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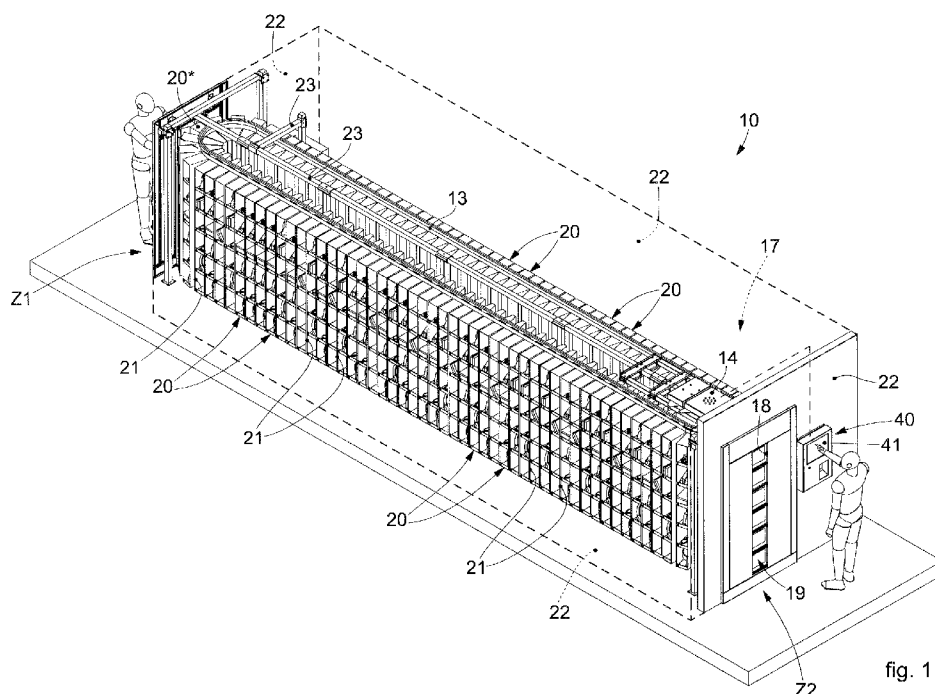
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(57) Abstract: Apparatus for storing articles (11) that comprises a conveyor member (12), a guide (13) at least partly defining a closed-ring movement path (P), and a drive unit (14) associated with the conveyor member (12) and configured to move the latter along the movement path (P). The apparatus for storing articles (11) comprises a plurality of containing devices (20) and a structure (16).

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## “APPARATUS FOR STORING ARTICLES”

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### FIELD OF THE INVENTION

5 The present invention concerns a storage apparatus, usable for the temporary storage of articles, for their movement and their removal, also automated.

The present invention, in particular, is usable, by way of example only, as a temporary “wardrobe locker” for the employees of a company, or for the clients, or visitors, of particular centers, or recreational facilities, such as for example spas, swimming pools, casinos, museums, or other, or as an “automatic  
10 distributor” of articles between an introduction zone and a separate collection zone.

### BACKGROUND OF THE INVENTION

Movement apparatuses are known, configured to transport hanging objects to make them available to an operator for their selective collection in a desired  
15 position.

For example, in the field of industrial laundries, movement apparatuses are known provided with conveyors to transfer hanging objects, such as for example items of clothing, comprising a support frame on which a guide is mounted, typically a rail or a pair of rails, which defines a circuit.

20 The circuit can be open and follow a linear or curved path, alternatively the circuit can also follow a closed path.

Inside the guide, or on it, a mobile support unit is made to slide conformed, normally, as a closed ring, and suitable to transport in suspension the items of clothing that are attached thereon to be transported.

25 These apparatuses allow to insert the garment in a delivery point and to collect the same garment at a collection point.

In the case of industrial laundry operations, further unloading and loading points can be present inside the circuit to allow the operator to carry out the operations to clean and iron the garment, before the conveyor system transports it  
30 to the delivery point.

One disadvantage of the known movement apparatuses is that they are not very versatile, and are not suitable to move articles with different shapes and sizes. Furthermore, they provide to hang the articles to be transported on the

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support unit one after the other, regardless of their size, and therefore do not allow to optimize the available useful space.

Known movement apparatuses have the disadvantage of poor automation, especially at the collection and delivery points. Consequently, delivery and  
5 collection times are long, with a consequent loss of time for the user and an increase in costs for the provider.

A further disadvantage of the known solutions is that they are not very versatile, and do not allow to create customized paths as a function of needs.

From EP-A-2.796.390 a system for the automatic transport and storage of  
10 products is known, which comprises a conveyor member and a plurality of containing devices with a rectangular parallelepiped shape, which are connected to the conveyor member in correspondence with a rear side thereof, and possibly cooperate with upper and lower guides.

Document FR-A-1.427.294 concerns a mobile multi-shelf shelving unit,  
15 mounted on wheels and attached to a transport chain by means of a rear side thereof, that is, a side opposite the access side to the shelves.

GB-A-1.531.028 describes a device for storing and moving articles comprising a conveyor consisting of two overlapping chains, and a plurality of modules, each attached to the two chains in correspondence with a rear side thereof.

20 FR-A-3.052.963 describes a food product dispenser comprising an endless chain to which elements for containing the food products are connected, which are connected to the chain and moved along it.

US-A-2010/0185754 describes an automatic dispenser of drugs comprising a housing provided with a delivery station and with a loading station, inside which  
25 a mechanism is provided comprising a plurality of containers connected to each other in the shape of a two-dimensional matrix.

The solutions described in these documents entail difficulties in moving the containing devices along curved paths, and in particular in the case of internal curves, since it would be necessary to keep the containing devices very distanced  
30 from each other and to provide paths with wide curvature radii in order to allow movement. In particular, due to the conformation of the containers and of the connection and transport means, these solutions do not allow to produce paths with concave shapes, but only substantially rectilinear paths, provided only with

external curves.

A further disadvantage is that the known movement apparatuses allow free access not only to the desired garment, but also to the garments adjacent to it.

One purpose of the present invention is to provide an apparatus for storing  
5 articles that can function as temporary storage, movement and automatic delivery of articles to one, or to a plurality, of users or operators.

A purpose of the present invention is to provide a storage apparatus that allows the automatic delivery of a specific article independently of other adjacent articles.

10 It is also a purpose of the present invention to provide an apparatus for storing articles that is automated, especially at the points of delivery and collection, and which is easy to use.

It is also a purpose to provide an apparatus for storing articles that can be used directly by a plurality of users without the intervention of an operator.

15 Another purpose of the present invention is to provide an apparatus for storing articles that allows different users to access a defined portion of the storage apparatus to introduce/collect an article.

A further purpose is to provide an apparatus for storing articles that allows to optimize the available useful space and that can be used to store/move items of  
20 different shape and size.

The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

#### SUMMARY OF THE INVENTION

25 The present invention is set forth and characterized in the independent claims, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

In accordance with the above purposes, an apparatus for storing articles, according to the present invention, comprises a conveyor member, a guide at  
30 least partly defining a closed-ring movement path, and a drive unit associated with the conveyor member and configured to move the conveyor member along the movement path.

According to one aspect of the present invention, the storage apparatus

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comprises a plurality of containing devices, each provided with at least one housing seating for the articles and connected to the conveyor member and mobile with the latter along the movement path.

5 The containing devices are advantageously connected to the conveyor member in correspondence with an intermediate position of an upper wall thereof. According to some embodiments, the containing devices are connected to the conveyor member in a substantially central position.

10 This configuration allows to move the containing devices along paths having different shapes, both convex and also concave, and in particular to make the containing devices follow both external curves and internal curves.

By external curves, here and in the following description, we mean the curves in correspondence with convex portions of the conveyor member, while by internal curves we mean curves in correspondence with concave portions of the conveyor member.

15 According to some embodiments, the housing seatings can have different sizes, suitable to house a plurality of different types of articles, including, by way of example, articles of clothing, shoes, books, personal effects such as mobile phones, keys, wallets, electronic devices, boxes, and more.

20 According to another aspect of the present invention, the storage apparatus comprises a structure delimiting a containing compartment in which at least the conveyor member and the containing devices are positioned.

The structure is provided with at least one aperture to access the containing compartment.

25 According to some embodiments, the at least one access aperture can be selectively opened/closed with at least one closing device, to allow or prevent access to the housing seatings of the containing devices.

According to some embodiments, the at least one closing device comprises a door.

30 According to variant embodiments, the at least one closing device comprises an optical barrier.

In this way, when a user has to temporarily place objects in the storage apparatus, he/she is given a specific containing device, or at least a specific housing seating.

