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(54) **Storage cabinet and method for making or assembling the same**

(57) The invention relates to a storage cabinet (2) and method for manufacture or assembly thereof. The storage cabinet comprises:

- at least two side walls (4) and a rear wall;
- a top side (6) and a bottom side (8);
- at least one storage space;
- at least one door (10) for closing one or more storage spaces; and

- at least one substantially horizontal shelf (28) placed between two side walls, wherein the shelf can be fastened in vertical position to the side wall at a desired position at fastening points such that a sufficiently strong construction is realized to enable effective resistance to vandalism.

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Description

[0001] The present invention relates to a storage cabinet provided with at least one storage space and a door for closing thereof. Such storage cabinets are also referred to in practice as lockers.

[0002] A storage cabinet known in practice is formed from steel plates which serve as side wall and rear wall. Shelves are provided therein, after which a storage space is closed with a door. These storage cabinets are used in, among other places, schools, sports centres, swimming pools and company premises. This requires a robust, vandal-proof storage cabinet. The size of the storage spaces in such a storage cabinet depends on the application. Such a storage cabinet can for instance be used as a letterbox, wherein the storage cabinet consists of a relatively large number of storage spaces of relatively small dimensions. It is also possible to dimension the storage space such that a coat can for instance be hung therein. Known storage cabinets have been developed for one specific application. This requires a design of the storage cabinet adapted to such a specific application. This results either in larger stocks or long delivery times. In addition, a relatively large number of operations is required for the purpose of realizing such a storage cabinet.

[0003] The present invention has for its object to provide a storage cabinet with which such a storage cabinet can be adapted to the requirement of a specific application, and which is also sufficiently robust.

[0004] This object is achieved with the storage cabinet according to the invention, comprising:

- at least two side walls and a rear wall;
- a top side and a bottom side;
- at least one storage space;
- at least one door for closing one or more storage spaces; and
- at least one substantially horizontal shelf placed between two side walls,

wherein the shelf can be fastened in vertical position to the side wall and/or rear wall at a desired position at fastening points such that a sufficiently strong construction is realized to enable effective resistance to vandalism.

[0005] One vertical column for a storage cabinet is obtained by providing two side walls and a rear wall. It is likewise possible to provide additional side walls in order to hereby obtain more adjacent vertical columns. It has thus been found for instance that the use of four side walls is very effective. Three adjacent vertical columns are hereby realized. This storage cabinet with side walls, top side and bottom side can be supplied as a unit, thereby limiting the number of assembly operations during placing. In an advantageous embodiment such a vertical column is about 1.80 metres high. Zero to nine shelves can for instance be placed in such a column, with which one to ten storage spaces are realized. These vertical columns can be closed by one or more doors connected

pivottally to the body of the storage cabinet. The number of doors will usually correspond to the number of storage spaces, so that each storage space can be closed individually. By further providing each door with an individual lock an individual user can be allocated a separate storage space. The number of shelves can be adapted to the specific application. The shelf is fastened here to the side wall and/or rear wall in a manner such that a sufficiently strong construction is realized. The shelf is herein placed at the desired position. A robust storage cabinet which is sufficiently vandal-proof is realized with the construction according to the invention.

[0006] In an advantageous preferred embodiment according to the present invention the at least one door is mounted pivottally with a pivot rod provided over substantially the full height of the storage cabinet.

[0007] A very flexible system is created by providing a single pivot rod per vertical column of the storage cabinet. In this way the pivot rod can be placed independently of the number of storage spaces and the number of shelves and doors therefor. The number of components required for storage cabinets used for various specific applications is hereby reduced considerably.

[0008] In an advantageous preferred embodiment the pivot rod is fixed to a shelf using a first protrusion. The fixing with a protrusion prevents the possibility of a lock of a door bursting open as a result of a side wall, and thereby possibly the pivot rod, being bent outward. Fixing the pivot rod relative to a shelf therefore avoids the pivot rod moving in width direction of the storage space and the storage cabinet. Vandalism and theft of property from the storage space is hereby prevented. A pivot rod is preferably fixed using such a protrusion to each shelf provided in the vertical column of the storage cabinet.

[0009] In a further advantageous embodiment according to the present invention the pivot rod is fixed to the side wall using a second protrusion.

[0010] The stability of the pivot rod is increased by also fixing the pivot rod to the side wall using a second protrusion. Providing the second protrusion realizes that the pivot rod is fixed relative to the side wall. In the case of a plurality of mutually adjacent vertical columns such a side wall can of course be a partition wall. The pivot rod is preferably fixed with a first protrusion relative to a shelf and with a second protrusion relative to a side wall. The pivot rod is hereby fixed in the whole flat plane substantially perpendicularly of the (door) opening of the vertical column of the storage cabinet. An additional advantage of the connection of the pivot rod to both the shelf and the side wall via the two protrusions is that the stability of the storage cabinet according to the invention is greatly increased. The vandal-proof nature of the storage cabinet is likewise enhanced by this increased stability. The pivot rod is fixed in vertical direction to the bottom and top side of the storage cabinet. The pivot rod is fully secured in such manner, whereby a robust and stable system is obtained.

[0011] The individual doors for the storage space are

formed from a door panel which is preferably provided at a standard width. By manufacturing both the body and the door panel with a standard height, for instance 1.80 metres, an individual door for each storage space can be realized in efficient manner by sawing or cutting the door panel to the correct length. The advantage hereof is that no further operations, such as for instance bending side edges, are necessary on an individual door. This has the result that the decision concerning the number of storage spaces in a storage cabinet need only be taken around the time that it is supplied. This reduces the necessary storage of standard components. This also limits the required delivery time. The material for the door is preferably a 6 mm thick composite material. It has been found that such a door has good resistance to vandalism. In a preferred embodiment the fastening points of the shelves on the side wall and/or the rear wall can be embodied as a recess in for instance the rear wall, in which a shelf support can be placed. It is also possible, particularly in the case of the rear wall, to as it were "rivet" the shelves fixedly onto this rear wall. By already providing a number of recesses at various heights in the storage cabinet during production of the rear walls and side walls the desired storage space can be realized from a standard body part. The recesses which are not used preferably serve as ventilation openings for the storage cabinet.

