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(54) **CONTAINER FOR TRANSPORTING AND/OR STORING A PLURALITY OF GLASS SHEETS**

(57) The invention relates to a container (30) for transporting and/or storing a plurality of glass sheets of a maximum length substantially parallel to each other, the container (30) comprising a frame (31) having a floor (32) and fastening uprights provided with holes (40, 41). The container (30) further includes moveable supporting and/or fastening means (42, 43, 44, 45) secured to the frame (31) by moveable attachment means (46) received

in the holes (40, 41) such that the location of the moveable supporting and/or fastening means (42, 43, 44, 45) can be tuned to the glass sheet dimensions. The supporting and/or fastening means (42, 43, 44, 45) may also be arranged so that they are disposed within the container (30) such that the faces of the glass sheets are disposed parallel to a main longitudinal direction of the frame (31).

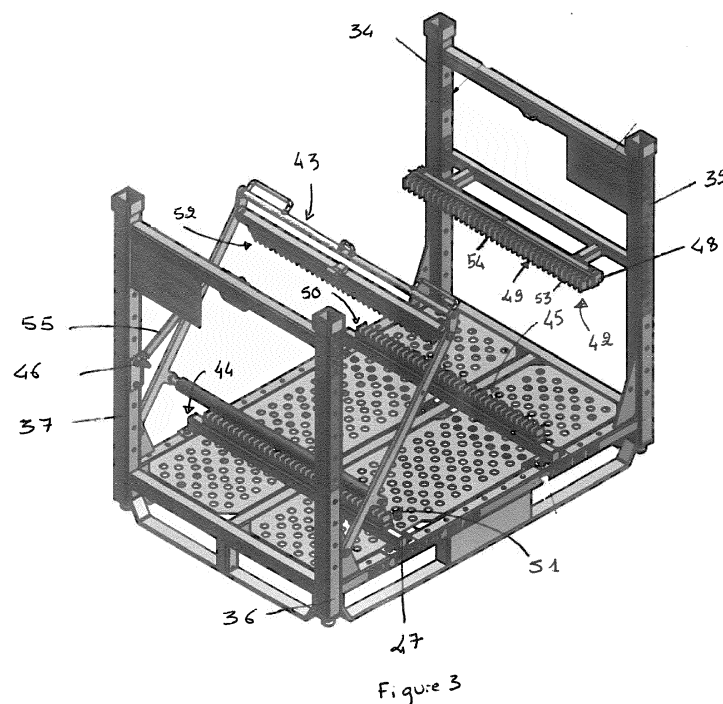


Figure 3

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## Description

### Technical field of the invention

**[0001]** The invention relates to a container for transporting and/or storing a plurality of rigid sheets, in particular a plurality of sheets made of fragile materials such as glass.

### Background of the invention

**[0002]** The transport of rigid sheets and in particular the transport of glass sheets, for instance for automotive glazing, raises various issues.

**[0003]** The main ones are obviously related to the perfect preservation of the integrity and surface condition of the glass sheets. To this end, the latter are commonly gathered into batches on specific supports called containers in the art. These containers are then loaded directly onto trucks for transport.

**[0004]** Figure 1 represents a prior art container 10. The prior art container 10 comprises a frame 11 with a substantially parallelepipedal shape. This frame 11 comprises a supporting floor 12 having an upper part 12a and a lower part 12b. The upper and lower parts 12a, 12b are connected to each other by central upright supports 12c, 12d. A forklift truck can be used for transporting the container 10. The frame 11 further comprises four fastening corner uprights 14a, 14b, 14c, 14d connected to the floor 12 such that they form together the substantially parallelepipedal shape of the frame 11. The parallelepipedal frame formed thereby is defined by a height H, a width W and a length L. The four fastening corner uprights 14a, 14b, 14c, 14d are distributed into a first pair of fastening corner uprights 14a, 14b, and a second pair of fastening corner uprights 14c, 14d, the pairs 14a, 14b; 14c, 14d being spaced apart by the length L of the parallelepipedal frame 11. The fastening corner uprights are rigidly connected by connection members 15, 16, 17 for ensuring the rigidity of the frame 11.

**[0005]** The container 10 also comprises supporting and/or fastening means, designated by the reference numbers 18, 19, 20. These supporting and/or fastening means 18, 19, 20 are welded on the frame 11 and form an integral part thereof. These supporting and/or fastening means 18, 19, 20 are for supporting and/or fastening the glass sheets substantially parallel to each other. The supporting and/or fastening means 18, 19, 20 comprise a plurality of rails 21 with respective indentations 22, 23, 24 formed therein, the indentations 22, 23, 24 providing a plurality of recesses 25 and protrusions 26 such that the glass sheets can be positioned within the recesses 25 and be maintained, separated from each other, by the protrusions 26. These rails 21 are also welded on the frame 11. The plurality of indentations 22, 23, 24 are disposed on several locations within the frame 11. Horizontal indentations 22 are disposed substantially horizontally above the floor 12, in the longitudinal direction, laterally

spaced apart by a predetermined distance. Lateral indentations 23 are also disposed substantially horizontally on an upper part of the frame. Finally, an upper indentation 24 is provided. This upper indentation 24 is disposed substantially horizontally, in the longitudinal direction and is arranged to be moveable in the elevation direction thanks to a pivoting link 27.