The closing device of the structure will open only when the respective containing device, or housing seating, assigned to the specific user is positioned in front of the aperture, thus preventing access to other objects contained in other containing devices and belonging to other users.

5 This configuration of the present invention therefore allows to obtain an extremely compact and organized storage apparatus, not requiring large spaces for example for accessing a plurality of individual lockers fixed in one position.

The presence of a closing device comprising a door, in a predefined position of the structure, and the presence of a plurality of containing devices allows to  
10 manage many users, as well as the articles they wish to temporarily place in the storage apparatus.

According to some embodiments, the movement path, and therefore the conveyor member, lies on a horizontal lying plane.

The containing devices can be associated, for example attached, or hung, to  
15 the conveyor member.

Furthermore, the containing devices can have an oblong development which, during use, extends in a vertical direction, that is, substantially orthogonal to the lying plane.

According to some embodiments, the containing devices have a box-like  
20 shape, open on one side facing toward the outside of the movement path, to allow access to at least one housing seating when the containing device is positioned in correspondence with the access aperture.

According to some embodiments, the containing devices have a cross-section with a shape tapered toward a rear wall, that is, located during use in the internal  
25 part of the closed-ring movement path, so as to allow them to follow both rectilinear and also curved paths without interfering with each other.

According to some embodiments, the containing devices comprise a reticular base structure and a panel connected to the reticular structure, which surrounds the latter defining the lateral and rear walls of the containing device.

30 According to some embodiments, the containing devices can be made starting from a panel and from a flat-shaped base structure, which can be connected to each other and folded so as to assume the final three-dimensional shape directly on the site of use.

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In particular, the base structure and the panel can have a first substantially flat conformation for transport and reciprocal connection, and a second folded conformation in which they assume, in assembled condition, a three-dimensional shape defining the bulk of the containing device.

5 In this way, it is possible to considerably reduce transport costs and storage spaces, as it is possible to stack the panels and the base structures one on top of the other, eliminating the empty spaces.

According to some embodiments, the at least one access aperture is positioned in correspondence with a curved segment of the movement path, that is, in  
10 correspondence with the segment where the containing devices, or at least their open sides, are most distanced from the adjacent containing devices. In this way, a user can only access a determinate housing seating, without having any access whatsoever to the adjacent ones that remain protected and hidden by the structure.

15 According to some embodiments, the apparatus comprises a single aperture to access the containing compartment, which can be used both to introduce an article into a housing seating of a containing device, and also to collect it therefrom.

This configuration is particularly advantageous if the storage apparatus is used  
20 as a “wardrobe locker” for a plurality of users who share the same introduction/collection zone.

According to variant embodiments, the storage apparatus comprises two access apertures, disposed distanced from each other along the movement path.

According to some embodiments, each of the access apertures can be provided  
25 with a respective closing device.

This configuration allows to put in communication an introduction zone and a collection zone with each other, which can be disposed in separate positions from each other along the movement path, and each associated with a respective access aperture.

30 According to some embodiments, the containing devices comprise at least a first housing seating and at least a second housing seating, overlapping each other, possibly vertically, and separated one from the other.

According to some embodiments, the first housing seatings lie on a common

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first lying plane and the second housing seatings each lie on a second lying plane parallel to the first lying plane.

The first lying plane can be distanced from the second lying plane in a vertical direction.

5        According to some embodiments, the closing device comprises at least one door, which comprises at least a first panel and at least a second panel, each having a size correlated respectively to the first housing seating and to the second housing seating, so as to only give access to a specific housing seating to a user.

10       According to further embodiments, it can be provided that at least one of either the first housing seating or the second housing seating is further divided into two or more further compartments to define further housing seatings. According to these embodiments, it can be provided that the, or each, door is provided with a number of panels correlated to the number of housing seatings, to close/open a respective housing seating.

15       According to further embodiments, the storage apparatus comprises a control and command unit configured to manage the functioning at least of the drive unit, and the selective opening/closing of the door.

20       According to some embodiments, the storage apparatus further comprises at least a user interface connected to the control and command unit, by means of which a user can provide a request to the storage apparatus to make available a determinate housing seating in correspondence with a determinate access aperture.

25       According to some embodiments, the control and command unit is also connected to the closing device, and is configured to selectively close/open it to allow/prevent access to the housing seatings of the containing device positioned in correspondence with the access aperture.

30       According to some embodiments, if the closing device comprises a door with several panels, the control and command unit is configured to open all and only the panels necessary to provide complete access to a specific housing seating.

Embodiments described here also concern a method for storing articles which provides to move, along a closed-ring movement path, a conveyor member in a guide by means of a drive unit associated with the conveyor member.

The method according to the present invention also provides that containing

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devices are connected to the conveyor member, each provided with at least one housing seating, and that the containing devices are moved with the conveyor member along the movement path.

Furthermore, the method provides that the conveyor member and containing devices are positioned in a containing compartment of a structure, provided with at least one aperture to access the containing compartment, to allow access to the housing seatings of the containing devices that, on each occasion, are brought, by the drive unit, in correspondence with the aperture.

#### BRIEF DESCRIPTION OF THE DRAWINGS

These and other characteristics of the present invention will become apparent from the following description of some embodiments, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a schematic three-dimensional view of an apparatus for storing articles according to embodiments described here;
- fig. 2 is a view from above of the storage apparatus of fig. 1;
- fig. 3 is a view from above of a storage apparatus according to a variant embodiment;
- fig. 4 is a schematic three-dimensional view of a containing device of the storage apparatus according to embodiments described here;
- fig. 5 is a schematic three-dimensional view of a containing device according to other embodiments described here;
- figs. 6a-6f are schematic views of operative steps of construction and assembly of a containing device according to embodiments described here;
- figs. 6g and 6h are enlarged details of fig. 6a and fig. 6d respectively;
- fig. 7 is a schematic three-dimensional view from above of a part of the storage apparatus according to embodiments described here;
- fig. 8 is a schematic three-dimensional view from below of a part of the storage apparatus according to embodiments described here;
- fig. 9 is an enlarged detail of fig. 8;
- fig. 10 is a front view of the storage apparatus of fig. 1 according to embodiments described here.

To facilitate comprehension, the same reference numbers have been used, where possible, to identify identical common elements in the drawings. It is

understood that elements and characteristics of one embodiment can conveniently be incorporated into other embodiments without further clarifications.

#### DETAILED DESCRIPTION OF SOME EMBODIMENTS

Embodiments described here concern an apparatus 10 for storing articles 11,  
5 which can be advantageously used, for example, as an “automatic distributor” of articles, or as a temporary “wardrobe locker” for the employees of a company, or for clients, or visitors, of particular centers, or recreational facilities, such as for example spas, pools, museums, stations and more.

The storage apparatus 10 according to the invention comprises a conveyor  
10 member 12, a guide 13 defining a closed-ring movement path P, and a drive unit 14 associated with the conveyor device 12 and configured to move it along the movement path P.

According to some embodiments, the storage apparatus 10 also comprises a plurality of containing devices 20, each provided with at least one housing  
15 seating 21 suitable to contain at least one article 11.

According to some embodiments, the containing devices 20 can each comprise two or more housing seatings 21a-21N, as will be described later in detail.

According to some embodiments, the containing devices 20 are connected to the conveyor member 12 and are mobile with the latter along the movement path  
20 P.

According to some embodiments, the conveyor member 12 can be defined by a strip having a laminar cross-section and made of a flexible material such as to adapt to the specific movement path P.

According to further embodiments, the conveyor member 12 can comprise a  
25 plurality of attachment elements 15, for example holes, to which the containing devices 20 can be attached and/or hung.

According to some embodiments, the conveyor member 12 is mobile along a movement path P having a substantially horizontal lying plane.

The containing devices 20 can have an oblong development which, during use,  
30 extends in a vertical direction, that is, substantially orthogonal to the lying plane.

The containing devices 20 are disposed one adjacent to the other, with the respective axes of longitudinal development aligned in a substantially vertical direction, orthogonal to the lying plane.

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According to some embodiments, for example described with reference to figs. 1 and 2, the movement path P, and therefore the conveyor member 12 comprises two rectilinear segment 24 and two curved segment 25 which connect the respective ends of the rectilinear segments 24 together.

5        According to possible variants, for example described with reference to fig. 3, the movement path P, and therefore the conveyor member 12 has a plurality of rectilinear segments, in the example six, and the same number of curved segments 25, of which two external curved segments 25a and two internal curved segments 25b.

