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(54) **Apparatus for handling drug containers**

(57) The present invention relates to an apparatus (1) for transporting and performing operations on a plurality of drug containers, comprising an enclosure (2) receiving one removable working cold storage accumulator (7), wherein the apparatus is further provided with a substantially plane area capable of adopting a working configuration in which said plane area faces the outside environment, said plane area being provided with snap-fitting means for temporarily securing said working cold storage accumulator on said plane area, at least when said plane area is in its working configuration. The invention further relates to a method for proceeding to the withdrawal of dose(s) of product from containers stored in such an apparatus.

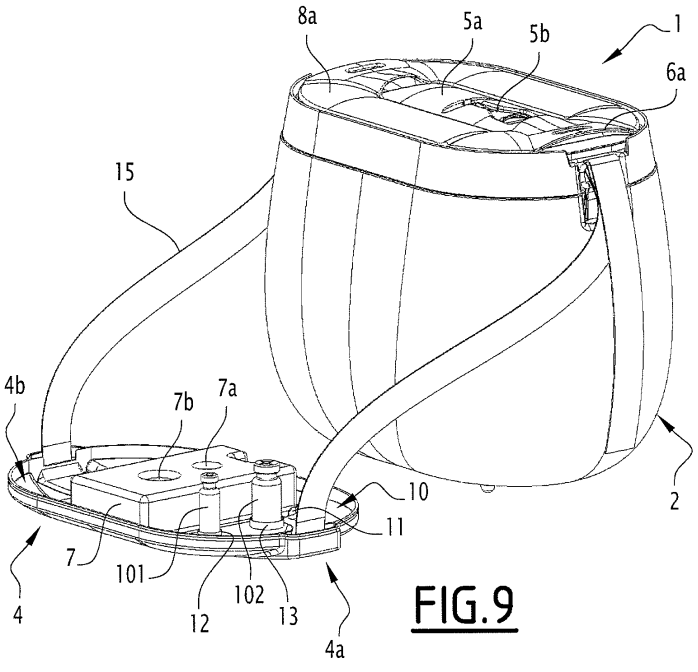

FIG.9

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Description

[0001] The present invention relates to an apparatus for the transportation of, and operations on, drug containers, the containers being intended to be used in combination with drug administering devices, such as syringes.

[0002] One of the ways to improve health is to immunize entire populations against a number of diseases. To date, injection administration is the most common method of administering vaccines.

[0003] Each year, numerous drugs, for example vaccines, need to be prepared throughout the world by healthcare institutions. Due to their biological nature, vaccines are complex to handle and to store. Many vaccine compositions are usually not stable at room temperatures and they must be stored at rather specific cold temperatures. Indeed, vaccines are usually temperature sensitive and typically need to be maintained and stored at any time between 2 and 8 degrees Celsius (°C). Some vaccines will be more sensitive to heat exposure and others will be sensitive to freezing. Therefore, maintaining and monitoring the appropriate temperatures during the storage and the handling of vaccines is a critical issue in order to sustain their efficacy. Overexposure to heat as well as overcooling may result in the destruction of the biological elements of the vaccines.

[0004] Furthermore, it is critical that the cold chain be not interrupted from production of the drug at a pharmaceutical company to its administration to the patient.

[0005] From a supply chain perspective, the most efficient vaccine packaging is the multidose container, that is to say, containers that may contain up to 10, 100 or 1000 doses of vaccine, one dose being intended for one patient. Nevertheless, it may happen that a multidose container, such as for example a 10-dose container, is opened and that only three doses are used, for vaccinating three patients only, the rest of the container being wasted because of repeated exposure at temperature above 8°C. Indeed, when a vaccine has been submitted several times to ambiant temperature, it is considered that it has been damaged and should not be further injected.

[0006] Indeed, in locations where it is difficult to maintain favorable hygienic conditions such as remote locations which are far from towns and from hospital facilities, the multidose vials may be handled and manipulated outdoors, at ambiant air.

[0007] Vaccination campaigns can therefore be made difficult in regions where there is limited or potentially no supply of energy to power cooling equipment such as a refrigerator. As a result, a significant proportion of vaccines may be wasted by the time they reach their target. This has an unacceptable cost for the health organizations in charge of immunization campaigns. In addition, it may happen that in case of vaccination campaigns, or pandemic, hundreds of patients need to be vaccinated in a very short time, in locations where it is difficult to maintain good hygienic conditions such as locations which are far from towns and from hospital facilities.

[0008] Therefore, it would be desirable to provide an apparatus that would allow the safe transportation and handling of several drug containers and that would guaranty the continuity of the cold chain which is a critical step for the drug compositions contained in multidose containers.

[0009] Apparatus for transporting drug containers, provided with refrigeration systems, have been proposed. Anyway, it is often necessary to remove a drug container from the apparatus in order to proceed to the withdrawal of several doses of the product contained therein, for successively filling the adequate drug delivery devices in view of administering each dose to a different patient. In remote location where electrical power is absent, once removed from the apparatus, the drug container may be exposed to temperature above 8°C, thereby leading to the wastage of vaccine doses.

[0010] It would be desirable to provide an apparatus allowing not only transporting a plurality of drug containers at a controlled temperature, but also performing various tasks on these drug containers, such as withdrawing doses of product from these containers, while preventing these containers from being exposed to excessive temperature variations. In addition, it would be desirable to provide an apparatus allowing such a handling of at least one container, without compromising the integrity of the other drug containers. In particular, it would be desirable to isolate in a simple way a drug container from the other stored drug containers so as to complete tasks on said drug container while maintaining said container at a determined temperature, without impeding on the temperature of the other drug containers. In addition, because of the rough conditions of the location of use, where these treatments are intended to take place, it would be desirable that such an apparatus allows performing these operations without having to implement sophisticated technology and energy consumming techniques.

[0011] There is therefore room for improvement in the field of storing, transporting and administering vaccines in regions where electricity supply is limited or nonexistent.

[0012] It is an object of the present invention to provide an apparatus for transporting and performing operations on a plurality of drug containers filled with a drug solution, the apparatus comprising an enclosure for receiving at least a first compartment for storing said plurality of drug containers and at least a second compartment for storing at least one removable working cold storage accumulator, the enclosure being provided with a closable opening for access to at least said first and second compartments, wherein

the apparatus is further provided with a substantially plane area capable of adopting at least a working configuration in which said plane area is located outside said enclosure, said plane area being provided with snap-fitting means for temporarily securing thereon said working

cold storage accumulator, at least when said plane area is in its working configuration.