**[0006]** With this special configuration, the frame 11 has a substantially parallelepipedal shape with at least a main longitudinal direction and the glass sheets are maintained separated from each other by the plurality of indentations 22, 23, 24 such that the main surfaces of the glass sheets are disposed orthogonally to the main longitudinal direction of the frame. The plurality of indentations 22, 23, 24 enable to secure the glass sheets and to avoid breakages during transport, thanks to the recesses 25 and protrusions 26. During loading of the glass sheets into the container 10, the upper indentation 24 is maintained at the maximum height. Then, once the loading is finished, the vertical position of the upper indentation 24 is adjusted to the height of the glass sheets.

**[0007]** The issues of this typical prior art design are the following. First of all, the orientation of the glass sheets within the container, orthogonally to the main longitudinal direction, is not optimal. Indeed, such a container can be opened only longitudinally. As a consequence of this orientation, a gap is lost, on each side of the container 10 for being able to reach the glass sheets. The dimensions of the glass sheets within such a container are limited by this specific orientation and are defined by the height H or width W of the container and not by its length L.

**[0008]** Moreover, the supporting and/or fastening means 18, 19, 20 being integral part of the frame 11, it is not possible to adapt them for different glass sheet dimensions. The rails 21 being welded on the frame 11, the distance between adjacent recesses 25 of the indentations cannot be changed over time as a function of glass sheet dimensions. The width of the recesses, to be adapted according to the thickness of the glass sheets, cannot be modified easily.

**[0009]** Finally, the dimensions of prior art containers are typically not optimal and the space occupation within a truck trailer is unfortunately often low. For instance, let's consider the dimensions of a typical truck trailer, according to the so-called Mega Truck<sup>®</sup> standard, which are 13,6 m x 2,47 m x 3 m. Let's compare then the space occupation of two typical standard containers within such a Mega Truck<sup>®</sup> trailer:

- type 1: 1,2 m x 0,8 m x 1,25 m,

79% of space occupation;

- type 2 : 1,55 m x 0,78 m x 1,26 m,

73% of space occupation.

**[0010]** It is clear from the above examples that the

space occupation of the containers is not yet optimized.

[0011] For all the above mentioned reasons, a solution remains to be proposed in order to provide an improved container for transporting and/or storing a plurality of glass sheets of a maximum length substantially parallel to each other, the improved container being arranged for achieving a better space occupation and for being customizable according to the glass sheet dimensions and more particularly according to a longitudinal direction of the container. The improved container should at the same time guarantee a perfect preservation of the integrity and surface condition of the glass sheets.

### Summary of the invention

[0012] The present invention relates to a container for transporting and/or storing a plurality of glass sheets of a maximum length substantially parallel to each other according to claim 1.

[0013] Thanks to the moveable supporting and/or fastening means secured to the frame by means of a plurality of moveable attachment means received in holes, the location of the moveable supporting and/or fastening means can be easily adapted to the glass sheet dimensions. Compared to the prior art containers, this is a great advantage since one single container can be adapted and used for transporting and/or storing glass sheets with a large number of different dimensions.

[0014] The present invention also relates to a container for transporting and/or storing a plurality of glass sheets of a maximum length substantially parallel to each other according to claim 2.

[0015] The specific orientation of the glass sheets within the container combined with the specific arrangement of the container enabling a loading of the glass sheets following a direction substantially orthogonal to the main longitudinal direction of the frame enables to maximise the number of glass sheets per container. In prior art, as explained above, a rather large gap is lost, on each side of the container, respectively, for being able to reach the glass sheets. With the container according to the present invention, this wasted space is now used while the accessibility of the glass sheets is maintained. Moreover, thanks to the container of the invention, glass sheets with a maximum dimension corresponding to the length of the container can be stored and/or transported.

[0016] The containers of the invention for transporting and/or storing a plurality of glass sheets of a maximum length substantially parallel to each other are both adapted to receive very large glass of sheets. The use of moveable attachment means received in holes and the specific orientation of the glass sheets are both solving this common issue.

