(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 116 949 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.01.2023 Bulletin 2023/02

(21) Application number: **22167620.8**

(22) Date of filing: **11.04.2022**

(51) International Patent Classification (IPC):
G07F 11/54 *(2006.01)* ***A47B 49/00*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
G07F 11/54; A47B 49/004; A47B 49/008

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **09.07.2021 CZ 202100336 U**

(71) Applicant: **VendPRO s.r.o.**
30100 Plzen (CZ)

(72) Inventors:
- **Kosturik, Kamil**
  33027 Vejprnice (CZ)
- **Weissar, Petr**
  30100 Plzen (CZ)
- **Pohorely, Pavel**
  30100 Plzeñ (CZ)
- **Vochoc, Jan**
  30100 Plzen (CZ)
- **VOCHOC, Marin**
  301 00 Plzen (CZ)

(74) Representative: **Sedlák, Jirí**
Okruzni 2824
370 01 Ceské Budejovice (CZ)

(54) DEVICE FOR AUTOMATED STORAGE AND DISPENSING OF ITEMS

(57) The device allows access to the storage cell of the storage drum (1) via a split door (3), the parts (4) of which open according to the size of the storage cell to be accessed. The storage cells are defined by shelves (5) and partitions (6) of the storage drum (1). The design of the invention makes efficient use of the storage space of the storage drum (1), since it can be divided into storage cells of a wide range of shapes and sizes.

EP 4 116 949 A1

Description

Area of invention

[0001] The invention relates to a device within which items can be stored in bulk for later individual dispensing, or into which items can be returned individually for later selection, both for bulk selection and for individual selection.

State of the art

[0002] Today, there are automated storage and dispensing devices for various types of items, from food and its sale for money to devices in industrial plants for the dispensing of consumer goods to employees, such as protective equipment, work tools and implements, etc.

[0003] An example of a known device for storing and dispensing articles is the invention of EP 2 113 890 A2. The invention discloses a device which at first sight resembles a conventional dispensing machine. A closer examination of the invention shows that inside the structure of the device, i.e. behind the protective casing, there is a storage drum in a carousel arrangement. A vertical axis passes through the centre of the device, which is also the axis of rotation of the storage drum. According to the description of the invention, the drum is coupled to a common drive unit which enables its rotation. The space of the storage drum can be configurably divided into tiers, which can be further divided by vertical partitions into storage cells for the stored items, but the height of the tier of the storage drum is always constant. For access to the storage tiers, the casing of the device is provided with a group of dispensing doors. The number of doors corresponds to the number of tiers in the storage drum. The height of the doors corresponds to the height of the corresponding floor of the storage drum. The shape of the door is rounded according to the storage drum.

[0004] The disadvantages of the present device are that the height of the storage drum and door tiers is fixed. This is disadvantageous because, in the case of small items, the space of the storage drum is inefficiently used. Moreover, the device cannot be adapted to receive items exceeding this fixed limit. The author of the invention himself states in the document that the configuration of the device is carried out in the factory from which the device originated. On-site configuration is not possible. Another disadvantage is the rounded shape of the door, which limits the operator's handling space.

[0005] The object of the invention is to create a device for automated storage and dispensing of items that retains the ability to store and dispense items of various sizes while making the most efficient use of storage space, essentially operating as an automated warehouse that allows for bulk replenishment of items and individual receipt, dispensing and return of items. One of the challenges of the invention is that the design of the device allows the operator to easily reconfigure the storage cells of the storage drum as the sizes of the stored items change.

The summary of the invention

[0006] The task is solved by creating a device for automated storage and dispensing of items according to the invention described below.

[0007] The device for automated storage and dispensing of items comprises the following mandatory components, which include at least one storage drum with an internal space divided into storage cells for storing items in the device. Furthermore, at least one drive unit for rotating the storage drum. Rotation of the storage drum provides access to the storage cells and the articles stored therein over a full 360° range. Further, the device comprises a shell for forming a barrier between the external environment and the interior of the device. The shell protects the interior of the device and the stored items from external influences, including theft. Further, the device includes at least one door for accessing the storage cells located within the shell. Finally, the device includes at least one control unit for receiving operational instructions and for controlling the operation of the device.

[0008] The essence of the invention is that the door is divided into at least two parts, each of the door parts being independently openable with an adjustable opening range for varying the size of the access opening to the storage cell of the storage drum. The split doors offer the undoubted advantage over the established solid doors, which always open over their full-size range, in that storage cells in the storage drum can be assembled into a wider range of sizes without the risk of removing items from adjacent storage cells through the wide-open door, particularly in cases where multiple small storage cells are adjacent to each other. By adjusting the number of door parts and the adjustable opening range, the door is always opened to allow access only to the correct storage cell of the storage drum. At the same time, it is advantageous that the storage drum is provided with a modular system of shelves and dividers for variable division of the storage space of the storage drum into storage cells of variable size in order to take full advantage of the split door. And to configure the storage cells of the storage drum freely on site according to the actual needs.