10       The conveyor member 12 can therefore have, according to the needs, a convex shape, defined as the set of points for which each segment joining any two points whatsoever of the shape is contained entirely in the shape itself, or a concave shape, for which at least one segment joining any two points whatsoever of the shape does not belong entirely to the shape itself.

15       According to some embodiments, the apparatus 10 further comprises a structure 16, delimiting at least one containing compartment 17 in which at least the conveyor member 12 and the containing devices 20 are positioned.

      According to some embodiments, the structure 16 can have a box-like shape, and comprise a plurality of perimeter walls 22 which can be defined by panels, or  
20    by perimeter walls of a room of a building, or by the floor of a room on which support means such as bars, frames or other rest.

      According to further embodiments, the support structure 16 comprises support elements 23 suitable to support the guide 13 and the conveyor member 12.

      According to other embodiments, not shown, the structure 16 can support a  
25    platform in which the conveyor member 12 can be integrated.

      According to some embodiments, the structure 16 is provided with at least one aperture 18 to access the containing compartment 17, so as to allow or prevent access to the housing seatings 21 of the containing devices 20.

      According to some embodiments, the access aperture 18 can be selectively  
30    opened/closed by means of at least one closing device 19.

      According to some embodiments, the aperture 18 has a width substantially corresponding to the width of a containing device 20, so as to allow access to the housing seatings 21a-21N of a single containing device 20.

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According to some embodiments, the structure 16 comprises a single aperture 18.

This configuration allows to use the apparatus 10 as a “wardrobe locker”, for example to temporarily store the personal effects of employees in a company, or  
5 visitors or clients of recreational facilities, sports centers, or other, providing a single zone for the introduction and collection of articles in/from the device 10.

According to variant embodiments, the apparatus 10 comprises two access apertures 18, disposed distanced one from the other along the movement path P.

According to some embodiments, each aperture 18 can be provided with a  
10 respective closing device 19.

For example, one aperture 18 can be provided in a first zone Z1, for example for the introduction of the articles 11, and the other aperture 18 can be provided in a second zone Z2, for example for collecting the articles, separated from the first zone Z1.

15 This configuration can be advantageous, for example, if the apparatus 10 is used as an “automatic distributor”, allowing to load an article 11 in a first zone Z1 located, for example, in a storage space not accessible to the clients, and collect it in correspondence with a second zone Z2 that is accessible to the clients.

20 It is understood that each aperture 18 can also be used for both introduction and collection operations.

According to further variants, the apparatus 10 can comprise three or more access apertures 18, for example positioned on different perimeter walls 22 of the structure 16 and accessible from different rooms or spaces, possibly separated  
25 one from the other (see for example fig. 3).

According to some embodiments, the closing device 19 can be of a different type, as a function of the application requirements of the storage apparatus 10.

According to some embodiments, the closing device 19 can be chosen from doors of the sliding-type, with hinges or horizontally pivoting, shutters, barriers  
30 of the optical type, or other devices suitable to selectively allow/prevent access to the internal compartment 17.

According to some embodiments, the closing device can be a door 19, suitable to completely close the access to the compartment 17, also preventing the view of

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the housing seatings 21. This embodiment is particularly suitable in the case of a storage apparatus 10 used as a wardrobe locker.

According to possible variant embodiments, the closing device 19 can be made as a barrier of the optical type, for example defined by a plurality of  
5 photocells located on one side and on the other of the aperture 18, suitable to prevent access to the compartment 17, however allowing the view of the housing seatings 21.

This solution can advantageously be applied, for example, to the aperture 18 located in the first introduction zone Z1, allowing on the one hand to speed up  
10 the operations of loading/introducing the articles 11, and on the other hand to guarantee at the same time the safety of the operators, preventing them from accessing the containing compartment 17 during the movement of the containing devices 20.

The aperture 18 located in the second collection zone Z2, according to  
15 requirements, can be associated with a door, a barrier of the optical type, or with another type of closing device 19.

According to some embodiments, at least one aperture 18 can be advantageously positioned in correspondence with a curved segment 25 of the movement path P.

20 According to some embodiments, the aperture 18 can be positioned, in particular, in a direction tangent to the curved segment 25, that is, at the point where the containing devices 20 are most distanced from the adjacent containing devices 20, so that the housing seatings 21 of the latter are not accessible.

According to some embodiments, for example described with reference to  
25 figs. 4 and 5, the containing devices 20 can have a box-like shape, provided with an open side facing, during use, toward the outside of the movement path P, to allow access to the housing seating 21 when the containing device 20 is positioned in correspondence with an access aperture 18.

According to some embodiments, the containing devices 20 each have a  
30 substantially parallelepiped shape, with a prevalent development along a longitudinal axis.

According to some embodiments, the containing devices 20 have a section with a shape that is symmetrical with respect to the longitudinal median plane M.

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According to some embodiments, the containing devices 20 comprise two lateral walls 26, respectively connected together by an upper wall 27, a bottom wall 28 and a rear wall 29.

Connection elements 34 can be provided on the upper wall 27, suitable to  
5 cooperate with the attachment elements 15 of the conveyor member 12 to attach the containing device 20 to the latter.

According to some embodiments, the connection elements 34 are disposed in an intermediate zone of the upper wall 27 of the containing device 20.

According to possible solutions, two connection elements 34 can be provided,  
10 disposed on the upper wall 27 and aligned with each other, for example in correspondence with facing and opposite zones in proximity to the edges of the lateral walls 26.

The connection elements 34 can be disposed aligned and facing each other with respect to a longitudinal median plane M of the containing device 20.

15 The containing devices 20, during use, are therefore hung in correspondence with a zone thereof that is intermediate to the conveyor member 12 with a respective front portion 20a positioned outside the path P defined by the conveyor member 12 and a rear portion 20b positioned inside the path P.

This solution makes the containing devices 20 suitable to be used both on  
20 concave paths P and also convex paths P, being suitable to follow both external curved segments 25a, and internal curved segments 25b, even with reduced radii of curvature, while still maintaining the overall bulk of the conveyor member 12 and of the apparatus 10 small.

According to embodiments described with reference to fig. 7, the containing  
25 devices 20 can be provided with a centering and guiding element 40 attached on the lower side of the bottom wall 28 and configured to cooperate with a guide member 41 of the storage apparatus 10.

According to some embodiments, the centering and guiding element 40 comprises an attachment pin 42 connected at one end to the bottom wall 28 and  
30 at the opposite end to a small wheel 43.

According to some embodiments, for example described with reference to figs. 8 and 9, the attachment pin 42 extends from an intermediate zone of the bottom wall 28 between the front side and the rear side.

According to possible variants, two or more centering and guiding elements 40 can be provided, aligned with each other in a position symmetrical with respect to the longitudinal median plane M.

5 According to some embodiments, the connection members 34 and the one or more centering and guiding elements 40 are substantially aligned along the same transverse plane  $\pi$ , orthogonal to the median longitudinal plane M (visible for example in figs. 7 and 8).

10 According to some embodiments, the guide member 41 can comprise a profiled element 44 extending along the movement path P and provided with a groove 45 defining the movement path P, in which the attachment pin 42 can be inserted.

15 According to this embodiment, the profiled element 44 can have a width substantially corresponding to that of the small wheel 43, which can slide therein substantially in contact with two opposite internal walls 46 of the profiled element 44.

According to some embodiments, the containing devices 20 have a shape tapered toward the rear wall 29.

20 For example, according to some embodiments, the containing device 20 comprises in cross-section a front portion 20a having a substantially square or rectangular shape, and a rear portion 20b substantially trapezoidal shaped, with the minor base defining the rear wall 29. In this case, the lateral walls 26 are not continuous, but have front and rear parts angled with respect to each other at an angle correlated to the tapered shape of the containing device 20.

25 This conformation allows the containing devices 20 to follow curved segments 25, in particular external curved segments 25b, having a radius of curvature R of less than 100cm, for example of about 90cm, allowing to reduce to a minimum the overall bulk of the storing apparatus 10.

According to some embodiments, the front portion 20a and the rear portion 20b have substantially the same size in the direction of the median plane M.

30 According to these embodiments, the transverse plane  $\pi$  along which the connection members 34 and/or the centering and guiding element 40 are disposed can correspond to a plane passing through a connection zone between the front 20a and rear 20b portions. The containing devices 20 can therefore be positioned

substantially half on one side and half on the other with respect to the conveyor member 12, so that the rear portions 20b are positioned in contact with one another in correspondence with the internal curved segments 25a (figs. 1 and 3).