[0017] Preferably, very common means are used as removable attachment means to secure the supporting and/or fastening means to the frame. It is of great interest. The frame possibly comprising matrix of holes, the supporting and/or fastening means can be placed anywhere

within the container and their location can be thus easily adapted to the dimensions of the glass sheets. When changing the contents of the container, i.e. when loading a new bundle of glass sheets, one operator has simply to remove the attachment means, change their positions and fix them again at another place. This is a very simple and convenient process.

[0018] Advantageously, the use of different pads fixed on different parts of the container enables to ensure a perfect preservation of the integrity and surface condition of the glass sheets.

[0019] The choice of materials for these pads may also be of interest. Preferably, a resilient material should be used. The container can thus be exposed to rather strong shocks with no risk of glass breaking.

[0020] Finally, the dimensions of the container of the present invention should be preferably such that, when positioned within a truck, the space occupation is equal or greater than 95%. More containers could be thus transported within one single truck, causing an advantageous reduction of the transport costs.

### Brief description of the drawings

[0021] Other advantages and features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a perspective view of a prior art container;

Figure 2 is a perspective view of a frame of a first embodiment of the container of the present invention;

Figure 3 is a perspective view of the container of Figure 2;

Figure 4 and Figure 5 are two enlarged views of an indentation of the container of Figure 2;

Figure 6 is a schematic top view representing a layout of containers of Figure 2 within a trailer; and

Figure 7 is a schematic side view of the layout of Figure 6.

### Description of the invention

[0022] As shown on the drawings, rectangular sheets of glass have been considered. However, the scope of the instant application should not be limited thereto.

[0023] The container 30 comprises a frame 31 with a substantially parallelepipedal shape. This frame 31 comprises a supporting floor 32 with an upper part 32a and a lower part 32b. The upper and lower parts 32a, 32b are connected to each other by central upright supports 32c, 32d such that a plurality of apertures 33a, 33b, 33c, 33d

are formed between the central upright supports 32c, 32d and the upper and lower parts 32a, 32b of the floor 32. These apertures 33a, 33b, 33c, 33d enable the use of a forklift truck for transporting the container 30. The frame 31 further comprises four fastening corner uprights 34, 35, 36, 37 connected to the floor 32, this resulting in the substantially parallelepipedal shape of the frame 31. The parallelepipedal frame 31 formed thereby is defined by a height H', a width W' and a length L'. The four fastening corner uprights 34, 35, 36, 37 are distributed into a first pair of fastening corner uprights 34, 35 and a second pair of fastening corner uprights 36, 37, the pairs 34, 35; 36, 37 being spaced apart by the length L' of the parallelepipedal frame 31. The fastening corner uprights 34, 35, 36, 37 of each pair are rigidly connected by connection members 38, 39 for ensuring the rigidity of the frame 31.

**[0024]** The floor 32 and the uprights 34, 35, 36, 37 are provided with a plurality of holes 40, 41. These holes 40, 41 are located on the whole surface of the upper part 32a of the floor 32, but also along the four fastening corner uprights 34, 35, 36, 37. Preferably, the upper part 32a of the floor 32 includes a matrix of lines and columns of holes 40.

**[0025]** The container 30 also comprises supporting and/or fastening means 42, 43, 44, 45 (Figure 3). These supporting and/or fastening means 42, 43, 44, 45 are fixed here on the frame 31 by means of a plurality of attachment means 46, preferably removable attachment means.

**[0026]** With respect to the holes and the corresponding attachment means, some remarks should be put forward. The holes can be blind holes or through holes. The holes can be threaded. As far as the attachments means are concerned, it could be bolts, pins, screws, etc... As attachment means, could be also provided straps, bands, braces, clips, etc...

**[0027]** The supporting and/or fastening means 42, 43, 44, 45 are for supporting and/or fastening the glass sheets substantially parallel to each other. The supporting and/or fastening means 42, 43, 44, 45 comprise a plurality of rails 47, 48 with respective indentations 49, 50, 51, 52 formed thereon, the indentations 49, 50, 51, 52 providing a plurality of recesses 53 and protrusions 54 such that the glass sheets can be positioned within the recesses 53 and be maintained separated from each other by the protrusions 54. These indentations 49, 50, 51, 52 are firmly connected to the rails 47, 48 by again attachments means 46, as best seen in Figures 4 and 5.

**[0028]** The rails are here provided with sides or longitudinal legs, apart from the indentations, through which the attachment means are extending.

**[0029]** The plurality of rails 47, 48 are disposed on several locations within the frame 31. Horizontal indentations 50, 51 are disposed substantially horizontally above the floor 32, in the lateral direction, longitudinally spaced apart by a predetermined distance. They are disposed for supporting the weight of the glass sheets. A rail 48 and respective indentation 49 are also disposed substan-

tially horizontally and the lateral direction on an upper part of the frame, for fastening laterally the glass sheets. This rail 48 and corresponding indentation 49 are arranged such that they connect two fastening corner uprights 34, 35 of a same pair. Finally, an upper indentation 52 is provided for a further fastening of the sheets. This upper indentation 52 is disposed substantially horizontally, in the lateral direction and is arranged to be moveable in the elevation direction thanks to a pivot link 55. This moveable upper indentation 52 connects two fastening corner uprights 36, 37 of a same pair.

