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(54) **Bulk bin with interlocking elements for stacking**

(57) A bulk bin container having a plurality of first interlocking elements along a bottom portion of the container, and a corresponding plurality of second interlocking elements along a top portion of the container. The interlocking elements help distribute impact forces to a stack of such containers.

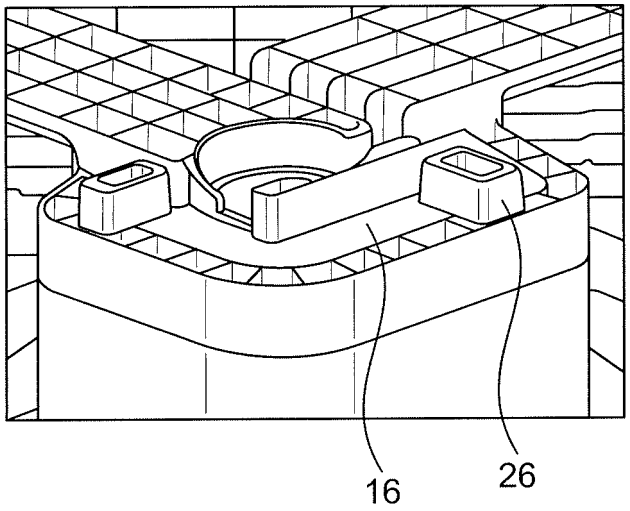

FIG. 4

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the benefit of U.S. Provisional Application No. 61/875,377 filed September 9, 2013, and U.S. Patent Application No. 14/474,600 filed September 2, 2014, the contents of which are incorporated herein by reference.

FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] N/A

FIELD OF THE INVENTION

[0003] The present invention is generally directed toward bulk bin containers with interlocking elements that distribute forces from an impact to a stack of such containers; and more particularly, to bulk bin containers with bottom structures that interlock or mate with top structures of another like container to more evenly distribute horizontal forces impacting two or more stacked bins.

DESCRIPTION OF THE PRIOR ART

[0004] Plastic bulk bin containers typically consist of a base and four hingeably connected sidewalls. The sidewalls are in an approximately horizontal position when the bulk container is in a collapsed state, and in a vertical position when the container is erected to receive shipping goods. The sidewalls have features along each side that interlock with adjacent sidewalls when containers are erected. Most bulk bin containers are designed to stack on each other in the erected state, with and without the use of top caps.

[0005] To align containers in a stack and prevent them from sliding off each other when no top cap is used, the bottom section of a container base is typically recessed to fit in-between the panels of an erected container. This recess is typically between ½" and 1" deep (see e.g., Figure 1).

[0006] One weakness of this prior design becomes apparent when a stack of containers is subjected to impacts as typically occur in use. For example: a stack of loaded containers is moved via fork lift, and the stack is moved into an obstacle, such as a guide rail; stacks of loaded containers are moved by rail and encounter horizontal impacts as they occur in switching situations; and during stacking of loaded containers, the upper container is slightly angled and moved into position above the lower container until the recess on the bottom of the upper container hits the inside top edge of a panel in the lower container.

[0007] In all these instances, one of the sidewalls of the lower container is subjected to high horizontal forces at the top edge of the sidewall that try to push the wall outward, generated by movement of the upper container. These forces result in high stresses in the upper sections of the two adjacent corners of the sidewall of the lower container, which quite often result in breakage as shown in Figure 2.

[0008] The present invention provides structure to distribute forces resulting from impacts to stacked bulk bins and reduces or prevents the amount of damage caused by such impacts. The present invention is described below and shown in the Figures.

SUMMARY OF THE INVENTION

[0009] The present invention is directed to a bulk bin container with collapsible sidewalls having interlocking elements (that mate with another like container) for distributing impact forces. As used herein, "another like container" refers to another container having the appropriate interlocking features described (and does not require the other container to be an exact copy of the claimed container).

[0010] In accordance with a first embodiment, a collapsible bulk bin container with interlocking top and bottom elements is provided. The collapsible bulk bin container comprises a base having a bottom portion, a first side, a second side, a third side and a fourth side. A first sidewall is hingedly connected to the first side of the base, a second sidewall is hingedly connected to the second side of the base, a third sidewall is hingedly connected to the third side of the base and a fourth sidewall hingedly connected to the fourth side of the base. A plurality of first interlocking elements are positioned on an edge of each side of the bottom portion of the base. A corresponding plurality of second interlocking elements are positioned on a top portion of each of the sidewalls. When one container is stacked on another container, the first interlocking elements on the bottom of the upper container engage the second interlocking elements on the top of the lower container.