According to some embodiments, the containing devices 20 can all have  
5 substantially the same size in height H and/or depth L.

By way of example, the height H can be comprised between about 150cm and 180cm, and the depth L can be comprised between about 30cm and about 70cm, although they can also be smaller, or larger, according to the needs.

According to other variants, described for example with reference to figs. 5  
10 and 6, at least one of the plurality of containing devices 20 has a width W at least of the front portion 20a greater, or smaller, than the other containing devices 20 of the storage apparatus 10.

For example, a first group of containing devices 20 having a first width and a second group of containing devices 20 having a second width, greater than the  
15 first width can be provided.

Advantageously, according to some embodiments, the containing devices 20 of the first group can be alternated with those of the second group.

By way of example, the width W can be comprised overall between about 12cm and about 35cm.

20 According to some embodiments, the containing devices 20 comprise at least two housing seatings 21, that is, at least a first housing seating 21a and at least a second housing seating 21b, disposed overlapping each other along the height H.

According to these embodiments, the containing devices 20 comprise at least one dividing wall 30 suitable to separate the housing seatings 21 from each other.

25 According to some embodiments, the first housing seatings 21a of the plurality of containing devices 20 lie on a common first lying plane, and the second housing seatings 21b lie on a respective second lying plane parallel to the first lying plane.

According to some embodiments, the second lying planes can coincide, or be  
30 parallel and offset in height one with respect to the other.

According to some embodiments, it can be provided that the possible dividing walls 30 are installed at predefined heights along the lateral walls 26.

According to some embodiments, the upper wall 27 and/or the dividing walls

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30 can be provided, on the side facing downward, with attachment elements 39 configured to allow to hang one or more articles 11, for example items of clothing, belts, keys, or other.

According to some embodiments, the bottom wall 28 and/or the dividing wall  
5 30 have a raised edge 28a, 30a configured to prevent the articles 11 contained in the respective housing seating 21 from exiting it during the movement of the containing devices 20.

According to some embodiments, the door or doors 19 of the storage apparatus  
10 10 comprise at least a first panel 19a and at least a second panel 19b, separate and independent from the first panel 19a, configured to make respectively the first housing seatings 21a and the second housing seatings 21b accessible.

According to some embodiments, each one of the first panel 19a and the second panel 19b has a size correlated respectively to the first housing seating 21a and to the second housing seating 21b.

15 If one of the containing devices 20 is provided with a single housing seating 21, the entire door 19, that is, both panels 19a, 19b, will be opened/closed.

According to some embodiments, for example described with reference to fig. 6, the containing devices 20 of the apparatus 10 can be customized as regards the number and height of the housing seatings 21.

20 For example, according to variant embodiments, it can be provided that at least one of either the first housing seating 21a or the second housing seating 21b is further divided into two or more further compartments in order to define further housing seatings 21c, 21d, 21e.

By way of example, the number of housing seatings 21 can indicatively vary  
25 between 1 and N, in which N for example is equal to six, as shown in fig. 1, or greater than six, for example eight, nine, ten, or more, or less than six, for example three, four or five.

In general, the number N can be chosen as a function of needs, that is, on the basis of the size and weight of the articles 11 to be moved, the specific  
30 application of the storage apparatus 10 and the conformation of the containing devices 20 themselves.

According to some embodiments, each housing seating 21a-21N has its own identification code and is autonomous and independent both from the housing

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seatings 21 of the other containing devices 20, and also from the other housing seatings 21a-21N of the same containing device 20.

According to these embodiments, each door 19 can comprise a number N of panels, corresponding to the number N of housing seatings 21a-21N, each  
5 suitable to close/open a specific housing seating 21a-21N.

According to some embodiments, the containing devices 20 can be made of flexible material, for example fabric, polymeric material, or a combination of both.

According to other embodiments, the containing devices 20 can comprise a  
10 rigid, or semi-rigid, base structure 31, for example with a reticular shape, comprising a plurality of longitudinal elements 32 connected to each other by means of transverse elements 33 or dividing walls 30, which can possibly be coated with a flexible material.

According to further embodiments, the containing devices 20 can be made of a  
15 rigid or semi-rigid material, for example made of plastic material.

According to some embodiments, the containing devices 20 comprise a reticular base structure 31 and a flat panel 50 associated with the base structure 31.

According to some embodiments, the panel 50 can be made of fabric, of  
20 polymeric material, or also of metal sheet, and possibly be provided with pre-folding incisions or lines.

The panel 50, during use, externally encloses the base structure 31, defining the lateral walls 26 and the rear wall 29.

According to some embodiments, for example described with reference to  
25 figs. 6a-6h, the containing devices 20 can be made starting from a panel 50 with a substantially flat shape, that is, planar and flat, directly at the installation site of the apparatus 10.

This solution allows to considerably reduce transport costs, since the panels 50 can be disposed stacked one on top of the other, and associated with the  
30 respective base structures 31 at the time of installation.

According to some embodiments, the base structure 31 can also have a substantially planar shape and be folded to assume a three-dimensional shape at the time of use.

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For example, the base structure 31 can comprise longitudinal elements 32 disposed parallel to each other, in the example case six, connected to each other by means of transverse elements 33, in the example case four, of which an upper one 33a associated with a first end of the longitudinal elements 32, a lower one  
5 33b associated with a second end, opposite the first, and two transverse elements 33c disposed in intermediate positions between the two upper 33a and lower 33b transverse elements.

According to some embodiments, the two longitudinal elements 32 disposed in the central position have a smaller reciprocal distance, for example comprised  
10 between about 20% and about 30% of the distance between the other longitudinal elements 32, correlated to the width of the rear wall 29.

According to some embodiments, for example described with reference to fig. 6g, the upper transverse element 33a and/or the lower transverse element 33b can have a substantially L-shaped profile, defined by a first flat portion 51 suitable to  
15 cooperate, during use, with the ends of the longitudinal elements 32, and a second portion 52 which is disposed substantially orthogonal with respect to the first portion 51.

According to some embodiments, the first portion 51 has notches 53 in correspondence with the central and/or intermediate longitudinal elements 32, configured to facilitate the folding of the base structure 31 from the flat  
20 conformation to the three-dimensional conformation.

According to some embodiments, the notches 53 can have a substantially triangular shape, whose shape and depth are correlated to the type of fold to be made. By way of example, the notches 53 in correspondence with the  
25 longitudinal elements 32 defining, during use, the rear wall 29, will have a greater depth and size than the notches 53 provided in correspondence with the longitudinal elements 32, defining, during use, the edges between the front portion 20a and the rear portion 20b.

According to some embodiments, the panel 50 comprises transverse 54 and  
30 longitudinal 55 perimeter edges which develop transversely with respect to a flat surface 56 and which are suitable to cooperate with the longitudinal 32 and transverse 33 elements.

According to some embodiments, the transverse perimeter edges 54 are

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configured to cover, during use, the second portions 52 of the upper 33a and lower 33b transverse elements, and be connected to them, for example by means of fastening members 60, for example screws, bolts, pins, rivets, or suchlike, inserted in suitable mating holes 57.

5       According to further embodiments, the longitudinal perimeter edges 55 are provided with grooves 58 suitable to house, during use, at least part of an intermediate transverse element 33c, so as to improve the coupling between the panel 50 and the base structure 31.

10       To build a containing device 20 according to the invention, it is therefore sufficient to attach the base structure 31 to the panel 50, possibly associating the second portions 52 with respective transverse perimeter edges 54, by means of fastening members (fig. 6b).

15       Subsequently, it is possible to fold together the panel 50 and the base structure 31 in assembled form in correspondence with the longitudinal elements 32 and the notches 53 (figs. 6c and 6d) obtaining a three-dimensional structure.

On the three-dimensional structure, the upper 27 and lower 26 walls can then be connected and attached respectively to the upper 33a and lower 33b transverse elements, by means of fastening members 60.

20       As a function of needs and of the number of seatings 21 which have to be defined in the containing device 20, the dividing walls 30 can also be connected and attached in correspondence with one or more of the transverse elements 33 by means of respective fastening members 60 cooperating with suitable fastening holes.

25       Subsequently, by means of holes 59 provided in the upper wall 27, the connection members 34 can be connected and attached.

The centering and guiding member 40, and in particular the attachment pin 42, can also be connected in correspondence with the bottom wall 28.

30       According to further embodiments, the storage apparatus 10 comprises a user interface 35 by means of which a user can request access to a determinate housing seating 21\* amongst the housing seatings 21a-21N of a specific containing device 20\* of said containing devices 20.

