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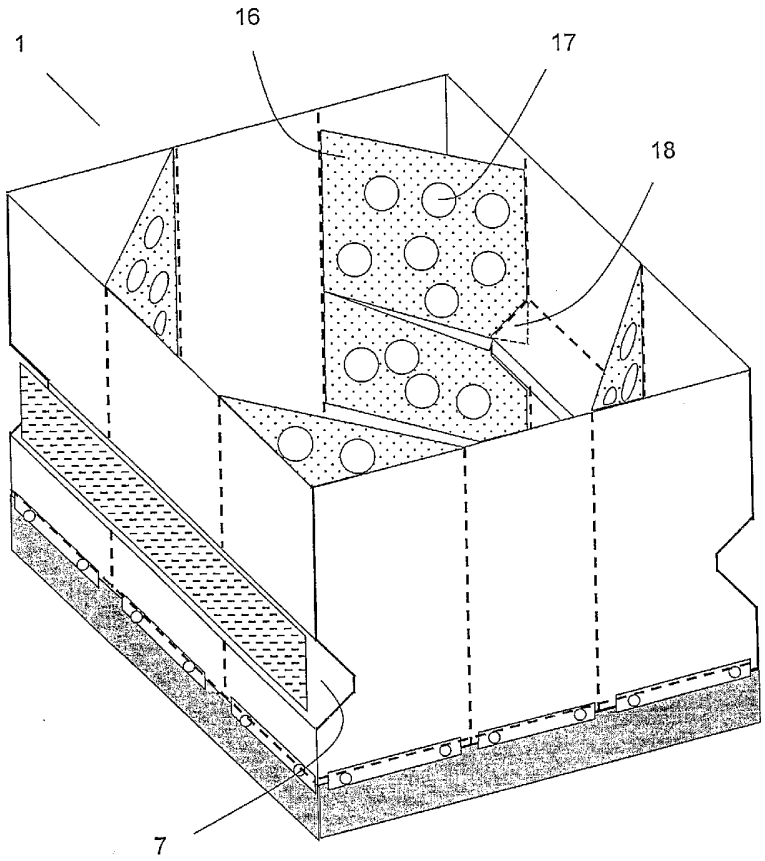
(54) **Title:** A PALLET- FREE FLEXIBLE CONTAINER



(57) **Abstract:** A flexible container (1) for transferring any kind of bulky, powdered or largely- granulated materials by means of a forklift like vehicle, comprising transfer guides (7) through which forklift forks being introduced; a basal zone (6); a top wall zone (5); and lateral walls (4) connecting the zones (5, 6) to form a closed formation the container is characterized in that said transfer guides (7) are positioned to an upper zone of said basal zone (6) so that an independent lower volume (9) is formed between said transfer guides (7) and said basal zone (6).

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A PALLET- FREE FLEXIBLE CONTAINER

Technical Field

The present invention relates to flexible containers providing the transport of any kinds of bulky, powdered, or granulated materials, more particularly the invention relates to pallet-free flexible containers comprising transfer guides, through which forks of forklifts or suchlike devices are introduced for transferring the container, are configured to an upper zone of the container with respect to the container base.

The transferring operation of such a container, commercially known as "Big Bags" or containers (Flexible Intermediate Bulk Containers) is generally ensured by means of transporters such as forklifts. The forks of forklifts are introduced into the openings of transfer guides preferably configured at a lower zone of containers, so that the required transferring is carried out.

Though various works are being carried on with the purpose of minimizing the material transferring costs, the primary object of the present work is to maximally exploit the volume occupied by containers filled with materials to be transported, namely, to minimize such volumes occupied by such containers, and to eliminate the necessity to make use of containers together with extra or other materials such as pallets.

Background of Invention

Forklifts are employed to transport containers from their filling points to the final destination point whereto they are to be transferred. Typically, forklift forks are positioned into proper openings provided on a lower site of containers in order to carry out the transportation.