[0012] In an advantageous preferred embodiment according to the present invention the storage cabinet comprises a profile on a side wall, in which the second protrusion can be mounted such that in open and in closed position of the door the pivot rod is enclosed in order to be able to withstand vandalism.

[0013] By providing an additional profile on the side wall it is possible to surround or as it were enclose the pivot rod, thereby preventing access to this pivot rod. This is of additional importance in the absence of shelves, so in the case of one large storage space, where the pivot rod is fixed less firmly relative to the storage cabinet. This shielding further avoids vandalism of and possible theft from the storage cabinet according to the invention. The profile is preferably formed by bending the edge of a side wall. Preferably provided in this profile is a number of openings, for instance in the form of slotted holes, in which the second protrusion can be mounted for the purpose of fixing the pivot rod. Also realized in this way is that the second protrusion is not accessible and cannot therefore be deliberately damaged. This further increases the robustness of the storage cabinet according to the invention.

[0014] In an advantageous preferred embodiment according to the present invention the storage cabinet comprises a cable duct which extends substantially over the full height and which can be mounted substantially form-fittingly in the storage cabinet.

[0015] A number of cables can be incorporated in efficient manner in the storage cabinet by providing a cable duct. It is hereby possible for instance to operate the locks electronically. A cable duct serves here as guide for these

cables. Providing a cable duct additionally prevents that access can be gained to these cables, with possible deliberate damage as a result. The cable duct is preferably placed close to the opening of the vertical column of the storage cabinet. A form fitting is hereby effected in simple manner in that the cable duct can be combined with the profile preferably provided on the side wall of the storage cabinet. The second protrusion is preferably connected here not only to the profile but also to the cable duct, likewise for fixing thereof. An additional advantage of the use of a cable duct is that the stability of the storage cabinet in vertical direction can hereby be further increased.

[0016] In an advantageous embodiment according to the present invention the storage cabinet comprises a door stop for limiting the angle of opening of a door.

[0017] Providing a door stop avoids the door of a storage space in an open position obstructing access to an adjacent storage space. This door stop is preferably realized together with the profile on the side edge. Such a limiting can hereby be realized in efficient manner without additional components being required.

[0018] In a closed position the door preferably lies against the profile of an adjacent storage space. Support of the door is hereby realized in vertical direction. The other outer end of the door is supported by the pivot rod. In closed position the door preferably lies against the shelves and/or the edge of the storage cabinet such that it is supported thereby. It is possible in this way to support a door all the way round as soon as it is closed. A good measure of resistance to vandalism is hereby achieved. In addition, this also achieves that other storage spaces are not accessible as soon as one door is opened, since the immediately adjacent doors rest against the shelves. Theft and vandalism are hereby further prevented. The shelf or shelves preferably lie slightly back from the side wall such that the door or doors are as it were placed inside the storage cabinet in closed position of the door. A handle is preferably integrated into the door. This is realized for instance by providing a small edge on the outer end of the door, close to the profile of an adjacent storage space.

[0019] The invention further also relates to a method for manufacturing or assembling a storage cabinet, comprising the steps of:

- providing side walls and a rear wall in which a profile can be arranged if desired;
- providing a top side and a bottom side;
- arranging fastening points for shelves and/or protrusions of a pivot rod in the side walls and/or profile;
- placing shelves on the fastening points at a desired position with optional protrusions for a pivot rod; and
- fixing to the protrusions the pivot rod on which at least one door is arranged for closing one or more storage spaces.

[0020] With this method a storage cabinet as described

above can be manufactured or assembled in efficient manner. The same effects and advantages are hereby achieved as discussed in respect of the storage cabinet.

[0021] Further advantages, features and details of the invention are elucidated on the basis of preferred embodiments thereof, wherein reference is made to the accompanying drawings, in which:

- Figure 1 shows a view of a storage cabinet according to the invention;
- Figures 2A-E show views of the successive steps for manufacturing a storage cabinet of figure 1;
- Figure 3 shows a cross-section of a storage cabinet according to the invention;
- Figure 4 shows a view of the storage cabinet of figure 3;
- Figure 5 shows a view of the fixation of the pivot rod of the storage cabinet of figure 4;
- Figure 6 shows a cross-section of the profile and pivot rod of the storage cabinet of figure 3; and
- Figures 7A-B show a top view of a storage cabinet with a door in closed and open position.

[0022] A storage cabinet 2 (figure 1) is formed from two or more side walls 4 which are connected to a rear wall (not shown), a top plate 6 and a bottom plate 8. In the shown embodiment top plate 6 is embodied as a flat plate. In order to prevent objects being placed on top of a storage cabinet 2 it can also be provided in downward sloping form. In the shown embodiment a cabinet 2 has two vertical columns. Each vertical column of cabinet 2 is provided with five doors 10, wherein each door 10 is provided with a lock 12. Each door 10 is provided with a number plate 14 integrated into the oblique edge of door 10. Identification of a storage space of cabinet 2 is hereby possible such that this identification is arranged in robust manner. In the case of an integrated number plate 14, as in the shown embodiment, the correct storage space can already be localized from one side without having to stand directly in front of cabinet 2.

