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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
16 August 2007 (16.08.2007)

PCT

(10) International Publication Number
WO 2007/090740 A1

(51) International Patent Classification:
G07F 11/62 (2006.01) *G06F 19/00* (2006.01)

(21) International Application Number:
PCT/EP2007/050684

(22) International Filing Date: 24 January 2007 (24.01.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
U-200600243 6 February 2006 (06.02.2006) ES

(71) Applicant *(for all designated States except US)*: **FUNDACIO AVE MARIA** [ES/ES]; C. Artur Carbonell, 11, E-08870 Sitges (ES).

(71) Applicants and
(72) Inventors: **MORENO VIDALES, Benigno** [ES/ES]; C. Sant Fructuós, 12, E2-1b, E-08004 Barcelona (ES). **REVERTER I GUIMESO, Antonio** [ES/ES]; C. Artur Carbonell, 11, E-08870 Sitges (ES).

(74) Agent: **PONTI SALES, Adelaida**; OFICINA PONTI, S.L., C. De Consell De Cent 322, E-08007 Barcelona (ES).

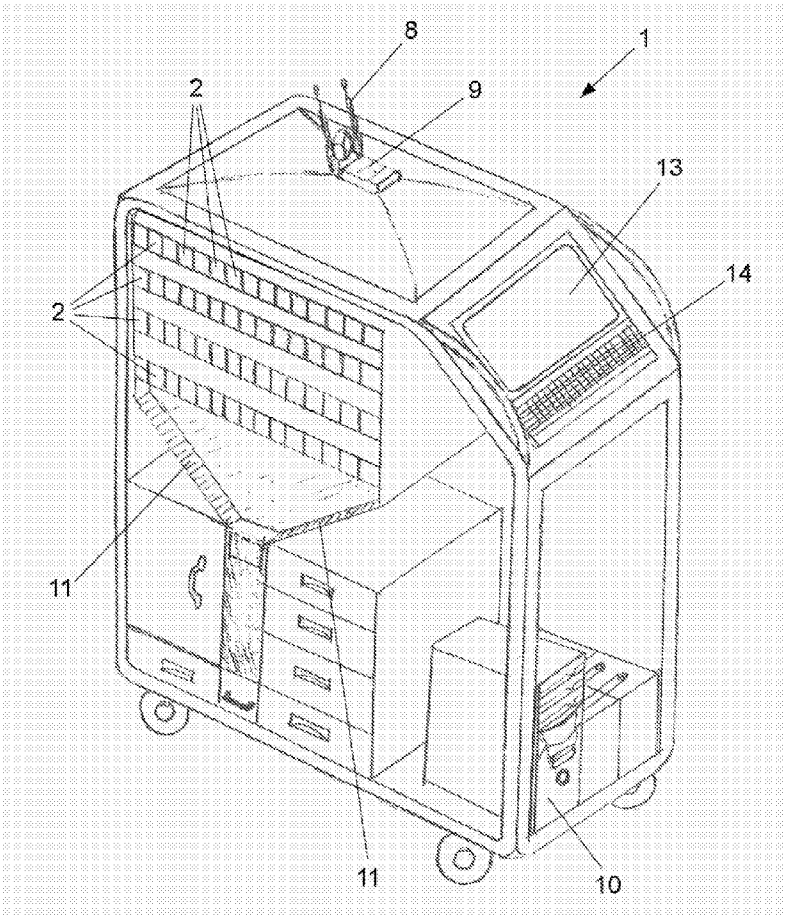
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,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

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:
— *as to the identity of the inventor (Rule 4.17(i))*

[Continued on next page]

(54) Title: DEVICE FOR DISPENSING MEDICINES



(57) Abstract: It comprises a mobile unit (1) intended for transportation by a nurse for personally providing each patient with his corresponding dose, the mobile unit (1) including at least one loading element (2) intended for orderly housing of a plurality of unit-dose packages (3), which are identified by a microchip (5) and containing the corresponding medicine doses (4), with each loading element (2) being associated with a different patient, identifying means (6,7) of each patient and nurse, dispensing means (11,12) of the unit-dose packages (3), and control means (9,10) including at least a receiving device (9) intended for picking up wirelessly data coming from the identifying means (6,7) and updated data about each patient with his medicine doses and daily administrations, and a computer (10) which receives said data, checks the administration assigned to the corresponding patient and in turn identifies the corresponding unit-dose package (3) through its microchip (5), sending a signal to the dispensing means (11,12) to provide the corresponding nurse with said unit-dose package (3).

