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(54) **MODULAR STRUCTURE FOR THE STORAGE AND UNITARY DISTRIBUTION OF SMALL OBJECTS**

(57) Modular structure (100) for the storage and distribution of small objects comprising:
- a storage compartment (1),
- a closure panel (2) provided with a first plurality of openings (3);

characterized in that it also comprises a plurality of rotatable mechanisms (4) configured to support a plurality of cases (5) for storing small objects and in that said first plurality of openings (3) allows the selective withdrawal of small objects.

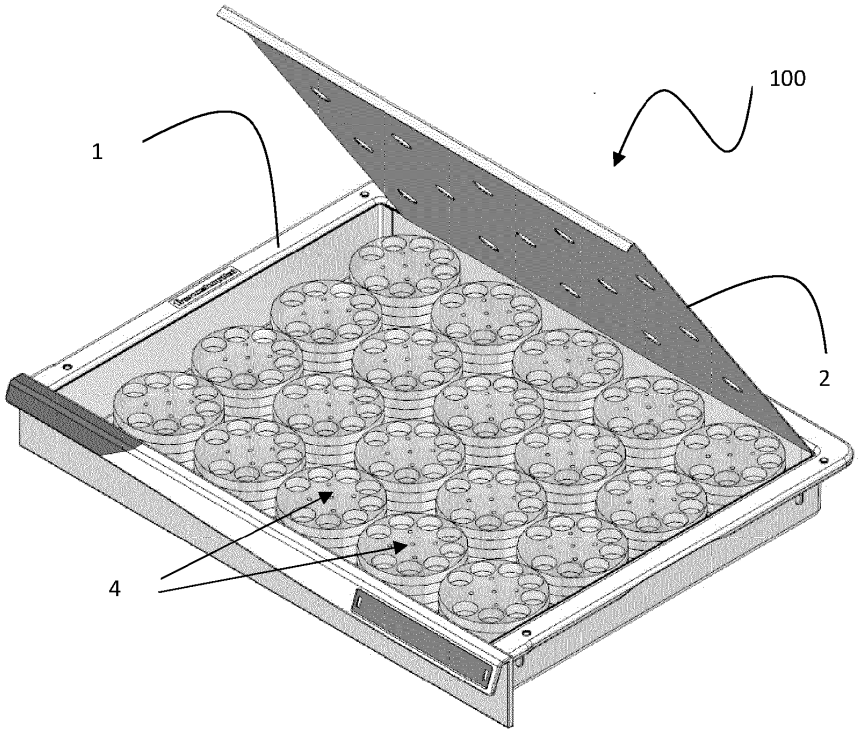

Fig.2

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Description

Technical field

[0001] The present invention relates to a modular structure for the storage and unitary distribution of small objects, which finds application above all in the healthcare sector, in particular for drugs and/or medications commonly used in hospitals, private clinics and medical and/or veterinary clinics, but also at private homes.

[0002] More specifically, the structure is suitable for being housed inside medicine storage systems (or other small products) and is equipped with a mechanism for the totally safe distribution of the objects contained therein.

Background Art

[0003] As is known, the storage and distribution operations of small objects, in particular of drugs and/or medications, can be carried out by means of dispensing trolleys/cabinets used by medical and nursing staff in healthcare facilities.

[0004] These dispensing trolleys/cabinets are generally provided with a plurality of modular structures or drawers in which a plurality of drugs for therapies are arranged in a pre-established order. These drugs are often housed in these structures in multiple packages, therefore subjected to loading and unloading by the operator. The management of the dispensing trolleys/cabinets is therefore entrusted solely to the nursing staff. These trolleys/cabinets are normally not equipped with adequate safety standards regarding the storage, distribution and control of stocks which occurs only manually.

[0005] The management of the multiple pharmaceutical forms, the distribution of the correct doses of a drug to a patient who is hospitalized in a healthcare facility based on the medical record, as well as the replenishment of the department and trolley stocks are therefore completely entrusted to human actions.

[0006] With these tools, commonly used today, common problems arise such as errors in the administration of therapy, in the management and storage of drugs, as well as theft of the drugs themselves due to the lack of adequate security systems.

[0007] There is therefore a need to define a modular structure for the storage and unitary distribution of small objects, applicable for example to dispensing trolleys/cabinets and which can guarantee maximum storage, withdrawal and administration safety, particularly in intensive care and operating rooms and specifically for risky drugs such as narcotics.

