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(54) **STORAGE SYSTEM**

(57) A storage system (1) for mounting in buildings, wherein the storage system (1) includes at least one bottom face (2) and a first lifting/lowering mechanism (3), the system (1) further including a rail system (4) disposed in a vertical plane, the rail system (4) having at least one means (5) which is guided along the longitudinal axis of the rail system (4), where the bottom face (2) further includes coupling means (6) for coupling/engagement with the means (5) of the rail system, and where the lifting/lowering mechanism (3) includes coupling means (7) for coupling/engagement with the coupling means (16) of the bottom face or with the means (5) of the rail system, whereby is provided a storage system for mounting in buildings, where the system is easy to set up in existing building as well as in new building constructions, and where the system (1) is freeing floor area.

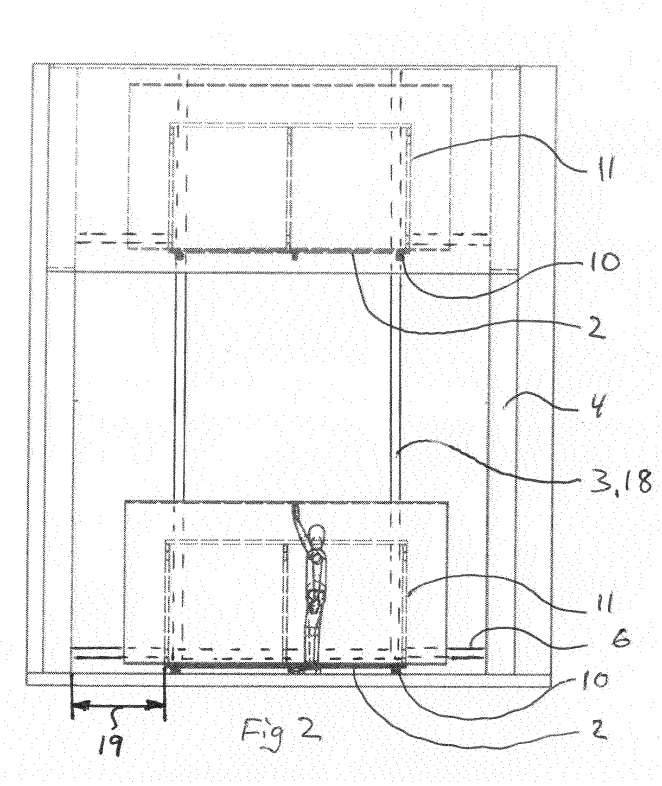

Fig 2

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Description

[0001] The present invention concerns a storage system for mounting in buildings, wherein the storage system includes at least one bottom face and a first lifting/lowering mechanism.

Prior art

[0002] It is known to store gymnastic appliances, tables/chairs etc. in storage rooms or tool rooms, from where the stored items are taken out when they are to be used, implying that storage rooms or tool rooms are required to have a certain size as e.g. gymnastic appliances like vaulting boxes, vaulting horses, trampolines and mats take up some space. As many items are in several sizes such that they fit children as well as adults, e.g. tables and chairs, the need for storage is appreciable.

[0003] In addition, storage in storage rooms or tool rooms entail some manual, hard and heavy work as the items are to be pushed, pulled and/or carried out to respective positions at which they are to be used. Besides the manual work of moving the items between the storage position and the desired place of use, it also takes some time, time which is taken from e.g. the gym periods in the schools.

[0004] It is known with storage systems which by wall-mounted fittings and cord drives enable lifting mats and other items up from floor level to a freely suspended position above the height of a person. The drawbacks by this system are, however, many, among others such systems are frequently not suspended in a stable way with a minimum of security with the risk that the stored items fall down again with additional risk of personal injury as the suspended items are not screened either.

[0005] US 5377787 A discloses a platform for use as mezzanine (an interposed level) where feet support the plate when the plate rests in its lower position. The drawback herewith is that the plate therefore only can be loaded when resting in its lower position and thus cannot be loaded on the way between two positions. The three legs of the platform are furthermore not disposed on a straight line, whereby the platform does not liberate any floor space by mounting at the middle of a wall.

Object of the Invention

[0006] It is the object of the invention to provide a storage system for mounting in buildings, where the system is easy to set up in existing buildings as well as in new building constructions, and where the system is freeing floor area and provides free square metres on the floor where the area previously has been used for storage or otherwise should have been used for storage, but where the floor area now can be used for other purposes.

[0007] It is a further object of the invention to make transport of the stored items as short as possible, or at least to enable moving/transporting of the items between a storage position and a position of use with as small physical effort as possible.

Description of the Invention

[0008] According to a first aspect of the invention, the above mentioned object is achieved by a storage system for mounting in buildings, where the storage system includes at least one bottom face and a first lifting/lowering mechanism as indicated in the preamble of claim 1, the system further including a rail system disposed in a vertical plane, the rail system having at least one means guided along the longitudinal axis of the rail system, where the bottom face further includes coupling means for coupling/engagement with the means of the rail system, where the bottom face further includes a number of coupling means, and where the lifting/lowering mechanism includes coupling means for coupling/engagement with the coupling means of the bottom face or with the means of the rail system.

[0009] This will enable lifting from and lowering to the position of the bottom face from floor level to storage level in an easy and safe way, at the same time freeing floor area corresponding to at least the area of the bottom surface, and thereby freeing at least a corresponding storage space.