WO 2007/090740 A1

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

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

DEVICE FOR DISPENSING MEDICINES

The present invention relates to a device for dispensing medicines.

The device of the invention is for application especially in communities of inmates, such as centres housing persons with mental disability, the mentally ill, the elderly, prisoners, etc.

BACKGROUND OF THE INVENTION

It is known that persons with severe mental disabilities, often persons with behavioural disorders, the mentally ill, or elderly persons with certain capacity impairments, can end up taking a large number of medicines, some of them highly dangerous.

The medicine administration times (morning, afternoon and night) coincide with breakfast, lunch and dinner, and the medicines are normally dispensed in rooms inhabited by various users at once, which are often noisy and have persons in movement.

Such institutions normally work with weekly pill-dispenser boxes prepared by the person in charge of the infirmary, and paper file cards with photos, names, types of medicines and daily dosages and times for each patient.

The ratios of direct-care staff are normally one nurse to every five patients, but there are shifts of 8 hours, morning, afternoon/evening and night, weekend, and account must also be taken of holiday and illness stand-in staff members. All this can lead to mistakes arising when it comes to dispensing the medicines correctly. Potential errors, which according to statistics are not more than three per year and centre, can nevertheless have serious consequences and often require hospitalisation.

In the report from the Institute of Medicine, "To err is human. Building a safer health system", National Academy Press, Washington, 1999, it was emphasised that in the United States alone the number of medicine-administration errors that lead to deaths each year (approximately 7,000) exceeds the total number of deaths due to workplace accidents (6,000).

There does not currently exist on the market a safe and reliable mobile, tamper-proof device for daily distribution of medicines in unit doses.

DESCRIPTION OF THE INVENTION

The object of the device for dispensing medicines of the present invention is to solve the disadvantages presented by the devices known in the state of the art, by providing a device that permits correct dispensing of medicines, is tamper-proof and rules out any possibility of errors.

The device for dispensing medicines of the present invention, which is suitable for being used in a health centre, includes a mobile unit intended for transportation by a nurse for personally providing each patient with his corresponding dose, and is characterised in that the mobile unit includes at least one loading element intended for orderly housing of a plurality of unit-dose packages, which are identified by a microchip and containing the corresponding medicine doses, with each loading element being associated with a different patient, identifying means of each patient and nurse, dispensing means of the unit-dose packages, and control means including at least a receiving device intended for picking up wirelessly data coming from the identifying means and updated data about each patient with his medicine doses and daily administrations, preferably from a central

computer of the health centre or from an external server to which the centre is connected, and a computer which receives said data, checks the administration assigned to the corresponding patient and in turn identifies the corresponding unit-dose package through its microchip, sending a signal to the dispensing means to provide the corresponding nurse with said unit-dose package.

Thanks to the device for dispensing medicines of the invention, it is possible automatically to associate the patient, the medication and the dose thereof, without the intervention of nursing auxiliaries and without any possibility of errors.

It should be noted that the mobile unit uses RFID technology (remote radiofrequency identification of electronic labels).

Preferably, the identifying means comprise a reader device intended for recording the data associated with a patient entered on a microchip attached to the clothing of that patient.

Optionally, the identifying means comprise a fingerprint reader.

Advantageously, the identifying means are mobile devices which can be moved close to the patient.

In accordance with one embodiment of the invention, the dispensing means of the unit-dose packages include an actuating mechanism intended for moving the corresponding unit-dose package towards at least one ramp which permits said unit-doses package to be ejected by gravity and placed in a compartment with an outlet window.

Advantageously, the number of loading elements is equal to or greater than the number of patients. This ensures that each patient has the loading elements assigned univocally.

Also advantageously, the number of unit-dose packages housed in a single loading element coincides with

the number of administrations assigned to the patient associated with said loading element and for a predetermined period of time. All the doses for each patient are usually prepared weekly.