Summary of the invention

[0008] The aim of the present invention is to create a modular structure for the storage and unitary distribution of small objects, in particular drugs, which guarantees maximum safety in their storage and removal. In particular, this modular structure is configured to allow selective sampling only by authorized users.

[0009] A further object is to provide a modular structure configured to allow the withdrawal and dispensing of a single object at a time, or multiple single objects at the same time.

[0010] Advantageously, this structure is able to store and remove individual objects of different sizes and shapes within a given range of heights and widths.

[0011] Therefore, according to one aspect of the present invention, a modular structure is provided for the storage and distribution of small objects having the characteristics set out in the independent product claim, attached to the present description.

[0012] Further embodiments of the invention, preferred and/or particularly advantageous, are described according to the characteristics set out in the attached dependent claims.

Brief description of the drawings

[0013] The invention will now be described with reference to the attached drawings, which illustrate a non-limiting example of implementation, in which:

- figure 1 is an overall axonometric view of the modular structure in closed configuration, according to a preferred embodiment of the present invention,
- figure 2 is an overall axonometric view of the modular structure of figure 1, in open configuration,
- figure 3 is a detail of figure 2, according to the present invention.

Detailed description

[0014] As illustrated in Figures 1-3, a modular structure 100 for the storage and distribution of small objects includes:

- a storage compartment 1, of prismatic shape,
- a closure panel 2 provided with a first plurality of openings 3;
- a plurality of rotatable mechanisms (carousels) 4 configured to support a plurality of cases 5 predominantly of a cylindrical shape for the storage of small objects.

[0015] The modular structure 100 is suitable for being inserted inside a trolley/cabinet of a known type or other container for storing products and therefore not illustrated in the attached figures. The number of modular structures 100 inserted in the trolley/cabinet for dispensing drugs and/or objects is variable depending on specific needs, thus making it possible to create a trolley/cabinet characterized by the fact that it includes at least one modular structure 100.

[0016] The modular structure 100 according to the

present invention has the objective of guaranteeing extreme safety:

- when taking and administering small objects, in particular small medicines and in single doses;
- in the storage of small objects and small medicines in single doses in large quantities;
- in simultaneous withdrawal in a maximum quantity equal to the number of withdrawal points.

[0017] Advantageously, the modular structure 100 is hermetically closed by a lock, by a lid with openings whose shapes depend on the objects to be removed and are of the same number as the rotatable mechanisms 4 present.

[0018] As shown in the open configuration of figure 2, inside the storage compartment 1, below the closure panel 2, a plurality of rotatable mechanisms 4, called carousels, are housed, each of which supports a plurality of cases 5, preferably of cylindrical shape, provided with openings 6, preferably circular and obtained on the upper face 6' of the case, for removing small objects contained therein, for example, single doses of medicines. These small objects can be withdrawn, through the appropriate withdrawal openings 6, one at a time from a single rotatable mechanism (carousel) 4, or several at a time depending on the number of rotatable mechanisms (carousels) available in the modular structure 100.

[0019] Advantageously, the cases 5 inside each rotatable mechanism 4 can have dimensions and shapes different from the cylindrical one within some specific ranges of height, length and width. In fact, as shown in the detail of figure 3, the plurality of cases 5 which are also rotatable can be of different sizes and shapes depending on the objects to be contained, just as the openings 6 can also have different shapes.

[0020] Advantageously, the plurality of cases 5 and the associated rotatable mechanisms 4 are configured to be connected to a coupling mechanism (of a known type and therefore not shown in the figures) which allows their replacement and are connected to a motor 9 capable of rotate the carousel 4, these motors 9 are managed by software capable of transmitting and governing the rotation to allow the removal of objects.

[0021] Conveniently, the modular structure 100 carrying the rotatable mechanisms 4 is closed by the closure panel 2 whose opening is permitted by means of a release lock only for the loading and unloading operations of the products.

[0022] The openings 3 of the plurality of openings made on the closure panel 2 are equivalent in number to that of the rotatable mechanisms 4 present in the storage compartment 1. These openings 3 can be of various shapes depending on the type of objects contained in the housing of the rotatable mechanisms 4.

[0023] According to the operation of the modular structure 100, the openings 3 of the closure panel 2 represent the object withdrawal stations only when the rotatable mechanism 4 moves to the position corresponding to the withdrawal one. The rotatable mechanism 4 is configured to be in a first position (zero position) in which all openings 3 on the closure panel 2 are closed and in a second position (position one) in which at least one opening 3 on the closure panel 2 is open for collection.

