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(54) **SUPPORT FRAME FOR ARRANGING MODULE UNITS IN A SERVICE VEHICLE**

STÜTZRAHMEN ZUR ANORDNUNG VON MODULEINHEITEN BEI EINEM NUTZFAHRZEUG

ARMATURE PORTEUSE POUR AGENCEMENT D'UNITÉS MODULAIRES DANS UN VÉHICULE D'ENTRETIEN

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Description

Technical field of the invention

[0001] The present invention relates to a support frame for arranging module units in a service vehicle, wherein four elongated elements form four corner columns of said support frame, wherein each of said elongated elements comprise four element sides forming a generally rectangular cross section of said elongated element.

Background

[0002] Service vehicles are used for a wide range of areas and the cargo space may be equipped to suit a particular application. For instance, a service vehicle may be used for storage and transport of tools for different kinds of craftsmen. It is common practise to equip the cargo space of a service vehicle with for instance storage cabinets, tool holders, shelves or other module units. It is also known to use flexible systems that allow for switching between different types of modules without having to change the whole vehicle.

[0003] The modules must be dimensioned to withstand quite large impacts or even collisions since the stored tools and equipments usually are heavy and roads and driving styles are not always smooth. In order to achieve acceptable roadworthiness for the vehicle, the tools or equipment must be thoroughly secured and not allowed to cause for instance too much vibration in the vehicle. During a collision it is also desired that the modules do not dislodge from the cargo space since such loose parts may cause even further damage to either drivers, vehicles or the surrounding. Thus, the modules are often made of rigid large metal sheets which are secured to the cargo space by bolts.

[0004] EP 1 894 773 shows a module system for a service vehicle which is adapted to allow different kinds of module units to be used in the cargo space and to change between module units without damaging the vehicle, such as drilling holes for bolts which may cause rust problems. The system is based on rails mounted on the floor and the walls inside the cargo space and different kinds of module units may be secured to the rails. A further known document US 5,921,052 A1 shows an elongated element, constructed of an aluminum extrusion, it discloses the preamble of claim 1. However, there is a need for an improved system adapted for cargo spaces of service vehicles. In particular, there is a need for a flexible system which may be used for many different storage purposes and which is easily adapted for a certain types of storage. High demands are put onto the strength of the whole system which is a problem for several known systems. Further, the stored equipment should be easily accessible for the craftsman. Preferably, the system should also be light weight in order to reduce fuel consumption of the vehicle.

Summary of the invention

[0005] It is therefore an object of the present invention to at least partly overcome the above-mentioned drawbacks. These and other objects are met by the appended independent claim. Preferred embodiments of the present invention are presented in the dependent claims. According to the invention a support frame for arranging module units in a service vehicle, wherein four elongated elements form four corner columns of said support frame, wherein each of said elongated elements comprise four element sides forming a generally rectangular cross section of said elongated element, wherein said support frame further comprises eight elongated elements transversely connecting said corner columns at their upper and lower ends to form a hollow box shaped support frame, said four corner columns define four surrounding sides, wherein said four surrounding sides have essentially the same width thus forming a generally square shaped cross section of said support frame, and a first element side and a fourth element side adjacent said first element side comprises fastening means for arranging a module device at said support frame, and a second element side and a third element side each comprises at least one undercut groove extending along said elongated element, and wherein the undercut grooves are directed away from a point inside that particular support frame, characterised in that said fastening means comprise openings repeated at an interval along essentially the entire element sides, and that said elongated element is produced from a sheet metal which is bent to form the particular shape of the element by roll forming. The support frame is made as a cage and able to stand alone and is thus easily moved between different positions inside the cargo space of a vehicle. Having the corner columns formed by elongated elements with rectangular cross sections with fastening means on two adjacent sides of the element sides allows for a flexible use of the support frame. For instance, module devices such as drawers may be inserted in at least two different directions in the same support frame, allowing a flexible support frame which may be accessible from different directions.

[0006] According to one embodiment of the invention said corner columns are positioned so that a corner on each corner column formed by said first and fourth element sides points toward a point inside said support frame. Module devices such as drawers, shelves, cabinet doors and brackets may be arranged in the fastening means of the elongated elements of a support frame. Thus it is suitable that the sides having fastenings means for the module devices are arranged on the interior of the support frame.

[0007] According to the invention said fastening means comprise openings repeated at an interval along essentially the entire element sides. This allows module devices to be arranged at several different levels along the elongated elements.

[0008] According to the invention said four corner columns define four surrounding sides, wherein said four surrounding sides have essentially the same width thus forming a generally square shaped cross section of said support frame. Having a support frame with four equally sized sides allows the support frame to be rotated 90 degrees and fastened in the same fastening arrangement.

[0009] According to the invention it further comprises eight elongated elements transversely connecting said corner columns at their upper and lower ends to form a hollow box shaped support frame. A hollow box shaped structure is of low weight since no covering side material is necessary. Still the structure becomes stable enough particularly after it has been installed with module devices such as drawers and shelves.

[0010] According to one embodiment of the invention said twelve elongated elements have the same cross sectional shape. If all elements are of the same cross sectional shape they may be manufactured from the same piece and cut into shorter segments in a late production stage. Having all elements of the same shape may to increase the capacity of production without increasing production costs.

[0011] According to one embodiment of the invention said four element sides form a generally square shaped cross section of said elongated element. Having the four element sides equally wide may allow improved flexibility of the elements usage. For instance, a support frame which is arranged by such elongated elements may be rotated 90 degrees and fastened in the same fastening means.

[0012] According to the invention said fastening means comprise openings repeated at intervals along said first and/or fourth element side. This allows module devices to be arranged at several different levels along the elongated elements

[0013] According to one embodiment of the invention said second element side comprises at least one undercut groove extending along said elongated element. The undercut groove may be used for fastening of the support frame to the vehicle or fastening or several support frames to each other.

[0014] According to the invention said third element side comprises at least one undercut groove extending along said elongated element. To improve the flexibility of usage and allow several elements to be connected to each other via the undercut grooves, two sides of the elongated element may have undercut grooves.

[0015] According to the invention said undercut grooves in said second and third element sides has essentially the same shape and are positioned at essentially the same distance from a corner formed by said second and third element sides. If two adjacent sides of the elongated element has undercut grooves with the same shape and located at the same distance from the corned between the two adjacent sides, the element may be used in a construction where the element may be turned 90 degrees and located at a new fixation direction inside the vehicle.

[0016] According to one embodiment of the invention a surface of said undercut groove comprises at least one opening for insertion of fixing means.

[0017] According to one embodiment of the invention said openings for insertion of fixing means are repeated with an interval along essentially the entire elongated element.

[0018] According to one embodiment of the invention said undercut groove is essentially T-shaped, formed by a main portion and a stem portion, wherein said main portion is defined by two lower walls, two side walls and one upper wall, and wherein said stem portion is defined by two stem walls.