The programming of weekly administrations is carried out weekly in the infirmary, by using a grid for loading unit-dose packages with the prescribed medication and the loading elements that identify the unit-doses package with each patient, by means of a package-by-package passing process to ensure correct patient-package identification.

Additionally, the device of the invention includes means of interaction with the nurse.

Preferably, the means of interaction with the nurse comprise a display screen for showing information related with each patient and his assigned administrations, and a keyboard for executing various functions, especially in the infirmary preparation. The screen can be of the touch type. The keyboard can be built into the actual housing of the mobile unit, or located under the screen and removable.

Advantageously, the device of the invention includes a mobile antenna for wireless communication with an external central unit or an external server in communication with a medical department of the centre.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to facilitate the description of the matters outlined above some drawings are attached which, schematically and solely by way of non-restrictive example, show a practical case of embodiment of the device for dispensing medicines of the invention, in which:

Figure 1 is a perspective view of the device for dispensing medicines of the invention;

Figure 2 is a perspective view of the device of Figure 1, showing its interior components;

Figure 3 is a perspective view of a loading element provided with unit-dose packages; and

Figure 4 is a perspective view of a unit-dose package with one administration of medicines inside it.

DESCRIPTION OF A PREFERRED EMBODIMENT

As can be observed in Figures 1 and 2, the device for dispensing medicines includes a mobile unit 1 intended for transportation by a nurse in order personally to supply each patient with his/her corresponding dose.

Said mobile unit 1 includes a set of loading elements 2, intended for housing in an orderly manner a plurality of unit-dose packages 3, as can be seen in Figure 3. The number of loading elements 2 is equal to or greater than the number of patients, in order to ensure that each patient is assigned at least one loading element 2.

The number of unit-dose packages 3 housed in a single loading element 2 coincides with the number of administrations assigned to the patient associated with said loading element 2, for a predetermined time period. All the doses for each patient are generally prepared weekly.

As can be seen from Figure 4, each unit-dose package 3 contains the dose of medicines 4 for a single administration (unit dose). Each unit-dose package 3 is likewise identified with a microchip 5.

Inside the infirmary the nurse responsible for the medication prepares said unit-dose packages 3 each week, on the basis of the information contained in a constantly updated database that relates the computer file of each patient with his/her medicines dose and daily

administrations. The nurse then places the unit-dose packages 3 in the respective loading elements 2, taking into account that the unit-dose packages 3 for a given patient must be placed in the taking order in a single loading element 2.

The mobile unit 1 also includes identifying means 6,7 for each patient and nurse, as can be observed in Figure 1. For this purpose, there can be a reader 6 that records the data associated with a patient entered on a microchip attached to the clothing of said patient, and/or a fingerprint reader 7. Either of said readers 6,7, or both for greater reliability, can be used to identify the patient, while in all cases there is the photographic identification and name of the patient shown on screen, as will be described below.

The identity of the dining-room medicines administering nurse or monitor will be taken in order to allow access to operation of the medicines unit 1, by means of a card with chip and/or finger print, officially approved and authorised in advance.

Both readers 6,7 are likewise mobile devices that can be moved close to the patient to take the readings. Both readers 6,7 then send the data recorded by radiofrequency (RFID) to the mobile unit 1 via a suitable antenna 8 for checking thereof.

The mobile unit 1 also includes control means that include a receiving device 9 that picks up by radiofrequency the updated data about each patient with his medicine doses and daily administrations coming from a central computer-server at the health centre, and a computer 10 which receives said data, checks the administration assigned to the corresponding patient and in turn identifies the corresponding unit-dose package 3 through its microchip 5, sending a signal to some dispensing means 11,12 described below, in order to

provide said unit-dose package 3 to the nurse.

Additionally, the device of the invention includes means of interaction with the nurse, consisting in a display screen 13 to show information about the patient and his/her assigned administrations of medicines, as well as a keyboard 14 for executing various functions, integrated into the actual housing of the mobile unit 1. Preferably, the screen will be of the flat, touch kind, and protected against potential impact.

The screen 13 will permit display of data such as: morning, afternoon and night doses; the medicine, so that it can be checked before it is given to the patient, which will be done actually in the presence of the patient, and only for that particular administration; a computer file showing the photo of the patient, his/her name, the time of dose administration, the time-frequency and the pertinent medicines. These displayed data are taken from a saved and secure database that is kept permanently updated and may be accessed only using a password, on the computer used as a server and supervised for these purposes by the medical department.