[0023] In the manufacture or assembly of a cabinet 2 (figures 2A-D) side walls 4 are first connected to a rear wall 16. Use can be made here of a bent edge 18 on side wall 4 for a simple and stable fixing thereof to rear wall 16. On the front side of cabinet 2 a side wall or partition wall 4 is provided with a profile 19. In the shown embodiment (figure 2A) this profile is formed by bending the side edge. A cable duct 20 can be arranged in profile 19. Cable duct 20 reinforces profile 19. Cables can also be guided in this cable duct 20, for instance for the purpose of electronic control of lock 12. Side wall 4 is provided with slotted holes 21. Cable duct 20 is provided with similar slotted holes 22. After placing of cable duct 20 in profile 19 these slotted holes 21 and 22 correspond such that a continuous opening is obtained. These openings can optionally also be provided after placing of cable duct 20 in profile 19.

[0024] A protrusion 26 for the pivot rod is provided in holes 21, 22. If necessary, additional shelf supports 24 can be provided on side wall 4 of cabinet 2 (figure 2B). The necessity of such shelf supports 24 depends on, among other factors, the dimensions of shelf 28 (figure 2C) provided in cabinet 2. A shelf 28 is provided with a second protrusion or pin 30 for the pivot rod. If desired, protrusion 30 can rest on protrusion 26, thereby also realizing a supporting function. Pivot rod 32 is held fast in all directions with protrusion 30 and protrusion 26. Shelf 28 further fixes cable duct 20 in profile 19.

[0025] Pivot rod 32 is provided running along the whole height of storage cabinet 2 (figure 2D). In the shown embodiment pivot rod 32 is arranged from above in storage cabinet 2 by being carried successively through protrusion 30 of shelf 28, protrusion 26 on profile 19 and through door 10. The storage space below is then provided with pivot rod 32. The storage spaces of cabinet 2 are hereby provided with a door 10 on which an integrally formed edge or handle 34 is also provided in the shown embodiment. The shown embodiment shows clearly that it is possible to mount the whole pivot rod 32 in enclosed manner to the body of cabinet 2. A robust and vandal-proof construction is hereby obtained. It is also possible to shield pivot rod 32 with edge 34 in the opened position of door 10 (figure 2E).

[0026] In an alternative embodiment the storage cabinet is embodied as a three-column cabinet 36 (figure 3). The three columns are formed by a first element 38, a central element 40 and a third element 42. In the case of a door 10 which opens to the left (as seen standing in front of door 10) a double side wall 44 is provided close to third element 42 such that protrusion 26, among other parts, can be fixed therein. A door stop 46 can also be realized for third element 42 using this double side wall 44, and achieved in addition is that all shelves have a uniform width. The overall width of the shown three-column cabinet 36 is 1134.6 mm. In the shown embodiment the external depth of three-column cabinet 36 is 499.2 mm. The internal dimension of a storage space of an element 38, 40, 42 amounts to 369 mm and the thickness of double side wall 44 amounts to 26 mm. The thickness of a single side wall 4 amounts to 0.8 mm. In the shown embodiment door 10 has a fixed width of 342.7 mm and a clear width of about 321.355 mm. Door 10 of composite material has in cross-section two bent edges along the vertical side of door 10. A small bent portion is provided close to the side with pivot rod 32 to enable rotation of door 10. On the opposite side of the door a bent portion is embodied so as to fit against profile 19. When an additional edge is provided, it can also serve as handle 34. In the shown embodiment door stop 46 is integrated with profile 19. In the shown embodiment door 10 is situated slightly inside storage cabinet 36. This achieves that door 10 is supported along the vertical side via pivot rod 32, profile 19 and in horizontal direction by two shelves 28. In the shown embodiment the height of storage cabinet 36 amounts to about 1.8 metres, excluding the integrated

plinth (figure 4). In the shown embodiment (figure 5) pivot rod 32 runs through protrusion 26, protrusion 30 and door 10.

[0027] In the shown embodiment (figure 6) cable duct 20 is situated in the bent edge formed by profile 19. Profile 19 here has an integrated function as end stop 46 because profile 19 is provided with a stop surface 48, with which door 10 is held in open position. Protrusion 26 is fixed to profile 19 and cable duct 20 through openings 21, 22. The robustness of storage cabinet 36 is hereby further increased and, in addition, profile 19 and cable duct 20 are fixed relative to each other. Door 10 is provided with an oblique side 52 which in the closed position lies against contact surface 50 of profile 19. An entire support surface is hereby realized, whereby pressing on and thereby destroying the door is impossible.

[0028] In the shown embodiment (figures 7A and B) door 10 can be opened at an angle of about 90 degrees. In a fully opened position door 10 comes up against stop surface 48, which is formed in the shown embodiment by profile 19. Door 10 hereby comes to a standstill against shelf 28 and side 4, or at least the bent profile 19 thereon. In the shown embodiment pivot rod 32 is connected to side wall 4, or double side wall 44, and shelf 28. Pivot pin 32 is here completely enclosed in both the closed and opened position. A robust and vandal-proof construction is hereby obtained. Shelves 28 can be provided at any desired vertical position. By making use of storage cabinets 2, 36 with a height of 1.8 metres, preferably with a fixed width of storage space, a fixed width can be employed for door 10. Because no horizontally running edges are provided on door 10 it is possible to make use of a door profile of standard length and saw or cut it to size. For the shown embodiments use can for instance be made of a door panel length of 5.4 metres, whereby with a single panel an entire three-column cabinet 36 can be provided with doors 10. It is hereby only necessary to stock one type of door panel, with which any specific application can be realized by sawing the door panel to the correct size for door 10. Although door 10 can be placed in front of a plurality of storage spaces, a separate door 10 is usually provided per individual storage space. In closed position door 10 lies at its top side and bottom side against two shelves 28 lying one above the other. On the vertical side door 10 lies against profile 19 and pivot rod 32 when in closed position. A full support of door 10 is hereby obtained.