[0019] According to one embodiment of the invention each of said lower walls and its adjacent stem wall define an S-shaped portion.

[0020] According to one embodiment of the invention said upper wall has a convex shape.

[0021] According to one embodiment of the invention said side walls are essentially straight.

[0022] According to the invention it is formed by a bent sheet metal.

[0023] According to a further aspect of the invention a vehicle is provide which has a support frame according to the first aspect of the invention. An elongated element for arranging module units in a service vehicle is provided, comprising four element sides forming a generally rectangular cross section of said elongated element, wherein a first element side comprises fastening means for arranging a module device at said elongated element. A second element side comprises at least one undercut groove extending along said elongated element. The undercut groove in the elongated element may be used to secure the elongated element to a cargo space of a service vehicle. The undercut groove allows the major part of the forces on an elongated element during an impact, such as a sharp turn, heavy braking or a vehicle collision to be transferred to a larger part of the elongated element than if the elongated element was connected to the vehicle by means of fastening means such as bolts, rivets or screws. Moreover the undercut groove may be used to secure several elongated elements to each other thus the impact transfer between different elements or sections of elements will be divided to a relatively large area of the element. A complete system for storage of equipment transported in a service vehicle may be build up by such elongated elements. Several elongated elements may be produced in one long element and in a later process step be cut onto pieces of suitable length. This provides for a system which comprises one main construction element, thus facilitating the production, and which may, in a late production stage be adapted for the particular usage. A framework cage or support frame (according to another aspect of the present invention) may be constructed for instance by having twelve such elongated elements, *i.e.* four corner columns, four upper hor-

izontal elements and four lower horizontal elements, welded together in the corners of the cage. Module devices such as drawer, shelves, cabinet doors and brackets may be arranged in the fastening means of the elongated elements of such a support frame.

Brief description of the drawings

[0024] This and other aspects of the present invention will now be described in more detail, with reference to the appended drawings showing embodiments of the present invention.

Figure 1 shows a perspective view of an elongated element according to the present invention.
Figure 2 shows a cross section of the elongated element in Figure 1
Figures 3a-b show the elongated element from Figure 1 and 2 in two different side views.
Figure 4 shows an arrangement with elongated elements according to the invention are connected to form support frames.
Figure 5 shows an arrangement inside a service vehicle where elongated elements according to the invention are connected to form support frames.
Figures 6a-b show a side view of a portion of two elongated elements according to the invention.
Figure 7 shows a perspective view of two elongated elements according to the invention.

Detailed description of exemplary embodiments

[0025] The invention will now for the purpose of exemplification be described in more detail by means of examples and with reference to the accompanying drawings.

[0026] Figure 1 shows one piece of an elongated element 1 forming part of the invention. The elongated element 1 has an essentially square shaped cross section with four main sides 2, 3, 4, 5 with essentially the same width. In the embodiment shown here the side width is 27 mm, which is the modular dimension for this particular embodiment. This modular dimension is used although the design is introduced in order to full modularity in all aspects. The elongated element 1 is produced from a sheet metal which is bent to form the particular shape of the element 1 by roll forming. Therefore, the corners between the main sides 2, 3, 4, 5 have a radius of about 0.2 - 2 mm. In other words, the cross section of the elongated element 1 is essentially square shaped but has rounded corners.

[0027] Two adjacent sides 3, 4 of the main sides are each formed with an undercut groove 7, 9. The grooves 7, 9 have essentially the same shape, which will be described in more detail below. Circular shaped bore holes 6 or openings 6 are located at the bottom of the grooves 7, 9 and repeated with an interval along the entire grooves 7, 9. For this particular embodiment the circular openings has a diameter of 7 mm and are repeated with an interval equal to the modular dimension, *i.e.* 27 mm. The other two sides 2, 5 are essentially flat and has openings 8 which correspond to the openings 6 in the grooves 7, 9, *i.e.* are located opposite the openings 6 in the grooves 7, 9, centred with respect to the side width, and repeated with the same interval as the opening 6 in the grooves 7, 9. However, the openings 8 in the flat sides 2, 5 are square shaped with a side length of 9.2 mm for the shown embodiment. Moreover, the square shaped openings 8 in the flat sides 2, 5 are accompanied by smaller openings 16 located aside each square shaped opening 8 towards the corner of the elongated element 1 which is adjoin the other flat side 2, 5. The smaller openings 16 have the same length as the square shaped openings 8, *i.e.* 9.2 mm, but are narrower having a side width of 3 mm, thus forming rectangular shaped openings 16. The centre to centre distance between each square shaped opening 8 and its adjacent rectangular shaped opening 16 is 9 mm and the distance between the rectangular shaped opening 16 and the edge of the element side is 3 mm. The elongated element 1 may be manufactured in any suitable length and element pieces may be cut in lengths suitable for the particular use.

[0028] Figure 2 shows the elongated element 1 in cross section, taken at a location along the elongated element 1 where no bore holes or openings are located, *.i.e.* at a location between the openings 6, 8, 16 in the sides 2, 3, 4, 5. As described above, two adjacent sides 3, 4 of the main sides 2, 3, 4, 5 are formed with an undercut groove 7, 9. Since the elongated element 1 is formed by bending a sheet metal the grooves 7, 9 do not have any seams. After the elongated elements 1 has been bend and formed into the described shape it is welded together preferably in one of the element corners.

[0029] The two grooves 7, 9 have the same shape. In order to describe the shape of the grooves they may be divided into five portions 21, 22, 23, 24, 25, of which the first and fifth portions 21, 25 as well as the second and fourth portions 22, 24 has the same shape, respectively, but are mirror-inverted and located on respective sides of the connecting third portion 23. The first and the fifth portions 21, 25 comprise the passage between the element side 3 and the groove 7. The first and fifth portions 21, 25 are essentially S-shaped and reversed S-shaped, respectively. The first and fifth portions 21, 25 define, together with the size of the groove opening 20, the width of the groove. The groove opening is here 8.2 mm and the total width of each groove is 14.5 mm. The S-shaped portions are followed by the second and fourth portions 22, 24, which are straight and parallel portions to allow a certain depth of the groove. The straight second and fourth portions 22, 24 are essentially perpendicular to the element side 3. Finally the groove 7 is completed by the third portion which connects the second and fourth portions 22, 24. The third portion 23 is cup-shaped in order to allow screws with as many threads as possible to be fitted into the groove. As can be seen in Figure 2, the

grooves 7, 9 in the two adjacent element sides 3, 4 are very close to each other or even abutting each other along one portion of the third portion 23 of the grooves 7, 9. The length of the portion where the groves 7, 9 are abutting each other depends on the particular cup-shape of the third portion 23 and also of the length of the second and fourth portions 22, 24.