[0011] The first interlocking elements can be protrusions extending downward from the bottom portion of the base. The protrusions can be integrally formed in the bottom portion of the base, or can be connected to the base, such as by a snap-fit with corresponding structure in the bottom portion. The second interlocking elements can be notches sized and positioned to receive the protrusions.

[0012] The bottom portion of the base can include a recess along the edge of each side of the base. The first elements can be positioned in the recess.

[0013] The bottom portion can include a plurality of feet. The bottom portion can also include a plurality of stringers connecting the feet.

[0014] Each side of the bottom portion can include at least three first interlocking elements. More or less elements can be utilized depending on design considerations such as the size of the container.

[0015] The notches can be designed to facilitate align-

ment of the containers during stacking. Each notch can include a wider portion proximate an opening of the notch. The opening can include angled or sloped portions.

[0016] In accordance with another embodiment of the invention, a plastic bulk bin container which can be interlocked to another like container is provided. The container comprises a rectangular base portion having a first side, a second side, a third side and a fourth side, a bottom portion having a recess along an outer edge of each side, and a plurality of first interlocking elements positioned along each side in the recess. The container also includes a first sidewall extending from the first side of the base portion, a second sidewall extending from the second side of the base portion, a third sidewall extending from the third side of the base portion, and a fourth side wall extending from the fourth side of the base portion. A plurality of second interlocking elements are positioned on an upper portion of each sidewall.

[0017] The recess can be continuous along each side of the base portion. Alternatively, the recess can be formed in segments along each side of the base portion.

[0018] In accordance with yet another embodiment of the present invention, a collapsible bulk bin container is provided comprising a rectangular base portion having a first side, a second side, a third side and a fourth side, a first corner foot extending downward from a corner connecting the first side and the second side, a second corner foot extending downward from a corner connecting the second side and the third side, a third corner foot extending downward connecting the third side to the fourth side, a fourth corner foot extending downward from a corner connecting the fourth side and the first side, a first central foot extending downward from a center portion of the first side, a second central foot extending downward from a central portion of the second side, a third central foot extending downward from a central portion of the third side, and a fourth central foot extending downward from a central portion of the fourth side. Each of the corner feet and central feet include at least a first interlocking element (in some embodiments, some or all of the feet can have more than one element). A first sidewall is connected to the first side of the base portion, a second sidewall is connected to the second side of the base portion, a third sidewall is connected to a third side of the base portion, and a fourth sidewall is connected to the fourth side of the base portion. Each of the sidewalls includes second interlocking elements.

[0019] Further aspects of the invention are disclosed below and shown in the Figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] To understand the present invention, it will now be described by way of example, with reference to the accompanying drawings and attachments in which:

FIGURE 1 is a side plan view and a partial, enlarged cross-sectional view of a first known container stacked on a second known container;

FIGURE 2 is a partial perspective top view of a known container with damage to a corner;

FIGURE 3 is a bottom perspective view of a base of a container with edge protrusions in accordance with an embodiment of the present invention;

FIGURE 4 is a partial, enlarged corner of the base portion of Figure 3;

FIGURE 5 is a partial top perspective view of a container with notches in accordance with the present invention;

FIGURE 6 is a plan view of a base portion of a container of the present invention;

FIGURE 7 is a partial perspective view of a first container stacked on a second container with interlocking elements in accordance with the present invention;

FIGURE 8 is a perspective view of a projection for use on a top portion of a sidewall in accordance with an embodiment of the present invention; and,

FIGURE 9 is a perspective view of a top portion of a sidewall with a sawtooth projection in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION

[0021] While this invention is susceptible of embodiments in many different forms, there is shown in the drawings, and will herein be described in detail preferred embodiments of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the broad aspect of the invention to the embodiments illustrated.

[0022] Figure 1 shows two known bulk bin containers 10, an upper container stacked on top of a lower container. The bulk bin containers 10 include a generally square or rectangular base portion 14 and four sidewalls 24 hingedly connected to the sides of the base portion 14.

[0023] As illustrated in the partial, enlarged cross-sectional view of one side of the stacked containers 10, a bottom portion 12 of a base 14 of the upper container 10, includes a recess 16 along an outer edge of the bottom portion. The recess 16 is formed from an upper horizontal surface 18 and a vertical, inwardly spaced surface 20. The recess 16 is sized to receive a top portion 22 of a sidewall 24 of the lower container 10. Both the outer edge and recess of the bottom portion can be continuous along each side, or can be broken into segments depending on the configuration of the bottom portion.