[0029] The present invention is by no means limited to the above described preferred embodiments. The rights sought are defined by the following claims, within the scope of which many modifications can be envisaged. It is thus possible for instance to provide an extra slot in door 10, such that it can serve as letterbox. In addition to an embodiment of storage cabinet 2, 36 with steel plate material and a composite door 10, it is also possible to envisage other materials, such as plastic and wood. Storage cabinets 2, 36 are preferably provided as standard with a door 10 opening to the right, in order to limit the

quantity of bodies for cabinets 2, 36 and door panels for door 10 it is necessary to hold in stock. Systems according to the invention which open to the left are also possible. It is however also possible to envisage other shapes and dimensions than those of the shown embodiments.

Claims

1. Storage cabinet, comprising:

- at least two side walls and a rear wall;
- a top side and a bottom side;
- at least one storage space;
- at least one door for closing one or more storage spaces; and
- at least one substantially horizontal shelf placed between two side walls,

wherein the shelf can be fastened in vertical position to the side wall and/or rear wall at a desired position at fastening points such that a sufficiently strong construction is realized to enable effective resistance to vandalism.

2. Storage cabinet as claimed in claim 1, wherein the at least one door is mounted pivotally with a pivot rod provided over substantially the full height.
3. Storage cabinet as claimed in claim 2, wherein the pivot rod is fixed to the shelf using a first protrusion.
4. Storage cabinet as claimed in claim 2 or 3, wherein the pivot rod is fixed to the side wall using a second protrusion.
5. Storage cabinet as claimed in one or more of the claims 1-4, wherein the door between two adjacent side walls can be divided into separate parts subject to the position of the shelves.
6. Storage cabinet as claimed in one or more of the claims 1-5, wherein fastening points in the form of recesses which are not in use form ventilation openings.
7. Storage cabinet as claimed in claim 6, comprising a profile on the side wall, in which the second protrusion can be mounted such that in open and in closed position of the door the pivot rod is shielded in order to enable effective resistance to vandalism.
8. Storage cabinet as claimed in one or more of the claims 1-7, comprising a cable duct which extends substantially over the full height and which can be mounted substantially form-fittingly in the storage cabinet.

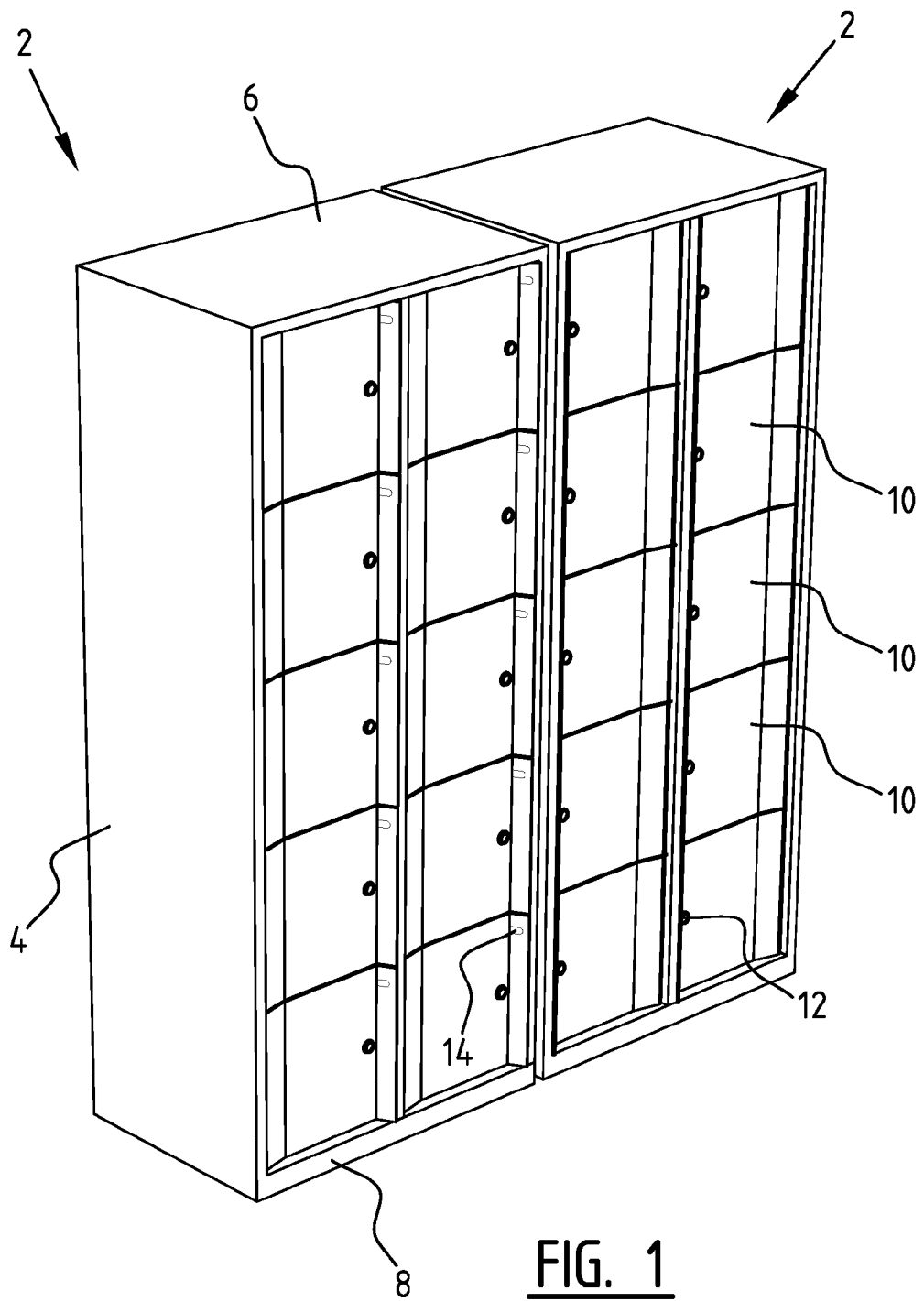
9. Storage cabinet as claimed in one or more of the claims 1-8, comprising a profile as door stop for limiting the angle of opening of the door.
10. Storage cabinet as claimed in claim 9, insofar as depending on claim 8, wherein the second protrusion can be operatively connected to the cable duct in order to fix the cable duct relative to the profile. 5
11. Storage cabinet as claimed in claim 9, wherein in closed position the door lies against the profile of an adjacent storage space. 10
12. Storage cabinet as claimed in claim 11, wherein the door is provided with an integrated handle. 15
13. Storage cabinet as claimed in one or more of the claims 1-12, wherein in closed position the door lies against the shelves and/or an edge of the storage cabinet. 20
14. Method for manufacturing or assembling a storage cabinet, comprising the steps of:
- providing side walls and a rear wall in which a profile can be arranged if desired; 25
 - providing a top side and a bottom side;
 - arranging fastening points for shelves and/or protrusions of a pivot rod in the side walls and/or profile; 30
 - placing shelves on the fastening points at a desired position with optional protrusions for a pivot rod; and
 - fixing to the protrusions the pivot rod on which at least one door is arranged for closing one or more storage spaces. 35