[0030] Figures 3a and 3b show the elongated element 1 described in Figure 1 and 2 in two different side views. In Figure 3b the element 1 is turned so that the one of the element side 5 having fastening means 8, 16 is shown in a frontal view. The fastening means is in the form openings 8, 16 arranged in pairs where one opening pair comprises one square shaped opening 8 and one rectangular shaped opening 16. The square shaped opening 8 is located centrally on the element side 5 and the rectangular shaped opening 16 is located aside and turned so that one of the long sides of each rectangular opening 16 faces the square shaped opening 8. The long sides of the rectangular shaped openings 8 have the same length as the side length of the square shaped openings 8. In Figure 3b the circular shaped openings 6 in one of the element sides 3 that has a groove 7 are caught since they are located opposite each square shaped opening 8. In other words, the circular shaped openings 6 in the groove 7 are centrally placed on the element side 3 and repeated with the same interval as the square and rectangular shaped openings 8, 16. In Figure 3a the element 1 is turned so that one of the element sides 4 having a groove 9 and circular shaped openings 6 is shown in frontal view.

[0031] The elongated element 1 is manufactured in a streamlined and accurate process. The steel for the element 1 is delivered in the correct thickness and in a width that is exactly what is needed for the roll forming in the form of a coil. There is thus no waste. In the preferred embodiment it is a high strength steel in order to improve strength while maintaining a low weight. The practically seen endless coil is unreeled and in the first manufacturing step the openings 6, 8, 16 are punched in the steel plate. Thereafter the steel plate is advanced forwards into a roll forming equipment where the shape of the elongated element 1 is stepwise formed. The steel plate is advanced fed between the punching station and the roll forming equipment with a slack in order for the roll forming to take place without any disturbances from the punching station. In a last step the two edges of the steel plate, which now after the roll forming are located immediately adjacent each other, are welded together to form a continuous "pipe" of elongated element 1.

[0032] This almost endless pipe of elongated element 1 is not until this point in time cut into lengths as needed for later production of support frames 10 according to the invention. This is a major advantage since there will be essentially no waste since the whole length of this initial elongated element 1 is used, and since the end product may be decided at a late stage and the order of cut to lengths elongated elements 1 then may also be decided at a late production stage and consequently not as much storage space is needed.

[0033] When the cut to lengths elongated elements 1 are finished, the assemblage of the support frames 10 begins. The correct number and lengths of elongated elements 1 are collected and welded together in the corners of the support frame 10 as discussed elsewhere, into a finally shaped support frame 10. Thereafter any protective and final coating such as a required colour is applied and the support frame 10 may be installed in a service vehicle 26. This is generally done by installing all drawers 19, 19', shelves, or any other equipment into and onto the support frame 10, packing it for transportation or storage and later delivering it to the installation location where it at some point is installed into the service vehicle 26.

[0034] Figure 4 shows support frames 10 assembled by elongated elements 1 of the shape described with reference to Figures 1-3. Each support frame 10 comprises four corner column elements 17 and eight transversal elements 18. Thus, each support frame 10 is shaped like a cage and able to stand alone, although here the support frames 10 are shown as connected together. Both the corner column elements 17 and the transversal elements 18 have the same profile as the element 1 described with reference to Figures 1-3. The elements 1 building up each support frame 10 are turned so than the corner between the two adjacent sides 3, 4 having grooves 7, 9 is directed away from a point inside that particular support frame 10. Thus, the corner between the two adjacent sides 2, 5 having square and rectangular shaped openings 8, 16 is directed to a point inside that particular support frame 10.

[0035] One of the support frames 10 shown in Figure 4 has drawers 19' which are openable in a direction transverse to the opening direction of another support frame set of drawers 19. Since the support frame is built by elongated elements having fastening means 8, 16 on both interior sides 2, 5 of the each element 1 it is possible to place the drawers 19, 19' in several different directions. Every one of the four support frames 10 shown in Figure 4 has the same width and depth. In other words the support frames 10 are square shaped which means that the drawers 19, 19' may be inserted into the support frames from any side of the support frames 10. In addition, is becomes possible to loosen the mounting devices 27 and rotate a support frame for instance 90 degrees and then fasten it again using the same mounting devices 27. The support frames 10 may naturally have any other required shape, normally any rectangular shape, to accommodate the desired equipment.

[0036] In Figure 5 a set of assembled support frames 10 are shown arranged inside a service vehicle 26. Thus, it is realized that having different opening directions of the drawers 19, 19' may provide an improved flexibility to the user. For instance, the set of drawers placed close to the rear door of the service vehicle 26 may be arranged with a drawer opening direction essentially along the driv-

ing direction of the vehicle 26. Figure 5 shows several support frames 10 assembled and arranged inside a cargo space of a service vehicle 26. The support frames 10 may be used for storage of for instance tools or other equipments. The support frames 10 are connected to the interior wall and/or floor of the service vehicle 26 by means of the T-shaped undercut grooves 7, 9 on the rear side 3, 4 and/or the underside of the elongated elements 1 (not shown in the drawing). Further, the support frames 10 are connected to each other using mounting devices 27 which are described in more detail with reference to Figures 6 and 7 below.

[0037] Each support frame 10, as the ones shown in Figure 4 and 5, is welded together in the support frame corners having the vertical elements 18 inside the corner column elements 17. Consequently the welding surfaces become the end surfaces of each vertical element 18 which is welded to the uppermost or lowermost piece of each side 2, 5 of the corner column elements 17 having square and rectangular shaped openings 8, 16.

[0038] The support frames 10 may be assembled in several different sizes. If the modular dimension is used as a basis, several different sizes may be used and still be compatible to each other. For instance one support frame may be twice as wide, or four times as wide, as another and still they may be connected in the same system of support frames. In addition, for instance if there is an obstacle inside the cargo space, such as the wheel housing (see Figure 5), a support frame with a smaller height may be used such as an integer multiplied by the modular length or modular dimension. In the same manner a support frame with smaller depth may be used (not shown in the drawings), for instance at the upper level of a system of support frames to fit the particular cargo space in an optimal manner.

[0039] The support frames 10 are connected to each other by for the purpose made mounting devices 27. Figures 6a-b and Figure 7 show the mounting device 27 which is used to connect two elongated elements 1 to each other. A mounting device 27 comprises one washer 28 having a basically rectangular shape, two screws 29 and two screw nuts 30. The washer 28 has two bore holes 31 for the screws 29, located at a centre to centre distance of 27 mm which correspond to the centre to centre distance between the grooves 7, 9 of two elongated elements 1 when arranged side by side abutting each other. Further each long side of the washer 28 has two protrusions 32, located at the bore holes 31 and adapted to be fitted into the grooves 7, 9 of the elements 1 to stabilize the washer 28 and facilitate positioning of the mounting device 27.