[0024] As described above, impact forces on the stacked containers 10 cause horizontal forces to the top portion 22 of the sidewall 24 of the lower container 10. The impact forces (to the sidewall opposite the impact) are transferred by the vertical surface 20 of the recess 16 of the upper container directly to the sidewall. This pushes the sidewall outward which results in stressing the corner sections on either side of the sidewall (con-

necting the sidewall at issue to the two adjacent sidewalls). This can result in breakage of the container in this area, such as a crack 25 as shown in Figure 2.

[0025] The present invention greatly increases the load and shock velocity levels that a stack of filled containers can withstand before breakage occurs. This is achieved by adding several interlocking features around the perimeter of the container that better distribute the horizontal forces that occur in a stacked impact situation.

[0026] As illustrated in Figures 3-5, a container 10 is provided with a plurality of interlocking features dispersed about the bottom and top of the container to distribute impact forces. Referring to Figures 3 and 4, a bottom portion 12 of the container 10 includes first interlocking elements in the form of a plurality of protrusions 26 positioned in the recess area 16 on each side of the base 12. In this embodiment, the bottom portion 12 of the base 14 is formed by a plurality of stringers 28 and a plurality of feet 30 connected by the stringers 28.

[0027] Referring to Figure 5, the top portion 22 of each sidewall 24 is provided with second interlocking elements in the form of a plurality of notches 32 corresponding to the protrusions 26 (in both size and corresponding position) on the bottom portion 12 of the base 14. When stacked on another like container 10, the protrusions 26 of the top container 10 will fit into and interlock with the notches 32 of the lower container 10.

[0028] Figure 6 shows a bottom plan view of a container with a plurality of protrusions 26 disbursed about the edges of the bottom portion 12. The protrusions 26 are connected to the bottom portion 12. This can be done by a snap-fit arrangement or other known means. Alternatively, the protrusions 26 can be molded-in (i.e., integrally formed in) the bottom portion 12.

[0029] Figure 7 shows a top container stacked on a lower container. The protrusions 26 of the top container are positioned in the notches 32 of the lower container. As evident in Figures 6 and 7, the protrusions 26 and notches 32 are distributed along each sidewall and corresponding side of the base to interlock the base 14 of the top container 10 to the sidewalls 24 of the bottom container 10 at multiple locations. By placing the interlocking elements at multiple locations along each sidewall, impact forces to one side of a stack will be distributed to more of the container and won't be focused on the opposite sidewall.

[0030] In accordance with a modified embodiment, the protrusions 26 and notches 32 can be switched (i.e., the protrusions can extend from the upper portion of the sidewalls to mate with notches - or other similar structure for capturing the protrusions - in the bottom of another like container). In another embodiment, the container could have both protrusions on the top of the sidewalls and the bottom portion of the base, and corresponding notches on the top of the sidewalls and the bottom portion of the base (e.g., alternating combinations). Additionally, the protrusions and notches can be other shapes or sizes than that shown in Figures 3-5.

[0031] Figure 8 shows a stacking cap 34 for placement over a corner formed by two sidewalls. The cap 34 includes a holding portion 36 designed for placement over the corner, and a projection or protrusion 38 extending upward. Similar holding portions (without the corner turn) can be used to position projections 38 along the sidewalls between corners. Alternatively, the projections can be integrally molded-in to the sidewalls. The base would be provided with corresponding structure to receive the projection 38.

[0032] In accordance with another embodiment, the notches can be provided with wider openings, and/or have slightly flared or inclined surfaces at the openings. This facilitates alignment of the protrusions 26 into the notches 32 when an upper container 10 is placed on a lower container 10.

[0033] In accordance with another embodiment, it is possible to utilize features that create a higher friction between the upper container and the lower container, rather than a "hard stop."

[0034] This could be in the form of, for example, elastomeric inserts or coatings on either the underside of the base or the top panel, or both. In yet another embodiment, an integral (i.e., molded-in) or attached "sawtooth" projection can be utilized as the first and second interlocking elements. An example of a molded-in sawtooth projection 40 on the top of a sidewall is shown in Figure 9.

[0035] Many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood within the scope of the appended claims the invention may be protected otherwise than as specifically described.