There are several disadvantages with this implementation of the current container transfer. The necessity that an extra component such as a pallet, is to be positioned in the relevant TIR or ship container, for instance, leads to a substantial reduction in the total transportation volume thereof, thereby creating an unusable volume for material transportation.

The practitioners have introduced pallet-free containers in order to overcome this obvious drawback caused by pallet usage. EP 1 149 777 discloses, for example, two parallel guides, which are assembled to the base of the containers and are made of an elastic plate. Detachable fork guides made of a rigid material of a forklift are positioned into the inner volume of said guides.

Though the Patent Application EP 1 149 777 suggests a solution towards such pallet-free containers, it has some obvious drawbacks. The rigid material-based fork guides positioned into the inner section of such parallel guides require an additional material use, and the operation towards their attachment/detachment causes to labor and material losses. Additionally, depending on the materials employed, such fork guides may lead to the use of non-recyclable materials.

US 5,785,175 discloses a pallet-free container directly provided onto the base and a secondary volume between the main volume of this container and the transfer guides wherein the forklift forks are introduced. In addition, US 5,785,175 comprises flexible coupling means fixed between the lateral walls of the transfer guides.

The aforementioned and other pallet-free container configurations in the art comprises formations where the transfer guides accommodating forks are positioned at the basal zone of flexible containers, or formations made with an layer directly associated with the basal surface.

Since containers of the prior art are configured with flexible materials, distribution of weight originating from the material to be transported exhibits an increasing form from the top wall downwards to the base such that the maximum load is reached at the container base.

As is known from the principles of mechanics, this weight distribution can be characterized essentially by a triangular graphic. Regarding this case, since the center of gravity is located at the $1/3^{rd}$ of the whole height from the base, the distance between the origin point of the container's gravity force (namely, the center of gravity) and the action point of reaction forces (namely, the transfer guides where the forklift forks are present) creates a moment, once any external

force affects said container (inertia forces arising from the forklift movements, for example).

As a result and because of the distance between the action zone of the reaction forces by the forks and the action zone of the container's center of gravity, any moment to occur due to any external forces causes said forks to move out from said transfer guides, or other interventions are required that increase the material loose, costs, etc for the reaction zones (transfer guides) creating the force balance, in order to maintain the static balance.

The moment to occur due to aforesaid weight imbalances actually does not cause problems only for pallet-free containers, but also for pallet-equipped containers. Since the forklift forks introduces into the pallets in pallet-equipped containers (in this case, the pallets are located at a distance even lower than the basal zone), the overturning moment shall be indexed to the presence of quantitatively smaller forces. For instance, quantitatively smaller forklift inertia forces shall cause this moment to occur and accordingly, the relevant operator shall put the vehicle into movement relatively slowly or stop it.

Brief Description of Invention

The object of the present invention is to reduce the spaces occupied by flexible containers by eliminating the pallets used in the transfer thereof.

Another object of the present invention is to maintain the stable structure of pallet-free type flexible containers by means of a transfer guide configured to a point upper than the base such that the container construction is not forced during carriage.

The present invention provides a flexible container for carrying any type of bulky, powdered, or largely-granulated materials by a forklift or a like, said flexible container comprising transfer guides through which the forks of a forklift being introduced; a basal zone; a top zone; and lateral walls joining said zones and thus enclosed; said flexible container being characterized in that said transfer guides are positioned on an upper zone relative to said basal zone. Whereby, a separate volume is formed between said transfer guides and said basal zone.

The base of the pallet-free flexible container can alternatively comprise connecting pieces provided between the transfer guides through which the forklift forks are introduced, and hollowed connecting pieces provided between said transfer guides and the basal surface.