The nurse in charge of the medication may likewise update in the database of the medicine unit 1 the changes prescribed by the psychiatrist, neurologist or general practitioner.

In accordance with one embodiment, the dispensing means of the unit-dose packages 3 include an actuating mechanism (not shown) for moving the pertinent unit-dose package 3 towards a pair of ramps 11 that allow said unit-doses package 3 to be expelled by gravity and placed in a compartment with an outlet window 12 (see Figure 1) in which there is an RFID detector sending the signal to the computer 10. The nurse picks up the unit-dose package 3 placed in said housing with outlet window 12 and the contents thereof will be given to the patient

immediately.

Where the dose must be administered due to absences arising because of weekends or other changes, a warning will be displayed on the screen and the dose will be issued through the window of the housing 12.

The mobile unit 1 can also communicate through its antenna 8 by radiofrequency with an external central unit or a server in communication with the medical department of the centre. It should be noted that within a single centre and depending on the number of patients there may be more than one mobile unit.

The device of the invention likewise ensures quality management in provision of the medicines, based on the associated program resident in the mobile unit 1 and on the server, which share constantly updated information; this ensures withdrawal by elapsed expiry date of medicines and permits the historical record of the medicines consumed to be monitored, in association with good medical practice, from the surgery and through to administration of the unit dose.

The mobile unit is a tamper-proof unit, so it is impossible for patients or non-authorised persons to gain access to the medicines.

The mobile unit is also autonomous, and is supplied with power during the periods between administrations and during the night by connecting it to the mains power supply. It also has a SAI to protect the computer system.

Thanks to the device for dispensing medicines of the invention an autonomous, computerised, wireless and tamper-proof mobile unit is obtained which is capable of automatically associating the patient, medication and dose thereof without intervention by nursing auxiliaries and without any possibility of errors.

C L A I M S

1. Device for dispensing medicines, suitable for being used in a health centre, including a mobile unit (1) intended for transportation by a nurse for personally providing each patient with his corresponding dose, characterised in that the mobile unit (1) includes at least one loading element (2) intended for orderly housing of a plurality of unit-dose packages (3), which are identified by a microchip (5) and containing the corresponding medicine doses (4), with each loading element (2) being associated with a different patient, identifying means (6,7) of each patient and nurse, dispensing means (11,12) of the unit-dose packages (3), and control means (9,10) including at least a receiving device (9) intended for picking up wirelessly data coming from the identifying means (6,7) and updated data about each patient with his medicine doses and daily administrations, preferably from a central computer of the health centre or from an external server to which the centre is connected, and a computer (10) which receives said data, checks the administration assigned to the corresponding patient and in turn identifies the corresponding unit-dose package (3) through its microchip (5), sending a signal to the dispensing means (11,12) to provide the corresponding nurse with said unit-dose package (3).

2. Device, according to claim 1, characterised in that the identifying means comprise a reader device (6) intended for recording the data associated with a patient entered on a microchip attached to the clothing of that patient.

3. Device, according to claim 1 or 2,

characterised in that the identifying means comprise a fingerprint reader (7).

4. Device, according to claim 2 or 3, characterised in that the identifying means (6,7) are mobile devices that can be moved close to the patient.

5. Device, according to any of the preceding claims, characterised in that the dispensing means of the unit-dose packages include an actuating mechanism for moving the corresponding unit-doses package (3) towards at least one ramp (11) which permits said unit-doses package (3) to be ejected by gravity and placed in a compartment housing with an outlet window (12).

6. Device, according to any of the preceding claims, characterised in that the number of loading elements (2) is equal to or greater than the number of patients.

7. Device, according to any of the preceding claims, characterised in that the number of unit-dose packages (3) housed in a single loading element (2) coincides with the number of administrations assigned to the patient associated with said loading element (2), and for a predetermined period of time.

8. Device, according to any of the preceding claims, characterised in that it includes means of interaction (13,14) with the nurse.

9. Device, according to claim 8, characterised in that the means of interaction with the nurse comprise a display screen (13) for showing information related with each patient and his assigned administrations, and a

keyboard (14) for executing various functions.