According to some embodiments, the apparatus 10 further comprises a control and command unit 36, connected to the user interface 35 and configured to

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command at least the drive unit 14 and the at least one door 19 to make available to the user the requested housing seating 21\* of said specific containing device 20\* in correspondence with the access aperture 18 associated with the door 19.

According to some embodiments, the control and command unit 36 is also  
5 configured to open all and only the panels 19a-19N of the door suitable to make the requested housing seating 21\* available.

According to some embodiments, the control and command unit 36 can comprise a storage unit 36a in which the identification codes of each housing seating 21a-21N of each containing device 20, the identification codes of the  
10 containing devices 20, and their position and reciprocal order along the movement path P are stored.

According to some embodiments, the user interface 35 can comprise a recognition device 37 configured to cooperate with a user identification device and proceed to identify and recognize him/her.

15 By way of example only, the recognition device 37 can comprise one or more of either an infrared code reader, a microchip reader, or a system to recognize biometric data, such as fingerprints, retina, facial features, a voice recognition system, or suchlike.

In a correlated manner, the user identification device can be chosen from a  
20 magnetic card provided with a microchip, a bar or QR code, the user's own biometric data, or other.

According to some embodiments, it can be provided that by means of the recognition device 37 the identification device directly supplies the control and command unit with the identification code of a determinate housing seating 21\*.

25 For example, if the storage device 10 is used as a "wardrobe locker" in a company, a user, after identifying him/herself by means of the user interface 35, will automatically receive in front of aperture 18 his/her own housing seating 21\*, in which he/she will be able to introduce his/her personal belongings. At the end of the work shift, the user will identify him/herself again, once again  
30 receiving his/her own housing seating 21\* to collect his/her personal belongings.

In the event that the storage device 10 is used as a "distributor", it is possible to manage the introduction zone Z1 and the collection zone Z2 independently.

According to this solution, for example, on the basis of a code of an article 11

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to be loaded supplied by an operator by means of the user interface 35 in correspondence with a collection zone Z2, it can be provided that the control and command unit 36 actuates the drive member 14 to position the housing seating 21\* in which the article 11 has to be introduced in correspondence with the aperture 18 in the introduction zone Z1.

According to variant embodiments, a closing device 19 can be provided in correspondence with the introduction zone Z1 with a single-panel door, or with an optical barrier, and luminous signaling elements 38 can be provided suitable to signal to an operator the correct housing seating 21\* in which to introduce the article 11.

Since each containing device 20 can be provided with a plurality of housing seatings 21a-21N, possibly having different sizes, it is possible to choose the suitable housing seating 21\* on each occasion, on the basis of the shape and size of the article 11 that has to be introduced into the storage apparatus 10. Furthermore, thanks to the plurality of housing seatings 21a-21N of a single containing device 20, it is possible to transport several articles 11 simultaneously, exploiting all the space available in the vertical direction.

It is clear that modifications and/or additions of parts may be made to the storage apparatus 10 as described heretofore, without departing from the field and scope of the present invention.

It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of storage apparatus 10, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

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### CLAIMS

1. Apparatus for storing articles (11) comprising a conveyor member (12), a guide (13) at least partly defining a closed-ring movement path (P), and a drive unit (14) associated with said conveyor member (12) and configured to move the latter along said movement path (P), **characterized in that** it comprises:
- a plurality of containing devices (20), each provided with at least one housing seating (21) for the articles (11), connected to said conveyor member (12) and mobile with the latter along said movement path (P), wherein said containing devices (20) are connected to said conveyor member in correspondence with an intermediate portion of an upper wall (27) thereof, and
  - a structure (16) delimiting a containing compartment (17) in which at least said conveyor member (12) and said containing devices (20) are positioned, said structure (16) being provided with at least one aperture (18) to access said containing compartment (17) to allow access to said housing seatings (21) of said containing devices (20) which are positioned on each occasion in correspondence with said at least one aperture (18).
2. Storage apparatus as in claim 1, **characterized in that** said movement path (P) lies on a horizontal lying plane, and said containing devices (20) are attached to said conveyor member (12), and have an oblong development that extends in a substantially vertical direction.
3. Storage apparatus as in claim 1 or 2, **characterized in that** said containing devices (20) have a substantially parallelepiped shape with a main development along a vertical longitudinal axis, and a cross section with a tapered shape toward a rear wall (29) facing toward the inside of said movement path (P).
4. Storage apparatus as in claim 3, **characterized in that** said containing device (20) comprises a front portion (20a) substantially square or rectangular shaped, and a rear portion (20b) substantially trapezoidal shaped, in which the minor base defines said rear wall (29).
5. Storage apparatus as in any claim hereinbefore, **characterized in that** said conveyor member (12) comprises attachment elements (15) and said containing device (20) comprises connection elements (34) disposed on said upper wall (27), suitable to cooperate with said attachment elements (15).
6. Storage apparatus as in any claim hereinbefore, **characterized in that** said

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containing device (20) comprises a centering and guiding element (40) attached on the lower side of a bottom wall (28) thereof, and configured to cooperate with a guide member (41) of said apparatus.

7. Storage apparatus as in claims 5 and 6, **characterized in that** said connection members (34) and said centering and guiding element (40) are substantially aligned along a same transverse plane ( $\pi$ ), orthogonal to a longitudinal median plane (M) of the containing device (20).

8. Storage apparatus as in any claim hereinbefore, **characterized in that** said containing devices (20) comprise a reticular base structure (31) and a panel (50), wherein said base structure (31) and said panel (50) have a first substantially flat conformation for transport and reciprocal connection, and a second folded conformation in which they assume in assembled condition a three-dimensional shape defining the bulk of said containing device (20).

9. Storage apparatus as in any claim hereinbefore, **characterized in that** said structure (16) comprises two access apertures (18), disposed distanced from each other along said movement path (P).

10. Storage apparatus as in any claim hereinbefore, **characterized in that** comprises at least a closing device (19) associated with said at least one aperture (18) and configured to selectively open/close said at least one aperture (18), to allow or prevent access to said housing seatings (21).

11. Storage apparatus as in any claim hereinbefore, **characterized in that** said at least one access aperture (18) is positioned in correspondence with a curved segment (25) of said movement path (P).

12. Storage apparatus as in any claim hereinbefore, **characterized in that** said containing devices (20) comprise at least a first housing seating (21a) and at least a second housing seating (21b), separated from and overlapping each other in a vertical direction.

13. Storage apparatus as in claim 12, **characterized in that** said first housing seatings (21a) of said containing devices (20) lie on a common first lying plane, substantially horizontal, and said second housing seatings (21b) each lie on a second lying plane parallel to the first lying plane.

14. Storage apparatus as in claims 10 and 12 or 13, **characterized in that** said at least one closing device (19) comprises a door and said door comprises at least a

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first panel (19a) and at least a second panel (19b), separate and independent from said first panel (19a), said first panel (19a) and said at least one second panel (19b) being configured to make said first housing seatings (21a) and said second housing seatings (21b) respectively accessible.

5 15. Storage apparatus as in claims 10 and 12 or 13, **characterized in that** it comprises a user interface (35) by means of which a user can request access to a determinate housing seating (21, 21a, 21b) of one of said containing devices (20), and a control and command unit (36) connected to said user interface (35) and configured to command at least said drive unit (14) and said closing device (19)  
10 to make available to the user access to said housing seating (21, 21a, 21b) in correspondence with the aperture (18) associated with said closing device (19).

16. Method for storing articles (11) which provides to move, along a closed-ring movement path (P), a conveyor member (12) in a guide (13) by means of a drive unit (14) associated with said conveyor member (12), **characterized in**  
15 **that** containing devices (20), each of which is provided with at least one housing seating (21), are connected to said conveyor member (12) in correspondence with an intermediate portion of an upper wall (27) thereof, **in that** said containing devices (20) are moved with the conveyor member (12) along said movement path (P), **in that** said conveyor member (12) and said containing devices (20) are  
20 positioned in a containing compartment (17) of a structure (16), **and in that** said structure (16) is provided with at least one aperture (18) to access said containing compartment (17), to allow access to the housing seatings (21) of the containing devices (20) which are taken on each occasion, by said drive unit (14), into correspondence with said aperture (18).