The site where the transfer guides are configured according to the present invention is preferably the site where the center of gravity of a filled flexible container corresponds to. The center of gravity of a filled flexible container ideally corresponds to the 1/3rd of the container height, upwards from the base. Thus any moment induced by external forces during the transfer of the subject pallet-free flexible container is reduced and the carriage and container materials' security are enhanced. On the other hand, the transfer guides according to the present invention can alternatively be configured at the upper part of the center of gravity and even at the top (right next to the top).

Brief Description of Figures

The advantages of the present invention along with the supplemental elements thereof shall be made clear by referring to the figures, as described below.

Figure 1 gives a perspective view of the flexible container embodied according to the present invention.

Figure 2a shows the weight distribution varying according to the height of such flexible container.

Figure 2b shows the weight distribution and moment effect varying according to the height of a flexible container.

Figure 3 gives a perspective view of the base of the flexible container embodied according to the present invention.

Figure 4a gives a perspective view of the flexible container base, together with the fixation elements thereof, embodied according to the present invention.

Figure 4b gives a cross-sectional view of the width and height of the flexible container base, together with the fixation elements thereof, embodied according to the present invention.

9- lower volume;

10- guide connecting piece;

11- basal connecting piece;

12- protective base pad;

13- basal connecting pieces;

14- reinforcing means;

15- column;

16- baffle;

17- baffle openings;

18- baffle trim zone;

19- guide connecting piece;

20- transfer guide inner wall;

21- transfer guide inner wall sewing line;

22- snap fastener; and

23- lateral wall extension;

Detailed Description of Invention

Figure 1 gives a perspective view of the flexible container configured according to the present invention. The flexible container (1) comprises a base (6), a top wall (5), and lateral walls (4) joined mutually so as to create a closed formation between said base (6) and top wall (5).

When the flexible container (1) is filled or discharged, it is suspended from the loops (2) provided at the joining edges of lateral walls (4) near the top wall (5) zone. The flexible container (1) is filled with a material to be transferred preferably by means of a spout (3) mounted at the top wall (5), and similarly, another spout (not shown in figures) mounted at the base (6) is used to discharge the flexible container (1) from material.

Transfer guides (7) are formed, as seen in Figure 1, to transfer the flexible container (1) by means of forklifts. The transfer guides (1) of the flexible container (1) according to the present invention are formed at an upper position in a certain distance form the base (6).

The character of a material to be transferred within the flexible container (1) and the fact that the flexible container (1) is made from a flexible material cause a weight distribution to occur along the height of flexible container due to the own-weight of such material within said flexible container (1).

The weight distribution is illustrated in Figure 2a. As is also seen from this Figure, the distribution arising from the weight of load within the flexible container makes a minimum at the top wall and a maximum at the base of said flexible container. The center of gravity of this weight distribution in the form of a triangle corresponds to $1/3^{rd}$ of the height of such triangle from the base.

The weight load (G) of the flexible container (1) is balanced by the reaction forces (G/2) created by forklift forks, to provide static balance, as seen in Figure 2a. Since the flexible container (1) cannot maintain the balanced position under the influence of external forces such as inertia forces induced by forklift while the container (1) is carried by means of a forklift, the container comes to the position illustrated with the discontinuous line, and in this position, though the flexible container's (1) weight load is quantitatively the same, the reaction forces become different, thereby creating a horizontal component for the flexible container's (1) weight load causing an overturning moment.

The cause of this overturning moment is the h/3 distance, upwards from the base (6), between the reaction forces, namely the action point of the reaction forces of forklift forks, and the action point of the center of gravity.

In order to eliminate the overturning moment, the transfer guides (7) according to the present invention are positioned essentially at the level of the vertical center of gravity of the flexible container (1).

Under ideal conditions, the center of gravity of a filled flexible container (1) corresponds to $1/3^{rd}$ of the flexible container height, upwards from the base (Figure 1).

Figure 3 gives a perspective view of the base of the flexible container according to the present invention. A lower volume (9) is formed at the lower part of the transfer guides (7). Therefore the transfer guides (7) according one embodiment of the present invention divide the flexible container (1) into two compartments: a main volume and a lower volume (9) formed under the transfer guides (7).