10. Device, according to any of the preceding claims, characterised in that it includes a mobile antenna (8) for wireless communication with an external central unit or an external server in communication with the medical department of the centre.

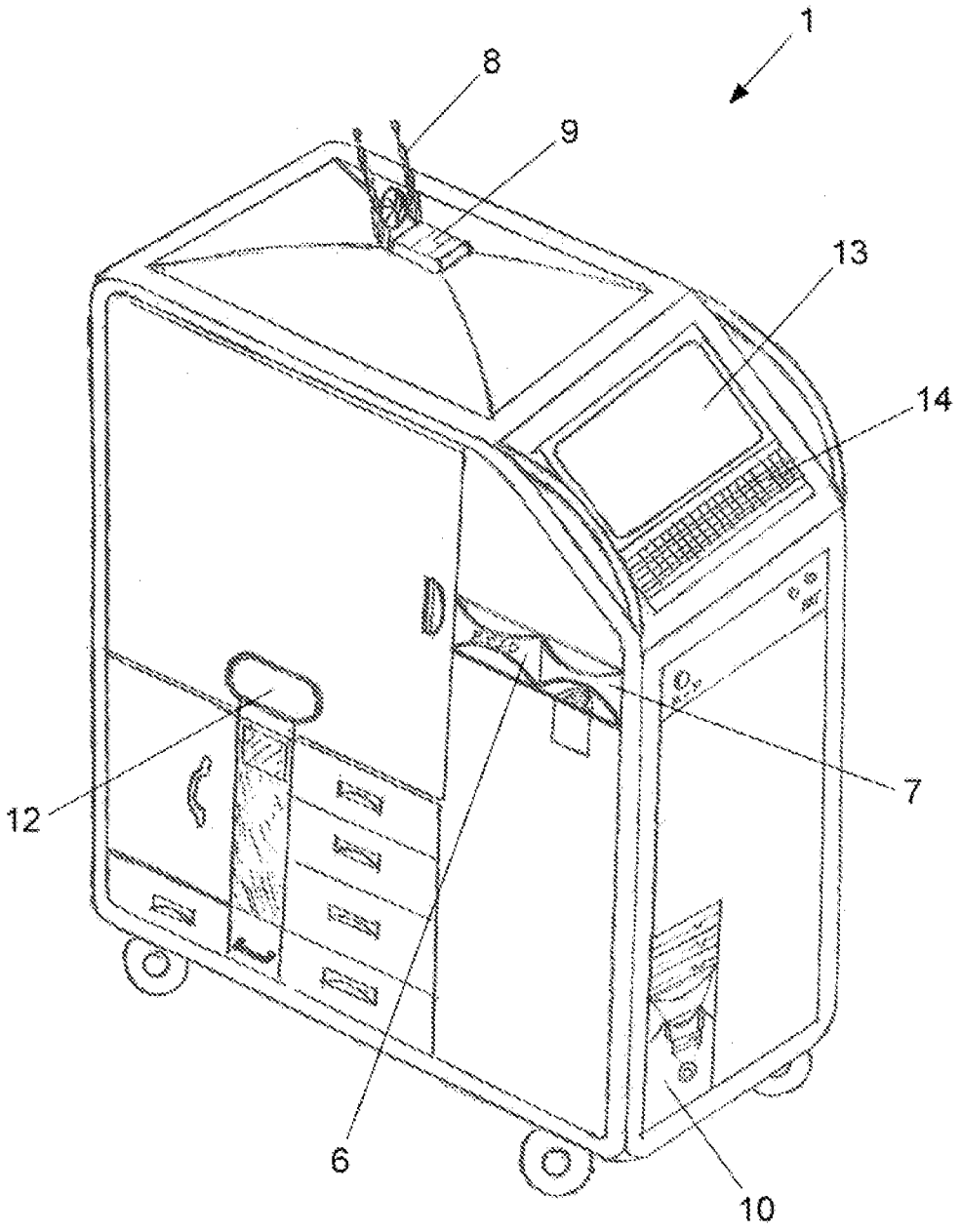


FIG. 1

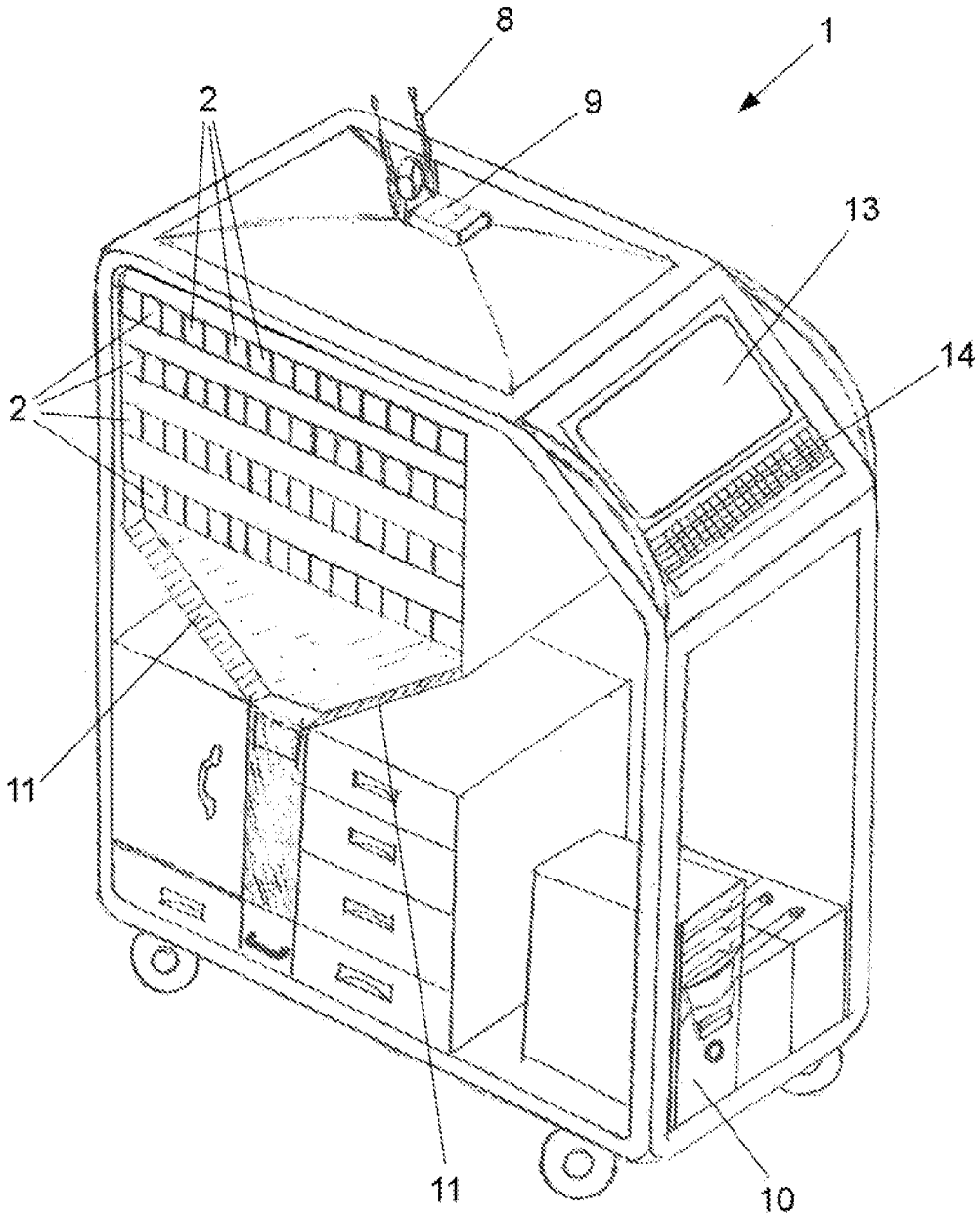


FIG. 2

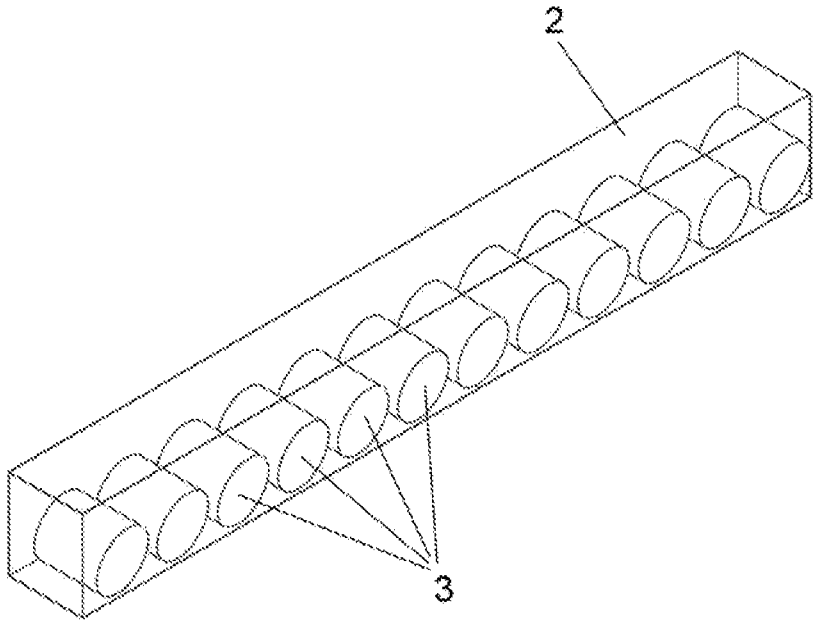


FIG. 3

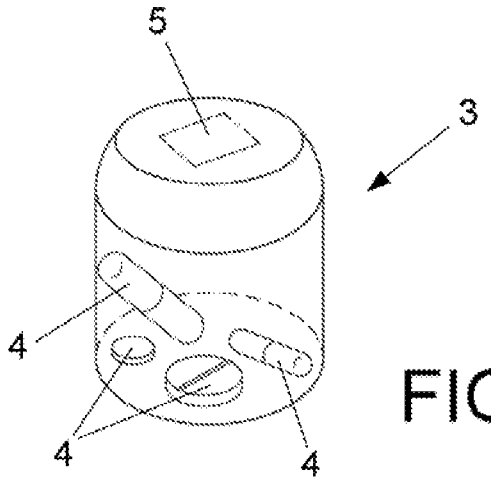


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2007/050684

A. CLASSIFICATION OF SUBJECT MATTER
INV. G07F11/62 G06F19/00

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)
G07F G06F A61J

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	US 5 314 243 A (MCDONALD SEAN C [US] ET AL) 24 May 1994 (1994-05-24) column 2, line 21 - column 3, line 12 column 4, line 8 - line 60; figures 1,2,4,7	1-10
