[0039]	1-29
A	--	
A	US 20100305750 A1 (CONLEY N SHARON), 2 December 2010 (2010-12-02); paragraphs [0027]-[0042]; figures 3-6	1-29
A	--	
A	US 20160107820 A1 (MACVITTIE DAVID ET AL), 21 April 2016 (2016-04-21); paragraphs [0027]-[0035]	1-29
	--	

Continuation of: second sheet

International Patent Classification (IPC)

B65D 83/04 (2006.01)

A61J 1/03 (2006.01)

A61J 7/04 (2006.01)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/NO2021/050164

US	20200121560 A1	23/04/2020	NONE		
US	10292906 B1	21/05/2019	NONE		
US	20150342829 A1	03/12/2015	US	9539177 B2	10/01/2017
US	20160008226 A1	14/01/2016	NONE		
US	20040188313 A1	30/09/2004	AT	463445 T	15/04/2010
			AU	2004208914 A1	19/08/2004
			CA	2515212 A1	19/08/2004
			DE	602004026406 D1	20/05/2010
			EP	1590266 A2	02/11/2005
			GB	2401602 A	17/11/2004
			GB	2412363 A	28/09/2005
			GB	2420774 A	07/06/2006
			GB	2420775 A	07/06/2006
			GB	2425768 A	08/11/2006
			HK	1072041 A1	12/08/2005
			JP	2006516517 A	06/07/2006
			WO	2004069688 A2	19/08/2004
US	3984031 A	05/10/1976	NONE		
US	3743085 A	03/07/1973	NONE		
US	20190046412 A1	14/02/2019	US	10772805 B2	15/09/2020
			US	10653584 B2	19/05/2020
			US	20180344575 A1	06/12/2018
			WO	2018126190 A1	05/07/2018
US	5409132 A	25/04/1995	AU	669529 B2	13/06/1996
			AU	4155893 A	06/01/1994
			CA	2099298 A1	02/01/1994
			CN	1080906 A	19/01/1994
			CZ	128393 A3	19/01/1994
			FI	932984 A	02/01/1994
			HR	P931004 A2	30/06/1995
			HU	T66092 A	28/09/1994
			IL	106150 A	31/10/1996
			JP	0680172 A	22/03/1994
			KR	940002144 A	16/02/1994
			NO	932360 L	03/01/1994
			NZ	248005 A	28/03/1995
			PL	299496 A1	07/03/1994
			SI	9300341 A	31/03/1994
			SK	67293 A3	02/02/1994
			TR	27454 A	29/05/1995
			TW	223015 B	01/05/1994
			ZA	934630 B	03/01/1994

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/NO2021/050164

US	20200093702 A1	26/03/2020	US	10966908 B2	06/04/2021
US	20100305750 A1	02/12/2010	NONE		
US	20160107820 A1	21/04/2016	US	20200307897 A1	01/10/2020
			US	10730687 B2	04/08/2020
			WO	2016061462 A3	25/08/2016