[0010] In a second aspect, the present invention concerns a storage system wherein the bottom face constitutes a plane with a first side and a second side, where there is at least one wheel on the first side and at least one holder or stand at the second side.

[0011] This enables supporting stored flat items such as mats or tabletops, high items such as stacks of chairs or boxes, barrels or other containers for e.g. hockey sticks, rackets or other items, up along the said holder. Also, the at least one wheel enables that the items partially or by a plurality of wheels can be completely transported to the position of use without any heavy manual work in the form of lifting, pushing and pulling, which is not appropriate, particularly for children.

[0012] In a third aspect, the present invention concerns a storage system wherein the bottom face has a top part which can be fastened to the second side of the bottom face, the top part surrounding an inner space, the inner space being entirely or partially closed by plate, perforated plate or wire mesh.

[0013] This enables storing of footballs, handballs, nets and many other items that are difficult to stack or pack stably in other ways. If the inner space is completely closed off by means of a top part of plate, the stored items will also remain clean and free from dust and dirt, and the items will not fade due to light incidence, and so on, which may be an advantage when storing costumes, wings, carpets or other coloured items.

[0014] In a fourth aspect, the present invention concerns a storage system wherein the holder or stand at the second side of the bottom face or the top part of the

bottom face includes at least one second coupling means for coupling/engagement with the means of the rail system.

[0015] This will enable further securing of the storage system and make it more stable, which in particular is expedient when storing high items which, as opposed to a flat box, are more wobbly and unstable on the bottom face. If a person, for example, is lifting a plate by grasping the lower edge, the handling will not be so secure and stable as when the person simultaneously gets hold of the upper edge of the plate. This is the principle that has been transferred to the storage system.

[0016] In a fifth aspect, the present invention concerns a storage system where the means of the rail system are slide blocks or rollers.

[0017] This will enable very accurate guiding of the movement of the bottom face and such that the bottom face does not overturn/runs skew during the handling of the lifting/lowering functions. A slide block may have such a length in the direction of the rail system and such a dimension in the cross-section of the rail system that a very little clearance between slide block and rail system is provided, whereby the movement of the slide block becomes very stable. Another possibility is the use of rollers, which can be single rollers, though boogie rollers/tandem rollers, or even better a roller construction in the form of a carriage with e.g. to tandem rollers, will, as with the slide block, make the movement in the rail system very stable.

[0018] In a sixth aspect, the present invention concerns a storage system wherein the rail system is disposed in several mutually intersecting planes, wherein the line of intersection between the planes has a longitudinal axis that is perpendicular to the longitudinal axis of the rail system, and where the rail system is curving at the transition between the planes.

[0019] This enables storing items on walls that are not necessarily vertical, but continue at a different angle with vertical - maybe even 90° in relation to vertical - whereby the items therefore can be stored under the ceiling or possibly lowered to a position in parallel with, but under the floor level. In order to enable these storages it is therefore necessary that the slide blocks/rollers follow a softer path than 90° at the transition between the various planes, or that these slide blocks/rollers at least can follow this path in the rail system.

[0020] In a seventh aspect, the present invention concerns a storage system wherein the lifting/lowering mechanism includes hydraulically and/or pneumatically operated lifting/lowering means, actuators, and/or a mechanically operated system, such as a wire drive.

[0021] This will enable securing an efficient and reliable transmission of force to the bottom face and, depending on wish, need and load, finding and choosing the mechanism that fits the purpose best.

[0022] In an eighth aspect, the present invention concerns a storage system wherein the system further includes a second lifting/lowering mechanism in the form of a lift-up fitting for lifting and lowering a second bottom face, respectively, into another position outside of and in parallel with a first position.

[0023] This will enable storing bottom faces at several levels in parallel with but outside of each other, though by the rail system it will be possible to have several bottom faces on the same rails, whereas the lift-up system can only store one bottom face. An example hereof will appear from one of the following Figures.

[0024] In a ninth aspect, the present invention concerns a storage system wherein the storage system includes at least one cover casing or cover jacket.

[0025] This will enable safeguarding that the suspended items - which possibly are hit during ball games - cannot overturn and fall down upon persons staying under the suspended items, as a cover casing or cover jacket will prevent a possible football from hitting the items and cause a wreck. Besides there is achieved the advantage that the items do not become dusty after storage for a long time.

[0026] In a tenth aspect, the present invention concerns use of a storage system according to any of the above described aspects for storing mats, gymnastic appliances, tables/chairs, or other appliances.

[0027] This will of course enable achievement of all the previously mentioned advantages by the invention.

The Drawing

[0028] The invention will now be explained more closely in the following by description of non-limiting embodiments with reference to the drawing, where:

- Fig. 1a shows an example of a prior art storage system;
- Fig. 1b shows the same example of a prior art storage system though in a close-up view;
- Fig. 2 shows an example of a storage system according to the invention, as seen from the front;
- Fig. 3 shows an example of a storage system according to the invention, as seen from the side;
- Fig. 4 shows an example of a storage system according to the invention, as seen from above;
- Fig. 5 shows an example of a storage system according to the invention, as seen in perspective view;
- Fig. 6 shows an example of a bottom face with a top part;
- Fig. 7 shows an example of the coupling means of the bottom face engaging the coupling means of the lifting/lowering mechanism;
- Fig. 8 shows an example of a storage system with a lift-up lifting/lowering mechanism.