[0024] The movement of the rotatable mechanisms 4 is implemented by means of mechatronic devices (actuators, sensors and safety devices) managed by specific firmware. The actuators are the motors 9 and a plurality of sensors (for example, optical) are able to detect whether an object is present in the compartments of the cases 5.

[0025] The modular structure 100 management software is configured to control:

- accesses for loading/unloading objects;
- the availability of the objects and their precise position inside the container compartment;
- accesses and withdrawals made by an authorized operator.

[0026] Advantageously, the modular structure 100 is equipped with microprocessor electronics.

[0027] Advantageously, the modular structure 100 object of the present invention allows:

- control over the collection and administration/delivery of small objects and/or drugs in single doses,
- access control by users or operators,
- reduction of the risk of theft, misappropriation and/or unauthorized withdrawals,
- reduction of the risk of error when picking up an object or administering a single dose of medicine.

[0028] Even more advantageously, the modular structure 100 object of the present invention allows:

- store, distribute and remove large quantities of small objects of the same type, in a safe and controlled way, up to a maximum number depending on the format and size of the individual object,
- collect a single object or dose or multiple single objects/single doses at the same time, based on the maximum number of collection points available,
- continuous real-time control of the withdrawal of one or more objects, even at the same time (or several single doses of the same medicine).

[0029] In addition to the embodiments of the invention, as described above, it is to be understood that numerous other variations exist. It should also be understood that such embodiments are exemplary only and do not limit either the scope of the invention, its applications, or its possible configurations. On the contrary, although the above description allows the specialized technician to implement the present invention at least according to one of its exemplary embodiments, it must be understood that many variations of the described components are possi-

ble, without thereby departing from the scope of the invention, as defined in the attached claims.

Claims

1. Modular structure (100) for the storage and distribution of small objects comprising:

   - a storage compartment (1),
   - a closure panel (2) provided with a first plurality of openings (3);

   characterized in that it also comprises a plurality of rotatable mechanisms (4) configured to support a plurality of cases (5) for storing small objects and **in that** said first plurality of openings (3) allows the selective withdrawal of small objects.

2. Modular structure (100) according to claim 1, wherein each case of the plurality of cases (5) is also rotatable and comprises a second plurality of openings (6) which in combination with the first plurality of openings (3) allows the selective withdrawal of small objects.

3. Modular structure (100) according to claim 2, wherein the second plurality of openings (6) is obtained on the upper face (6') of each case of said plurality of cases (5).

4. Modular structure (100) according to any of the preceding claims, wherein the number of first plurality openings (3) made on the closure panel (2) is equivalent in number to that of the rotatable mechanisms (4) located in the containment compartment (1).

5. Modular structure (100) according to any of the preceding claims, wherein the rotatable mechanism (4) is configured to acquire in use a first position in which the first plurality of openings (3) on the closure panel (2) is closed and a second position in which at least one opening of the first plurality of openings (3) is open.

6. Modular structure (100) according to any of the preceding claims, wherein the closure panel (2) comprises a release lock for the loading and unloading operations of the small objects.

7. Modular structure (100) according to any of the preceding claims, wherein the plurality of cases (5) and the associated rotatable mechanisms (4) are configured to be connected to a latching mechanism and are managed by a software.

8. Trolley or cabinet for dispensing small objects **characterized in that** it comprises at least one modular structure (100) according to any of the preceding claims.