**[0030]** With this special configuration, the frame 31 has a substantially parallelepipedal shape with a main longitudinal direction and the glass sheets are maintained separated from each other by the plurality of indentations 49, 50, 51, 52 such that the faces of the glass sheets are disposed parallel to the main longitudinal direction of the frame. The plurality of indentations enable to secure the glass sheets and to avoid breakages during transport. The glass sheets can be positioned within the recesses 53 and be maintained separated from each other by the protrusions 54. The width of the recesses 53 should be selected to be slightly greater than the thickness of the glass sheets, for instance between 3 and 6 mm. The container 30 is arranged for the glass sheets to be loaded therein following a direction substantially orthogonal to the main longitudinal direction of the frame 31.

**[0031]** The frame 31 comprises at least one supporting pad 56 for supporting at least one edge of the glass sheet. Moveable indentations are formed within a moveable separating pad 57 for separating the glass sheets substantially parallel to each other. Both pads 56 and 57 can be made of resilient materials. The choice of the appropriate resilient material should preferably take into account the fact that the container can be exposed to rather strong shocks and should guarantee no risk of glass breakage. A hardness of 85 +/- 5 ShA is preferred. Appropriate material may be for instance polyurethane (PU) or ethylene propylene diene monomer (EPDM).

**[0032]** The loading and unloading processes can be performed as follows. During loading of the glass sheets within the container 30, the upper indentation 52 is maintained at the maximum height. The glass sheets are loaded into the container following a direction substantially orthogonal to the main longitudinal direction of the frame 31. Then, the vertical position of the upper indentation 52 is adjusted to the height of the glass sheets. The unloading is simply the reverse process. When changing the contents of the container, i.e. when loading a new bundle of glass sheets with different dimensions, the operator has simply to remove the attachment means 46, change their positions and fix them again at other place. The higher the number of holes 40, 41, the higher the number of possible configurations and the lighter the final container 30. The number of holes 40, 41 should be thus high, at least higher than the number of attachment means 46, but the load-bearing properties should be also taken into account when determining, for instance, the

density of holes 40 in the upper floor 32a.

**[0033]** In order to maximize the space occupation of the containers of the present invention within a truck, and more particularly within a standard Mega Truck<sup>®</sup> trailer, applicant decided to preferably adjust the dimensions of the container 30 more appropriately.

**[0034]** The dimensions of a typical truck trailer 100, according to the Mega Truck<sup>®</sup> standard, are 13,6 x 2,47 x 3 m<sup>3</sup>. By choosing the dimensions of the container according to the present invention to be 1,2 x 0,8 x 1 m<sup>3</sup>, a space occupation of 95% can be obtained within a Mega Truck<sup>®</sup> trailer.

**[0035]** Three layers of 33 containers can be loaded within the Mega Truck<sup>®</sup> trailer.

## Claims

1. A container (30) for transporting and/or storing a plurality of glass sheets of a maximum length substantially parallel to each other, the container (30) comprising a frame (31) having a supporting floor (32) and a plurality of fastening uprights (34, 35, 36, 37), **characterized in that**

- said floor (32) and said uprights (34, 35, 36, 37) are provided with holes (40, 41) and
- the container (30) further includes moveable supporting and/or fastening means (42, 43, 44, 45) for supporting and/or fastening the glass sheets, the supporting and/or fastening means (42, 43, 44, 45) being secured to the frame (31) by means of a plurality of moveable attachment means (46) received in the holes (40, 41) such that the location of the moveable supporting and/or fastening means (42, 43, 44, 45) can be tuned to the glass sheet dimensions.

2. A container (30) for transporting and/or storing a plurality of glass sheets of a maximum length substantially parallel to each other, the container (30) comprising:

- a frame (31) having a supporting floor (32) and a plurality of fastening uprights (34, 35, 36, 37), the frame (31) having a substantially parallelepipedal shape with a main longitudinal direction and
- the container further including supporting and/or fastening means (42, 43, 44, 45) for supporting and/or fastening the glass sheets,

**characterized in that**

- said supporting and/or fastening means (42, 43, 44, 45) are arranged for supporting and/or fastening the glass sheets so that they are disposed within the container (30) such that the faces of the glass sheets are disposed parallel to the main longitudinal direction of the frame (31)

and

- the container (30) is arranged for the glass sheets to be loaded therein following a direction substantially orthogonal to the main longitudinal direction of the frame (31).