[0009] It is very convenient if the door of the device is sliding. The sliding opening is very easy to program, so that the door parts are always opened to the extent they are supposed to be, and there is no access to adjacent storage cells, and the sliding doors do not interfere with the removal/removal of the object into the storage cell, as is the case with hinged doors.

[0010] During development, the most advantageous design was a door divided into N number of parts, in two columns of N/2 number of rows. The two columns allow the installation of sliding mechanisms sideways along the opening facing the storage drum.

[0011] It is also very advantageous if the partitions of the modular system divide the storage drum into storage cells with a floor plan in the shape of variously sized intercircular sections, or circular sections, or quadrangles. At the same time, it is advantageous if the shelves of the modular system have the shape of a flat surface or a cascading surface. In particular, the quadrilateral plan makes it possible to store even square or rectangular objects such as boxes. This was not possible with the current equipment.

[0012] Among the advantages of the invention is the ability to store objects of different shapes and sizes in a single storage drum. This has not been possible until now, as the storage tiers of the drum and the associated door had a fixed size of storage cells, thus unnecessarily too much storage space was allocated for even a small object. The invention remedies this disadvantage in that the split door safely and conveniently makes both small and large storage cells accessible, so that it is possible to have storage cells of different sizes in a single storage drum. In addition, thanks to the modular system of shelves and dividers, storage cells can be freely reconfigured on site without having to return to the factory. According to the new layout of the storage cells, the instructions for opening the doors in the control unit are simply adjusted and the device is ready for operation.

Clarification of drawings

[0013] The invention will be explained in more detail in the following illustrations, where:

Figure 1 shows an axonometric view of the invented device,
Figure 2 shows an axonometric view of the uncoated invented device,
Figure 3 shows three drive units for the carousel rotation of three storage drums,
Figure 4 shows a storage drum partially fitted with shelves and partitions to create storage cells,
Figure 5 shows a view of a storage drum with partitions and shelves forming storage cells with a quadrangular plan for storing cubic or cuboid objects,
Figure 6 shows sample of shelf shapes,
Figure 7 shows a sample of storage cell composition on a deployed storage drum,
Figure 8 shows the split door.

Example of the embodiment of the invention

[0014] It is understood that the specific embodiments of the invention described and illustrated below are presented for purposes of illustration and not as a limitation of the invention to the examples provided. Those skilled in the art will find or be able to provide, using routine experimentation, a greater or lesser number of equivalents to the specific embodiments of the invention described herein.

Figure 1 shows a device according to the invention. The three divided doors 3, which in this example embodiment of the invention have eight parts 4 each, are very clearly discernible. The middle door 3 is shown with two parts 4 partially open to allow a view into the storage cell. A person skilled in the art would have been able, by ordinary trying, to design a device with one door 3 or with a higher number of doors 3. Since the parts 4 of the doors 3 are slidable, it has proved advantageous to arrange the parts 4 in the doors 3 in two columns. Whether in other potential embodiments of the invention eight parts 4 of door 3 as in the exemplary embodiment of the invention, or a different number of parts 4 of door 3, will be chosen, cannot be ruled out, but the variation of two columns of four parts 4 of door 3 per column is fully sufficient to understand the invention. Figure 1 further illustrates a control panel 7 which acts as a communication interface between the user and the control unit of the device.

Figure 2 shows the device without the shell, so that three storage drums 1 arranged one above the other can be seen, located just behind the door 3 of Figure 1. Also visible are the partitions 6 and shelves 5 which divide each storage drum 1 into storage cells for items.

Figure 3 shows a detail of the arrangement of the drive units 2 for the three storage drums 1 of figure 2. The drive unit 2 comprises a carrier on which the storage drum 1 is placed. The carrier in the drive unit 2 is rotated by an electric motor with a gearbox.

Figure 4 shows a detail of storage drum 1. As can be clearly seen from the figure, the storage drum 1 is divided into storage cells by a folding system of shelves 5 and partitions 6. The shelves 5 may be straight, but the cascading shelves 5 can also be clearly seen in Figure 4. Details of the shapes of the shelves 5 are shown in Figure 6. The folding system uses tongues and grooves that fit together.

Figure 5 shows a storage drum 1, the storage cells of which are suitable for storing a cubic or angular object, such as a box. The storage cells are defined by partitions 6, stacked so that the shelf 5 inserted therein has a quadrangular plan. This creates storage cells for the angular object. The remaining space of the storage drum 1 can be divided into small storage cells by the partitions 6 and the shelves 5.

Figure 6 shows details of the possible shapes of shelves 5. It is possible to see a straight shelf 5 and a cascading shelf 5.

Figure 7 shows the layout of the storage cells on the deployed storage drum 1. As can be seen from Figure 7, the invention overcomes the shortcomings of the prior art by not only allowing a selectable width of the storage cells, but also allowing the existence of storage cells of different heights on the same storage drum 1, which was not possible with the present devices.

Figure 8 shows the split door 3. The door 3 is divided into eight parts 4 arranged in two columns of four rows. The parts 4 of the door 3 open sideways and can be opened partially or all the way. Which parts 4 are opened and how much they are opened can be controlled via an not shown control unit.