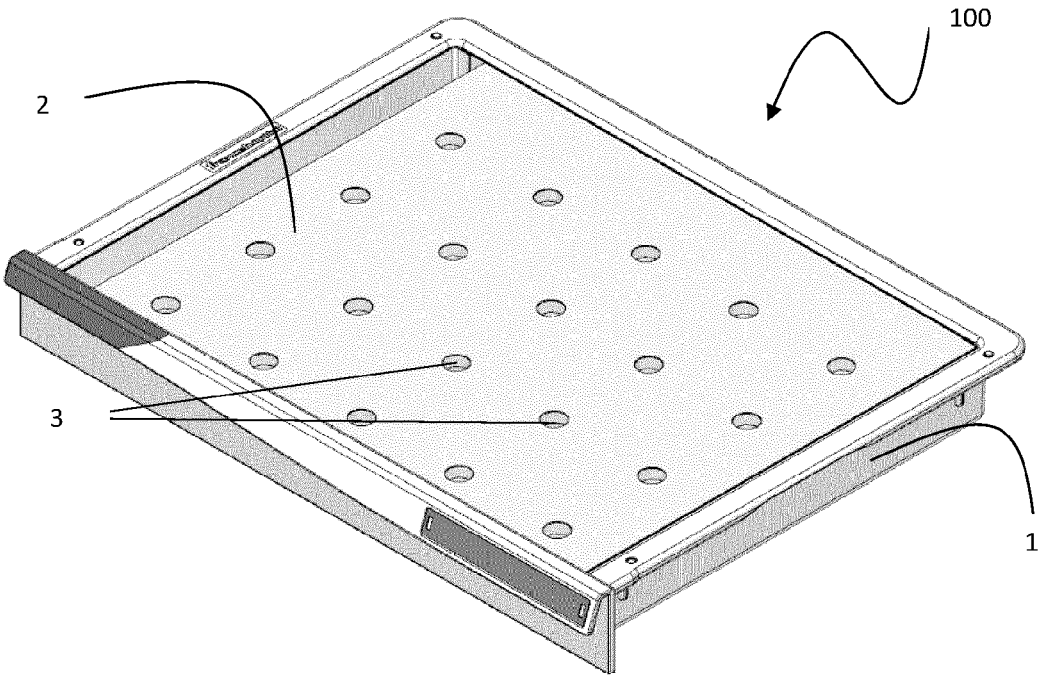

Fig.1

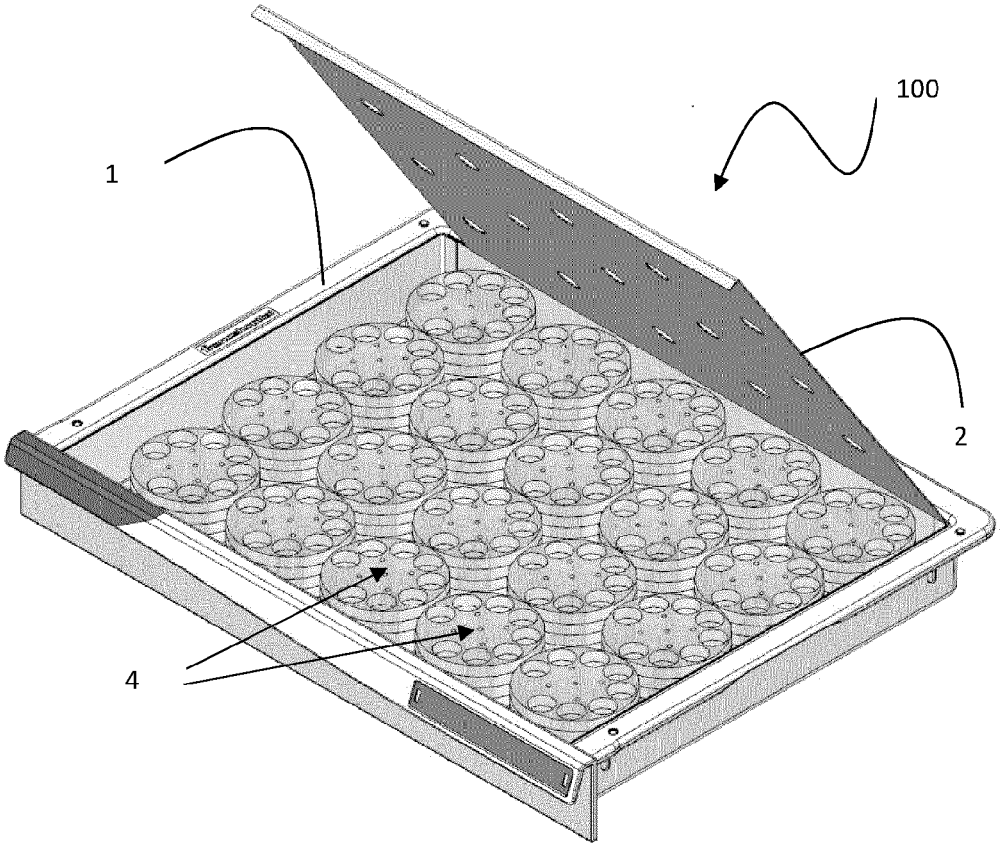

Fig.2

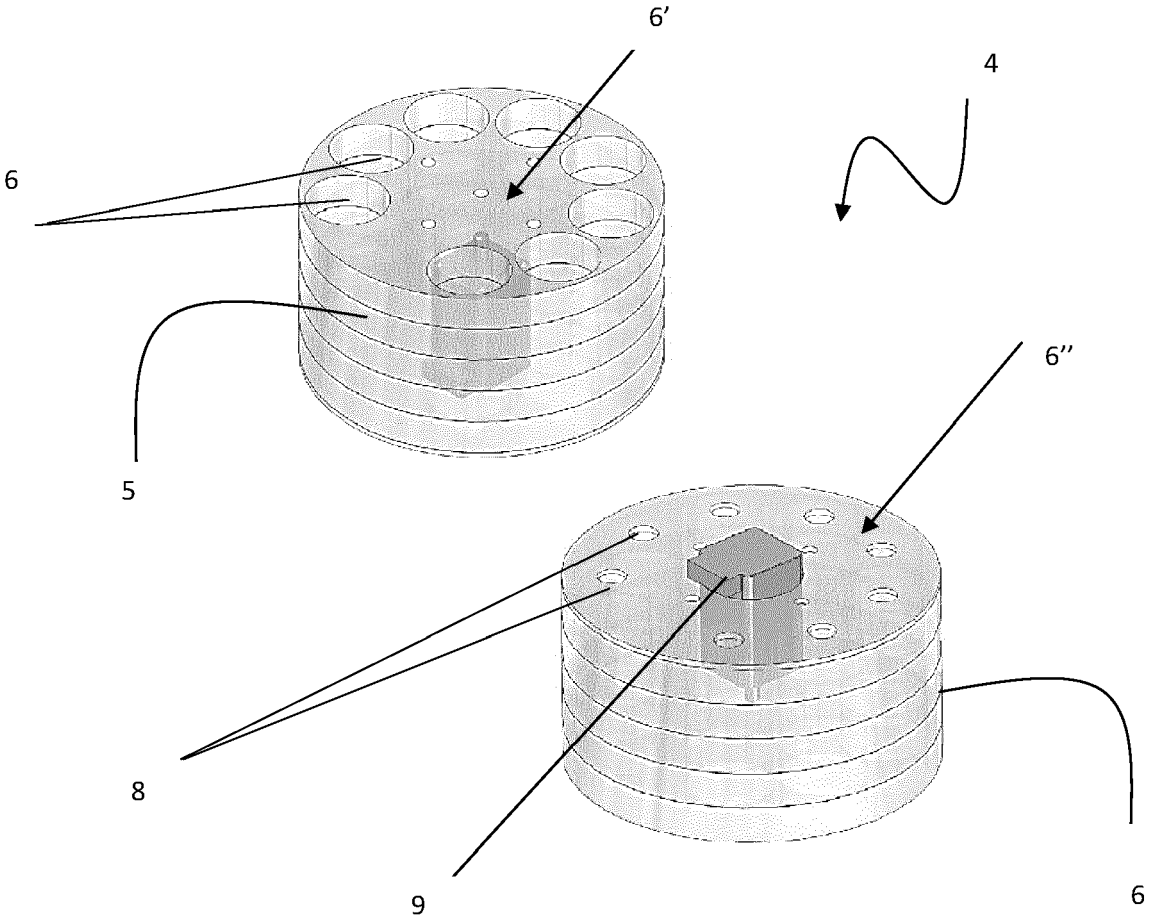

Fig.3

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EUROPEAN SEARCH REPORT

Application Number
EP 24 15 6381

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2016/158100 A1 (FLYNN MICHAEL [US]) 9 June 2016 (2016-06-09) * paragraph [0007] * * figures 1A, 1B *	1-8	INV. A61J7/00
A	CN 112 294 648 B (QINGDAO CITY CHENGYANG PEOPLES HOSPITAL) 25 November 2022 (2022-11-25) * paragraph [0029] - paragraph [0036] * * figures 1-7 *	1-8	
A	US 8 567 640 B1 (JOHNSON-LOFTON CONNIE [US]) 29 October 2013 (2013-10-29) * column 4, line 3 - column 6, line 10 * * figures 1-8 *	1-8	
			TECHNICAL FIELDS SEARCHED (IPC)
			A61J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	4 June 2024	Ong, Hong Djien

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 24 15 6381

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
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04-06-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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CN 112294648 B	25-11-2022	NONE	
US 8567640 B1	29-10-2013	NONE	

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