[0040] The screw nuts 30 have an oblong shape and when seen in a front view, looking straight into the bore holes as is depicted in Figures 6a-b, the screw nut 30 has the shape of a parallelogram. The tilting of the parallelogram is clockwise, as seen from the side where the screw 29 enters the screw nut 30. The smallest parallelogram height is slightly smaller than the groove opening 20 of the grooves 7, 9 in the elongated element 1. Thus, if the screw nut 30 is turned so that the long sides of the parallelogram shaped screw nut 30 is parallel with the groove 7, 9, as in Figure 6a, the screw nut 30 is allowed to be placed into the groove 7, 9 at any location along the groove. This gives the advantage that the screw nut 30 does not have to be placed into the groove 7, 9 in the end of the elongated element 1 but may be placed into the groove 7, 9 at any place along the groove 7, 9.

[0041] Moreover, the length of the long side of the parallelogram is long enough to allow the screw nut 30 to be turned about 45 degrees in clockwise direction inside the groove 7, 9. In a position when the screw nut 20 has been turned 45 degrees inside the groove 7, 9 in clockwise direction, which shown in Figure 6b, the short sides of the screw nut 20 are essentially parallel with the groove 7, 9. Also, when the screw nut 30 has been placed into the groove 7, 9 and turned about 45 degrees in clockwise direction, the short side of the screw nut 30 will be locked against the interior side wall of the groove 7, 9. Thus, the screw nut 30 stays in place as the screw 29 is screwed into the nut 30, which normally is made in clockwise direction. Naturally, if anti-clockwise screws are used the screw nut should instead be made having anti-clockwise threads and with an anti-clockwise tilting shape of the nut 30. When seen in a side view (not shown) the screw nut 30 is essentially T-shaped, formed by a main portion and a stem portion and where the upper contour of the main portion has the shape of a sector of a circle with a radius of 9 mm.

[0042] The screws 29 of the mounting device 27 are not necessarily inserted through the circular shaped openings in the grooves 6. The circular shaped openings 6 are present to enable through bolts but for a mounting device 27 as the one shown in Figures 6 and 7 the circular shaped openings 6 does not directly participate in the mounting arrangement. Certainly the screws 29 will pass through the circular openings 6, at least as long as the screws 29 are of a certain length, but the circular openings 6 will not be directly subject to impact if the vehicle 20 turns, accelerate or decelerate. However, the circular openings 6 in the grooves 7, 9 are also useful to facilitate positioning of the fastening means 27 in the grooves 7, 9.

Claims

1. Support frame (10) for arranging module units in a service vehicle (26), wherein four elongated elements (1) form four corner columns (17) of said support frame (10), wherein each of said elongated elements (1) comprise four element sides (2, 3, 4, 5) forming a generally rectangular cross section of said elongated element (1), wherein said support frame (10) further comprises eight elongated elements (18) transversely connecting said corner columns (17) at their upper and lower ends to form a hollow box shaped support frame (10), said four corner columns

(17) define four surrounding sides (11, 12, 13, 14), wherein said four surrounding sides (11, 12, 13, 14) have essentially the same width thus forming a generally square shaped cross section of said support frame (10), and a first element side (2) and a fourth element side (5) adjacent said first element side (2) comprises fastening means (8, 16) for arranging a module device at said support frame (10), and a second element side (3) and a third element side (4) each comprises at least one undercut groove (7, 9) extending along said elongated element (1), and wherein the undercut grooves (7,9) are directed away from a point inside that particular support frame (10),
characterised in that said fastening means (8, 16) comprise openings (8, 16) repeated at an interval along essentially the entire element sides, and that said elongated element (1) is produced from a sheet metal which is bent to form the particular shape of the element (1) by roll forming.

2. Support frame (10) according to claim 1, wherein said corner columns (17) are positioned so that a corner on each corner column (17) formed by said first and fourth element sides (2, 5) points toward a point inside said support frame (10).

3. Support frame (10) according to anyone of the preceding claims,
wherein said twelve elongated elements (1, 17, 18) have the same cross sectional shape.

4. Support frame (10) according to anyone of the preceding claims,
wherein said four element sides (2, 3, 4, 5) form a generally square shaped cross section of said elongated element (1).

5. Support frame (10) according to any one of the preceding claims,
wherein said undercut grooves (7, 9) in said second and third element sides (3, 4) has essentially the same shape and are positioned at essentially the same distance from a corner (10) formed by said second and third element sides (3, 4).

6. Support frame (10) according to anyone of claim 1-5, wherein a surface of said undercut groove (7, 9) comprises at least one opening (6) for insertion of fixing means (29).

7. Support frame (10) according to claim 6, wherein said openings (6) for insertion of fixing means (29) are repeated with an interval along essentially the entire elongated element (1).

8. Support frame (10) according to anyone of claims 1-7, wherein said undercut groove (7, 9) is essentially T-shaped, formed by a main portion (21, 22, 23, 24, 25) and a stem portion (21, 25), wherein said main portion (21, 22, 23, 24, 25) is defined by two lower walls (21, 25), two side walls (22, 24) and one upper wall (23), and wherein said stem portion (21, 25) is defined by two stem walls (21, 25).

9. Vehicle (26) having a support frame (10) according to any one of the preceding claims.

Patentansprüche

1. Tragrahmen (10) zum Anordnen von Moduleinheiten in einem Versorgungsfahrzeug (26), wobei vier längliche Elemente (1) vier Ecksäulen (17) des Tragrahmens (10) bilden, wobei jedes der länglichen Elemente (1) vier Elementseiten (2, 3, 4, 5) umfasst, die einen im Allgemeinen rechteckigen Querschnitt des länglichen Elements (1) bilden, wobei der Tragrahmen (10) ferner acht längliche Elemente (18) umfasst, die die Ecksäulen (17) an ihren oberen und unteren Enden quer verbinden, um einen hohlen kastenförmigen Tragrahmen (10) zu bilden, wobei die vier Ecksäulen (17) vier umgebende Seiten (11, 12, 13, 14) definieren, wobei die vier umgebenden Seiten (11, 12, 13, 14) im Wesentlichen die gleiche Breite haben, wodurch sie einen im Allgemeinen quadratisch geformten Querschnitt des Tragrahmens (10) bilden, und eine erste Elementseite (2) und eine vierte Elementseite (5), die zu der ersten Elementseite (2) benachbart ist, Befestigungsmittel (8, 16) zum Anordnen einer Modulvorrichtung an dem Tragrahmen (10) umfassen und eine zweite Elementseite (3) und eine dritte Elementseite (4) jeweils mindestens eine hinterschnittene Nut (7, 9) umfassen, die sich entlang des länglichen Elements (1) erstreckt, und wobei die hinterschnittenen Nuten (7, 9) von einem Punkt im Inneren des bestimmten Tragrahmens (10) weggerichtet sind,
dadurch gekennzeichnet, dass die Befestigungsmittel (8, 16) Öffnungen (8, 16) umfassen, die sich in einem Intervall entlang im Wesentlichen der gesamten Elementseiten erstrecken, und dass das längliche Element (1) aus einem Blech hergestellt ist, das gebogen ist, um die bestimmte Form des Elements (1) durch Walzformen zu bilden.