Claims

1. A collapsible bulk bin container comprising:

a base having a bottom portion, the base having a first side, a second side, a third side and a fourth side;
a first sidewall hingedly connected to the first side of the base;
a second sidewall hingedly connected to the second side of the base;
a third sidewall hingedly connected to the third side of the base;
a fourth sidewall hingedly connected to the fourth side of the base;
a plurality of first interlocking elements on an edge of each side of the bottom portion of the base and a corresponding plurality of second interlocking elements on a top portion of each of the sidewalls.

2. The collapsible bulk bin container of claim 1 wherein the first interlocking elements are protrusions extending downward from the bottom portion of the

base;
and optionally wherein the second interlocking elements are notches configured to receive the protrusions.

3. The collapsible bulk bin of claim 1 wherein the bottom portion of the base includes a recess along the edge of each side of the base;
and optionally wherein the first elements are positioned in the recess.

4. The collapsible bulk bin of claim 2 wherein the protrusions are integrally formed in the bottom portion of the base.

5. The collapsible bulk bin of claim 1 wherein the bottom portion includes a plurality of feet;
and optionally wherein the bottom portion includes a plurality of stringers connecting the feet.

6. The collapsible bulk bin of claim 1 wherein each side of the bottom portion includes at least three first interlocking elements;
optionally wherein each notch includes a wider portion proximate an opening of the notch;
optionally wherein the first interlocking element is a holder for a projection and the second interlocking element is a projection.

7. A plastic bulk bin container which can be interlocked to another like container comprising:

a rectangular base portion having a first side, a second side, a third side and a fourth side, a bottom portion having a recess along an outer edge of each side, and a plurality of first interlocking elements positioned along each side in the recess;
a first sidewall extending from the first side of the base portion;
a second sidewall extending from the second side of the base portion;
a third sidewall extending from the third side of the base portion;
a fourth side wall extending from the fourth side of the base portion; and,
a plurality of second interlocking elements on an upper portion of each sidewall.

8. The container of claim 7 wherein the recess is continuous along each side of the base portion.

9. The container of claim 7 wherein the recess is formed in segments along each side of the base portion.

10. The container of claim 7 wherein each of the plurality of first interlocking elements is a projection extending downward from an upper surface of the recess.

11. The container of claim 7 wherein each of the plurality of second interlocking elements is a notch in the upper portion of the sidewalls.

12. The container of claim 7 wherein each of the sidewalls is hingedly connected to the base portion.

13. The container of claim 7 wherein the bottom portion is formed from a plurality of feet connected by stringers.

14. A collapsible bulk bin container comprising:

a rectangular base portion comprising a first side, a second side, a third side and a fourth side, a first corner foot extending downward from a corner connecting the first side and the second side, a second corner foot extending downward from a corner connecting the second side and the third side, a third corner foot extending downward connecting the third side to the fourth side, a fourth corner foot extending downward from a corner connecting the fourth side and the first side, a first central foot extending downward from a center portion of the first side, a second central foot extending downward from a central portion of the second side, a third central foot extending downward from a central portion of the third side, and a fourth central foot extending downward from a central portion of the fourth side, each of the corner feet and central feet including a first interlocking element;
a first sidewall connected to the first side of the base portion;
a second sidewall connected to the second side of the base portion;
a third sidewall connected to a third side of the base portion;
a fourth sidewall connected to the fourth side of the base portion;
each of the sidewalls including second interlocking elements.

15. The container of claim 14 wherein each first interlocking element is a projection extending downward from each foot, and each second interlocking element is a notch in a top portion of each side wall.