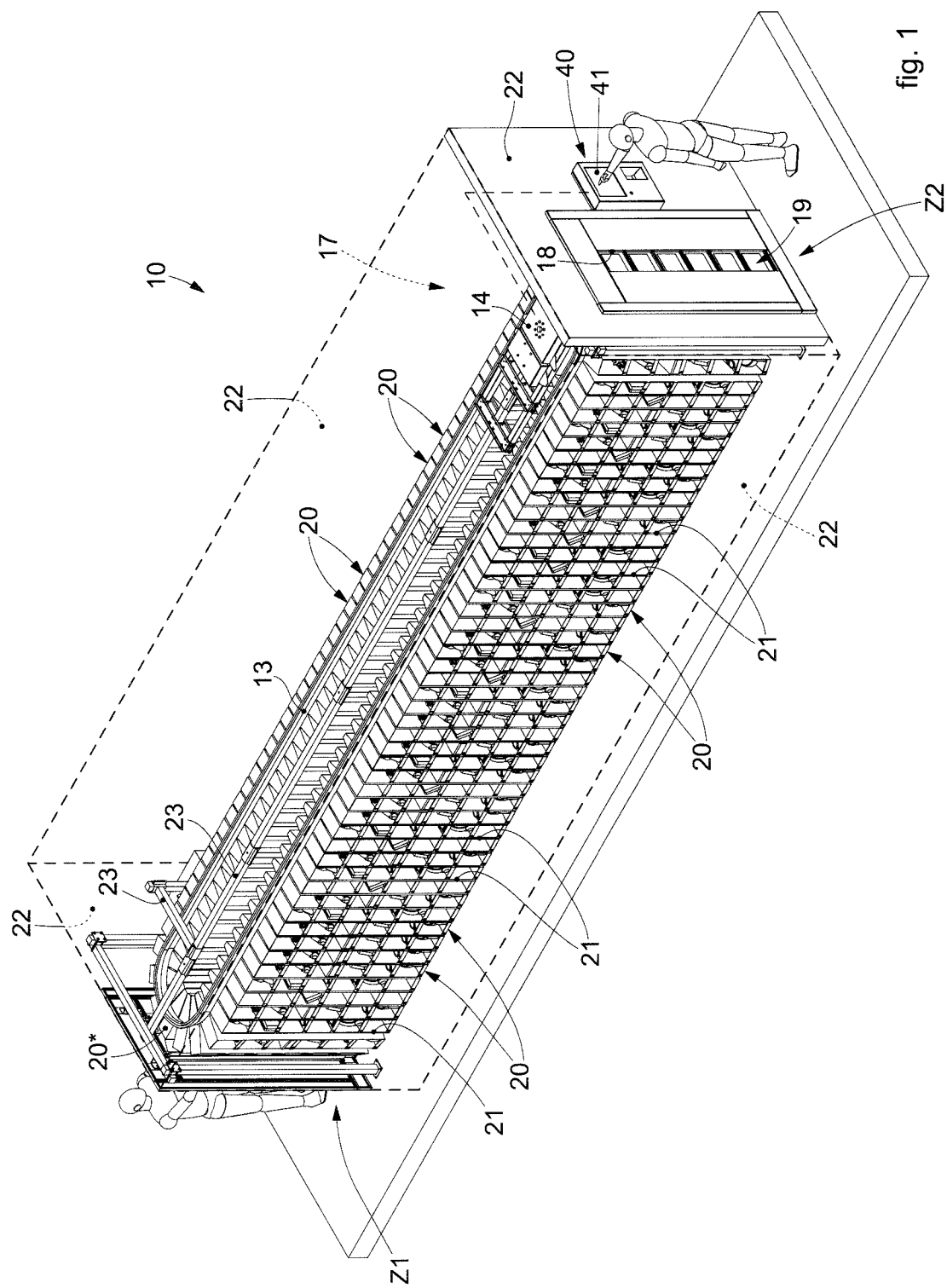
25 17. Method as in claim 16, **characterized in that** it provides to use containing devices (20) with a shape tapered toward the rear part, comprising a substantially square or rectangular shaped front portion (20a), and a substantially trapezoidal shaped rear portion (20b), in which the minor base defines a rear wall (29) of said containing device (20).

30 18. Method as in claim 16 or 17, **characterized in that** to produce each of said containing devices (20) to be connected to said conveyor member (12) it provides to make available a reticular base structure (31) and a panel (50) having a first substantially flat conformation for transport, to reciprocally connect them to each

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other and fold them in assembled condition, so as to make them assume a three-dimensional shape defining the bulk of said containing device (20).

19. Method as in claim 18, **characterized in that** it provides to subsequently connect respective upper (27), lower (28) and dividing (30) walls to respective transverse elements (33) of said reticular structure (31) and to attach in  
5 correspondence with an intermediate position of said upper wall (27) connection members (34) configured to cooperate with attachment elements (15) provided on said conveyor member (12).