2. Tragrahmen (10) nach Anspruch 1, wobei die Ecksäulen (17) derart positioniert sind, dass eine Ecke auf jeder Ecksäule (17), die durch die erste und vierte Elementseite (2, 5) gebildet ist, hin zu einem Punkt im Inneren des Tragrahmens (10) zeigt.

3. Tragrahmen (10) nach einem der vorhergehenden Ansprüche, wobei die zwölf länglichen Elemente (1, 17, 18) die gleiche Querschnittsform haben.

4. Tragrahmen (10) nach einem der vorhergehenden Ansprüche, wobei die vier Elementseiten (2, 3, 4, 5) einen im Allgemeinen quadratisch geformten Querschnitt des länglichen Elements (1) bilden.

5. Tragrahmen (10) nach einem der vorhergehenden Ansprüche, wobei die hinterschnittenen Nuten (7, 9) in der zweiten und dritten Elementseite (3, 4) im Wesentlichen die gleiche Form haben und im Wesentlichen in dem gleichen Abstand von einer Ecke (10), die durch die zweite und dritte Elementseite (3, 4) gebildet ist, positioniert sind.

6. Tragrahmen (10) nach einem der Ansprüche 1-5, wobei eine Fläche der hinterschnittenen Nut (7, 9) mindestens eine Öffnung (6) zum Einsatz von Fixierungsmitteln (29) umfasst.

7. Tragrahmen (10) nach Anspruch 6, wobei sich die Öffnungen (6) zum Einsatz von Fixierungsmitteln (29) in einem Intervall entlang im Wesentlichen des gesamten länglichen Elements (1) wiederholen.

8. Tragrahmen (10) nach einem der Ansprüche 1-7, wobei die hinterschnittene Nut (7, 9) im Wesentlichen T-förmig ist, durch einen Hauptabschnitt (21, 22, 23, 24, 25) und einen Schaftabschnitt (21, 25) gebildet ist, wobei der Hauptabschnitt (21, 22, 23, 24, 25) durch zwei untere Wände (21, 25), zwei Seitenwände (22, 24) und eine obere Wand (23) definiert ist und wobei der Schaftabschnitt (21, 25) durch zwei Schaftwände (21, 25) definiert ist.

9. Fahrzeug (26) mit einem Tragrahmen (10) nach einem der vorhergehenden Ansprüche.

Revendications

1. Armature porteuse (10) pour l'agencement d'unités modulaires dans un véhicule d'entretien (26), dans lequel quatre éléments allongés (1) forment quatre colonnes de coins (17) de ladite armature porteuse (10), chacun desdits éléments allongés (1) comprenant quatre faces d'élément (2, 3, 4, 5) formant une section transversale globalement rectangulaire dudit élément allongé (1), ladite armature porteuse (10) comprenant en outre huit éléments allongés (18) connectant transversalement lesdites colonnes de coins (17) par leurs extrémités supérieures et inférieures pour former une armature porteuse en forme de boîte creuse (10), lesdites quatre colonnes de coins (17) définissant quatre faces d'entourage (11, 12, 13, 14), lesdites quatre faces d'entourage (11, 12, 13, 14) ayant sensiblement la même largeur en formant ainsi une section transversale globalement de forme carrée de ladite armature porteuse (10), et une première face d'élément (2) et une quatrième face d'élément (5) adjacente à ladite première face d'élément (2) comprenant un moyen de fixation (8, 16) pour disposer un dispositif modulaire au niveau de ladite armature porteuse (10), et une deuxième face d'élément (3) et une troisième face d'élément (4) chacune comprenant au moins une gorge dégagée (7, 9) s'étendant le long dudit élément allongé (1), et les gorges dégagées (7,9) s'étendant directement depuis un point situé à l'intérieur de cette armature porteuse particulière (10), **caractérisée en ce que** ledit moyen de fixation (8, 16) comprend des orifices (8, 16) se répétant à intervalles le long de sensiblement toutes les faces d'élément et que ledit élément allongé (1) est produit à partir d'une feuille de métal qui est courbée pour former la forme particulière de l'élément (1) par laminage.

2. Armature porteuse (10) selon la revendication 1, dans laquelle lesdites colonnes de coins (17) sont positionnées de manière à ce qu'un coin de chaque colonne de coin (17) formé par lesdites première et quatrième face d'élément (2, 5) pointe vers un point à l'intérieur de ladite armature porteuse (10).

3. Armature porteuse (10) selon l'une quelconque des revendications précédentes, dans laquelle lesdits douze éléments allongés (1, 17, 18) ont la même forme de section transversale.

4. Armature porteuse (10) selon l'une quelconque des revendications précédentes, dans laquelle lesdites quatre faces d'élément (2, 3, 4, 5) forment une section transversale de forme globalement carrée dudit élément allongé (1).

5. Armature porteuse (10) selon l'une quelconque des revendications précédentes, dans laquelle lesdites gorges dégagées (7, 9) desdites deuxième et troisième faces d'élément (3, 4) ont sensiblement la même forme et sont positionnées sensiblement à la même distance d'un coin (10) formé par lesdites deuxième et troisième faces d'élément (3, 4).

6. Armature porteuse (10) selon l'une quelconque des revendications 1 à 5, dans laquelle une surface de ladite gorge dégagée (7, 9) comprend au moins un orifice (6) pour l'insertion d'un moyen de fixation (29).

7. Armature porteuse (10) selon la revendication 6, dans laquelle lesdits orifices (6) destinés à l'insertion d'un moyen de fixation (29) se répètent à intervalles le long de sensiblement tous les éléments allongés (1).

8. Armature porteuse (10) selon l'une quelconque des revendications 1 - 7, dans laquelle ladite gorge dégagée (7, 9) est sensiblement en forme de T, formée par une section principale (21, 22, 23, 24, 25) et une

section en tige (21, 25), ladite section principale (21, 22, 23,24, 25) étant définie par deux parois inférieures (21, 25), deux parois latérales (22, 24) et une paroi supérieure (23), ladite section en tige (21, 25) étant définie par deux parois de tige (21, 25).