[0015] The control unit consists of a computer, either industrial or integrated tablet, etc. The control unit has a map of the storage cells stored on its data storage, with each storage cell record having associated information on how to open the door 3. If a storage cell is rearranged, the information in the control unit is updated. The control unit may communicate with a remote server, or with another external device, e.g. via an internet connection, or via Bluetooth, etc. If the control unit is not equipped with a communication interface for user interaction, the device may additionally be equipped with a touch screen, keyboard, or means for communication with the user's mobile phone

Industrial applicability

[0016] The device for automated storage and dispensing of items finds application in unattended sales, as well as in industrial operations where items are dispensed and collected from authorized persons.

Overview of relationship tags

[0017]

1 storage drum
2 drive unit
3 door
4 part of door
5 shelve
6 partitions
7 control panel

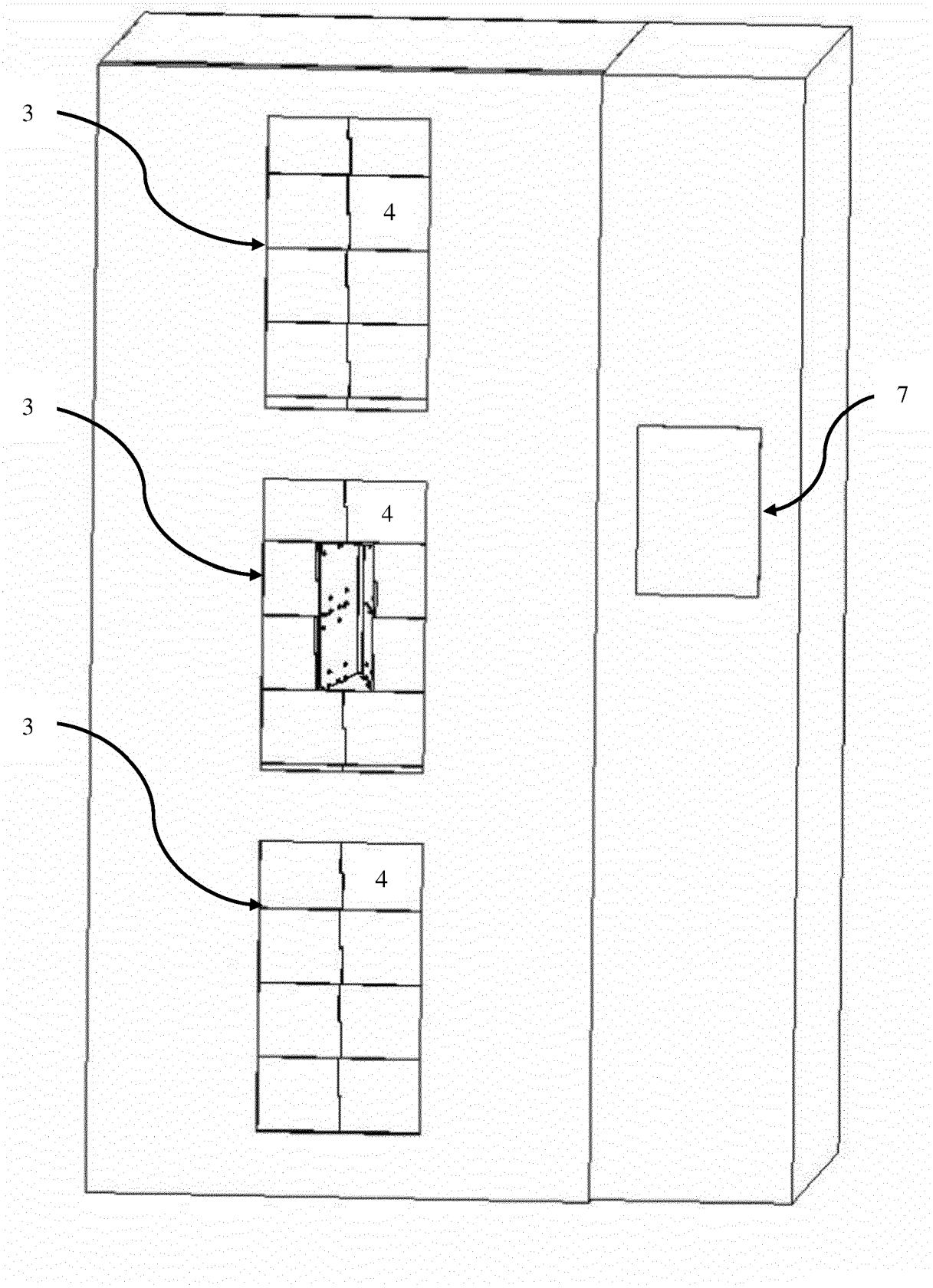
Claims

1. A device for automated storage and dispensing of items, comprising at least one storage drum (1) with a divided interior space into storage cells for storing articles, and at least one drive unit (2) for rotating the storage drum (1), a casing for forming a barrier between the external environment and the interior of the device, at least one door (3) for access to the storage drum (1) arranged in the casing, and at least one control unit for receiving operational instructions and for controlling the operation of the device, **characterized in that** the door (3) is divided into at least two parts (4), each of the parts (4) of the door (3) being independently openable with an adjustable opening range for varying the size of the access opening to the storage cell of the storage drum (1), and at the same time the storage drum (1) is provided with a modular system of shelves (5) and partitions (6) for variable division of the storage drum (1) into storage cells of variable size.