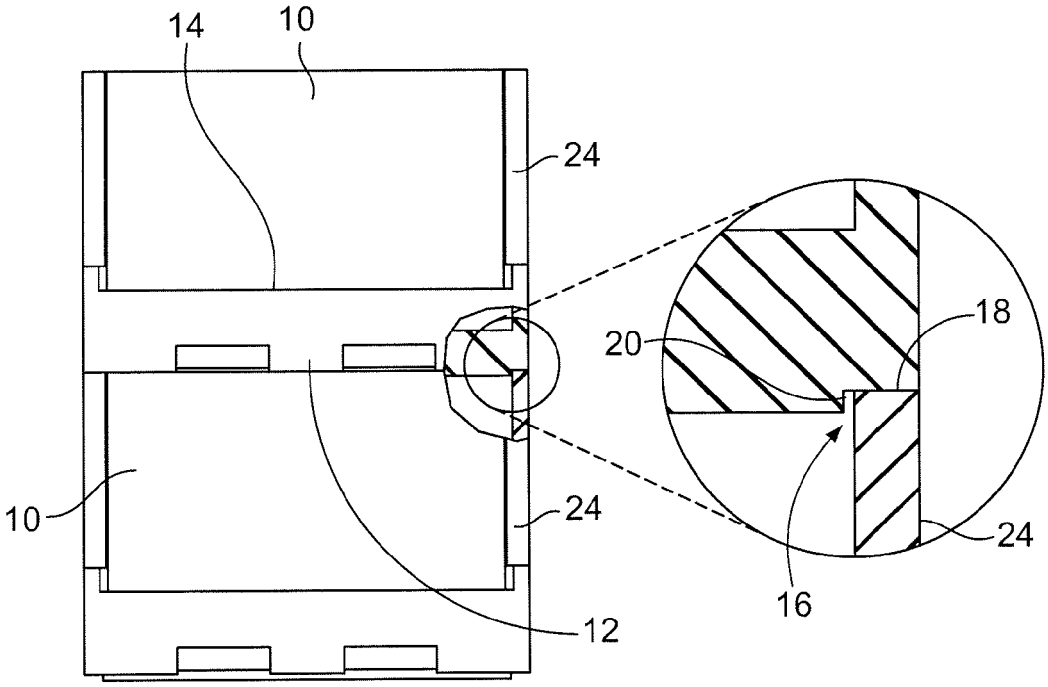

FIG. 1

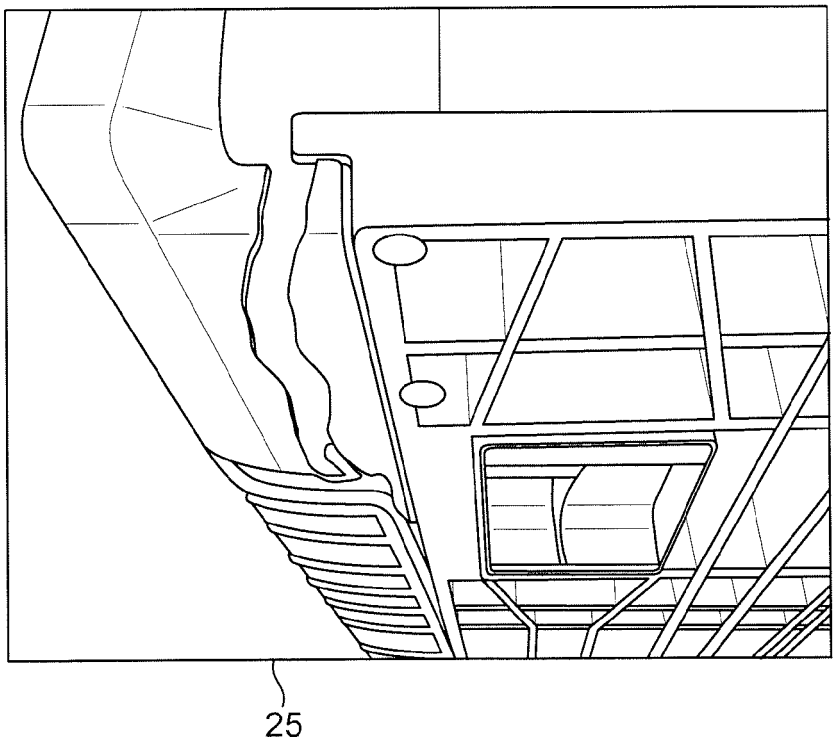

FIG. 2

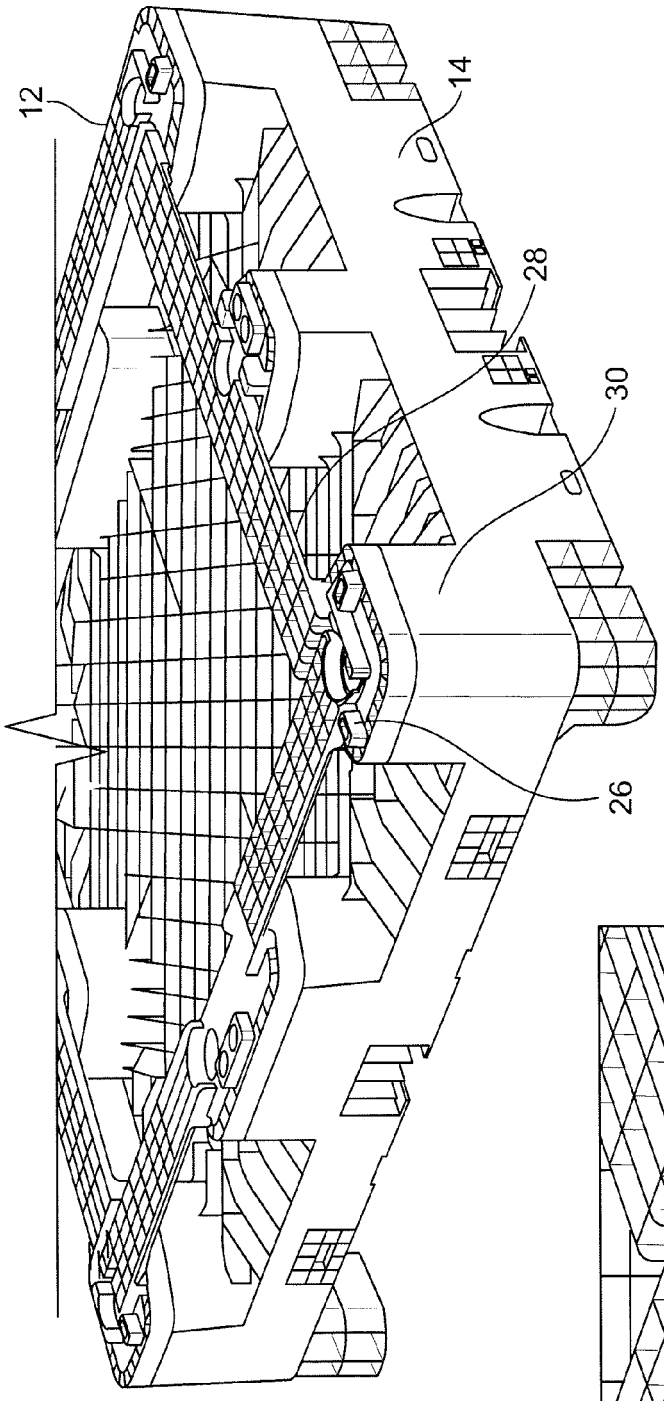

FIG. 3

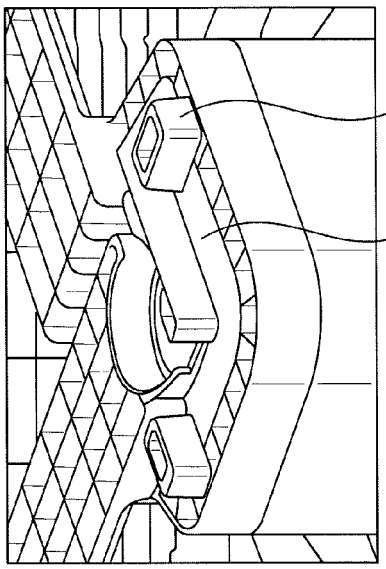

FIG. 4

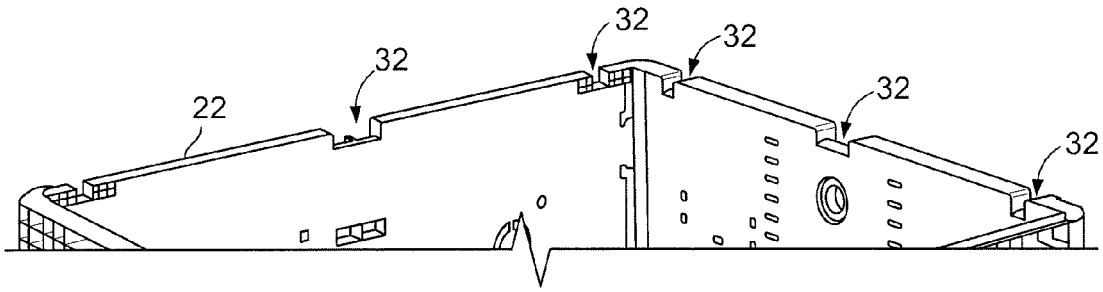