[0029] The following reference numbers are used on the drawing for the reference numbers used in the detailed part of the description:

1 storage system
2 bottom face
3 a first lifting/lowering mechanism
4 rail system
5 means
6 coupling means, bottom face
7 coupling means, lifting/lowering mechanism
8 first side, bottom face
9 second side, bottom face
10 wheels
11 holder/stand
12 top part
13 a second coupling means
14 a second lifting/lowering mechanism
15 cover casing/cover jacket
16 coupling means, bottom face
17 bottom face end
18 profile, lifting/lowering mechanism
19 distance between rail system and bottom face

Detailed Description of Embodiments of the Invention

[0030] A storage system for mounting in buildings, where the storage system according to the invention is shown on Figures 1 to 8.

[0031] On Figs. 1a and 1b appears an example of an existing storage system 1, including at least one bottom face 2 and a first lifting/lowering mechanism. It appears that the system 1 is suspended on a wall as some angle braces are fastened to the wall, and where cord drives enable lifting mats and other items up from floor level to a freely suspended position above the height of a person. The storage system 1 shown here, however, has the drawback that there is a risk of the stored items - here mats - may fall down due to unstable suspension or due to external impacts where the storage system e.g. is impacted by balls from e.g. football games, and the stored items standing on the bottom face 2 can fall down thereby.

[0032] On Fig. 2 appears a storage system 1 for mounting in buildings in a side view, where the storage system includes at least one bottom face 2 and a first lifting/lowering mechanism 3, the system 1 further including a rail system 4 disposed in a vertical plane, here constituted by a wall, the rail system 4 having at least one means 5 guided along the longitudinal axis of the rail system 4, and where the bottom face 2 further includes coupling means 6 for coupling/engagement with the means 5 of the rail system, and where the lifting/lowering mechanism 3 includes coupling means 7 (see Fig. 7) for coupling/engagement with the bottom face 2 or with the means 5 of the rail system.

[0033] The lifting/lowering mechanism 3 is shown here as a system including two profiles 18, which may be an advantage with regard to a more even force transmission to the bottom face 2 during lifting/lowering, but a lifting/lowering mechanism 3 with one profile 18 may of course also be used as the rail system 4 is both guiding and stabilising the bottom surface 2 in the system 1.

[0034] The means 5 of the rail system 4 are coupled together with the coupling means 6 of the bottom face, thereby securely guiding the bottom face 2 during lifting/lowering. The coupling means 6 are here shown as tubes, displaceable tubes or telescoping tubes which can be under, on the side of, or, as shown on Fig. 6, within the top part 12 of the bottom face.

[0035] By using coupling means 6 as telescoping tubes or tubes that can be pushed into the bottom face 2, the coupling means 6 do not take up much space when not in use, and they do not lie about nor take up space when not in use. On the contrary, the coupling means 6 are always at the spot where they are needed, namely in connection with the bottom face 2.

[0036] If the distance between the two ends 17 of the bottom face and the rail system 4 is not very great, common tubes or rods can be applied which still can be displaced and stored in the bottom face 2 when not in use.

[0037] The lifting/lowering mechanism 3 can in a not shown embodiment, where the lifting/lowering mechanism 3 is closer to and even incorporated in the rail system 4, couple the coupling means 7 to the means 5 of the rail system.

[0038] The described rail system 4, which lies in a vertical plane, can, as shown on Figs. 2, 3 and 5 be a rail system 4 disposed at either side of the two ends 17 of the bottom face. However, the distance 19 between the rail system 4 and the ends 17 of the bottom face does not need to be so great as indicated on Fig. 2, though the distance 19 between the rail system 4 and the ends 17 of the bottom face has to be greater than the elements stored on the bottom face.

[0039] A not shown alternative is the disposition of a rail system 4 between the bottom surface 2 and a wall, typically where the storage system 1 is mounted up along a wall. The situation is obviously different in such cases as allowance for the length of the elements stored on the bottom face 2 is not to be made - at least not regarding the rail system 4. Instead, coupling means 6 are to be positioned and oriented differently and therefore usually turned 90° relative to the positions shown on Figs. 2 to 6.

[0040] The rail system 4 may include several rails, e.g. 2 or 4, where the rails can be located in the same vertical plane or in two parallel vertical planes. The rail system 4 can e.g. be like the one known from e.g. sectional overhead doors and which is easily mounted between two rafters, columns or walls in a sports centre.

[0041] In one embodiment there may be two sets of rails lying in the same vertical plane, where one rail system 4 can be used for the innermost solution and the other rail system 4 can be used for the outermost solution.

[0042] In another embodiment there may thus be arranged several such rail systems 4 outside each other, either of the same type or of different types. For example, port rails can be used for the innermost solution whereas the outermost solution can be with so-called lift-up fittings

of the type known from e.g. kitchen cabinet doors, though in a somewhat larger design. Such a solution is shown as an example on Fig. 8.

[0043] In a third embodiment there may be used a rail system 4 with track switches lying in the same vertical plane as the rest of the rail system 4, but such that the innermost solution runs one way and the outermost solution runs the other way.

[0044] On Figs. 2 and 3 the bottom face 2 is seen as being a plane with a first side 8 and a second side 9, where there is at least one wheel 10 on the first side 8 and at least one holder or stand 11 at the second side 9.

[0045] In an embodiment, the bottom face has a wheel 10, and it may then function as a kind of wheelbarrow if the parts of the bottom face possibly in contact with floor/base are lifted up.

[0046] Two or three wheels 10 are obviously also an option, but in a preferred embodiment the bottom face 2 has at least four wheels 10 such that it is sufficient to push and/or pull in order to move the bottom face 2. More than four wheels as shown on Figs. 2 and 3 is, of course, also possible, and this may be a necessity, depending on the stiffness of the bottom face 2 and the moving behaviour of the wheels 10.