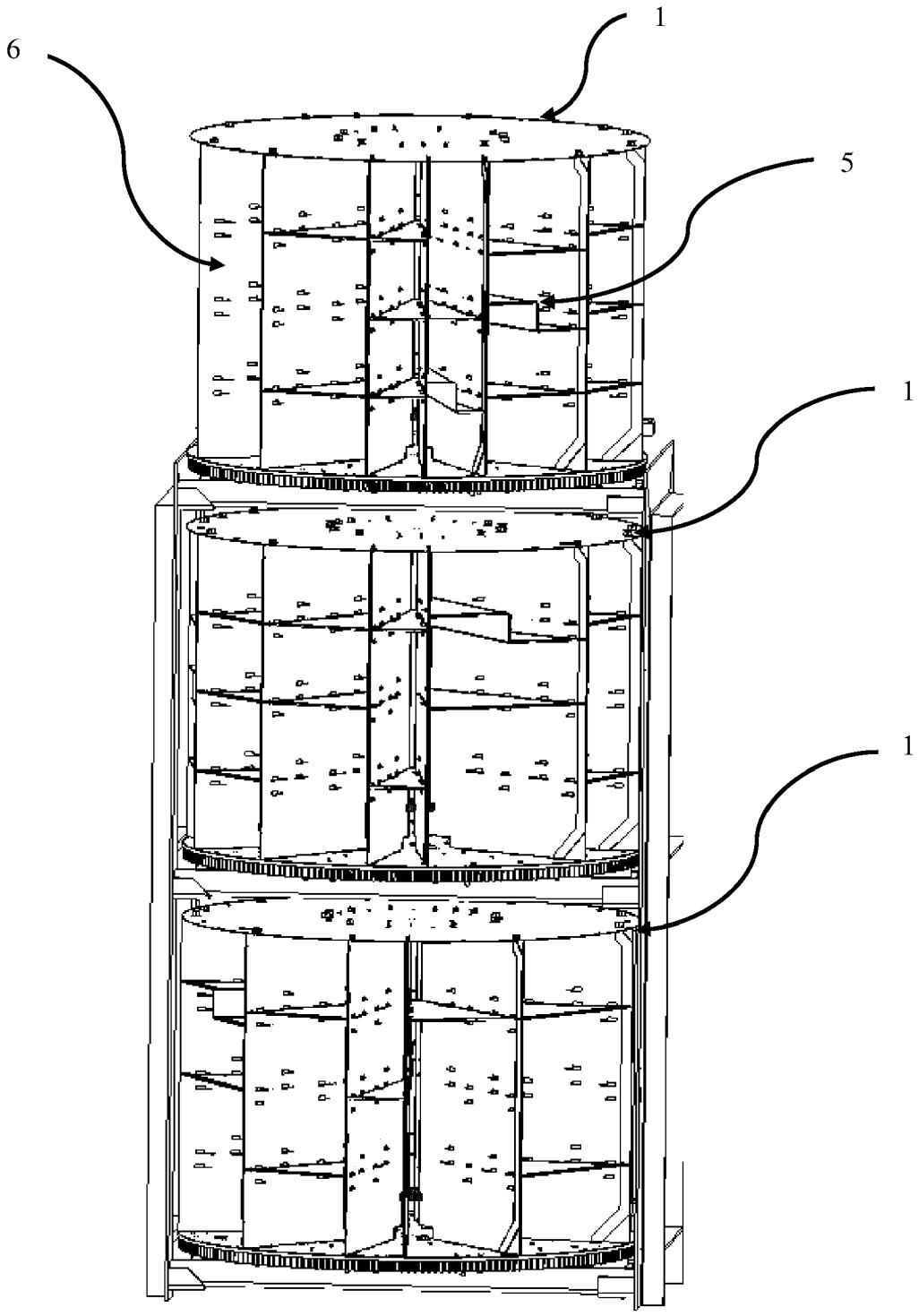
2. The device according to claim 1, **characterized in that** the door (3) is slidable.

3. The device according to claim 1 or 2, **characterized in that** the door (3) is divided into N number of parts (4), in two columns of N/2 number of rows.