The lower volume (9) is filled with a material to be transferred as with the upper volume, and is freed from such material while the flexible container is discharged.

Figure 4a gives a perspective view of the flexible container base, together with the fixation elements thereof, according to the present invention. A basal connecting piece (11) between the transfer guides (7) and base (6), or a guide connecting piece (10) between the lateral surfaces (8) of transfer guides is positioned in order to prevent any contractions and displacements to occur between said transfer guides (7) leading to a prismatic deformation on the flexible container, when the latter is filled. The basal connecting piece (11) and guide connecting piece (10) are made of a flexible or rigid material.

The guide connecting piece (10) can be formed of a plurality of number and in a form to allow the contained material in the flexible container to pass into the lower volume (9); likewise the basal connecting piece (11) can also be of a plurality of number and of a hollowed formation.

Figure 4c also illustrates the flexible container basal connecting pieces, together with the spout embodiment provided at the flexible container base to discharge any contained materials from the flexible container (1).

Figure 5a gives a perspective exploded view of the basal stretching pieces of the flexible container according to the present invention. Basal connecting pieces (13) are provided here, similar to the basal connecting pieces in the Figure 4 group, but preferably with a hollowed formation and in a form to contain the lower volume (9) of the subject flexible container (1). Said basal connecting pieces (13) are preferably positioned in the lower volume (9) so as to form a frame.

Figure 6 gives a perspective view of the flexible container, together with the protective base pad according to the present invention. A protective base pad (12)

made from a rigid or flexible material is placed on the flexible container's base (6) to avoid any damages as a result of external effects.

Whilst not shown in figures, said transfer guides (7) of the flexible container (1) accommodating the forklift forks can also be opened in the lengthwise direction of said flexible container (1), in addition to the transverse direction thereof, thereby eliminating the necessity to swing the flexible container (1) while it is placed to the forklift.

In some circumstances, it is necessary to place a lining made from polyethylene (PE) or similar materials within the flexible container (1). Because of the members sewn in the flexible container (1), however, it becomes impossible to place such a lining therein. Therefore reinforcing means (14) with enhanced rigidity obtained by forming rigid or semi-rigid materials are provided at the required forklift channel cavity, namely the transfer guides (7). This case is illustrated in Figure 6. Accordingly, the reinforcing means (14) are provided on transfer guides (7) in a three-side closed and one-side open "U" shape, or in an entirely closed shape, or in a single-piece shape (not shown in figures). As another alternative, such reinforcing means (14) can be positioned as separate pieces in the corresponding inner walls of the transfer guides (7), as shown in Figure 6A. The reinforcing means (14) are coupled to each other by a column-like means (15), preferably from the external surface of the subject flexible container (1), to ensure their interconnection and their continuance in structural rigidity, as seen in Figure 6. The reinforcing means (14) can also be employed in configurations where the interior of the flexible container (1) is not lined.

The reinforcing means (14) is made from a rigid or semi-rigid material or a material made rigid by means of a forming process.

Figure 7 illustrates an alternative configuration where the transfer guides (7) are formed at a vertically upper zone with respect to the level of the center of gravity. Accordingly, the transfer guides (7) are preferably formed in a triangular shape, but this cross-section can also be embodied in any geometric shapes such as a square, rectangle, trapezoid, any polygons or circle, ellipse, etc. The transfer guides (7) are provided along two opposite lateral surfaces of the flexible container and make a recession towards the flexible container's inner volume. With the

purpose of setting the baffles (16), which are fixed to the corner zones of the flexible container, on the transfer guides (7) in order to secure the flexible container compactness, the sections of the baffles (16) joined to the transfer guides (7) both on the lower and upper surfaces of the latter (7) are formed in a trimmed manner, whereby these trimmed sections define the baffles trim zone (18). The baffles (16) contain a number of openings (17) or a net structure to allow for material transfer.