[0047] The storage system 1 is made very flexible by the holder or stand 11 as it can be adapted to a wide range of needs, thereby providing many options for storage if there are earmarked bottom faces 2 always used for the same purpose, or if there are small special fittings, holes or other on the bottom face adapted to the stored items. These could be, for example, holes for chair legs or more general bottom faces 2 that are used for one type of items at one time and for another type of items at another time.

[0048] On Figs. 4 and 5 appear a storage system according to the invention as seen from above and in perspective view, respectively, where a cover casing/cover jacket 15 is seen containing a bottom face 2.

[0049] As seen on Fig. 6, the bottom face 2 has a top part 12 which can be fastened to the second side 9 of the bottom face, the top part 12 surrounding an inner space, the space being entirely or partially closed by plate, perforated plate or wire mesh forming a box, possibly with a lid. It is thereby possible to use the top part for a wide range of different appliances or items, again resulting in great flexibility.

[0050] Besides, means can be disposed at the inner side of the top part 12 and the second side 9 of the bottom face 2, means for fastening one or more appliances, instruments or other items. These can be fastening means in the form of Velcro tape, zipper joints, spring locks, either by themselves or in combination with each other. It is preferred that the fastening means are evenly distributed across the entire inner side of the top part 12 with regard to the flexibility such that there are an optimal variety of options for fastening.

[0051] The holder or stand 11 at the second side 9 of the bottom face 2 or the top part 2 of the bottom face 2 can include at least one second coupling means 13 for coupling/engagement with the means 5 of the rail system 4. This is with regard to functionality, stability and security. The second coupling means 13 of the bottom face can also be tubes, displaceable tubes or telescoping tubes which can be on the side of or, as shown on Fig. 6, within the top part 12 of the bottom face. Other coupling means can thus be fitted according to need and necessity, which can be done in a similar way as with the other coupling means 6 and 13 of the bottom face 2.

[0052] On Fig. 6, where part of the first lifting/lowering mechanism 3 and part of the rail system 4 are removed, the coupling means 16 of the bottom face is visible. This coupling means 16 is intended for engagement with the lifting/lowering mechanism 3 and may, as mentioned below, have many alternative embodiments.

[0053] On Fig. 7 is shown an example of the coupling between the coupling means 16 of the bottom face and the coupling means 7 of the lifting/lowering mechanism. On Fig. 6, one of the coupling means 16 of the bottom face is visible in an embodiment as part of the first lifting/lowering mechanism 3 is omitted from the drawing. Many different kinds of coupling means in the form of hooks, fasteners, catches, click systems or snap systems can be used.

[0054] Means 5 of the rail system 4, their position indicated on Fig. 7, can be slide blocks or rollers or other low friction structural elements that enhance the guiding and stabilising structural properties of the storage system 1. A slide block may have such a length in the direction of the rail system 4 and such a dimension in the cross-section of the rail system 4 that will provide very little clearance between slide block and rail system 4, whereby the movement of the slide block becomes very stable. Another possibility is the application of rollers. They may be single rollers, though boogie rollers/tandem rollers, or even better a roller construction in the form of a carriage with e.g. to tandem rollers, will, as with the slide block, make the movement in the rail system 4 very stable.

[0055] The rail system 4 can be in or designed to be disposed in several mutually intersecting planes, wherein the line of intersection between the planes has a longitudinal axis that is perpendicular to the longitudinal axis of the rail system 4, and where the rail system 4 is curving at the transition between the planes. The curvature can in most cases be a circular arch with a given radius. By such a design option, the rail system 4 can therefore enable that the storage system 1 can be used for wall only in the combination wall and ceiling, in the combination wall and under floor, or in the combination wall, ceiling and under floor.

[0056] The rail system 4 can possibly be made with track switches which may further increase the flexibility, either at the beginning where storage system 1 is mounted/installed, or at a later time where a need/wish will make it interesting.

[0057] The options for the lifting/lowering mechanism 3 include (not shown) hydraulically and/or pneumatically

operated lifting/lowering means and/or a mechanically operated system, such as a wire drive.

[0058] A hydraulically based actuator is more robust and capable of exerting a force that will ensure that the total weight of the bottom face 2, including items, can be elevated and lowered without any problems, and without overloading the lifting/lowering mechanism 3, and such an actuator can therefore be preferred in case of large loads.

[0059] The lifting/lowering mechanism 3 is preferably controlled via a control unit which is operated via an operating panel, possibly in the form of a remote control such as a wireless unit. The wireless unit is e.g. a traditional remote control with buttons for elevating and lowering other apparatuses in the premises/halls. Alternatively, the operating unit is a smartphone, a tablet computer or similar portable unit on which is installed a program that via a wireless connection, such as a wireless data network, mobile network, internet, bluetooth or infrared connection, transmits information to the control unit regarding lifting/lowering the bottom face 2 to the wanted position.

[0060] The storage system 1 may furthermore, as shown on Fig. 8, include a second lifting/lowering mechanism 14 in the form of so-called lift-up fittings for lifting/lowering a bottom face 2 to a different position outside of and in parallel with a first position. Lift-up fittings are known from i.a. doors on baggage compartments on coaches, lids, tabletops and on some microwave oven fittings, and many other items where the lift-up devices displace lids etc., preferably in a circular movement. On Fig. 8 the circularly curved movement between two positions is shown with a broken line as a circular arch.