3. The container according to claim 1, wherein the moveable attachment means (46) are removable.

4. The container according to claim 3, wherein the floor (32) of the frame (31) includes a matrix of lines and columns of holes (40).

5. The container according to any one of claims 1 to 4, wherein the frame (31) comprises at least one supporting pad (56) made of resilient material for supporting at least one edge of the glass sheets.

6. The container according to any one of claims 1 to 5, wherein the moveable supporting and/or fastening means (42, 43, 44, 45) comprise at least one moveable separating pad (57) made of resilient material for separating the glass sheets substantially parallel to each other.

7. The container according to claim 6, wherein the moveable separating pad (57) comprises an indentation (49, 50, 51, 52) with a plurality of recesses (53) and protrusions (54) for the glass sheets to be positioned and separated.

8. The container according to one of claims 5 and 6, wherein the supporting pad (56) and the separating pad (57) is made of ethylene propylene diene monomer.

9. The container according to one of claims 5 and 6, wherein the supporting pad (56) and the separating pad (57) is made of polyurethane.

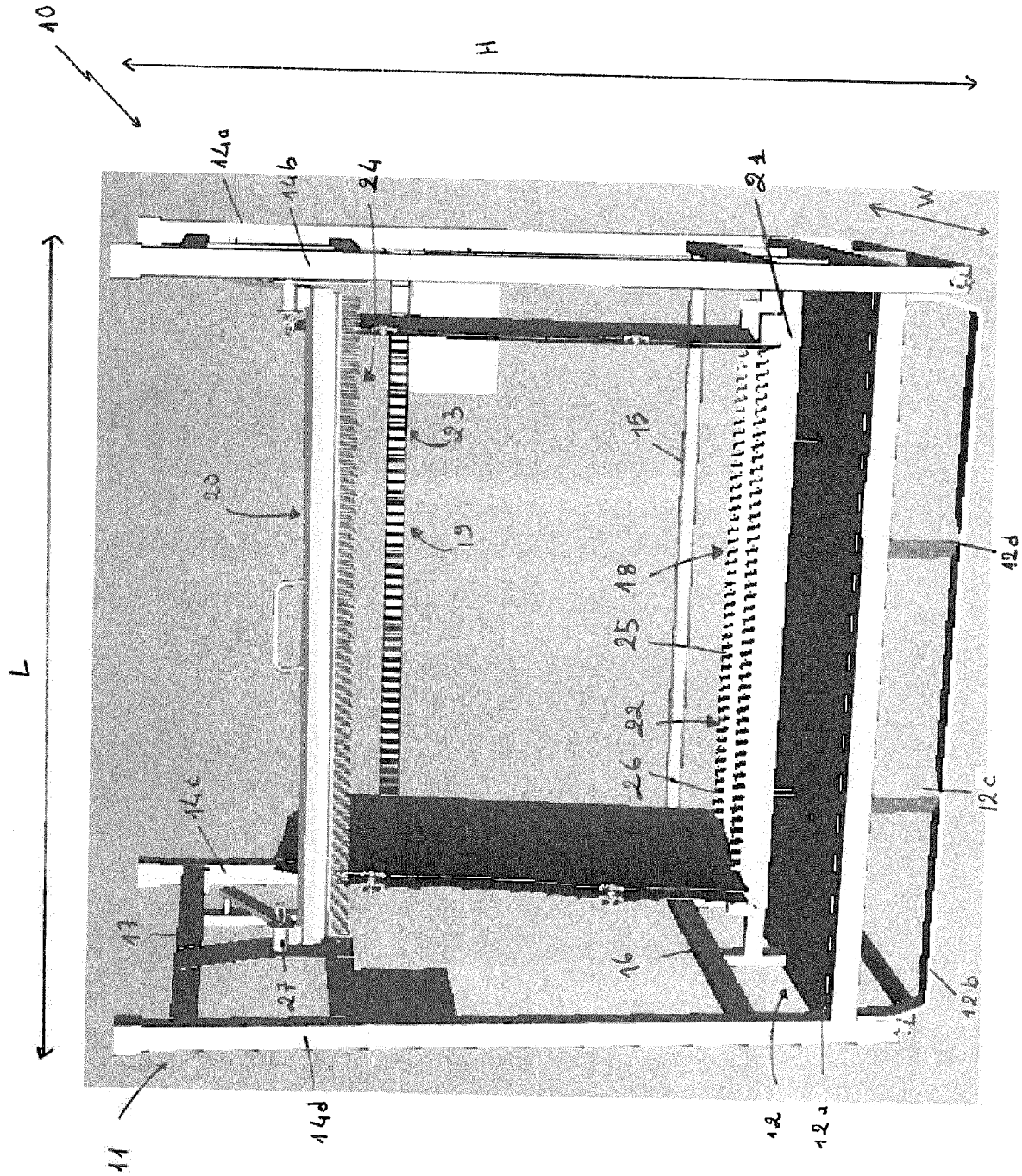


Figure 1

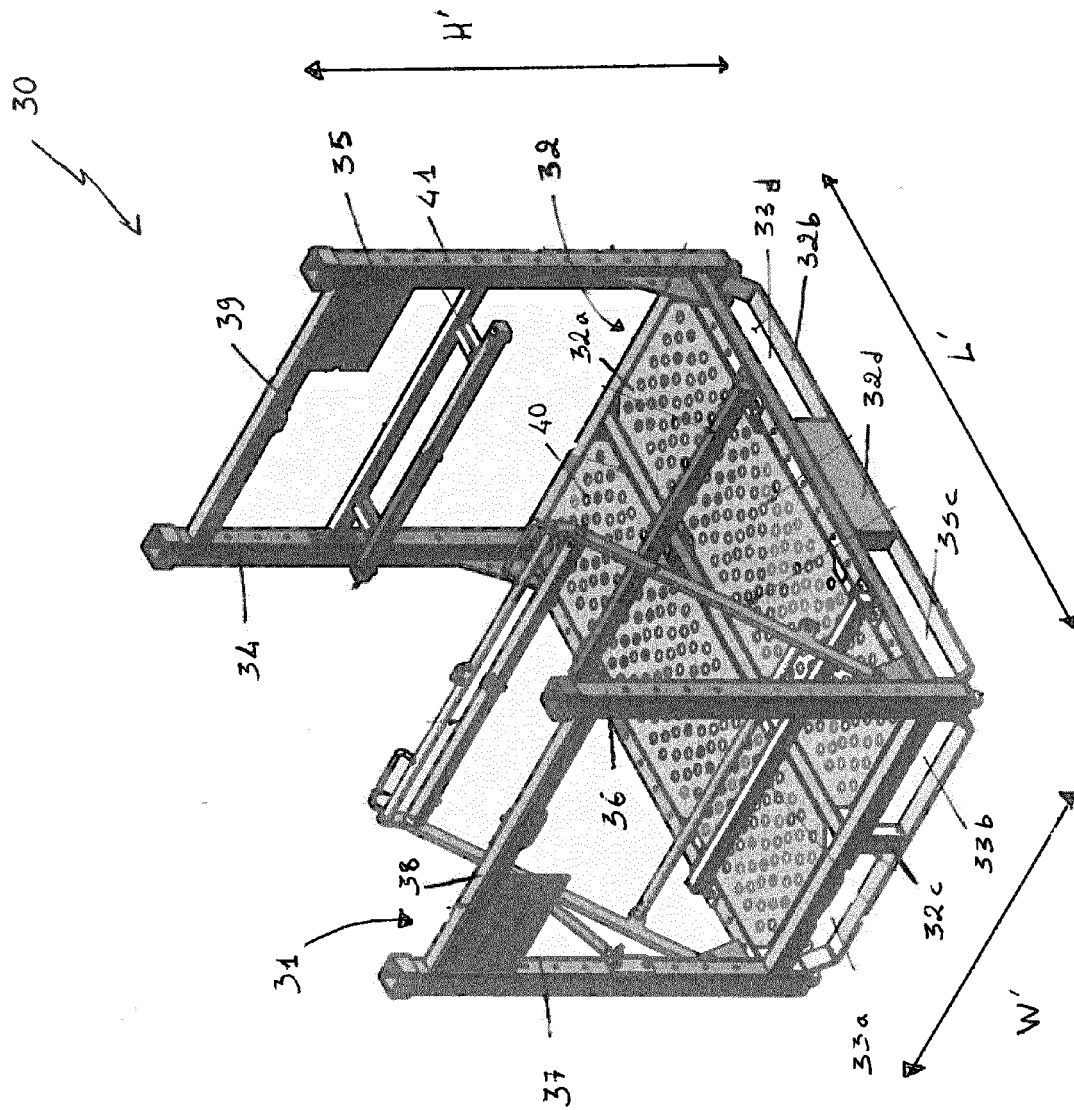


Figure 2

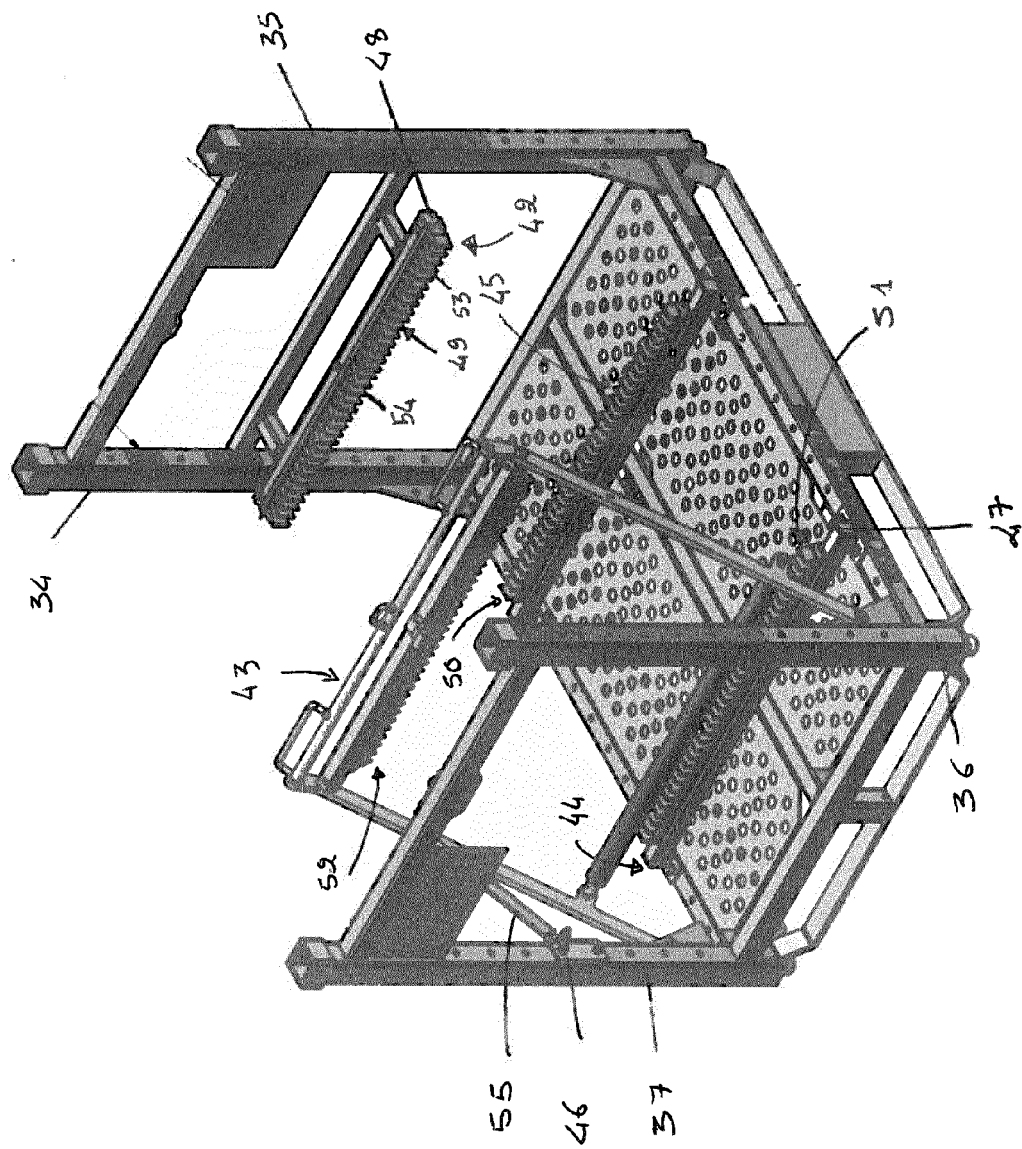
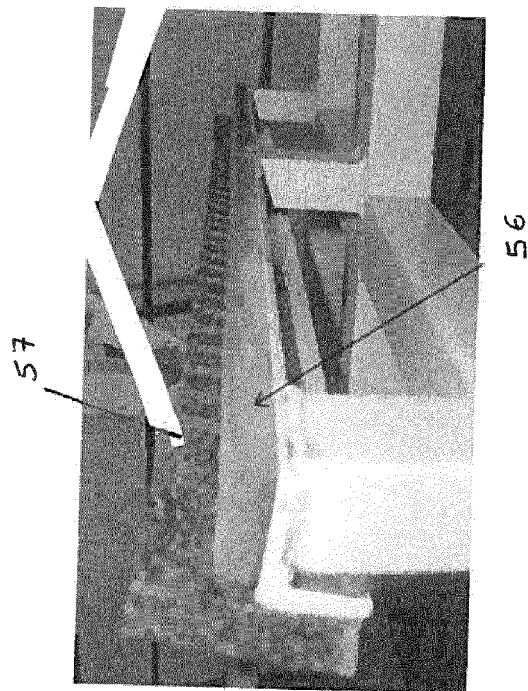
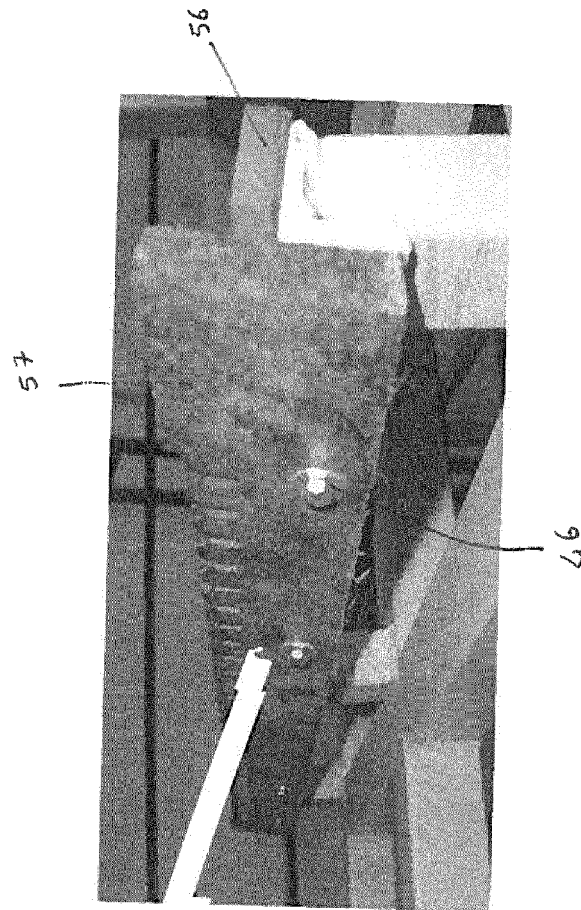