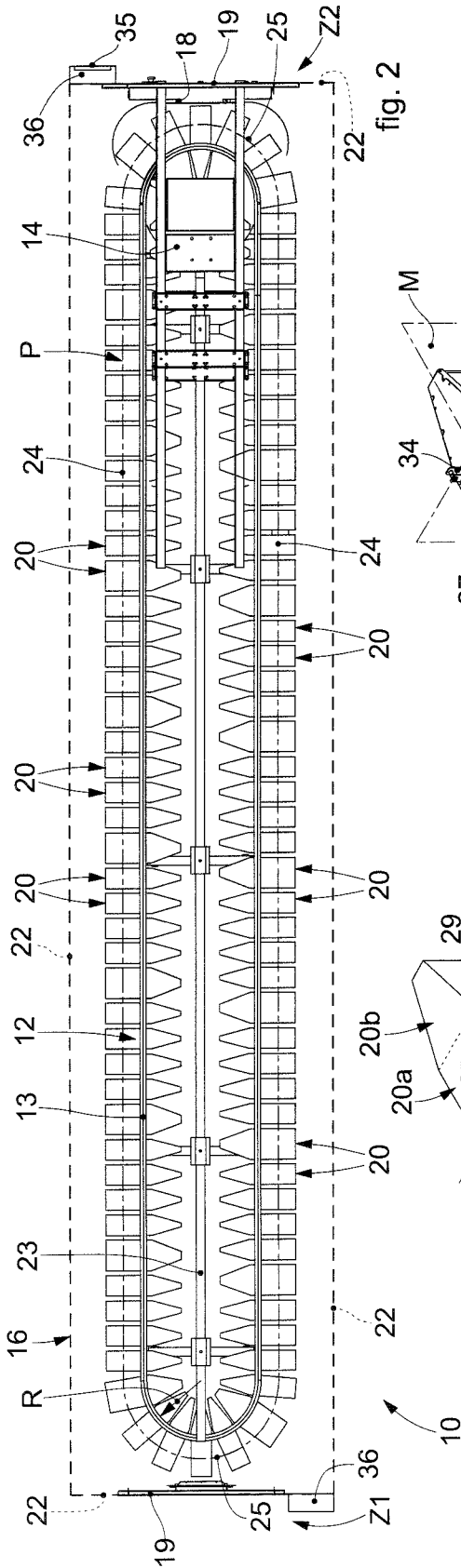


fig. 2

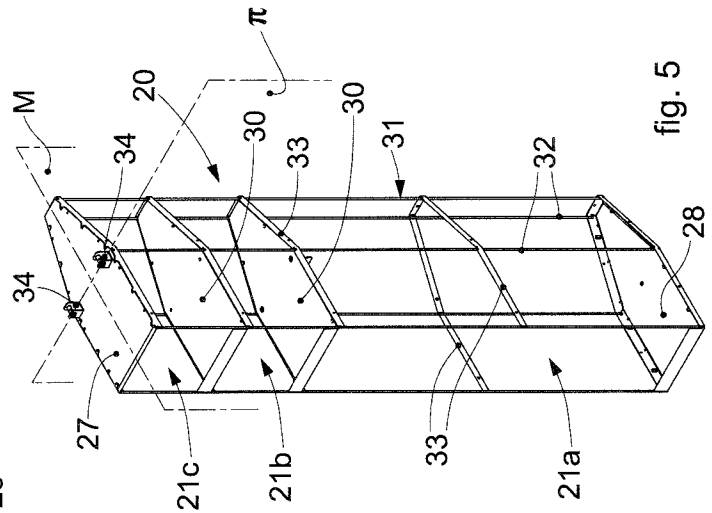


fig. 5

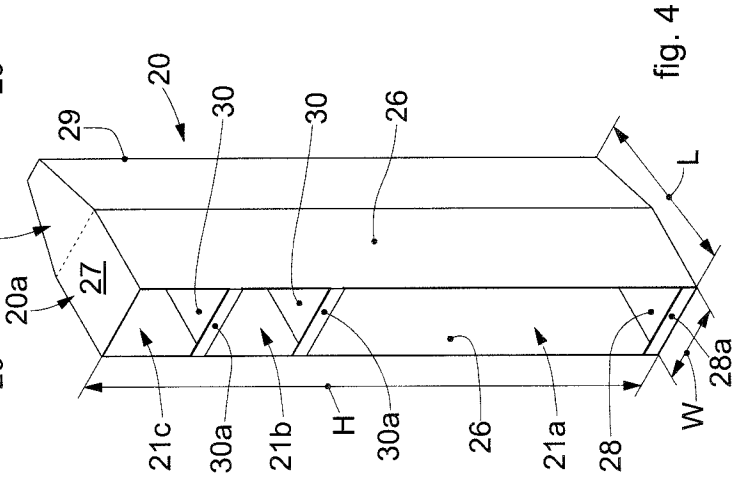


fig. 4

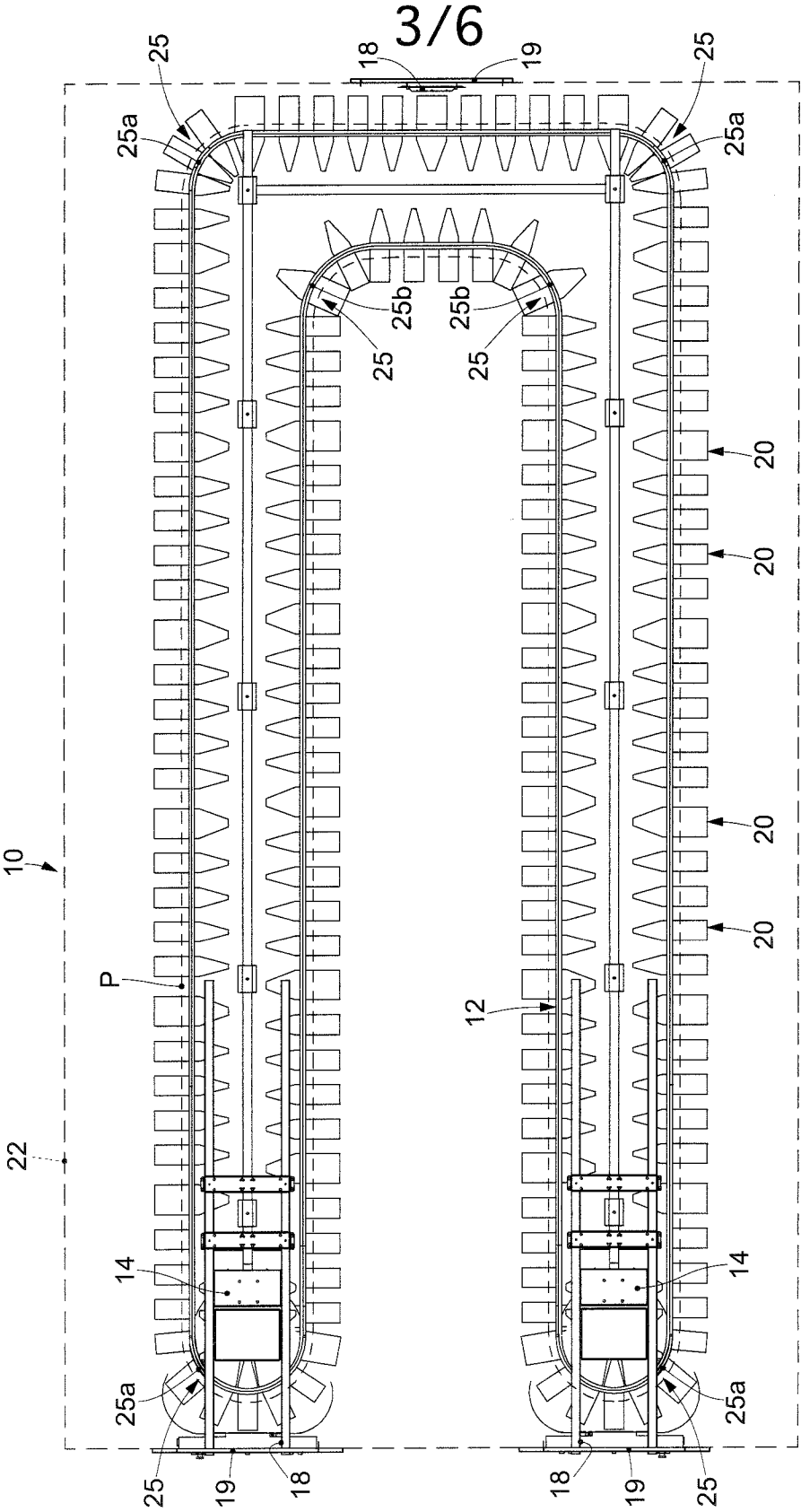


fig. 3

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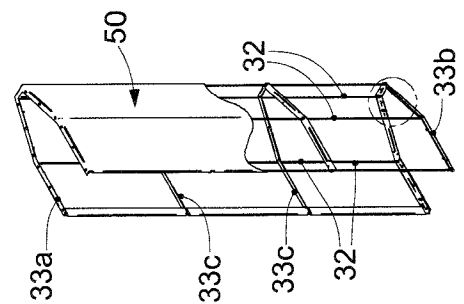