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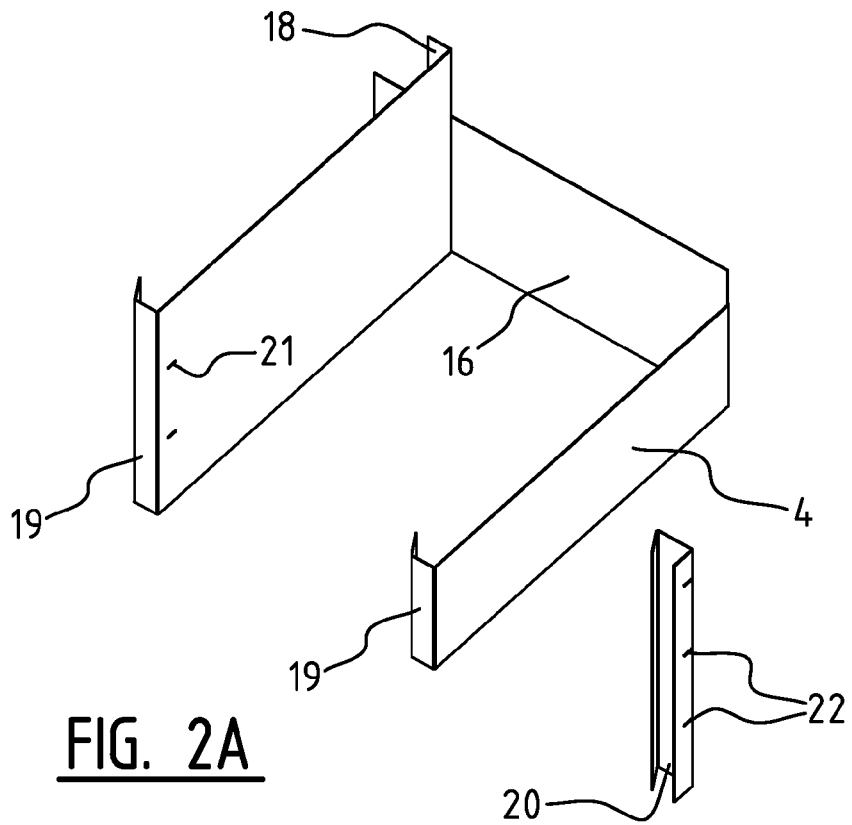