[0013] The apparatus of the invention allows the transportation of prefilled drug containers in good temperature conditions, as the working cold storage accumulator located in the enclosure enables the maintenance of the temperature in the first compartment, also located in the enclosure, at a predetermined temperature range, for example 2-8 °C. In addition, the apparatus of the invention allows the removal of the working cold storage accumulator from the enclosure and the securing of such a working cold storage accumulator on a plane area capable of being located outside the enclosure, for example capable of facing ambiant air, allowing then the healthcare worker to set up a convenient working space where he may position a selected drug container next to the working cold storage accumulator snap-fitted to the plane area. The presence of the working cold storage accumulator next to the selected drug container allows preventing dramatical temperature variations, in particular excessive heating of the drug container, during the time the healthcare worker proceeds to the withdrawal of doses of product vaccine. For example, the healthcare worker may substantially align the plane area of the apparatus of the invention on a horizontal area, such as the ground or a table, and the plane area of the apparatus of the inevntion may receive a drug container in an upright position in a stable manner. In locations remote from hospital facilities and where electrical power is absent, the plane area of the apparatus of the invention may constitute an aseptic plane working space for the healthcare worker.

[0014] The plane area is capable of adopting a working configuration in which it is located outside the enclosure. In particular, in its working configuration, the plane area faces the outside environment, and in particular enough space in the outside environment, such as ambiant air, for receiving the working cold accumulator within its snap-fitting means. "Outside the enclosure" means, according to the present application, separate from the inside of the enclosure or located on a surface of the enclosure capable of facing the outside environment, such as an outer face of the enclosure or a movable wall of the enclosure capable of facing the outside environment at some point. For example, the plane area may be located on an element positioned inside the enclosure, said element being removable from the enclosure when the plane area needs to be in its working configuration. In other embodiments, the plane area may be located on the outer surface of the enclosure.

[0015] For example, the plane area may be designed on the outer face of a wall of the enclosure of the apparatus of the invention. For example, in embodiments, where the enclosure has the shape of a rectangular case, the plane area may be designed on an outer face of one of the large sides of the case, the opening of the case being located on a small side of the case. When the healthcare worker has reached a vaccination site where he needs to prepare vaccine injections, he removes the working cold storage accumulator and a selected drug container from the case via the opening located on a small side of the case. He then closes back the opening, puts the case on the ground with the large side of the case which is not provided with the plane area directed towards the ground. As a consequence, the plane area, which is designed on the opposite large side, faces the outside environment, such as the ambiant air, and in addition is substantially aligned with a horizontal plane. The plane area is in its working configuration. The healthcare worker then snap-fits the working cold storage accumulator onto the plane area and positions the selected drug container on the plane area, next to the working cold storage accumulator. The healthcare worker may then proceed to the withdrawal of the doses of product/vaccine contained in the drug container without having to fear that the temperature of the container raises dramatically in a short time.

[0016] In embodiments, said plane area is linked to said apparatus so that said plane area is capable of being switched from its working configuration to a storage configuration, in which said plane area is protected from the ouside environment. In particular, in embodiments, the plane area is in a relationship with the apparatus allowing the plane area to switch from a storage configuration, in which it is protected from the ouside environment such as ambiant air, to its working configuration, in which it faces the outside environement, in particular in which it is surrounded by enough space in the outside environment so that the working cold storage accumulator may be snap-fitted on said plane area.

[0017] For example, the plane area, in particular when it is designed on an outer wall of the enclosure, may be provided with a shutter protecting it from the ouside environment, and in particular from ambiant air, when no operation is performed on a drug container and the apparatus is for example in a storage mode, the shutter being capable of pivoting or sliding with respect to the plane area so as to leave said plane area exposed to the outside environment and ambiant air when needed. When operations are to be performed on the drug containers and the apparatus is in the working mode, the healthcare worker moves the shutter so that the plane area faces the outside environment and is therefore capable of receiving the working cold storage accumulator. Alternatively, the plane area may be designed on a face of a pivoting or sliding shutter provided on the outer wall of the enclosure, so that, when the shutter is shut, the plane area faces the enclosure wall and is therefore protected from the outside environment, and when the shutter is open, the plane area faces the outside environment and is capable of receiving the working cold storage accumulator.

[0018] In embodiments, said plane area is designed on a face of a plate member releasingly connected to the enclosure. The plate member may then be an independent element having a substantially bidimensional shape capable of being stored inside the enclosure when no

operation is to be perfomed on a drug container, and then removed from the inside of the enclosure in order to put the plane area in its working configuration. In particular, once removed from the enclosure, the plate member may be put on the ground or on any horizontal area. For example, the plate member may be stored inside the enclosure independently from the working cold storage accumulator. In such a case, the working cold storage accumulator may be removed from the second compartment and then snap-fitted onto the plane area designed on a face of the plate member, with the opposite face of the plate member having been previously put on the ground. Alternatively, the plate member may be stored inside the second compartment, with the working cold storage accumulator already snap-fitted onto the plane area designed on said plate member. In such a case, the plate member and the working cold storage accumulator already snap-fitted thereon are removed simultaneously from the second compartment and the face of the plate member not bearing the working cold storage accumulator is for example preferably put on a horizontal area.

[0019] In embodiments, the plate member forms at least part of a cover for closing said closable opening. For example, the plane area is designed on a face of the cover.

[0020] In embodiments, said cover having an inner face intended to be directed towards the inside of the enclosure when said cover closes said closable opening, said plane area is designed on said inner face of said cover. The plane area is therefore protected from the outside environment when no operation is to be performed on a drug container, for example during the storage mode of the apparatus. On the contrary, the inner face of the cover being for example intended to face the outside environment when the cover does not close the closable opening, the plane area is then in its working configuration. Such embodiments allow a very simple use of the apparatus of the invention, as the healthcare worker can readily find out the plane area and set up his working space when he needs to perform operations on the drug containers.

[0021] In embodiments, the working cold storage accumulator is provided with at least one lodging capable of receiving at least one of said drug containers. For example, said lodging(s) may receive one or more drug containers, when said working cold storage accumulator is snap-fitted onto the plane area in its working configuration. Such embodiments are particularly useful for drugs or vaccines which can sustain very low temperature, namely below 2 °C. As the drug container is lodged within the working cold storage accumulator, the temperature of the drug container is maintained at a desired range for a longer time.

[0022] In embodiments, the plane area is further provided with releasable fixing means for temporarily securing one or more of said drug container(s) onto said plane area. For example, the drug container to be treated may also be releasably fixed onto the plane area, when the plane area is in its working configuration. The working space is therefore safer, as the drug containers are secured and may not fall or roll away from the plane area. The procedure of withdrawing a dose of product from the drug container is therefore rendered easier and safer for the healthcare worker.

[0023] For example, said releasable fixing means are located adjacent to said snap-fitting means. Such embodiments may be useful for vaccines which may not sustain very low temperature. When the releasable fixing means are located adjacent to the snap-fitting means, the working cold storage accumulator and one or more container(s) are both secured on said plane area. The proximity with the working cold storage acumulator may then protect the drug containers from excessive heating during a significant period of time, in particular, during the time required for a healthcare worker to withdraw the doses of product and prepare the injections, without risking that the vaccine be overcooled by very low temperature. Potential waste of the vaccine is therefore avoided.