fig. 6d

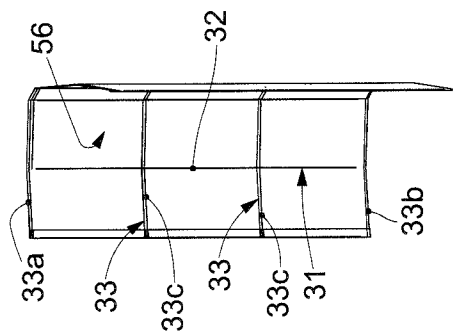


fig. 6c

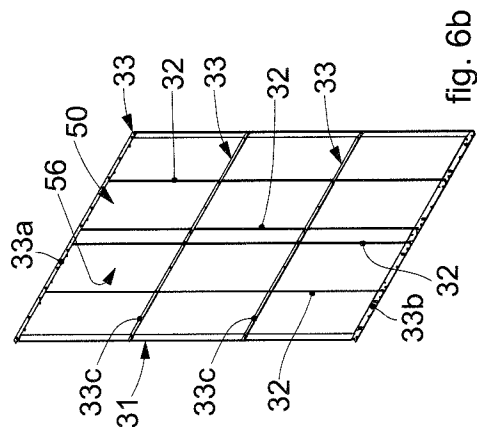


fig. 6b

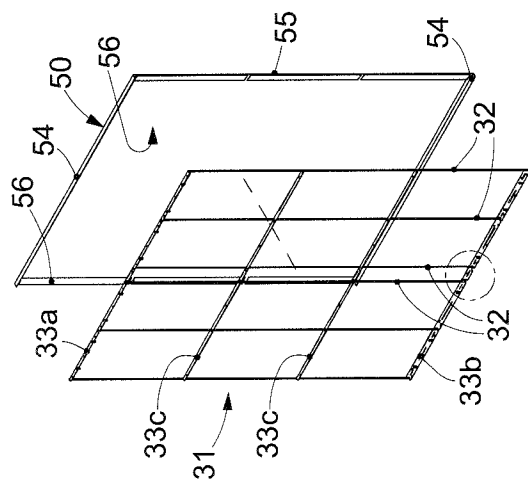


fig. 6a

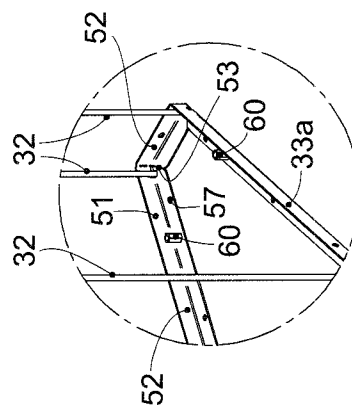


fig. 6h

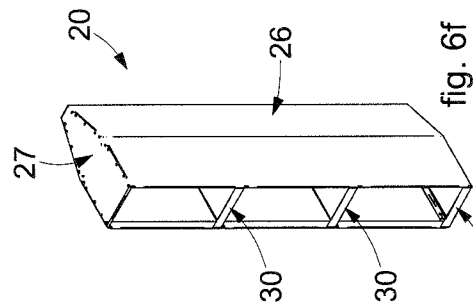


fig. 6f

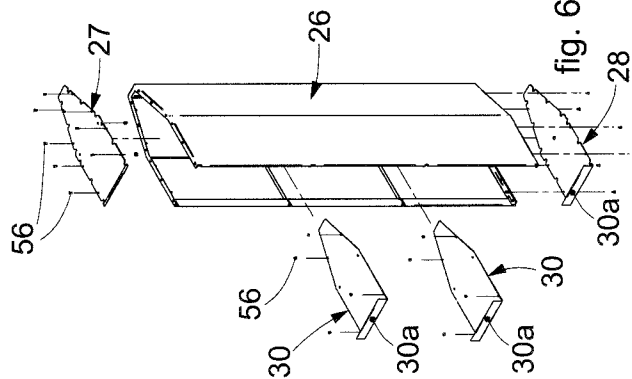


fig. 6e

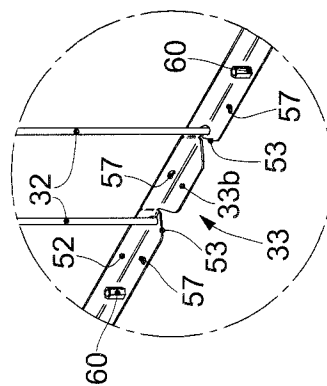
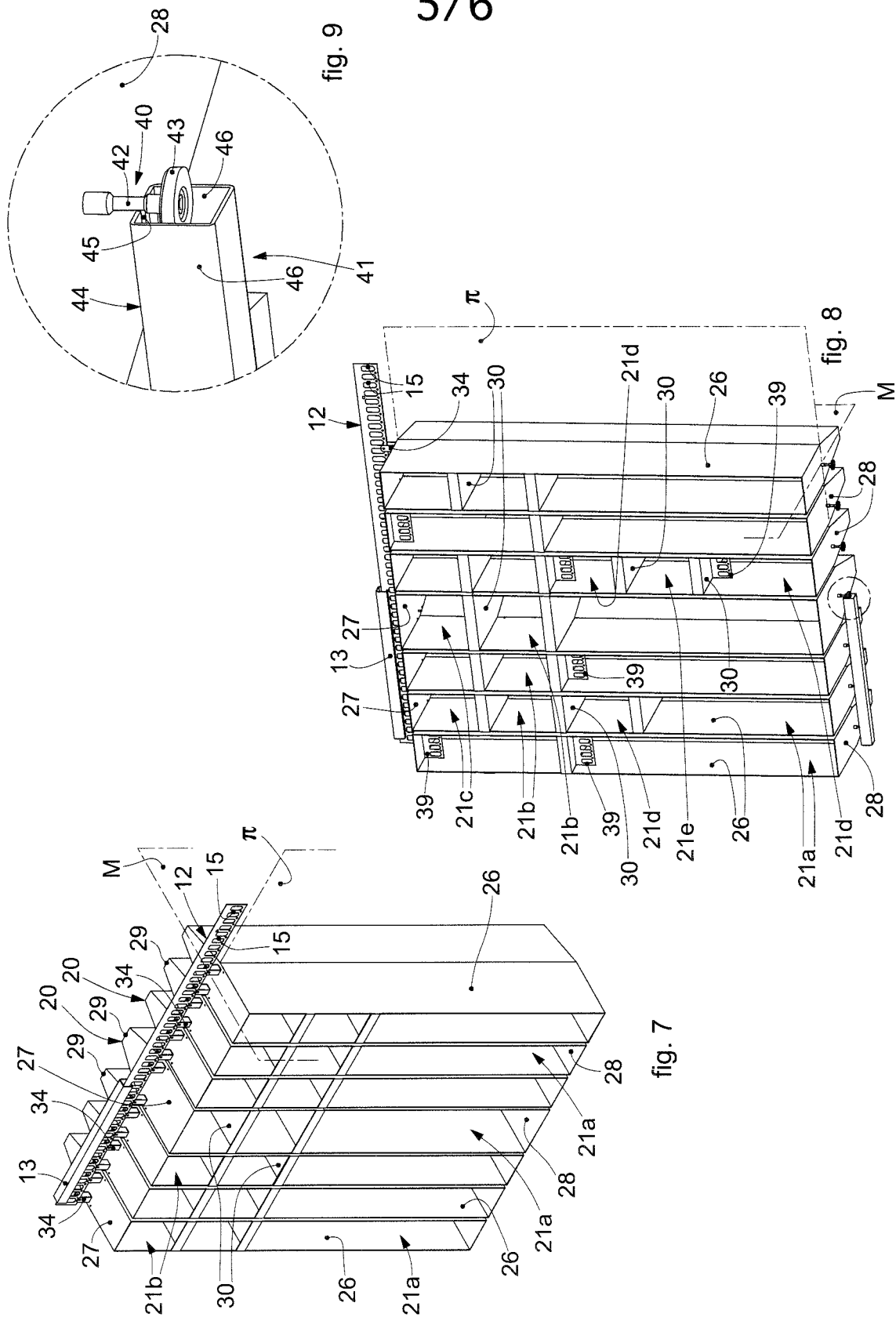


fig. 6g



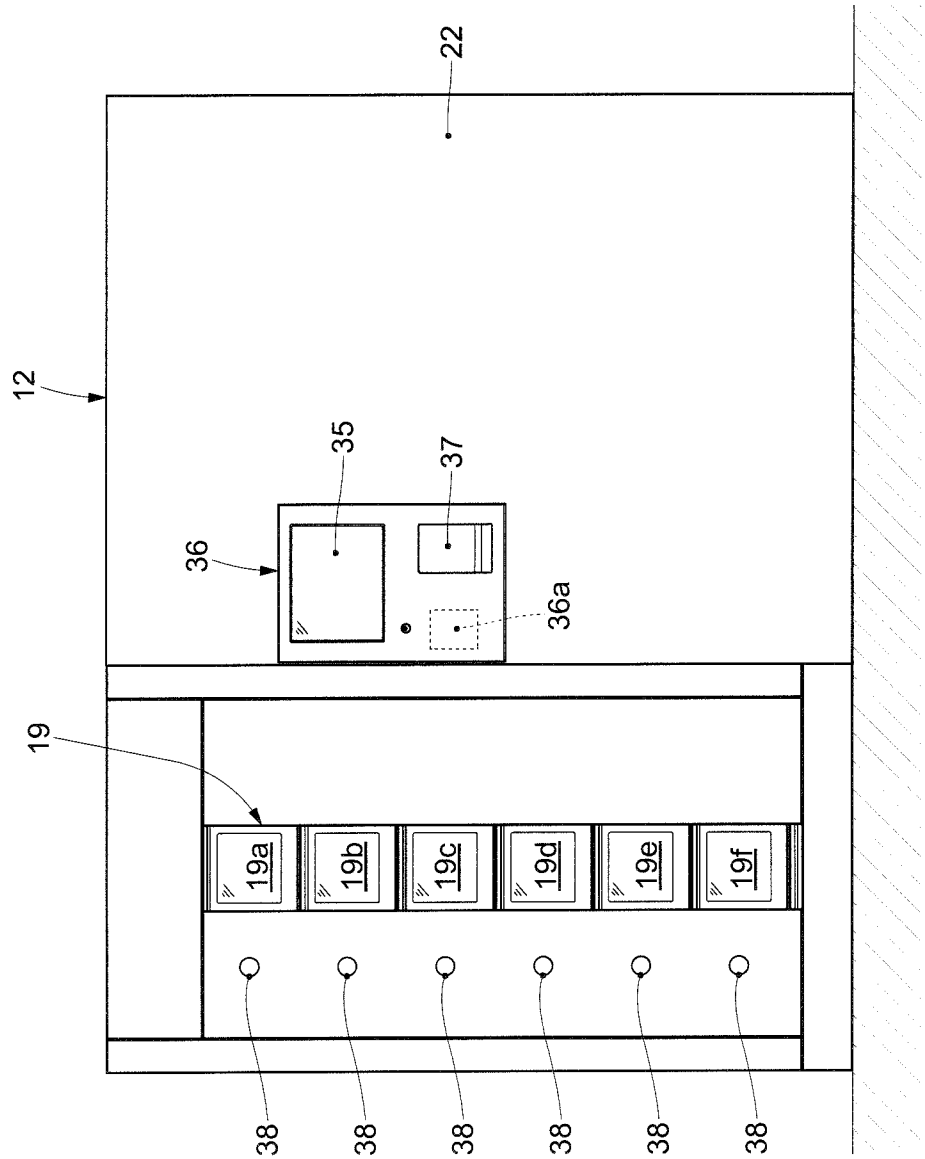


fig. 10