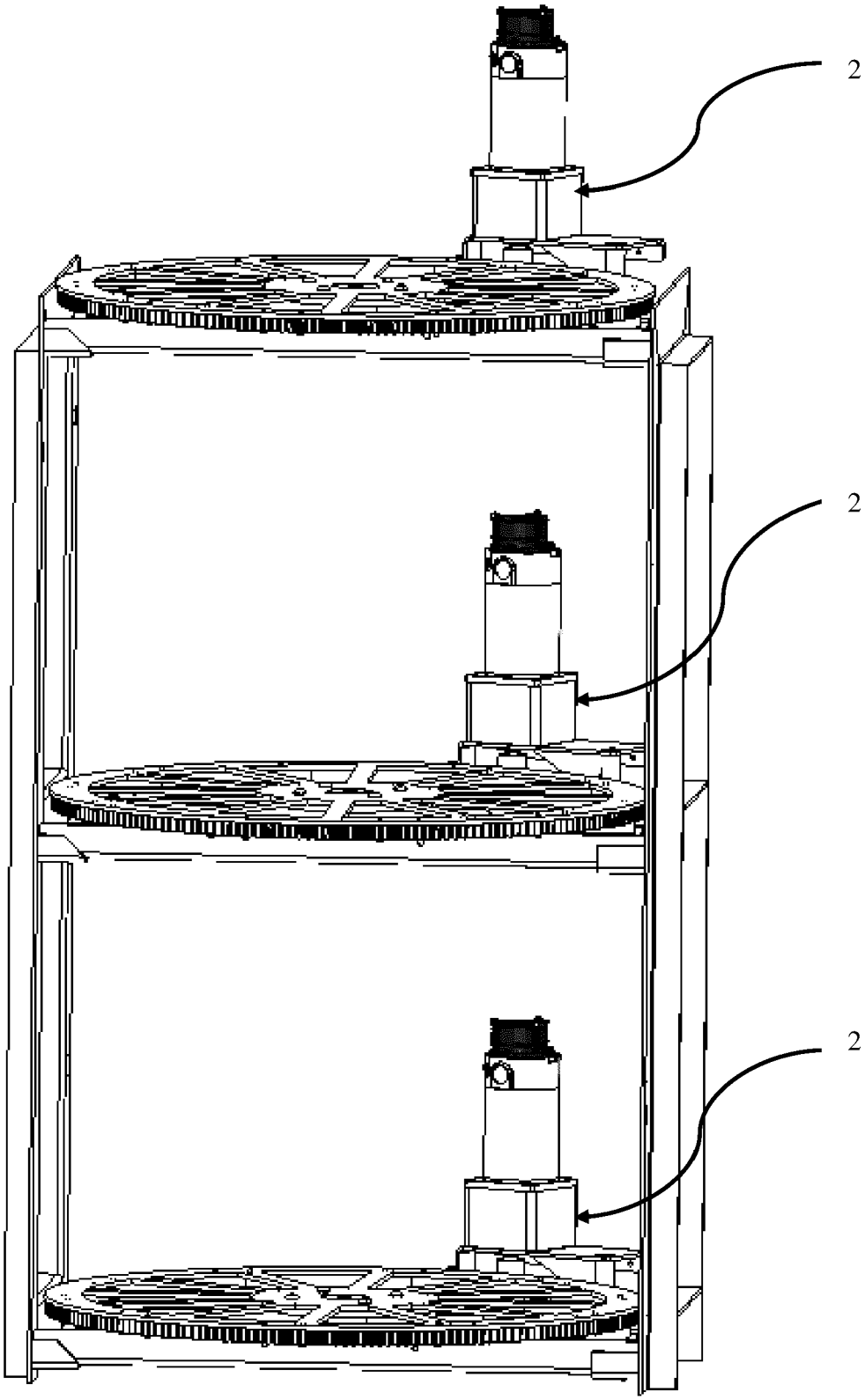
4. The device according to any one of claims 1 to 3, **characterized in that** the partitions (6) of the modular system divide the storage drum (1) into storage cells having a plan shape of intermediate ring section, or circular sectional intercircle, or quadrilateral, and at the same time the shelves (5) of the modular system have a flat surface or a cascading surface.