FIG. 2A

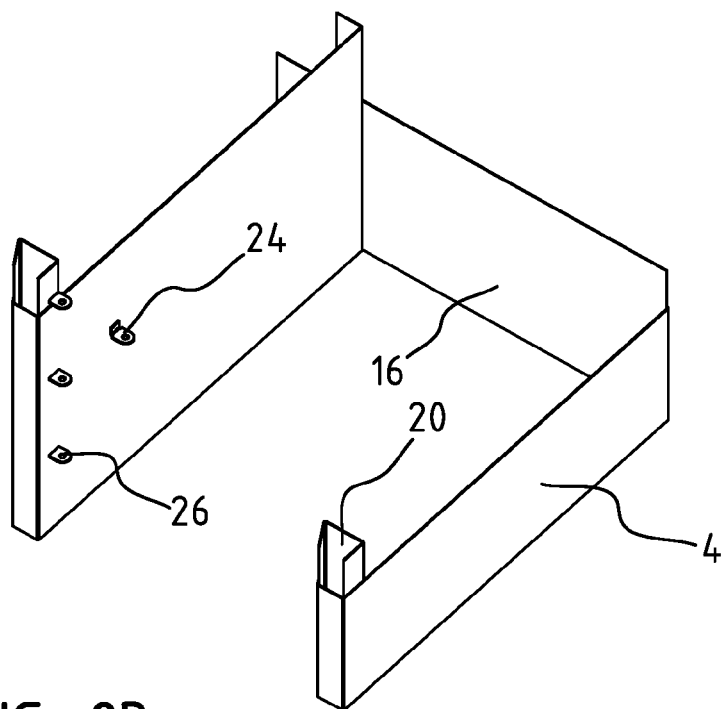


FIG. 2B

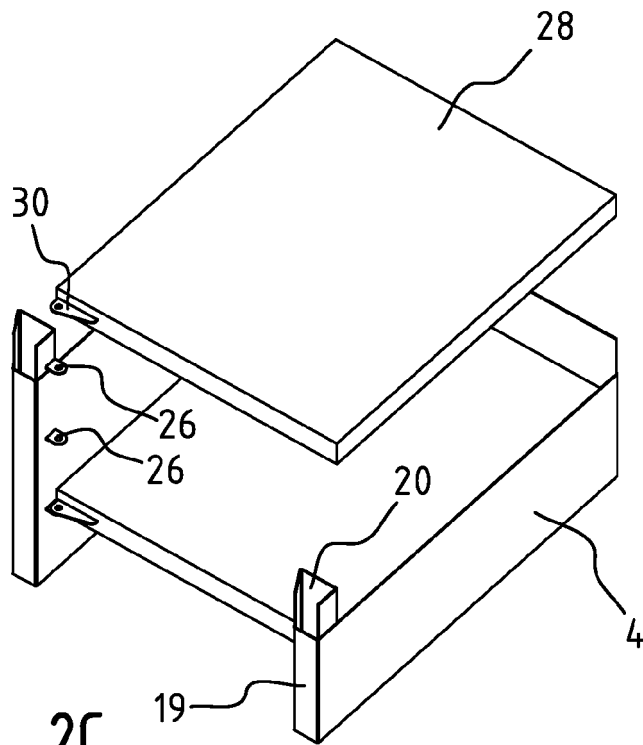


FIG. 2C

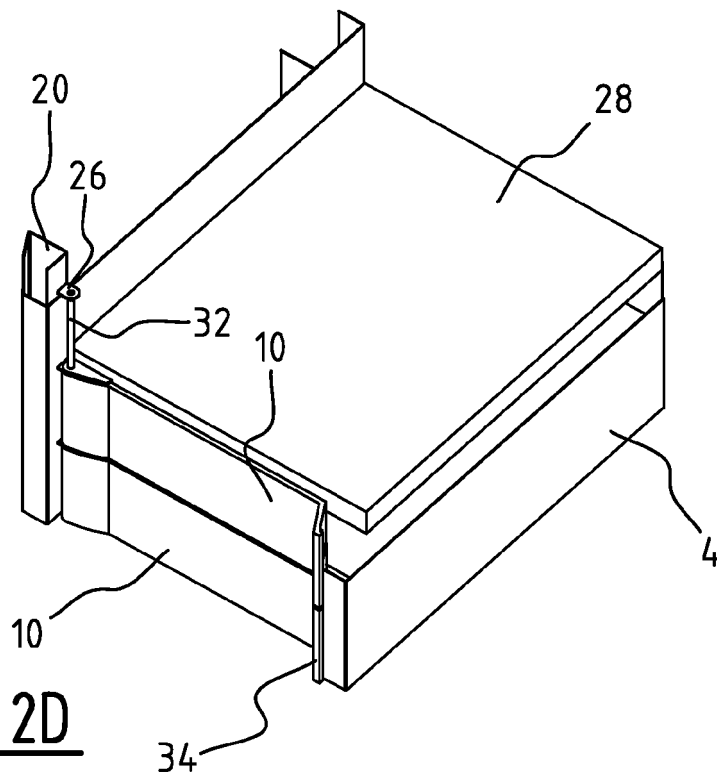


FIG. 2D