9. Véhicule (26) comportant une armature porteuse (10) selon l'une quelconque des revendications précédentes.

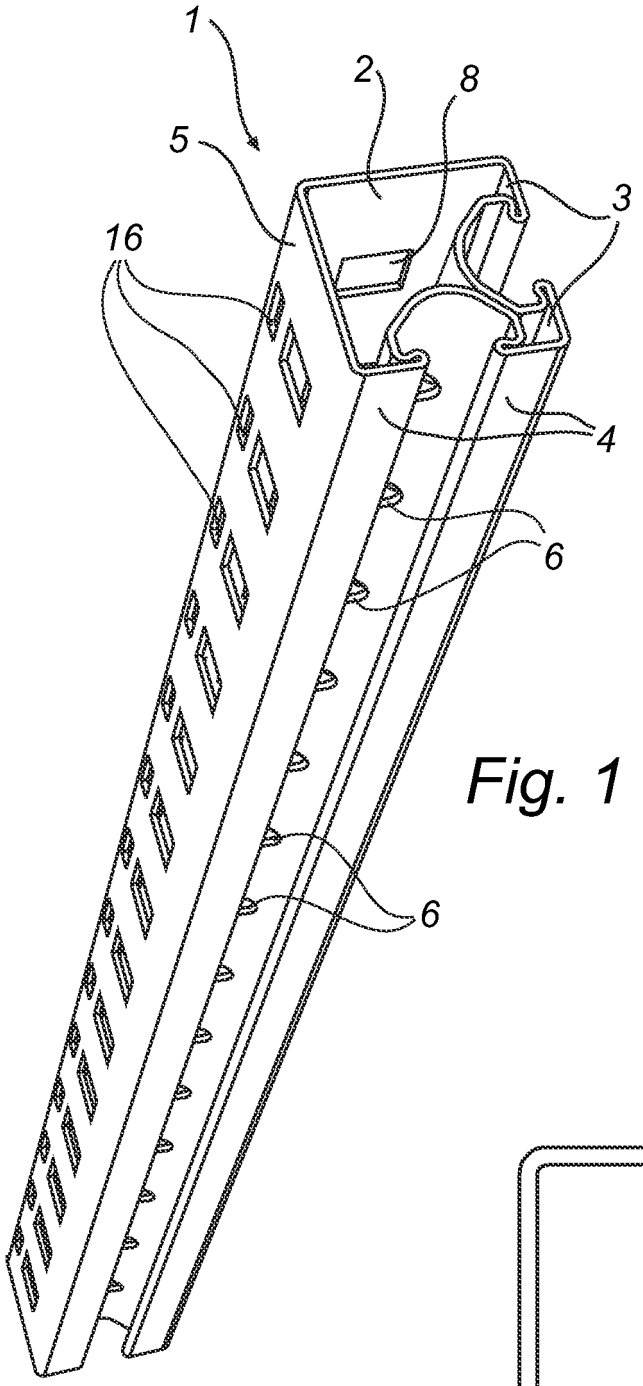


Fig. 1

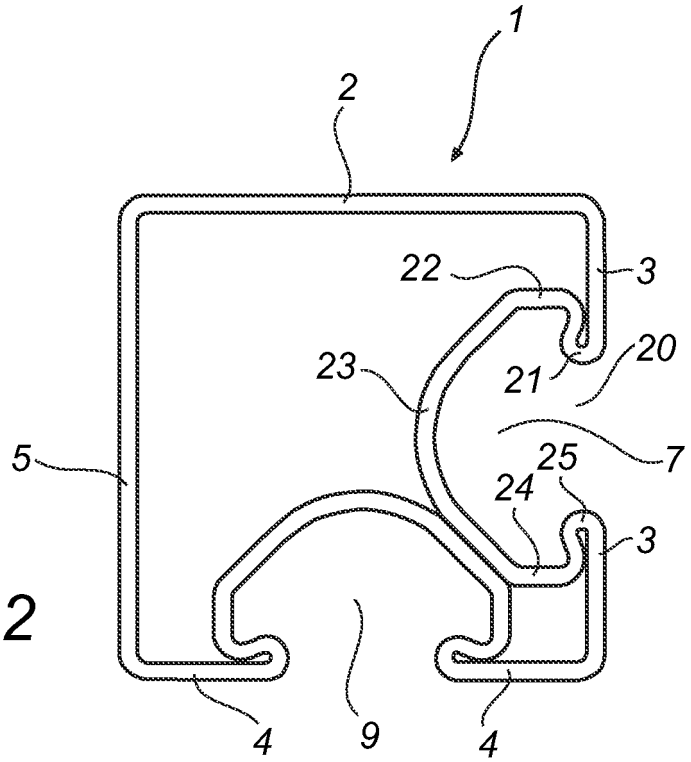


Fig. 2