[0024] In embodiments, the enclosure further comprises at least a third compartment for storing additional cold storage accumulators. These additional cold storage accumulators may contribute to the maintenance of the desired temperature range inside the enclosure at any time, during storage and working modes of the apparatus. When the apparatus is for example in a working mode where operations are performed on the drug containers, the additional cold storage accumulators may maintain the desired temperature range inside the enclosure, even after the working cold storage accumulator has been removed from the second compartment, and during the time it is is snap-fitted onto the plane area for operation on a selected drug container. The drug containers which remain inside the enclosure are therefore maintained at a controlled temperature.

[0025] In embodiments, the second compartment is insulated independently from said first, and optionally third, compartment(s). The various compartments of the enclosure are preferably insulated from the ambiant air and from the ambiant temperature. The second compartment may be insulated independently from said first and optionally third compartment(s). When the healthcare worker opens the second compartment in order to remove the working cold storage accumulator, the other compartments, such as the first compartment receiving the plurality of drug containers, and the third compartment, receiving the additional cold storage accumulators are therefore less or not affected by the ambiant temperature.

[0026] In embodiments, the enclosure is further provided with a holding strap. The apparatus is therefore easily transportable for a healthcare worker, even in remote locations accessible only by foot.

[0027] In embodiments, the plate member is slidingly connected to the holding strap. For example, when the plate member is part of the cover, the cover may be slidingly connected to the strap. The plane area may therefore be secured to the apparatus and cannot be lost in

remote locations.

[0028] Another aspect of the invention is a method for proceeding to the withdrawal of dose(s) of product from drug containers stored in an apparatus as above described, comprising the following steps :

i) removing the one or more selected drug container(s) from the first compartment and the at least one removable working cold storage accumulator from the second compartment,
ii) putting the plane area in its working configuration,
iii) temporarily securing said working cold storage accumulator onto the plane area,
iv) optionally temporarily securing said one or more selected drug container(s) onto said plane area,
v) withdrawing the dose(s) of product from the one or more selected drug container(s).

[0029] The present invention will now be described in greater detail based on the following description and the appended drawings in which :

- Figure 1 is a side view of an apparatus of the invention in a storage mode,
- Figure 2 is a partial cross section view of the apparatus of Figure 1,
- Figure 3 is a perspective view of the cover of the apparatus of Figure 1 with the plane area,
- Figure 4 is a partial perspective view of the apparatus of Figure 1, once the cover has been removed,
- Figures 5 and 6 are perspective views of the apparatus of Figure 1 showing the step of removing the working cold storage accumulator from the second compartment,
- Figure 7 is a side view of the apparatus of Figure 1 showing the step of removing one or more drug container(s) from the second compartment,
- Figure 8 is a perspective view of the cover of the apparatus of Figure 1, with the working cold storage accumulator and two drug containers,
- Figure 9 is a perspective view of the apparatus of Figure 1 in a working mode,
- Figure 10 is a perspective view of the enclosure of the apparatus of Figure 1, showing the first and third compartments open.

[0030] For purposes of the description hereinafter, the terms "upper", "lower", "right", "left", "vertical", "horizontal", "top", "bottom", "lateral", "longitudinal", and derivatives thereof shall relate to the invention as it is oriented in the drawing figures.

[0031] With reference to Figures 1-4, an apparatus 1 is shown in accordance with an embodiment of the invention, for transporting and performing operations on a plurality of drug containers 100 filled with a drug solution. The drug solution may be a product that needs to be maintained at a determined temperature range, such as a vaccine. For example, some vaccines need to be maintained at a temperature range varying from 2 to 8°C.

[0032] On Figures 1 and 2, the apparatus 1 is shown in a storage mode, namely in a mode where no operation is completed on the drug containers 100. The storage mode of the apparatus 1 is useful for storing and transporting the drug containers 100 at a predetermined temperature range, for example for carrying such drug containers 100 to a remote location where electrical power is absent or scarce but where people need to be vaccinated.

[0033] With reference to Figure 1, the apparatus 1 comprises an enclosure under the form of a case 2 having a substantially rectangular shape in the example shown, provided with a top opening 3 closable by a removable cover 4 having a outer face 4a and an inner face 4b, opposite its outer face 4a. The walls of the case 2 can be suitably made of an insulating material such as, for example, a sandwich of different layers having a hard and smooth surface on the outside for durability and hygiene, as well as internal layer(s) of for example polystyrene foam for thermal insulation purposes.

[0034] The case 2 comprises a first compartment 5 for storing the plurality of drug containers 100, and a second compartment 6 for storing a working cold storage accumulator 7 on the example shown.

[0035] As shown later below, the working cold storage accumulator 7 is intended to be removed from the second compartment 6 when the apparatus 1 is in a working mode, namely in a mode where various operations, such as withdrawal of doses of product or vaccine, are to be performed on some selected drug containers (100), which also need to be removed from the enclosure for purposes of performing said operations. The working cold storage accumulator 7 has the shape of a rectangular pack on the example shown, and is provided with a first lodging 7a and a second lodging 7b, both of them being shaped and dimensioned to receive a drug container 100. On the example shown, the first lodging 7a and the second lodging 7b do not have the same diameter so that drug containers 100 of various sizes and shapes may be received therein. In other embodiments not shown, the lodgings (7a, 7b) could have the same shape and dimensions. Alternatively, the working cold storage accumulator 7 could be provided with only one of such lodgings (7a, 7b) or on the contrary with more than two lodgings.

[0036] On the example shown, the apparatus 1 comprises only one such removable working cold storage accumulator 7. Anyway, in embodiments not shown, several such removal working cold storage accumulators may be present.

[0037] On the example shown, the case 2 further comprises a third compartment 8 for storing additional cold storage accumulators 9 (see also Figure 10). Although the additional cold storage accumulators 9 are removable from the third compartment 8 in order to regenerate their cooling power when needed, they are not intended to be removed from the case 2 when the apparatus 1 is in a

working mode and operations are to be perdormed on selected drug containers. The additional cold storage accumulators 9 are intended to protect the inside of the case 2, and in particular the first compartment 5 and the drug containers 100 stored therein, from excessive heat from the outside environment and to maintain a controlled temperature inside the case 2.

[0038] In the example shown, the third compartment 8 is U-shaped (see Figure 10) and receives three additional cold storage accumulators 9. In other embodiments not shown, the apparatus 1 may comprise less or more than three additional cold storage accumulators 9, depending on the temperature range desired inside the case 2 and the first compartment 5.

[0039] The working cold storage accumulator 7 and the additional cold storage accumulators 9 can contain an eutectic fluid able to freeze in a refrigerating equipment such as a freezer and which are then able to absorb heat from their surrounding environment. The working cold storage accumulator 7 and the additional cold storage accumulators 9 are intended to maintain at least the first compartment 5 at a predetermined temperature range; for example for vaccines, this temperature range should be between 2°C and 8°C for preserving the integrity and efficacy of the vaccines contained in the drug containers 100.