FIG. 5

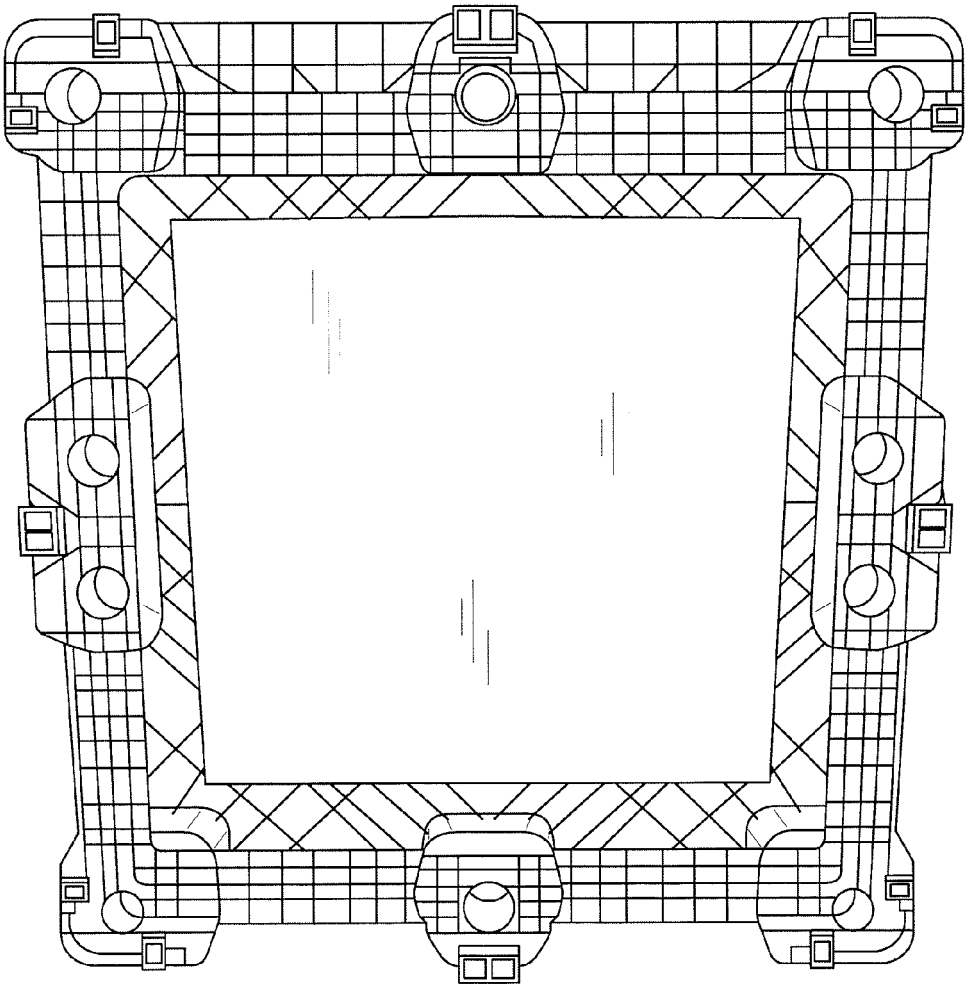

FIG. 6

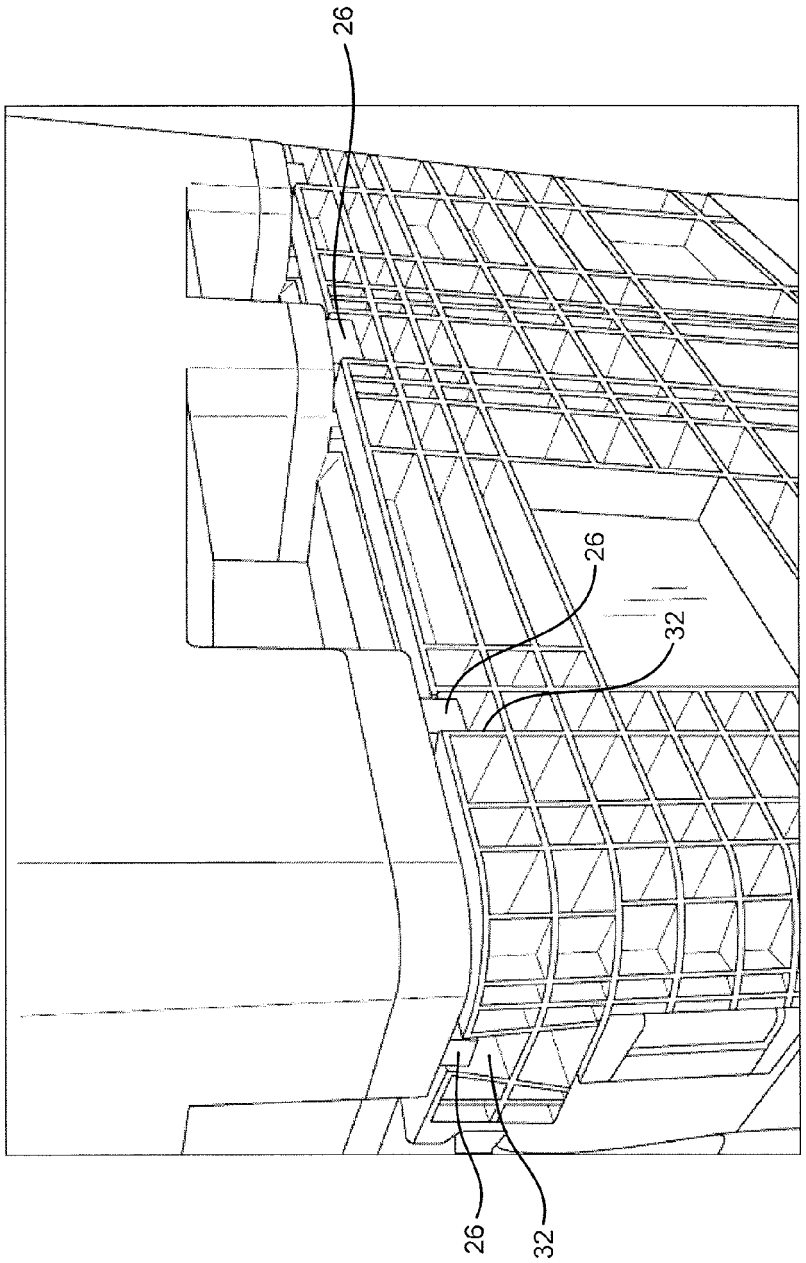

FIG. 7

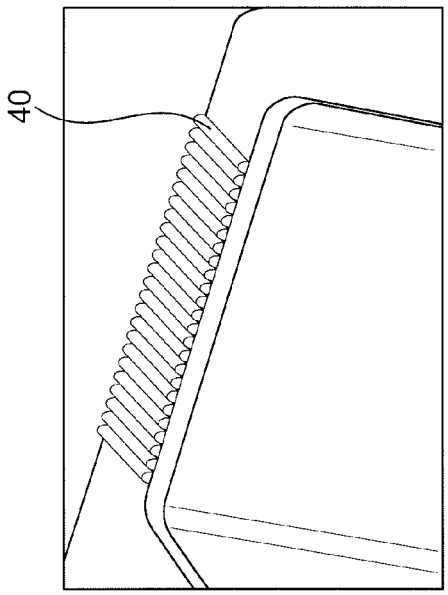

FIG. 9

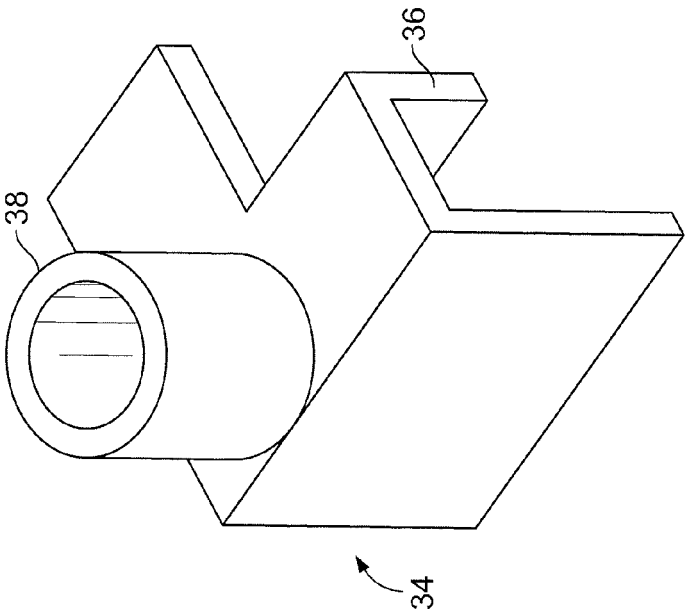

FIG. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 14 18 3992

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A	* page 17, line 28 - page 18, line 7 * * figures 1,7,10 *	3,7,8	
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A	* paragraph [0029] - paragraph [0032] * * paragraph [0056] * * figures 1-7 *	5,14,15	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 January 2015	Weyand, Tim

CATEGORY OF CITED DOCUMENTS

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