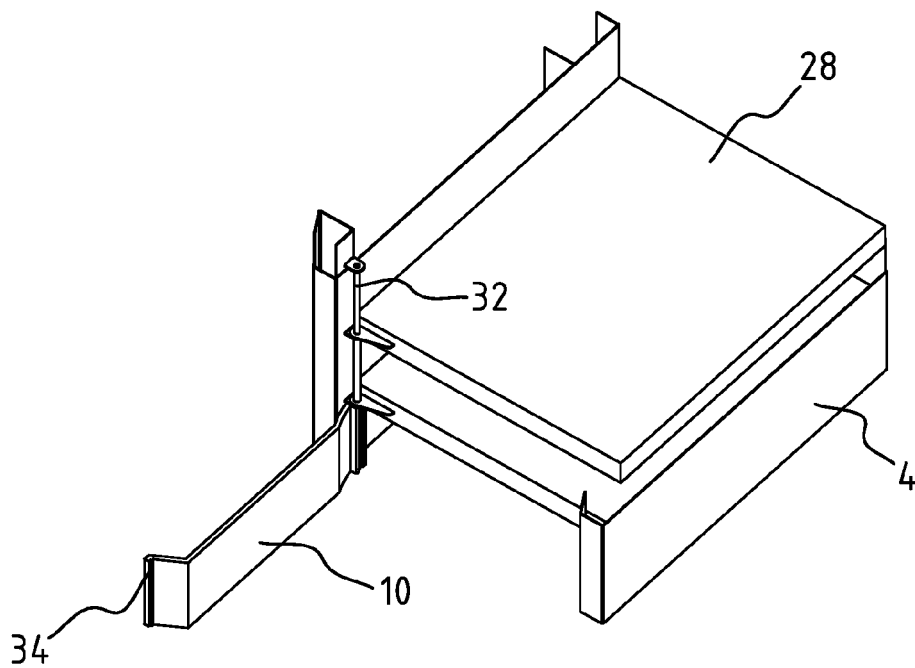


FIG. 2E

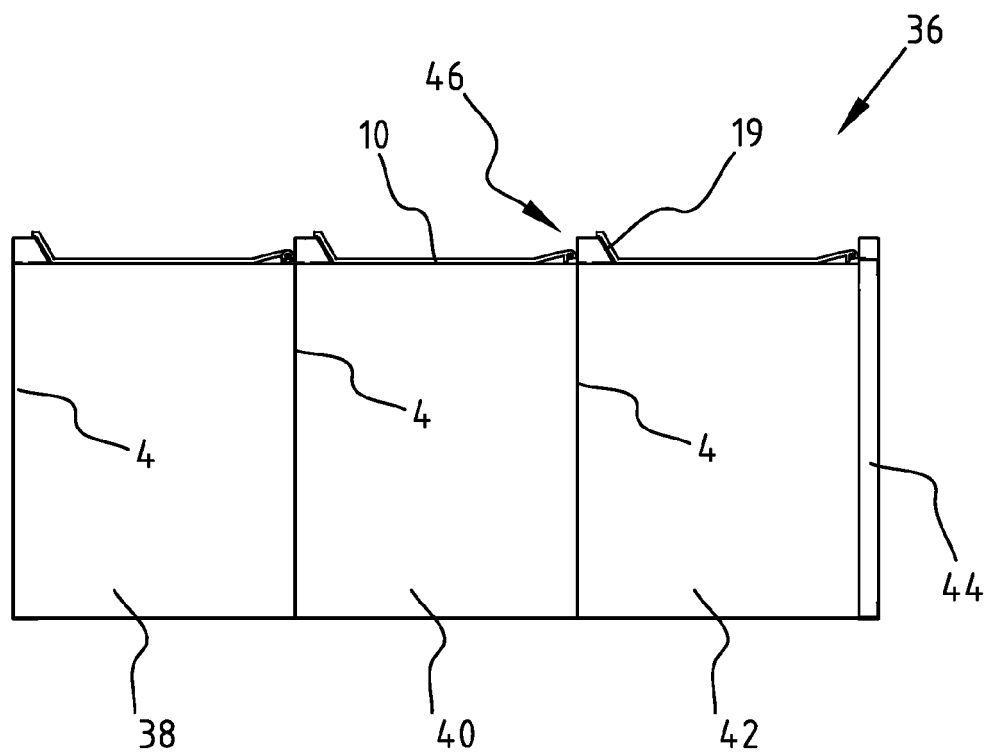


FIG. 3

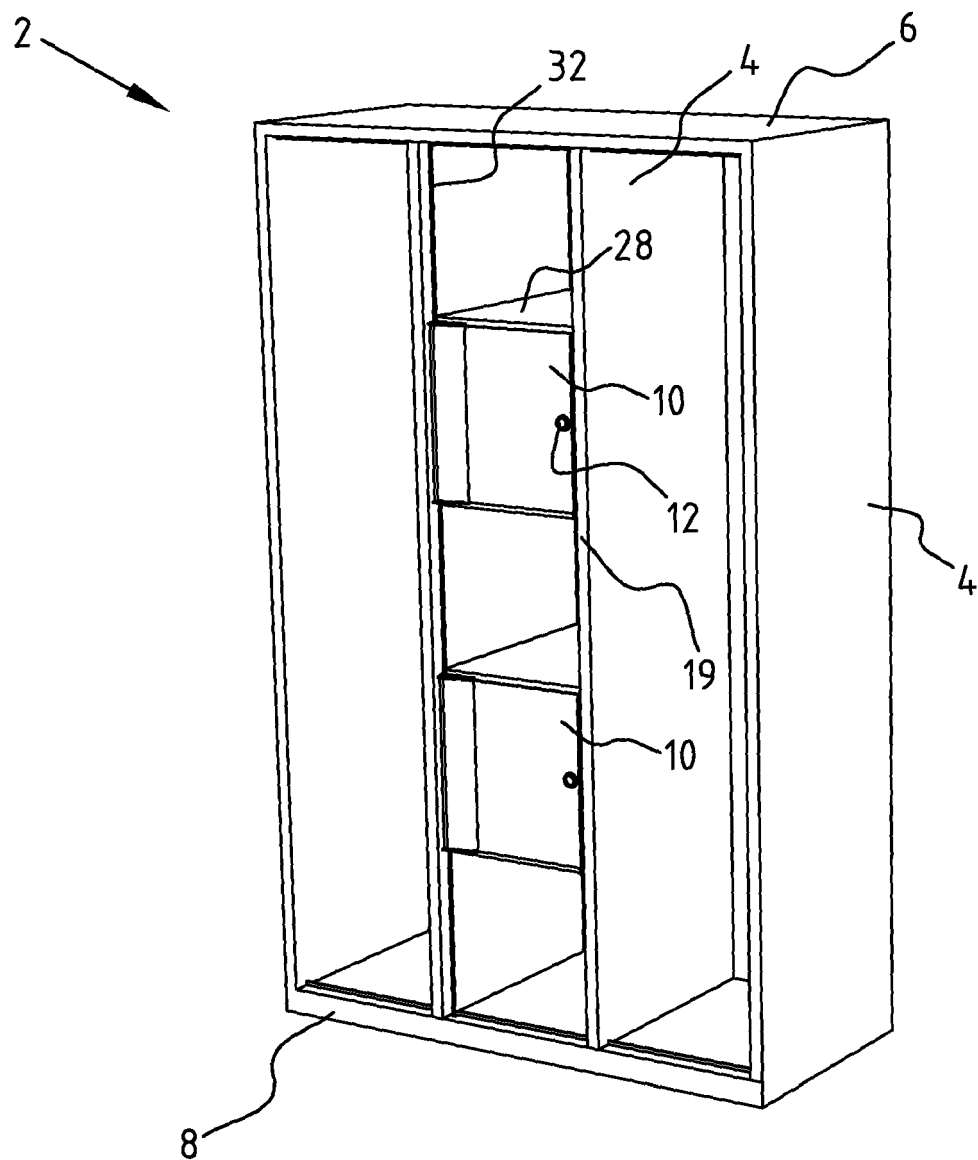


FIG. 4

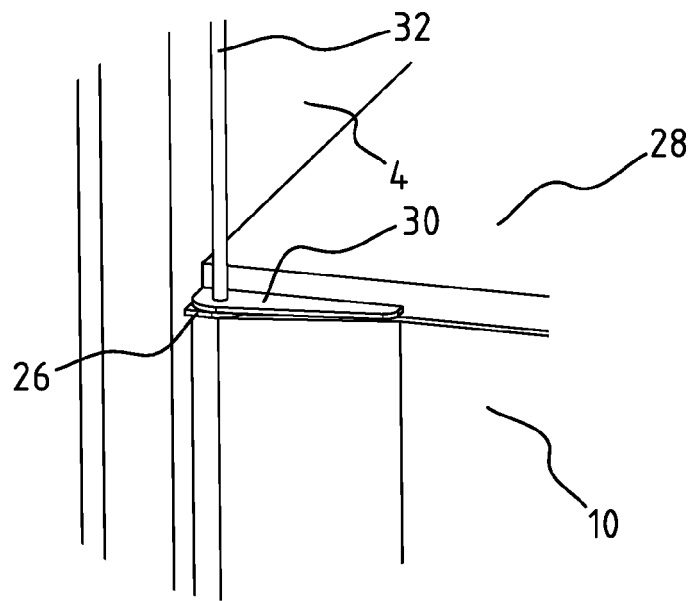