[0061] As it appears from the Figs. 2 to 5, the storage system 1 can further include at least one cover casing/cover jacket 15 that may be a more or less closed unit covering the bottom face 2 and possibly applied holder/stand 11 or top part 12.

[0062] The cover casing/cover jacket 15 can be made of wire mesh so that it can be seen what is stored on the bottom face 2, and therefore can be applied as prevention against falling items, or it can be made of closed, opaque material such as plywood or similar, which in addition to the preventive effect against falling items also can be used as decoration in the form of paintings or advertisements.

[0063] If several bottom faces 2 are used in the same storage system 1, e.g. as shown on Fig. 8, the cover casing/cover jacket 15 can of course be of such size that all bottom faces 2 are covered thereby. If there are several bottom faces 2 in a storage system 1, there is obviously a plurality of options for the design of the cover casing/cover jacket 15, as a storage system 1 using a lift-up fitting entails other solutions than storage systems 1 where the bottom faces 2 are running on the same rail system 4.

[0064] The cover casings/cover jackets 15 can be closed at the top, thereby ensuring that the stored items do not become dusty during storage, and not the least whereby is achieved a solution that appear more orderly.

Claims

1. A storage system (1) for mounting in buildings, wherein the storage system (1) includes at least one bottom face (2) and a first lifting/lowering mechanism (3), **characterised in that** the system (1) further includes a rail system (4) disposed in a vertical plane, the rail system (4) having at least one means (5) guided along the longitudinal axis of the rail system (4), that the bottom face (2) further includes coupling means (6) for coupling/engagement with the means (5) of the rail system (4), that the bottom face (2) further includes a number of coupling means (16), and that the lifting/lowering mechanism (3) includes coupling means (7) for coupling/engagement with the coupling means (16) of the bottom face or with the means (5) of the rail system (4), the bottom face (2) constituting a plane with a first side (8) and a second side (9), provided with at least one wheel (10) at the first side (8).

2. Storage system (1) according to claim 1, **characterised in that** the bottom face (2) at least has a holder or a stand (11) at the second side (9).

3. Storage system (1) according to any of claims 1 and 2, **characterised in that** the bottom face (2) has a top part (12) which can be fastened to the second side (9) of the bottom face, the top part (12) surrounding an inner space, the inner space being entirely or partially closed by plate, perforated plate or wire mesh.

4. Storage system (1) according to any of claims 2 to 3, **characterised in that** the holder or stand (11) at the second side (9) of the bottom face (2) or the top part (12) of the bottom face includes at least one second coupling means (13) for coupling/engagement with the means (5) of the rail system.

5. Storage system (1) according to any of claims 1 to 4, **characterised in that** the means (5) of the rail system are slide blocks or rollers.

6. Storage system (1) according to any of claims 1 to 5, **characterised in that** the rail system (4) is disposed in several mutually intersecting planes, wherein the line of intersection between the planes has a longitudinal axis that is perpendicular to the longitudinal axis of the rail system (4), and where the rail system (4) is curving at the transition between the planes.

7. Storage system (1) according to any of claims 1 to

6, **characterised in that** the lifting/lowering mechanism (3) includes hydraulically and/or pneumatically operated lifting/lowering means, and/or a mechanically operated system, such as a wire drive.

8. Storage system (1) according to any of claims 1 to 5, **characterised in that** the system (1) further includes a second lifting/lowering mechanism (14) in the form of a lift-up fitting for lifting and lowering a second bottom face (2), respectively, into a position outside of and in parallel with a first bottom face (2).

9. Storage system (1) according to any of claims 1 to 6, **characterised in that** the storage system (1) includes at least one cover casing or cover jacket (15).

10. Use of a storage system (1) according to any of claims 1 to 9 for storing mats, gymnastic appliances, tables/chairs, or other appliances or tools.