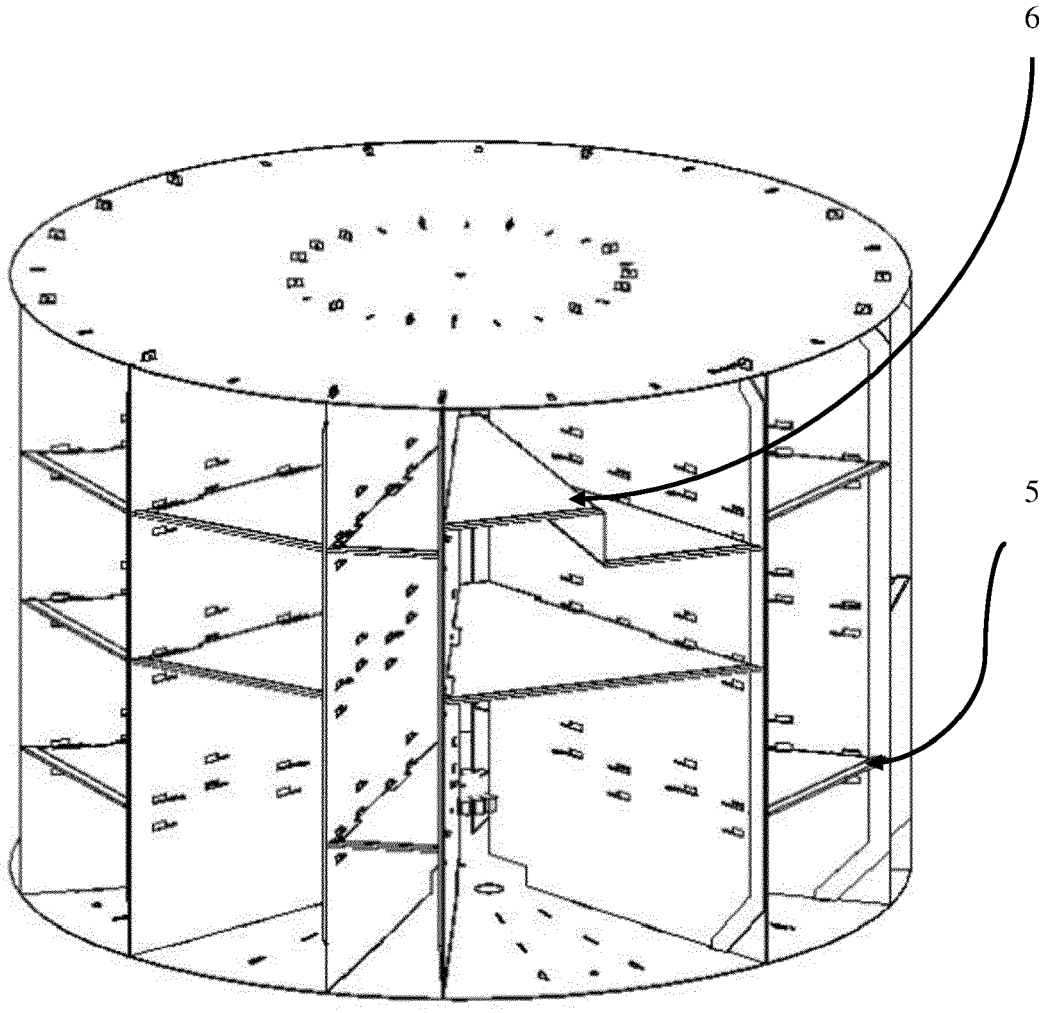
Obr. 1



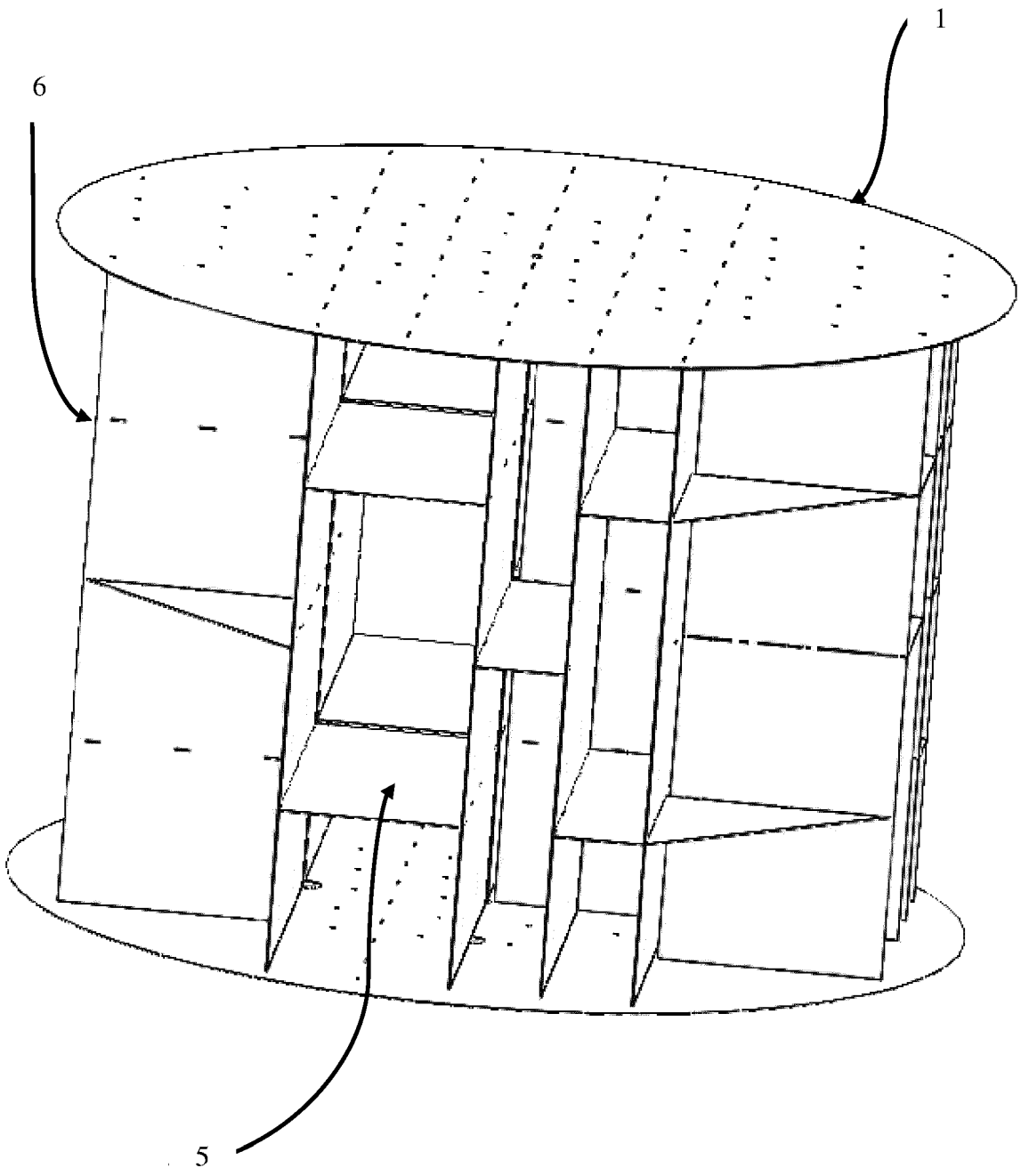
Obr. 2



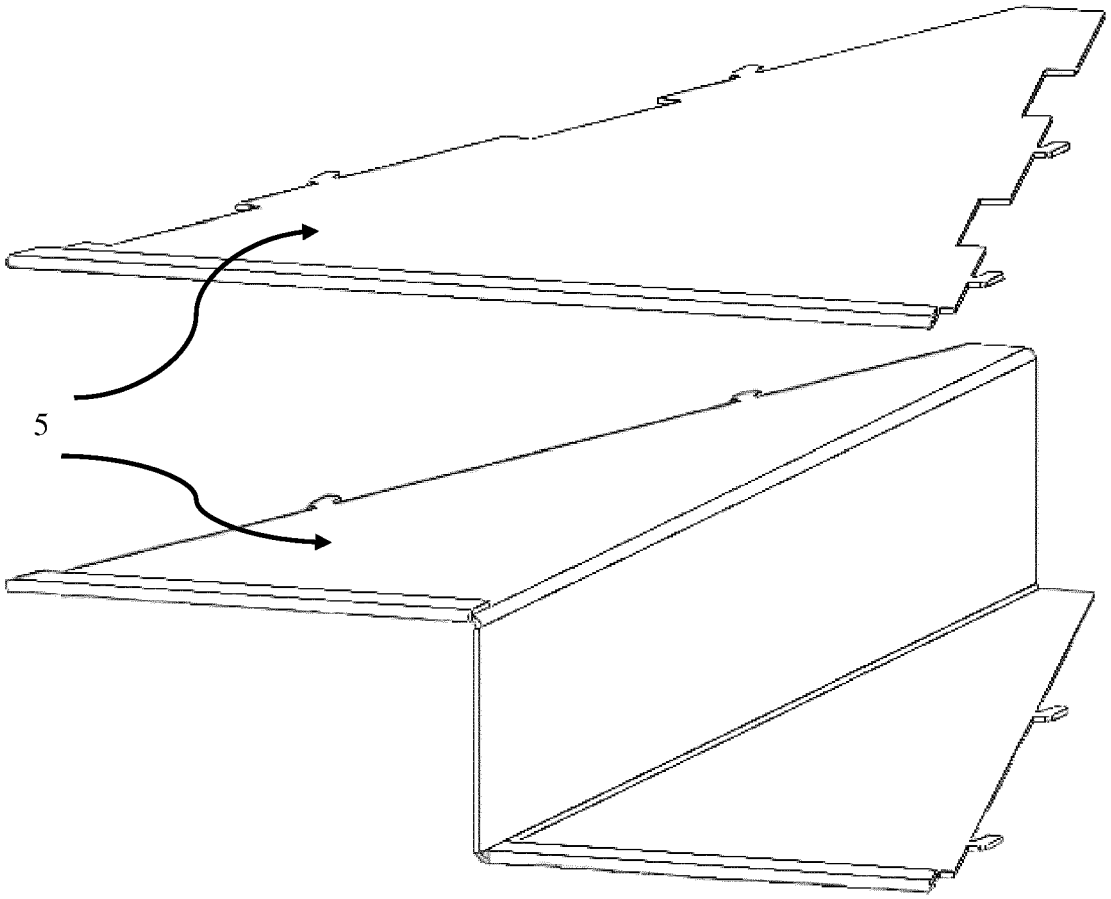
Obr. 3



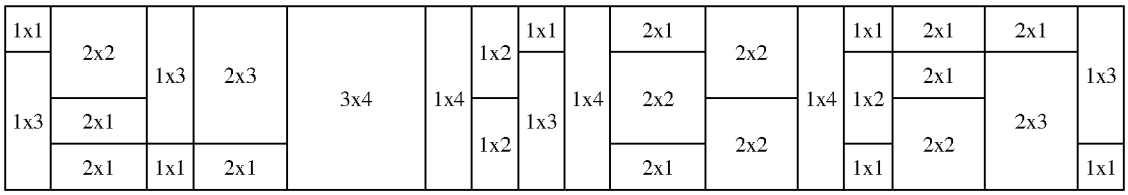
Obr. 4



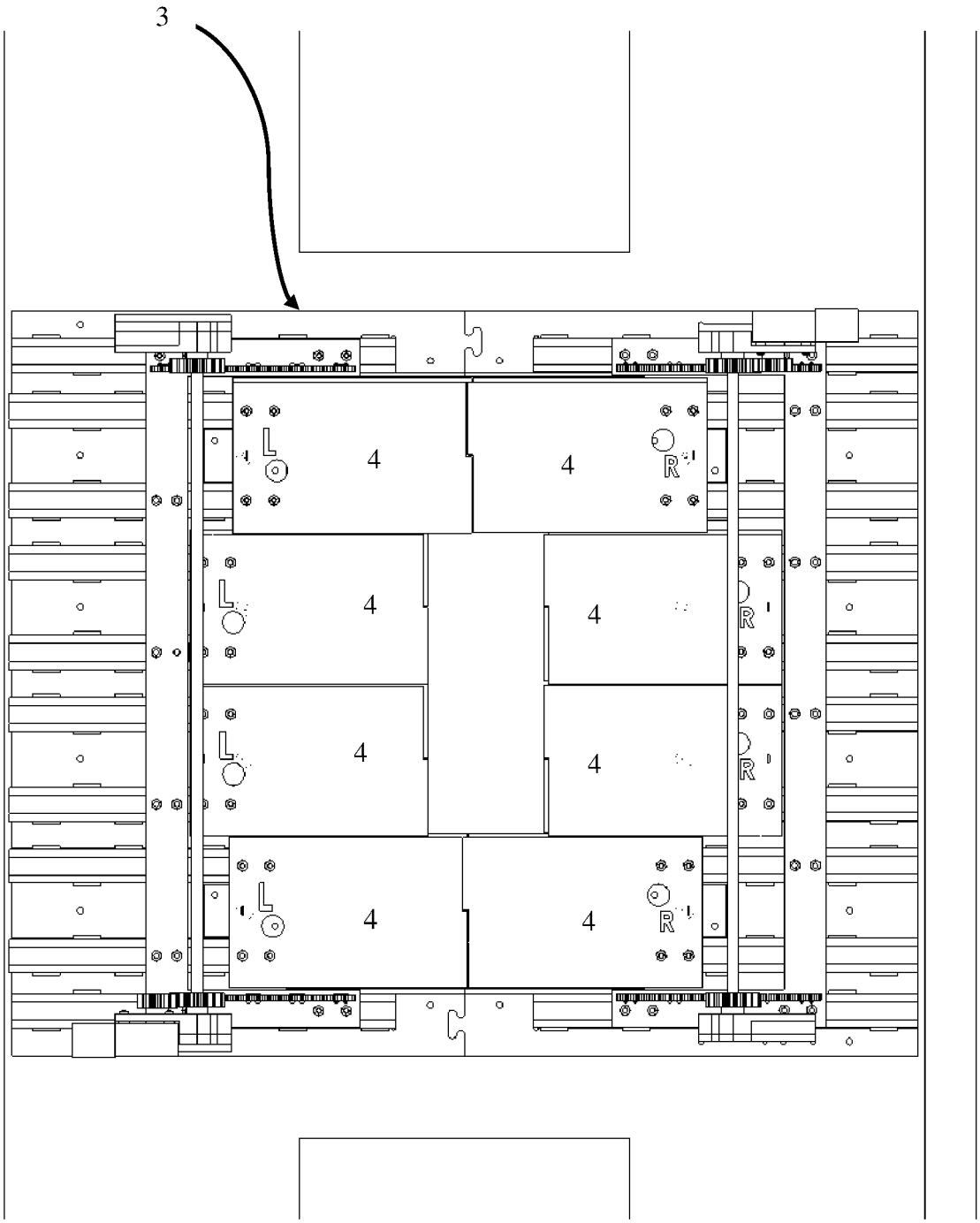
Obr. 5



Obr. 6


1x1
2x2
1x3
2x3
3x4
1x4
1x2
1x1
1x4
2x1
2x2
1x4
1x1
2x1
2x1
1x3
1x3
2x1
1x3
2x2
2x2
1x2
2x1
2x3
1x3
2x1
1x1
2x1
1x2
2x2
2x1
1x1
1x1

Obr. 7



Obr. 8

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 16 7620

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 488 792 A (AUTOMATED SPACE LTD [GB]) 12 September 2012 (2012-09-12) * abstract * * page 1, line 6 - page 10, line 6 * * claims 1-13; figures 1-19 *	1-4	INV. G07F11/54 A47B49/00
X	WO 2012/025712 A1 (AUTOMATED SPACE LTD) 1 March 2012 (2012-03-01) * abstract * * page 1, line 3 - page 12, line 18 * * claims 1-15; figures 1-19 *	1-4	
A	US 8 246 127 B1 (CLAUSEN MARK KIRGISS [US]) 21 August 2012 (2012-08-21) * the whole document *	1-4	
A	US 5 169 027 A (FALK LEONARD P [US] ET AL) 8 December 1992 (1992-12-08) * the whole document *	1-4	
			TECHNICAL FIELDS SEARCHED (IPC)
			G07F A47B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 September 2022	Bassanini, Anna

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 16 7620

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-09-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2488792 A	12-09-2012	NONE	
WO 2012025712 A1	01-03-2012	NONE	
US 8246127 B1	21-08-2012	NONE	
US 5169027 A	08-12-1992	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 2113890 A2 **[0003]**