FIG. 5

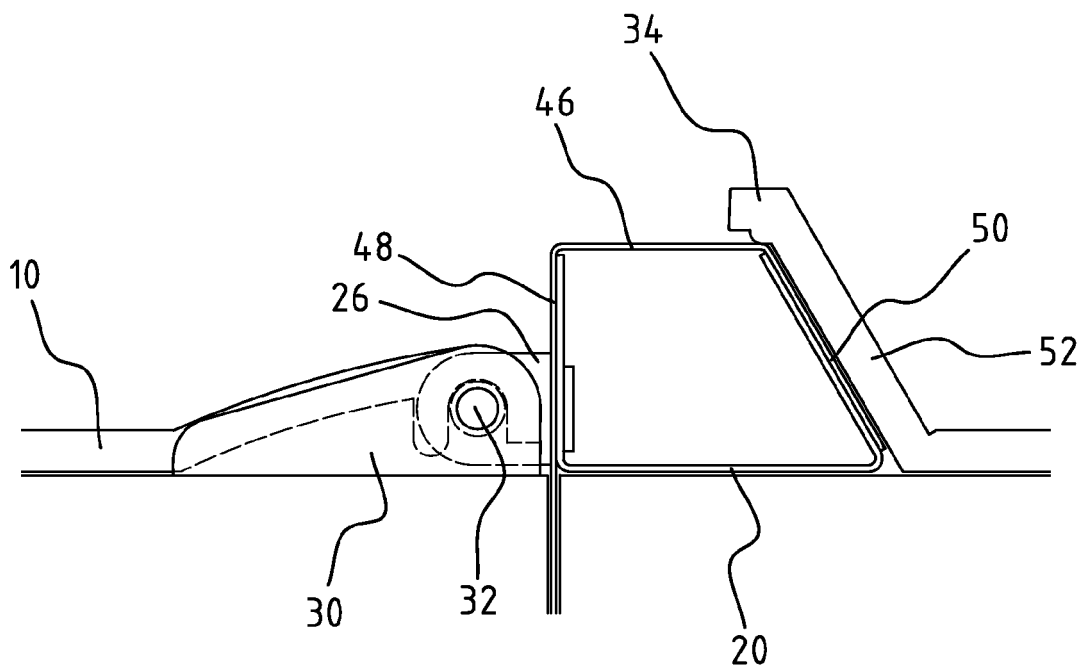


FIG. 6

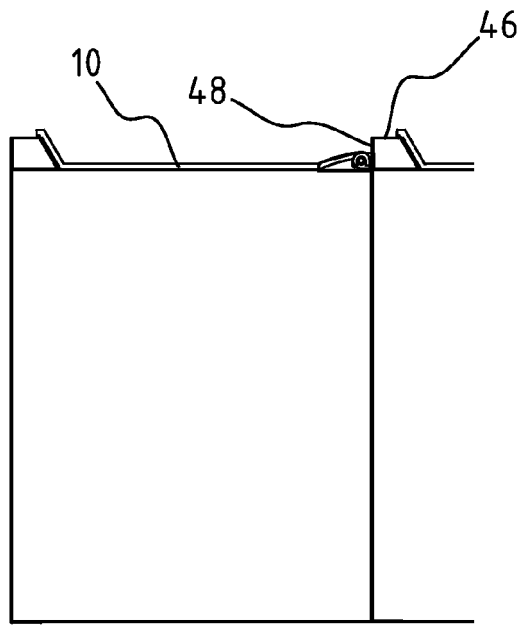


FIG. 7A

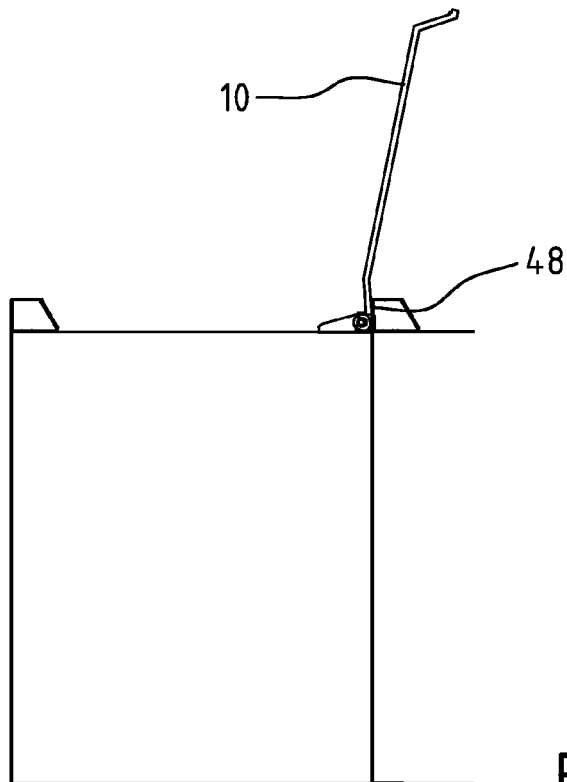


FIG. 7B