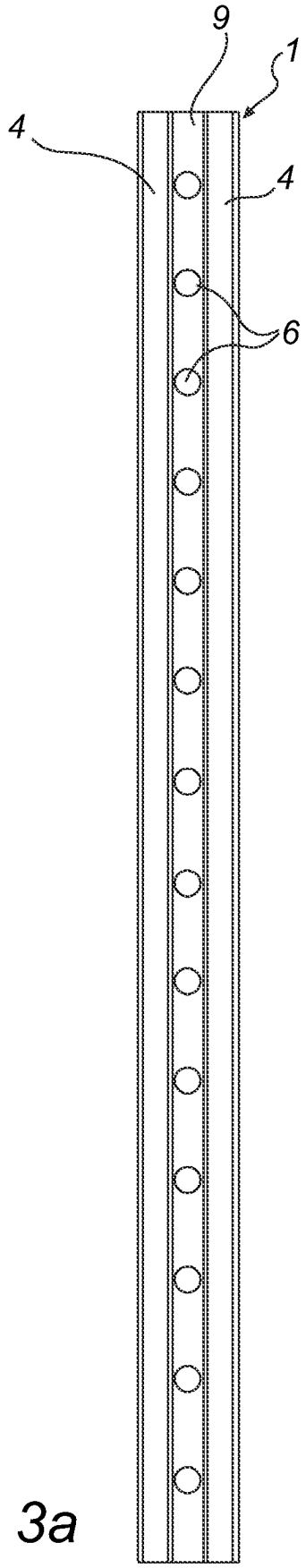


Fig. 3a

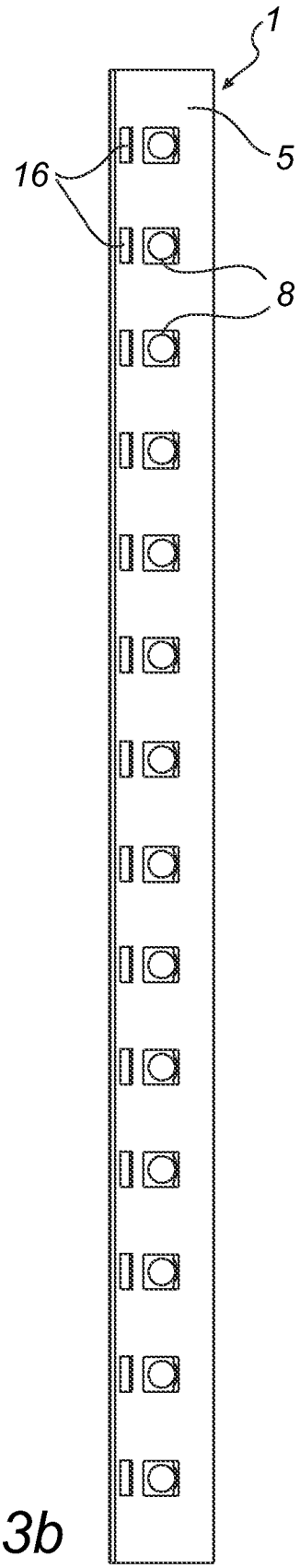


Fig. 3b

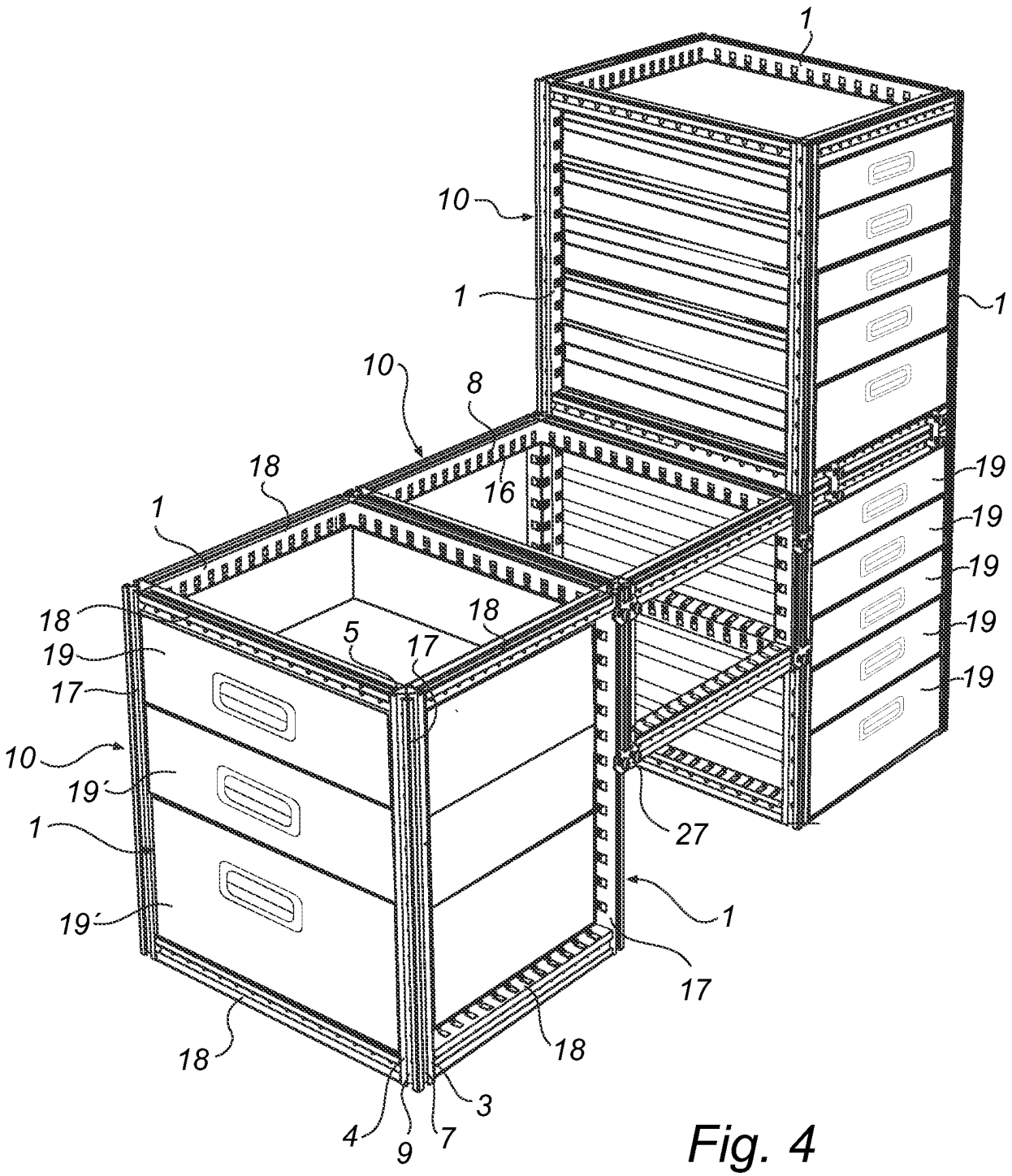

1
10
1
1
10
8
18
16
19
1
19
19
19
19
18
18
5
17
19
17
10
19´
1
27
1
19´
17
18
18
3
4
9
7