[0040] In order to help maintaining the desired temperature range within the various compartments (5, 6, 8), these compartments are preferably insulated. In addition, because the second compartment 6 is intended to be opened in order to remove the working cold storage accumulator 7 at the time the apparatus 1 is in a working mode, this second compartment 6 is insulated independently from the first compartment 5, and from the third compartment 8. In this view, as shown on Figures 4-6, the second compartment 6 is preferably closed by an insulated top lid 6a, whereas the third compartment 8 is closed by a different insulated U-shaped top lid 8a. The first compartment 5 is provided with an insulated top wall 5a provided with a handle 5b and fixed to a support 14 receiving the drug containers 100. The handle 5b allows pulling the support 14 out of the first compartment 5 in order to proceed to the removal of one or more selected drug container(s) 100 to be treated (see Figure 7). The top lids (6a, 8a) and the top wall 5a also form a protection of the compartments from outside contaminants.

[0041] With reference to Figure 3 is shown the cover 4 of the apparatus 1 of Figure 1, once this cover 4 has been removed from the case 2, with its outer face 4a facing the ground. The cover 4 has the global shape of a bidimensional plate member provided with curved edges. On the inner face 4b of the cover 4 is designed a substantially plane area 10. As shown on Figure 3, this substantially plane area 10 is provided with four corner projections 11 positioned so as to define a rectangular print 11a within the plane area 10. As shown below, these four corner projections 11 are dimensioned and shaped so as to form snap-fitting means for temporarily securing the rectangular pack forming the working cold storage accumulator 7.

[0042] Still with reference to Figure 3, the plane area 10 is further provided with four annular rims, two small annular rims12 and two large annular rims 13. The two small annular rims 12 have a diameter substantially corresponding to the diameter of a small-sized drug container 101 (see Figures 8-9) and are dimensioned and shaped so as to form releasable fixing means for temporarily securing such small-sized drug containers 101 to the plane area 10, while the two large annular rims 13 have a diameter substantially corresponding to the diameter of a large-sized drug container 102 (see Figures 8-9) and are dimensioned and shaped so as to form releasable fixing means for temporarily securing such large-sized drug containers 102 to the plane area 10.

[0043] The four annular rims (12, 13) are located adjacent to the corner projections 11 while leaving the rectangular print 11a free. As shown later with reference to Figures 8 and 9, when the working cold storage accumulator 7 is snap-fitted into the corner projections 11 of the plane area 10 and the drug containers (101, 102) are secured to the plane area 10 via the annular rims (12, 13), the working cold storage acumulator 7 may then protect the drug containers (101, 102) from the excessive outside temperature during a significant period of time, in particular, during the time required for a healthcare worker to withdraw the doses of product from the drug containers (101, 102) and prepare and realize the adequate injections.

[0044] With reference to Figure 1, the apparatus 1 is further provided with a holding strap 15. This holding strap 15 allows a healthcare worker to carry the apparatus 1 easily, on one shoulder for example. In a alternative embodiment, the holding strap is designed in order to carry the apparatus as a backpack. In other embodiments not shown, the apparatus is free of holding strap.

[0045] With reference to Figure 9, in the example shown, the cover 4 is slidingly connected to the holding strap 15.

[0046] The method of use of the apparatus 1 of the invention will now be described with reference to Figures 1-10.

[0047] A healthcare worker is provided with the apparatus 1 in a storage mode, as shown on Figures 1 and 2, as described above. In this mode, the inner face 4b of the cover 4, onto which is designed the plane area 10, faces the inside of the case 2. The plane area 10 is therefore protected from the outside environment, and in particular from ambiant air and outside contaminants, and is therefore not in a working configuration.

[0048] When the healthcare worker has reached the location of the vaccination where electrical power may be absent or scarce and where people need to be vaccinated, he opens the case 2 by removing the cover 4. As the cover 4 is slidingly connected to the holding strap 15, the healthcare worker causes the cover 4 to move along the holding strap 15 until he can position the outer

face 4a of the cover 4 on the ground, as shown on Figure 5. In this position of the cover 4, the plane area 10 is located outside the case 2 and is in its working configuration. In this configuration, the plane area 10 is capable of receiving the working cold storage accumulator 7 in the projection corners 11. For facilitating the next step, the healthcare worker substantially aligns the cover 4 on the ground, so as to substantially align the plane area 10 on a horizontal plane.

[0049] Still with reference to Figure 5, the healthcare worker then removes the insulated top lid 6a of the second compartment 6 in order to reach the working cold storage accumulator 7. He removes the working cold storage accumulator 7 from the second compartment 6, puts the top lid 6a back in place, and snap-fits the working cold storage accumulator 7 in the four corner projections 11 of the plane area 10. The healthcare worker then pulls on the handle 5b present on the top wall 5a of the support 14, as shown on Figure 7, and removes for example a small-sized drug container 101 and a large-sized drug container 102 from the support 14. He then snap-fits these drug containers (101, 102) in the corresponding annular rims (12, 13) of the plane area 10, as shown on Figures 8 and 9.

[0050] The removal and positioning steps of the working cold storage accumulator 7 and of the drug containers (101, 102) may be completed in a different order : for example, the drug containers may be placed on the plane area 10 before the working cold storage accumulator 7.

[0051] In another embodiment not shown, the plane area is designed on a face of an independent plate member, which is stored inside the case when no operation is to be performed on a selected drug container, and which may be removed from the case when operations are to be performed on selected drug containers. For example, this plate member may be directly stored within the second compartment, with the working cold storage accumulator already snap-fitted on the plane area. In such a case, the plane area and the working cold storage accumulator are removed simultaneously from the case.

[0052] With reference to Figures 8 and 9, the apparatus 1 is therefore in a working mode, during which handling of the drug containers (101, 102) may take place. Because the working cold storage accumulator 7 is close to the operated selected drug containers (101, 102), the cooling energy it releases allows protecting the drug containers (101, 102) from the excessive ambiant temperature during the time required for the healthcare worker to proceed to the withdrawal of the doses of product/vaccine. Indeed, the working cold storage accumulator 7 refreshes the ambiant air located around the drug containers (101, 102) and thereby limits the heat transfer to the sensitive product/vaccines contained in these drug containers. The increase in temperature resulting from the removal of the drug containers (101, 102) from the case 2 is therefore limited and the healthcare worker can prepare and inject doses to the patients without damaging the remaining product/vaccines.

[0053] In another embodiment not shown, the plane area 10 could be designed on an independent plate member, capable of being stored inside the case in a storage mode of the apparatus, and provided with means capable of temporarily fixing the plate member onto the outer faces of the top lids (6a, 8a) of the compartments when operations are to be performed on selected drug containers, so that the plate member would be prevented from contacting the ground and would form an additional insulated wall for the inside of the case 2 during the time operations are performed on the drug containers.

[0054] Once the drug containers are empty, or once the vaccine injections are completed, the healthcare worker removes the working cold storage accumulator 7 from the plane area 10 by disengaging the working cold storage accumulator 7 from the four corner projections 11. He also removes the drug containers (101, 102) from their corresponding annular rims (12, 13). He replaces the working cold storage accumulator 7 and the empty drug containers (101, 102) inside the case 2, replaces the cover 4 on top of the case 2 and closes the opening 3.