Figure 9 illustrates an application where the transfer guides (7) are positioned preferably on the top zone of the flexible container, according to an alternative configuration of the present invention. Preferably the extension of the relevant lateral wall (23) is used on the lateral walls where the transfer guides (7) are arranged to form the upper part, namely the upper covering section, of the latter (7); and in order to form the lower part of the transfer guide (7), a certain amount of the upper edges of lateral walls not having the transfer guides (7) are trimmed, thus a transfer guide inner wall (20) stitch is made from the trimmed edges of the trimmed lateral walls of the mutual standing upper margins.

The transfer guide inner wall (20) stitch is made along a transfer guide inner wall stitch line (21), as shown in the figure as well. The above-mentioned configuration exhibits a preferred formation of the present invention and except this preferred formation, any other transfer guides (7) with other shapes can also be positioned on the top of the flexible container. According to an alternative embodiment of the present invention, the transfer guide inner wall (20) can further be embodied so as to become the lateral wall's extension, and said extension (23) can be made so as to be subsequently added thereto.

As seen in Figure 8, in order to maintain the stretched condition of the transfer guides (7) positioned on the upper part of the flexible container as a result of material filling, preferably at least one guide connecting piece (19) is fixed, coupling the transfer guides (7) mutually. The guide connecting piece (19) is fixed along one inner surface of the transfer guide inner wall (20) in the flexible container's vertical direction, by means of sewing manner or the like.

In Figure 10, the subject flexible container comprises further a protective base pad (12), which is positioned at the lower part and is made from a material that is

reinforced against abrasion. This protective base pad is attached to the flexible container preferably by means of snap fastener pairs (22) in a detachable manner. The female part of the snap fastener (22) pair is fixed preferably to the bottom of the flexible container and the male counterpart to the protective base pad (12). Any other detachable or fixed couplings such as Velcro pairs or direct stitches, except such snap fasteners, are also covered by the present invention.

CLAIMS

1. A flexible container (1) for transferring any kind of bulky, powdered or largely-granulated materials by means of a forklift like vehicle, comprising transfer guides (7) through which forklift forks being introduced; a basal zone (6); a top wall zone (5); and lateral walls (4) connecting the zones (5, 6) to form a closed formation characterized in that

   said transfer guides (7) are positioned to an upper zone of said basal zone (6) so that an independent lower volume (9) is formed between said transfer guides (7) and said basal zone (6).

2. A flexible container according to Claim 1, characterized in that said transfer guides (7) are positioned essentially on a level corresponding to the vertical center of gravity of the flexible container (1).

3. A flexible container according to any of the foregoing claims, characterized in that said transfer guides (7) are positioned at about a distance of 1/3rd of the flexible container (1) height, upwards from said basal zone (6).

4. A flexible container according to any of the foregoing claims, characterized in that at least one guide connecting piece (10) is provided between said transfer guides (7) for coupling, the connecting piece (10) being made from a flexible or a rigid material.

5. A flexible container according to any of the foregoing claims, characterized in that at least one basal connecting piece (11) is provided between said transfer guides (7) and said basal zone (6) for coupling, the connecting piece (11) being made from a flexible or a rigid material.

6. A flexible container according to any of the foregoing claims, characterized in that basal connecting pieces (13) are provided at the basal zone of the flexible container, the basal connecting pieces (13) covering the lower volume (9).

7. A flexible container according to Claim 6, characterized in that said basal connecting pieces (13) comprise at least one opening.

8. A flexible container according to any of the foregoing claims, characterized in that the transfer guides (7) are positioned both in transversal and longitudinal direction of the flexible container (1).

9. A flexible container according to any of the foregoing claims, characterized in that reinforcing means (14) are provided to the transfer guides (7).

10. A flexible container according to Claim 9, characterized in that the reinforcing means (14) are made from a rigid or semi-rigid material or from a material that being made rigid by means of a forming process.