Fig. 4

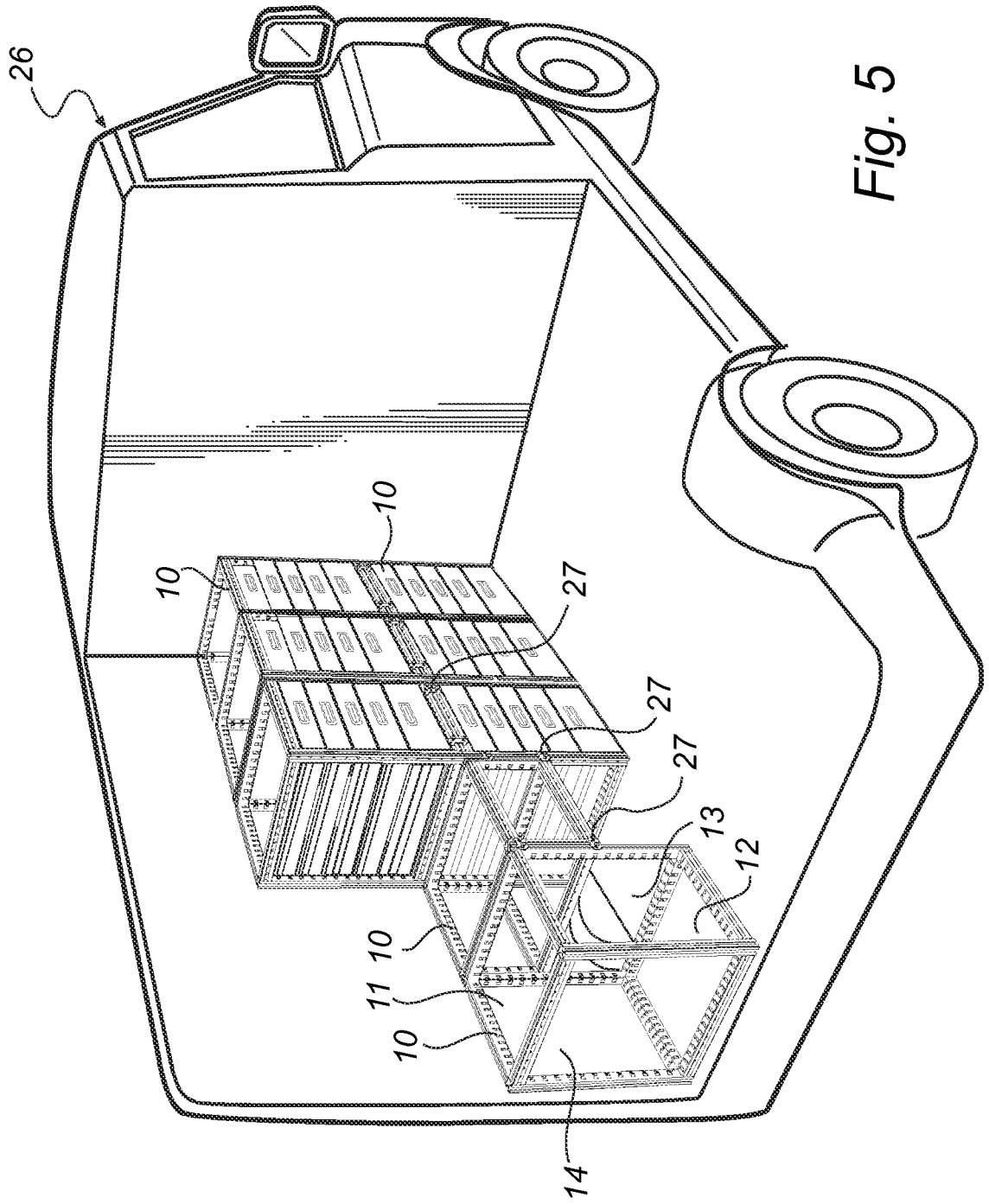


Fig. 5

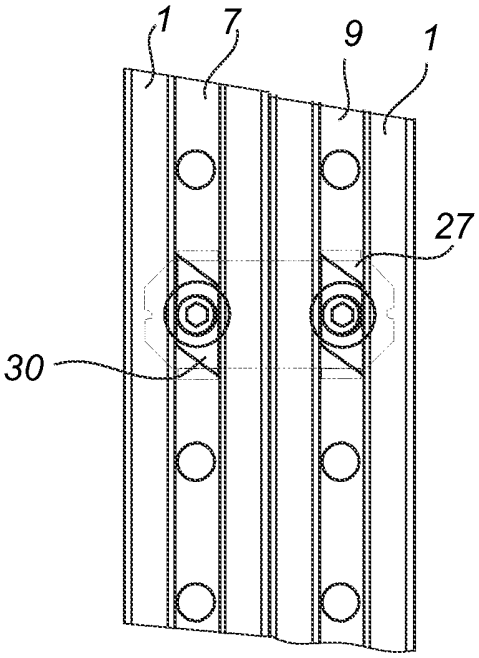


Fig. 6a

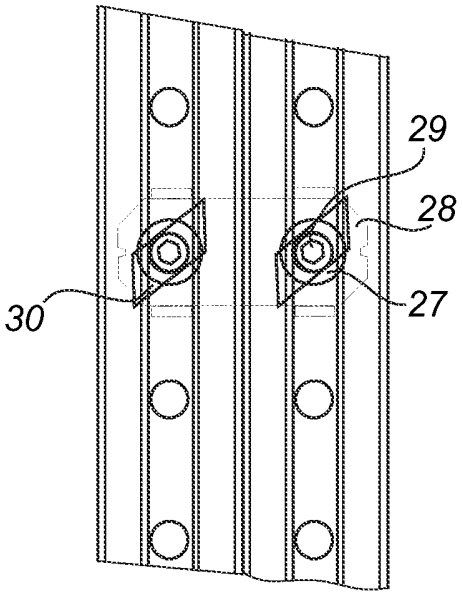


Fig. 6b

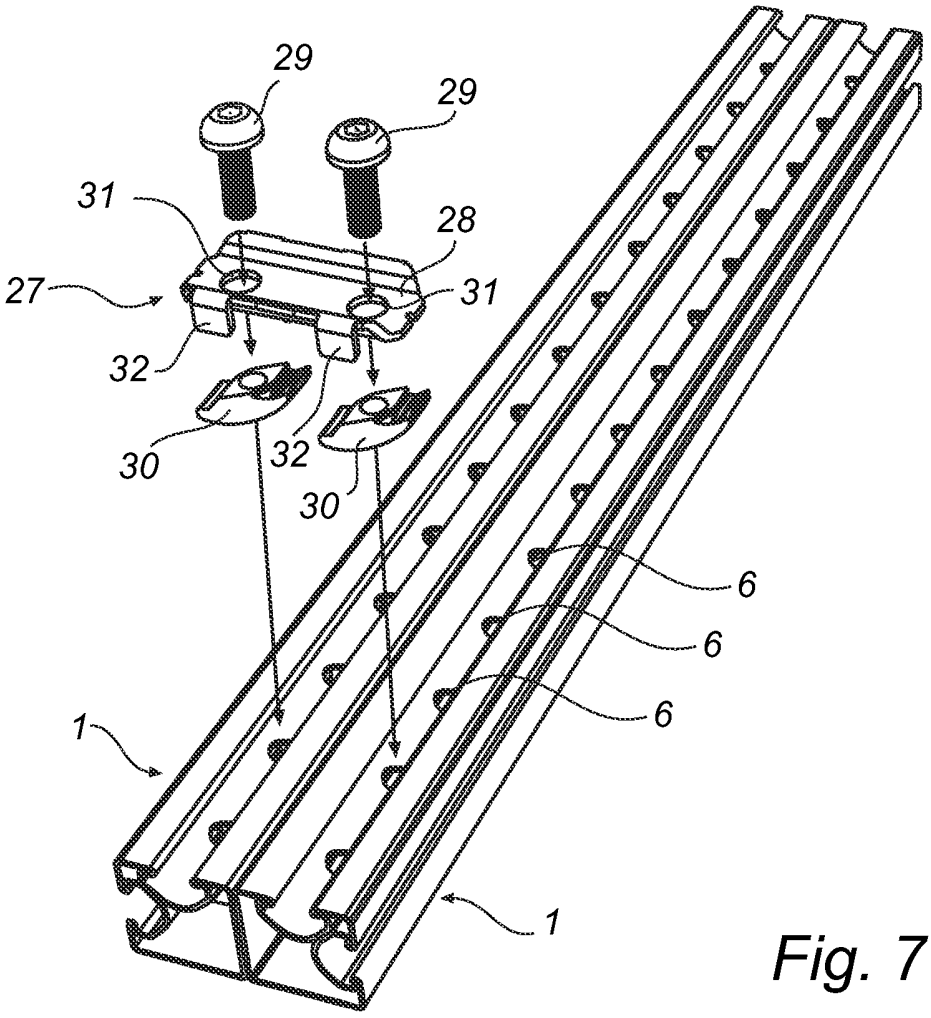


Fig. 7

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- US 5921052 A1 **[0004]**