[0055] The apparatus 1 may then be transported to a hospital or to a location provided with electrical power in order to regenerate all the cold storage accumulators (7, 9) and to replace the empty containers by newly filled ones.

[0056] The apparatus of the invention allows storing, transporting and performing operations on drug containers, such as withdrawing doses of product/vaccine contained in these drug containers, in a simple and safe manner, in remote locations where electrical power is absent or scarce, without having to implement sophisticated technology and energy consumming systems, while maintaining the drug containers at a safe temperature range during all these steps.

[0057] In other embodiments not shown, the plane area could be designed on an outer face of the case wall and provided with a shutter capable of protecting it from the outside atmosphere, heat and contaminants in a storage mode of the apparatus.

Claims

1. An apparatus (1) for transporting and performing operations on a plurality of drug containers (100, 101, 102) filled with a drug solution, the apparatus comprising an enclosure (2) for receiving at least a first compartment (5) for storing said plurality of drug containers and at least a second compartment (6) for storing at least one removable working cold storage accumulator (7), the enclosure being provided with a closable opening (3) for access to at least said first and second compartments,
wherein
the apparatus is further provided with a substantially plane area (10) capable of adopting at least a working configuration in which said plane area is located

outside said enclosure, said plane area being provided with snap-fitting means (11) for temporarily securing thereon said working cold storage accumulator (7), at least when said plane area is in its working configuration.

2. The apparatus (1) of claim 1, wherein said plane area (10) is linked to said apparatus so that said plane area is capable of being switched from its working configuration to a storage configuration, in which said plane area is protected from the outside environment.

3. The apparatus (1) of claim 1 or 2, wherein said plane area (10) is designed on a face (4b) of a plate member (4) releasingly connected to the enclosure.

4. The apparatus (1) of claim 3, wherein the plate member forms at least part of a cover (4) for closing said closable opening (3).

5. The apparatus (1) of claim 4, wherein said cover having an inner face (4b) intended to be directed towards the inside of the enclosure when said cover closes said closable opening, said plane area is designed on said inner face of said cover.

6. The apparatus (1) of any one of claims 1 to 5, wherein the working cold storage accumulator (7) is provided with at least one lodging (7a, 7b) capable of receiving at least one of said drug containers.

7. The apparatus (1) of any one of claims 1 to 6, wherein the plane area is further provided with releasable fixing means (12, 13) for temporarily securing one or more (101, 102) of said drug container(s) onto said plane area.

8. The apparatus (1) of claim 7, wherein said releasable fixing means (12, 13) are located adjacent to said snap-fitting means (11).

9. The apparatus of any one of claims 1-8, wherein the enclosure further comprises at least a third compartment (8) for storing additional cold storage accumulators (9).

10. The apparatus of any one of claims 1-9, wherein the second compartment (6) is insulated independently from said first, and optionally third, compartment(s).

11. The apparatus of any one of claims 1-10, wherein, the enclosure being further provided with a holding strap (15).

12. The apparatus of any one of claims 3 and 11, wherein the plate member (4) is slidingly connected to the holding strap (15).

13. Method for proceeding to the withdrawal of dose(s) of product from drug containers (100, 101, 102) stored in an apparatus (1) according to any one of claims 1 to 12, comprising the following steps :

i) removing the one or more (101, 102) selected drug container(s) from the first compartment (5) and the at least one removable working cold storage accumulator (7) from the second compartment (6),
ii) putting the plane area in its working configuration,
iii) temporarily securing said working cold storage accumulator (7) onto the plane area,
iv) optionally temporarily securing said one or more (101, 102) selected drug container(s) onto said plane area,
v) withdrawing the dose(s) of product from the one or more (101, 102) selected drug container(s).