11. A flexible container according to Claim 9, characterized in that the reinforcing means (14) are selected from the group consisting of a three-side closed and one-side open "U" shape, an entirely closed shape, a single-piece shape, a number of separate pieces.

12. A flexible container according to Claim 9, characterized in that columns (15) are provided for connecting the reinforcing means (14) to each other by the outer surface of said flexible container (1).

13. A flexible container according to Claim 1, characterized in that said transfer guides (7) are positioned essentially on an upper part with respect to the vertical center of gravity of said flexible container (1).

14. A flexible container according to any of the foregoing claims, characterized in that baffles (16) are provided at the corner zones of said flexible container for providing compactness along the vertical direction of the bag, said pieces (16) comprising a number of openings (17).

15. A flexible container according to any of the foregoing claims, characterized in that said transfer guides (7) have any geometric forms including polygons like a triangle, square, rectangle, trapezoid or a circle, ellipse, etc.

16. A flexible container according to any of the foregoing claims, characterized in that the baffles (16) have trimmed sections (18) for positioning the baffles (16) to both upper and lower surfaces of the transfer guides (7).

17. A flexible container according to Claim 1, characterized in that said transfer guides (7) are positioned at the top zone of said flexible container (1).

18. A flexible container according to claims 1 and 17, characterized in that the extension of the relevant lateral wall (23) is used to form the upper part of the transfer guides (7) at the lateral walls where said transfer guides (7) are formed and to form the lower part of the transfer guides (7), a certain amount of the upper part corners of lateral walls not having the transfer guides (7) are trimmed, thus a stitch is made along the transfer guide inner wall stitch line (21) from the trimmed edges of the mutual standing lateral walls with their upper edges trimmed.

19. A flexible container according to claims 1, 17 and 18, characterized in that at least one guide connecting piece (19) is provided, the connecting piece (19) mutually coupling said transfer guides (7) and in that said transfer connecting piece (19) being fixed to said transfer guide inner wall (20) by means of stitching or a like method along the inner surface of a transfer guide inner wall (20) in the container's vertical direction.

20. A flexible container according to claims 1 and 19, characterized in that said transfer guide inner wall (20) can be formed so as to become the lateral wall's extension, and said extension (23) can be formed so as to be subsequently added thereto.

21. A flexible container (1) for transferring any kind of bulky, powdered or largely-granulated materials by means of a forklift like vehicle, the container comprising transfer guides (7) through which forklift forks are introduced; a basal zone (6); a top wall zone (5); and lateral walls (4) connecting the zones (5, 6) to form a closed formation, characterized in that a protective base pad (12) is provided to the basal zone.

22. A flexible container according to any of the foregoing claims, characterized in that the protective base pad (12) is attached to the lower part of the container by means of a coupling element (22) in a detachable or a fixed manner.

23. A flexible container according to any of the foregoing claims, characterized in that the coupling element (22) is fastened to the container by means of a connecting means including snap fasteners, Velcro fasteners or by means of stitching etc.