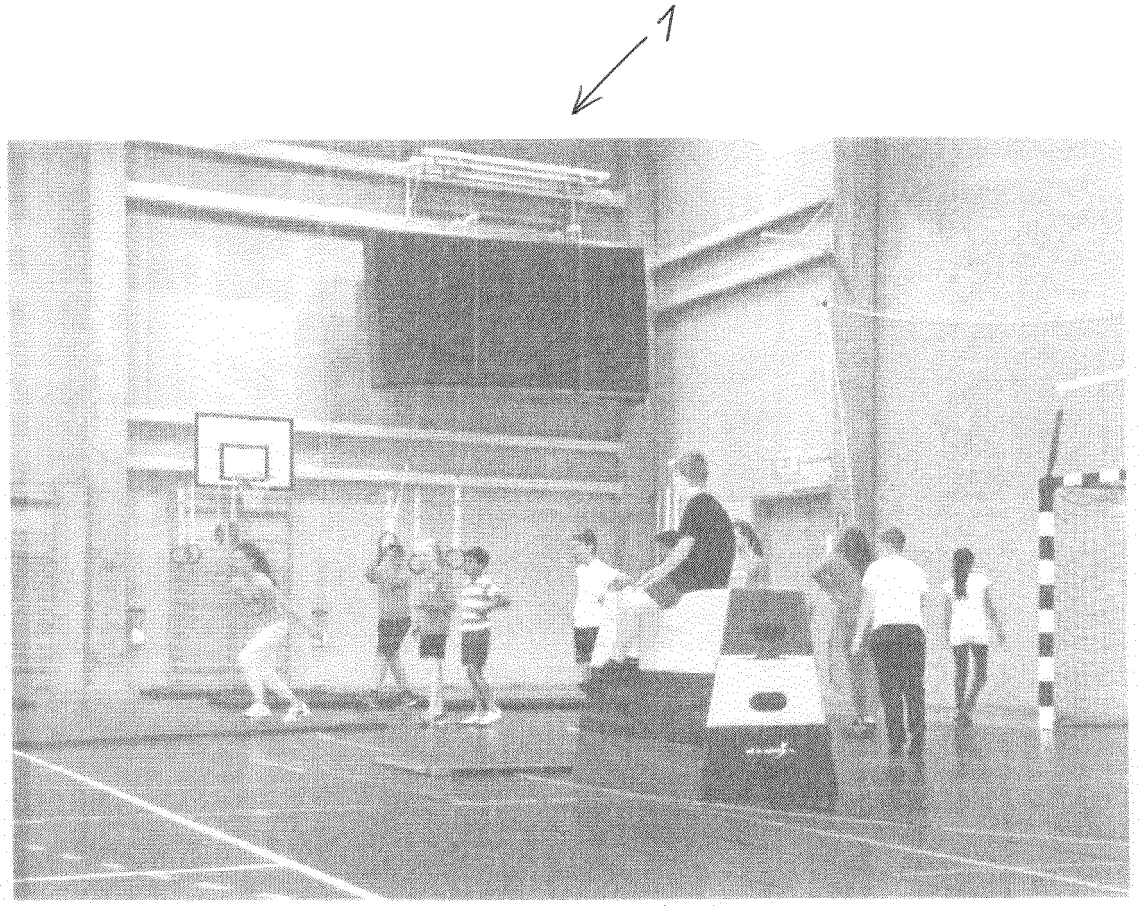

Fig 1a

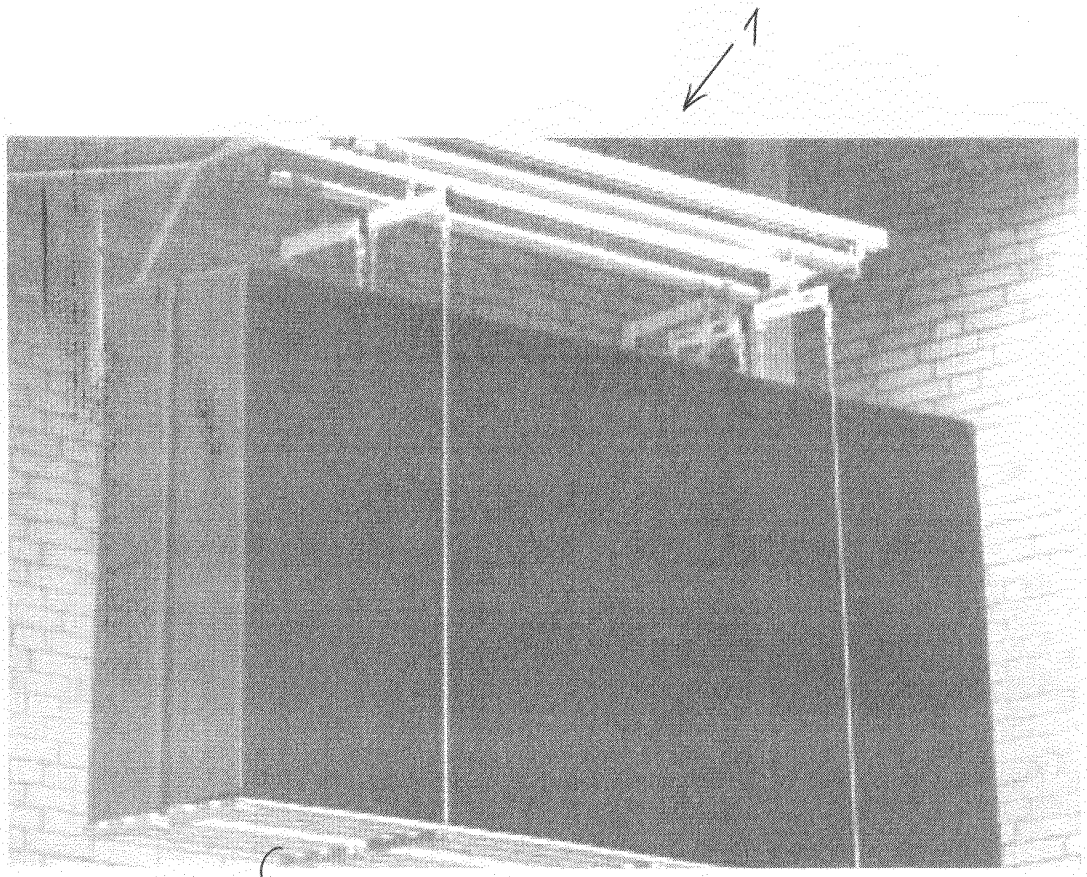

Fig 1b

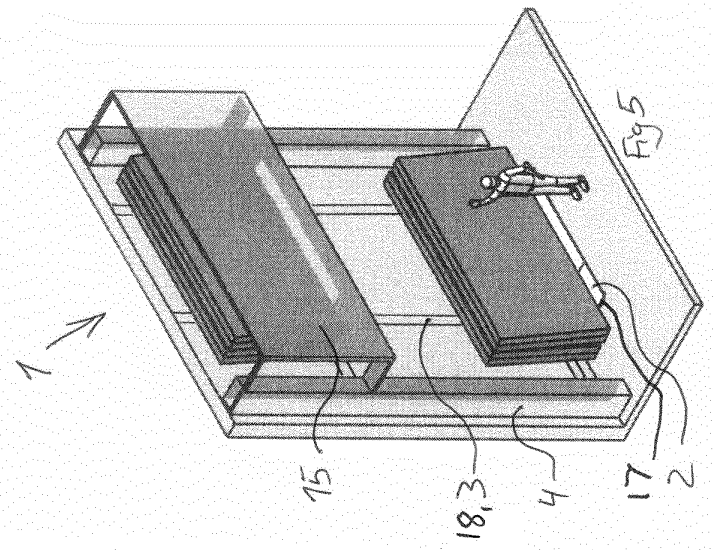

Fig 5

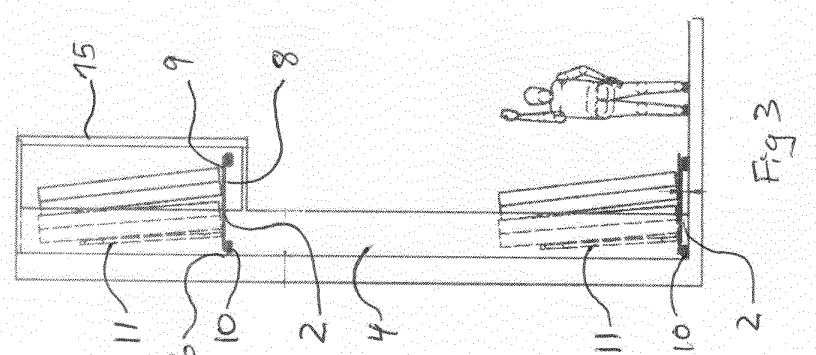

Fig 3

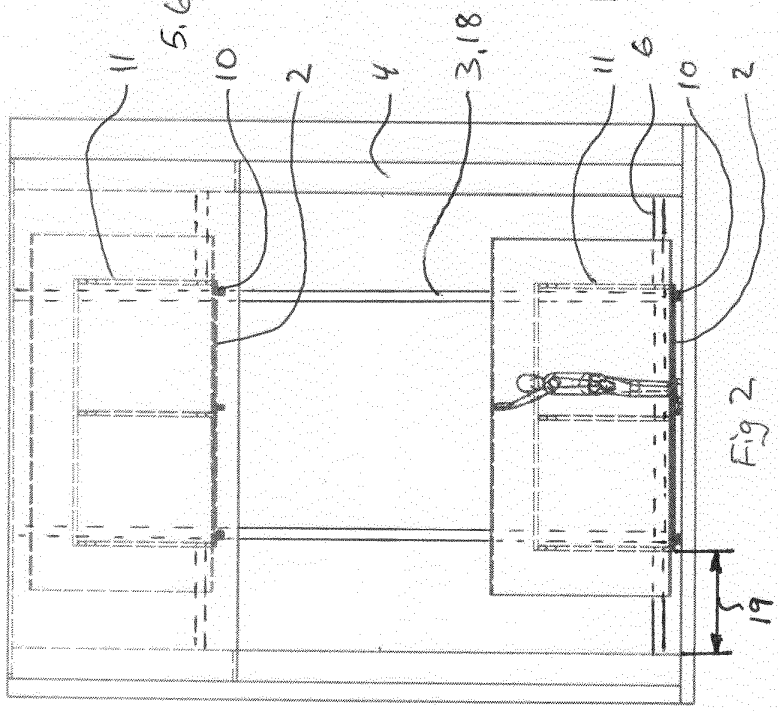