Y	US 2003/164401 A1 (ANDREASSON CHRISTER O [US] ET AL) 4 September 2003 (2003-09-04) page 1, paragraph 7 - page 2, paragraph 19 page 3, paragraph 31 - paragraph 37 page 4, paragraph 45 - page 5, paragraph 50 page 6, paragraph 58 - page 7, paragraph 69; figures 2,5,6,8	1-10

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 May 2007	21/05/2007

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Guivol, Ouri

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3 917 045 A (WILLIAMS ROBERT L ET AL) 4 November 1975 (1975-11-04) column 19, line 33 - column 21, line 29; figures 19-21	5-7
A	WO 2005/022323 A (CONCEPT MEDICAL TECHNOLOGIES I [US]; WILLOUGHBY CHRISTOPHER W [US]; WR) 10 March 2005 (2005-03-10) page 1, paragraph 5 - page 3, paragraph 10 page 5, paragraph 30 page 16, paragraph 58 - page 18, paragraph 64	1-3,5-9
A	JP 2004 046582 A (OJI PAPER CO) 12 February 2004 (2004-02-12) abstract; figure 1	1-3,8,9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2007/050684

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5314243 A	24-05-1994	AU 5685494 A	04-07-1994
		WO 9413250 A1	23-06-1994
		US 5564803 A	15-10-1996
US 2003164401 A1	04-09-2003	US 2005131579 A1	16-06-2005
		US 2006032918 A1	16-02-2006
		US 2004238631 A1	02-12-2004
US 3917045 A	04-11-1975	NONE	
WO 2005022323 A	10-03-2005	CA 2537116 A1	10-03-2005
		EP 1665179 A2	07-06-2006
		JP 2007503267 T	22-02-2007
JP 2004046582 A	12-02-2004	NONE	