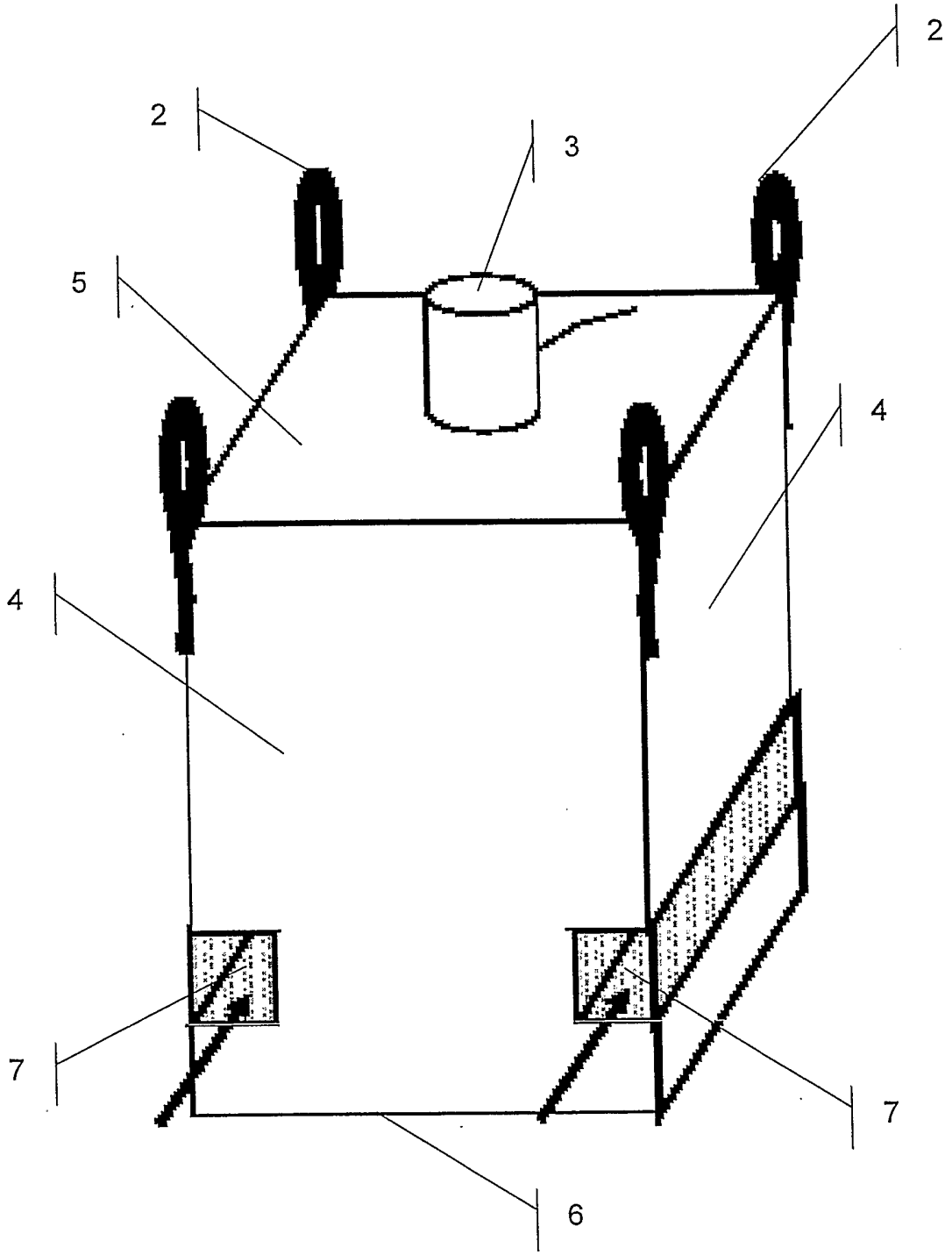


Fig. 1

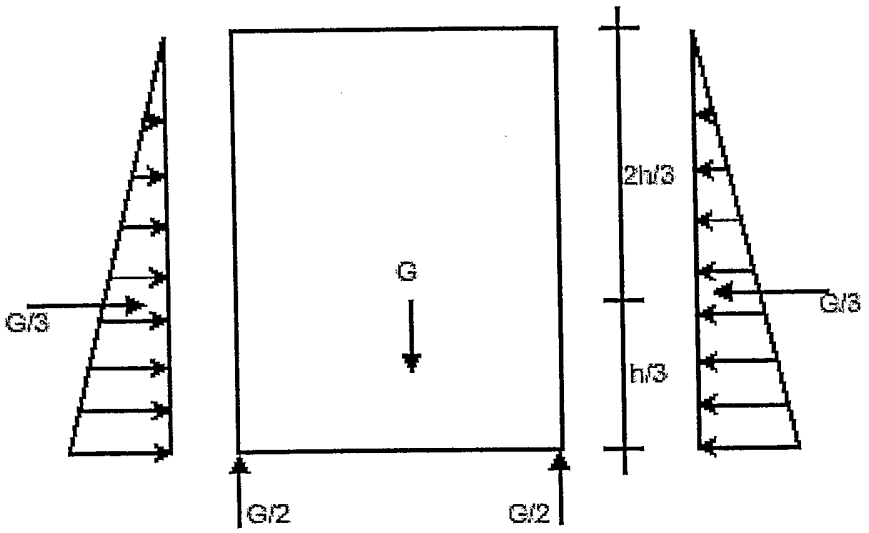


Fig. 2A