Fig 2

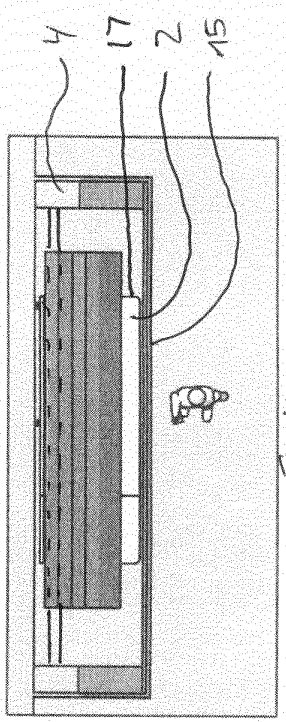

Fig 4

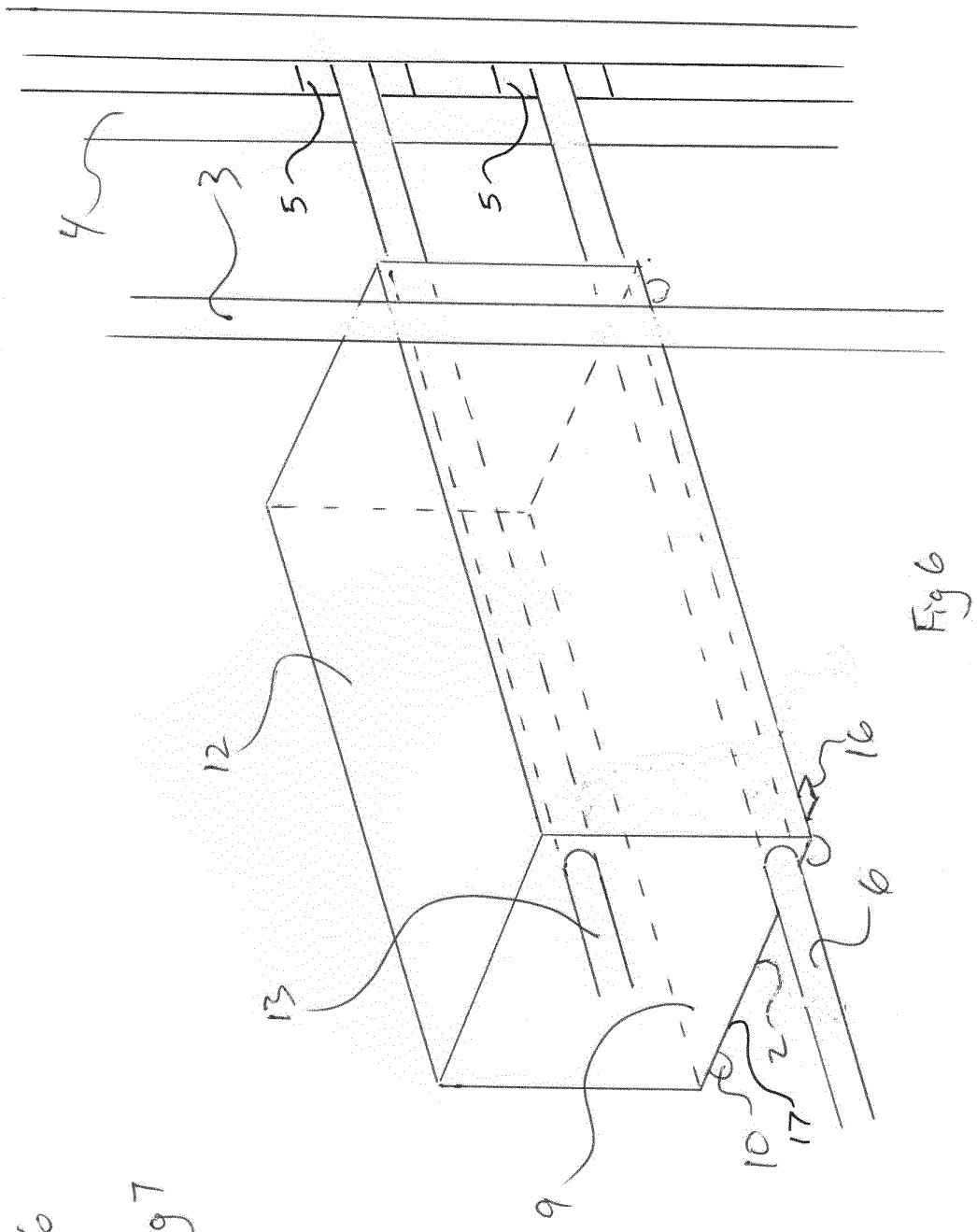

Fig 6

Fig 7

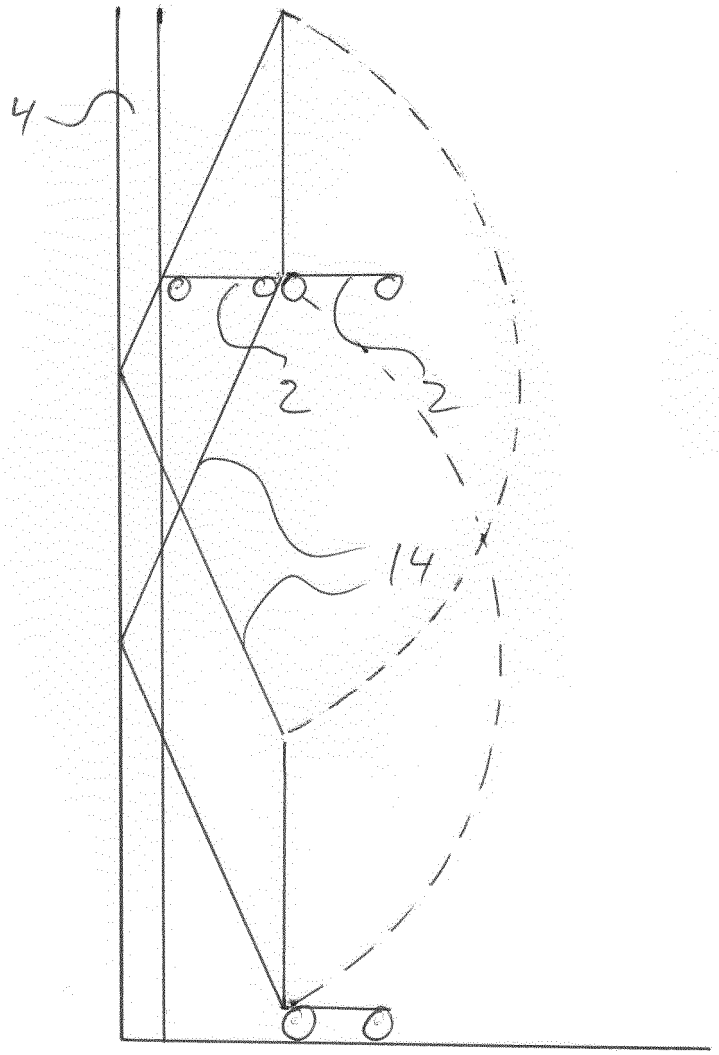

Fig 8

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EUROPEAN SEARCH REPORT

Application Number
EP 15 17 1661

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The Hague	1 October 2015	Dijoux, Adrien

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