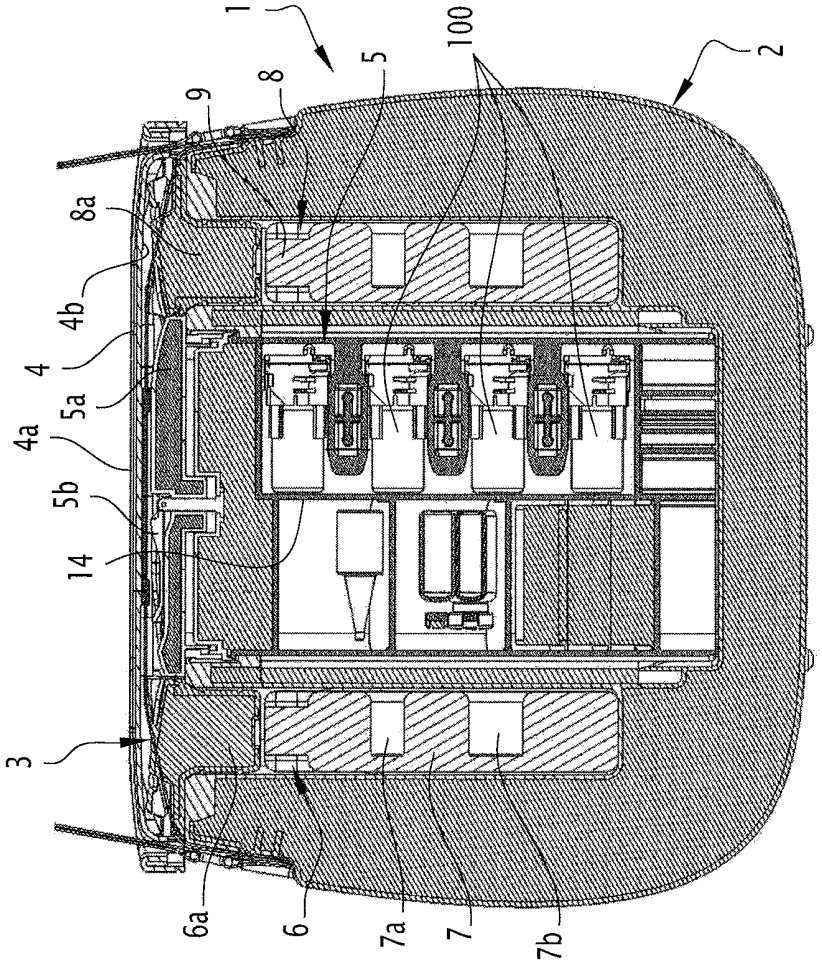

FIG.2

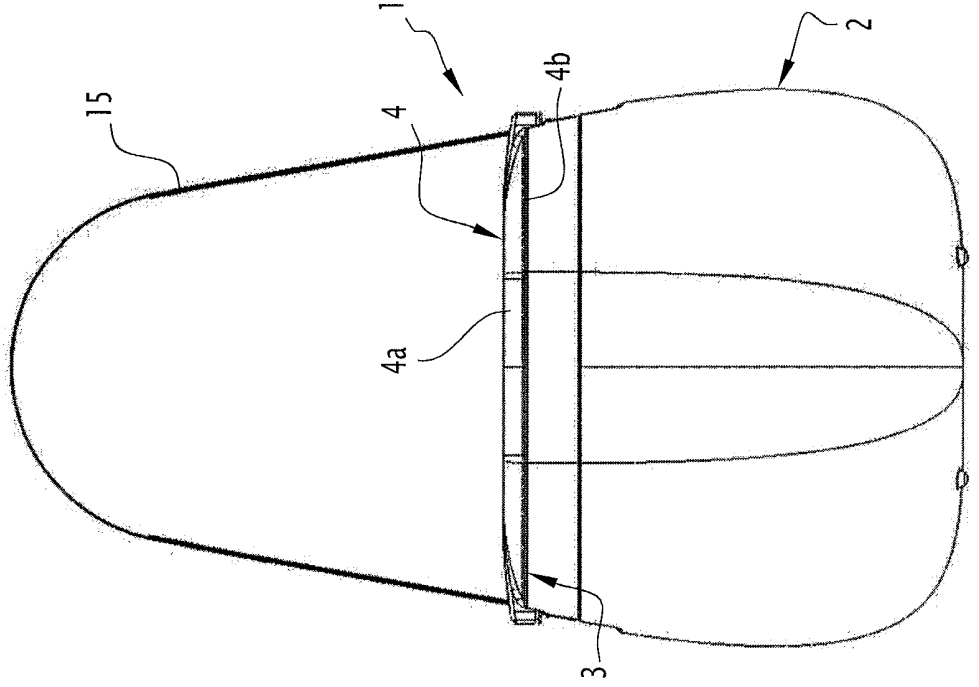

FIG.1

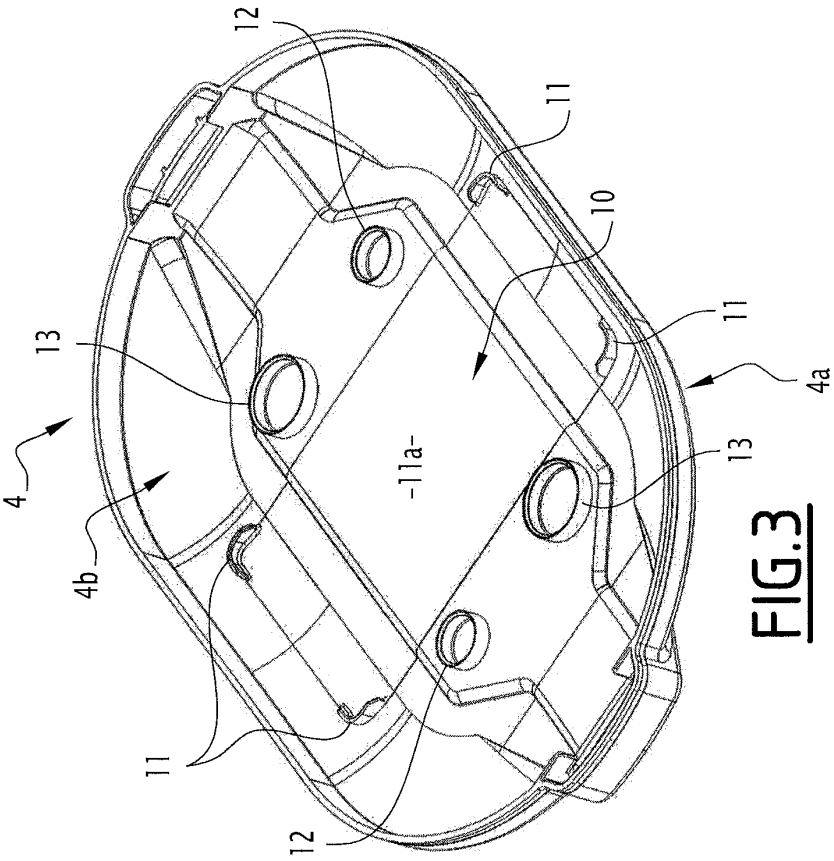

FIG.3

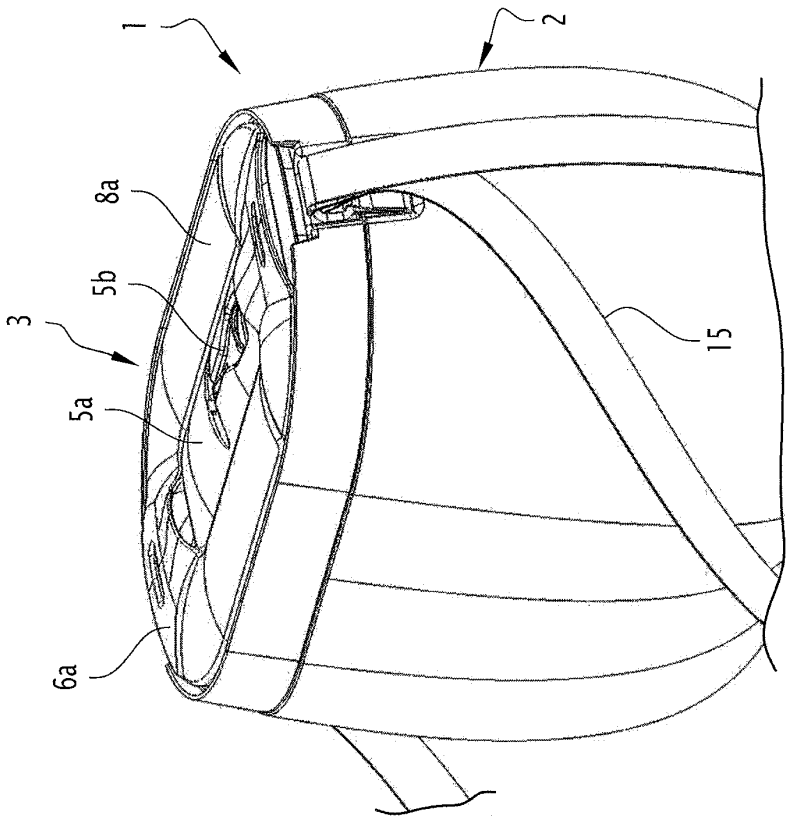

FIG.4

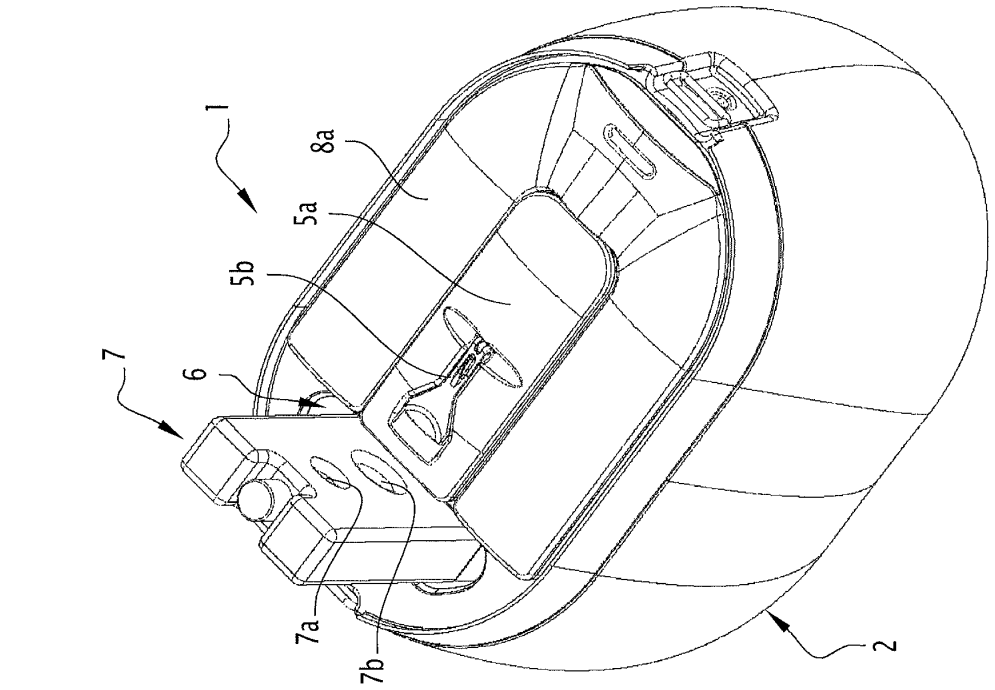

FIG.6

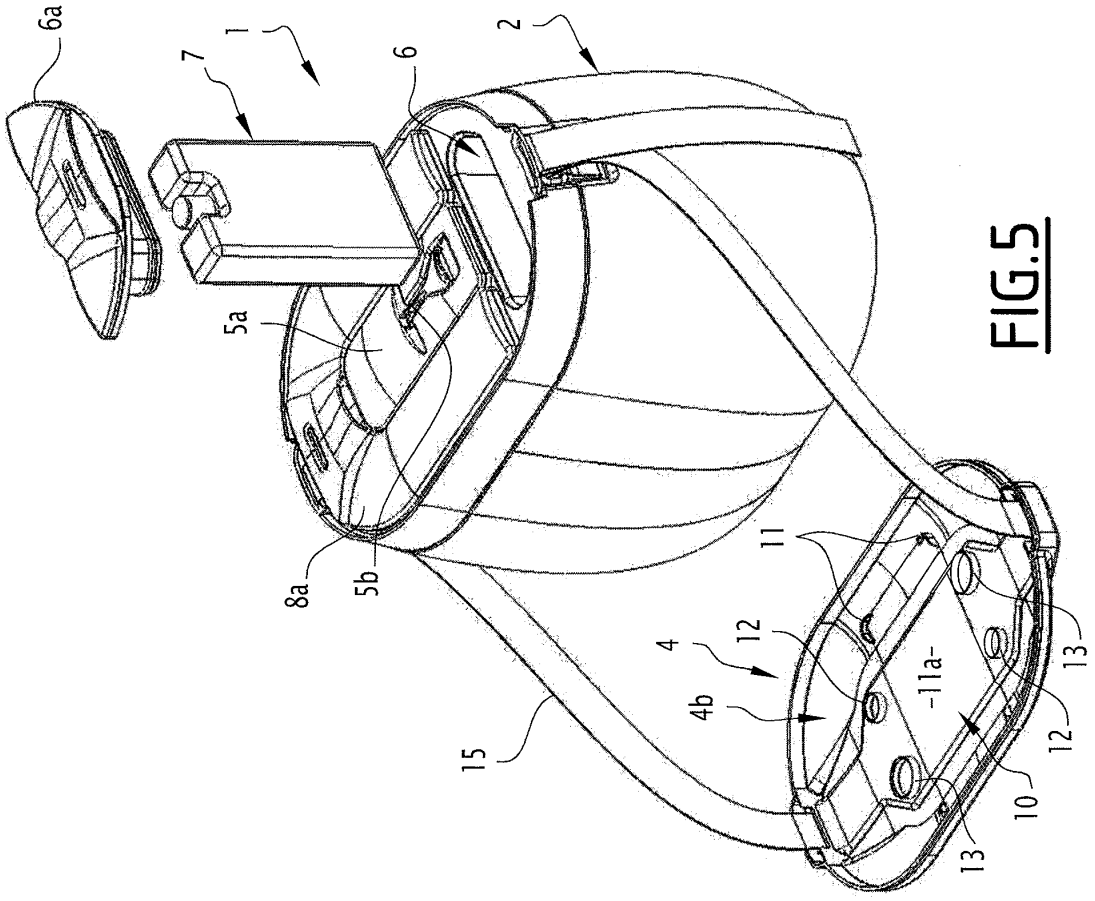