Figure 3





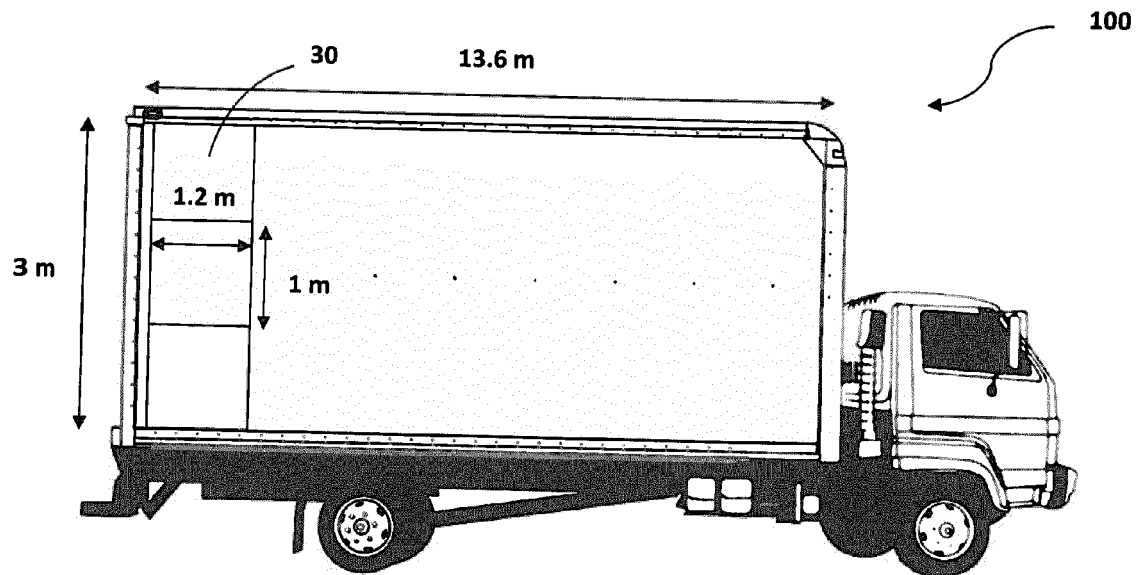


Fig. 6

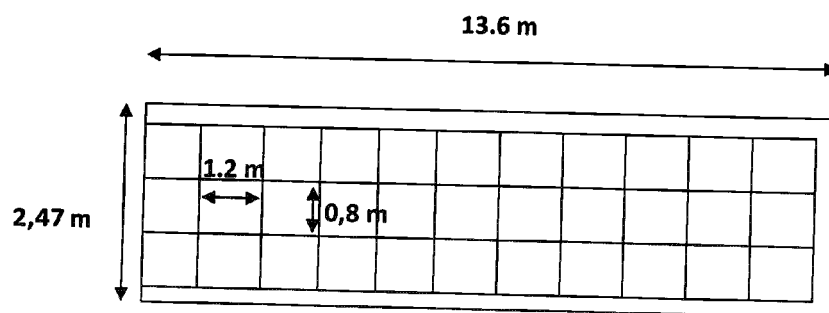


Fig. 7



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