FIG.5

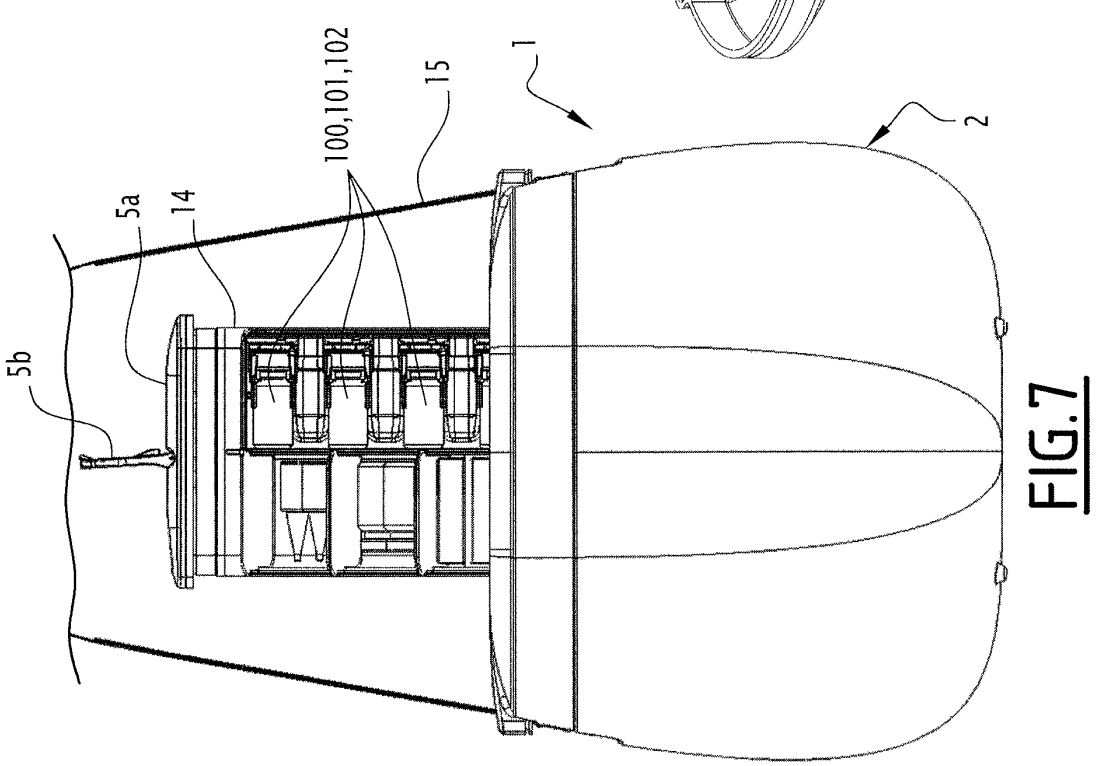

FIG.7

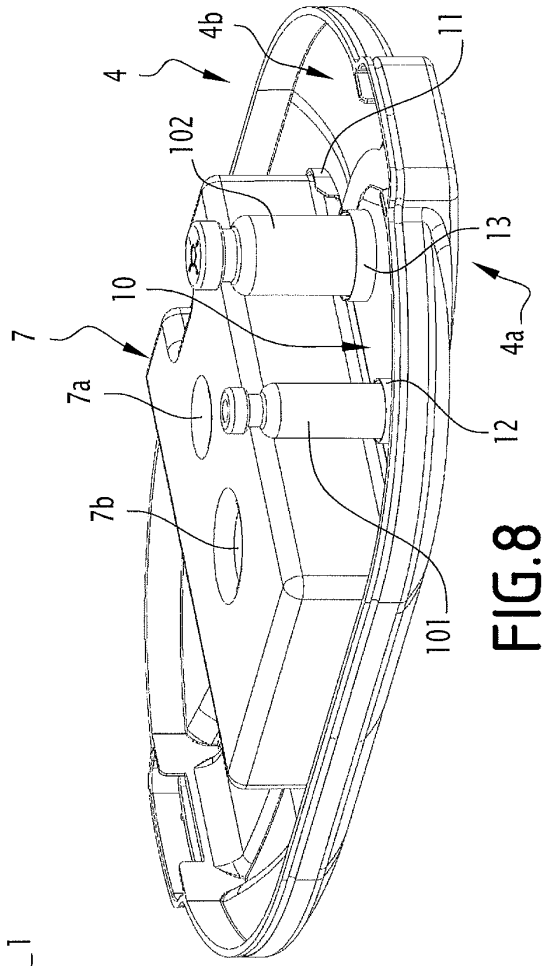

FIG.8

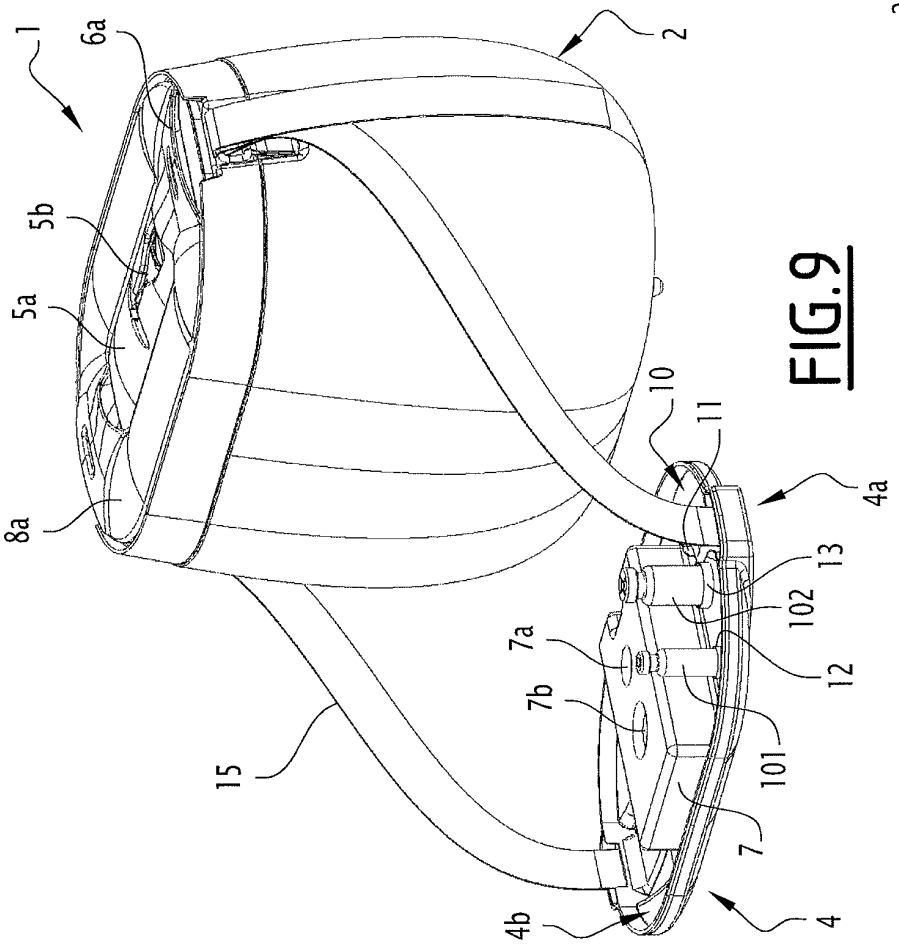

FIG.9

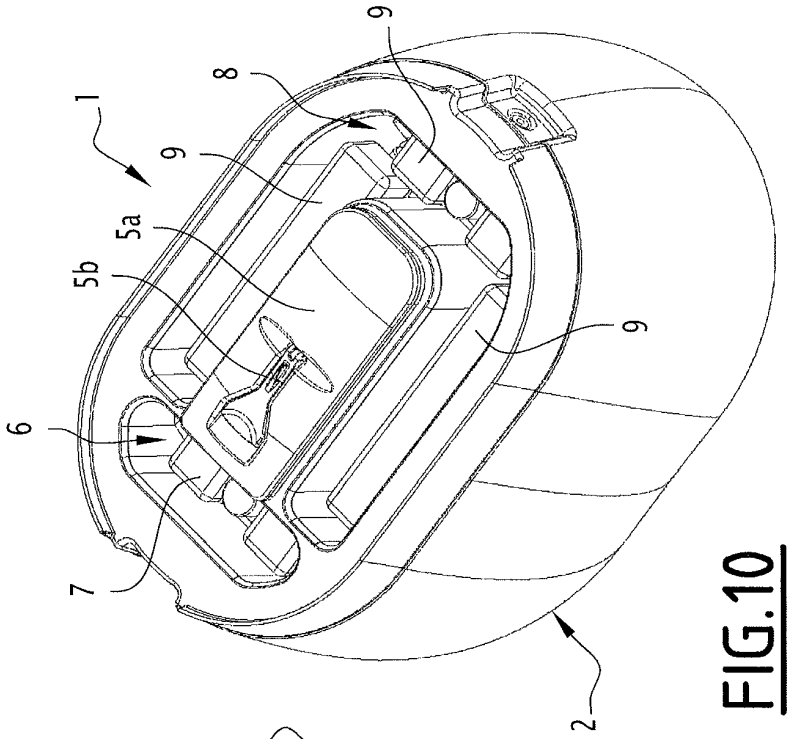

FIG.10

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EUROPEAN SEARCH REPORT

Application Number
EP 13 30 5089

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A61J
A45C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	6 June 2013	Yousufi, Stefanie

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