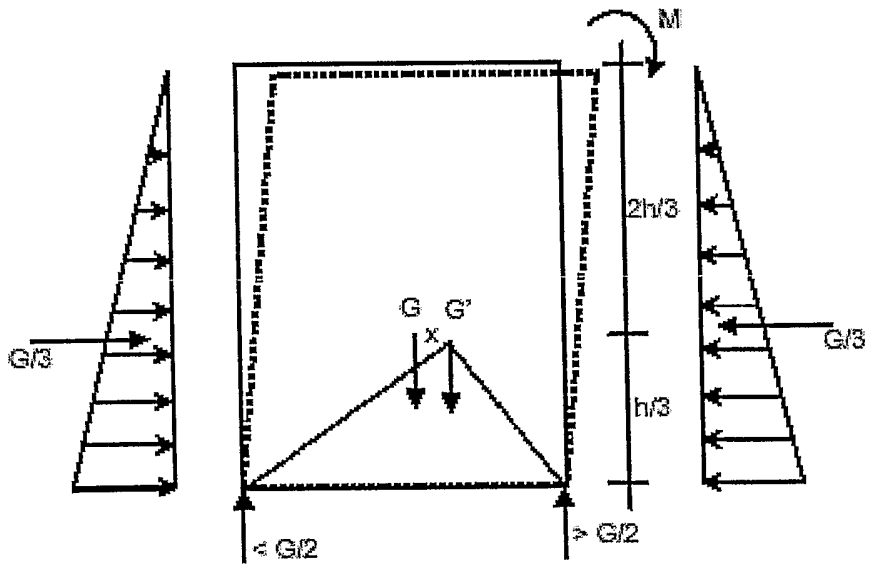


Fig. 2B

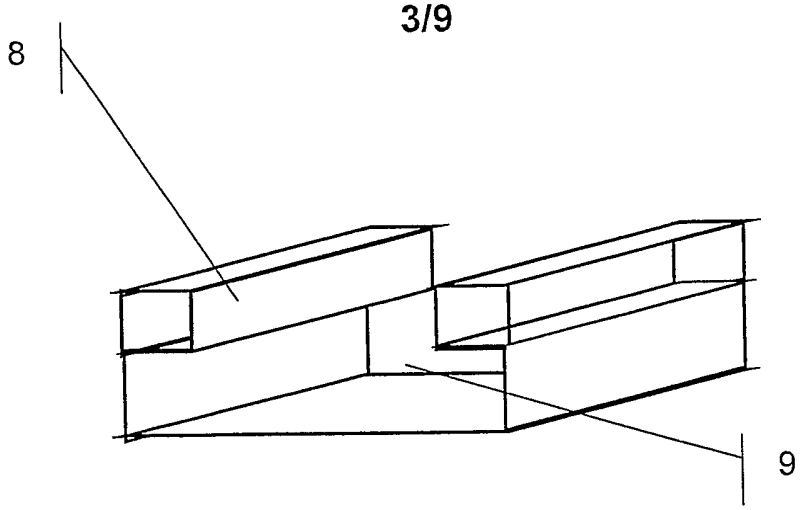


Fig. 3

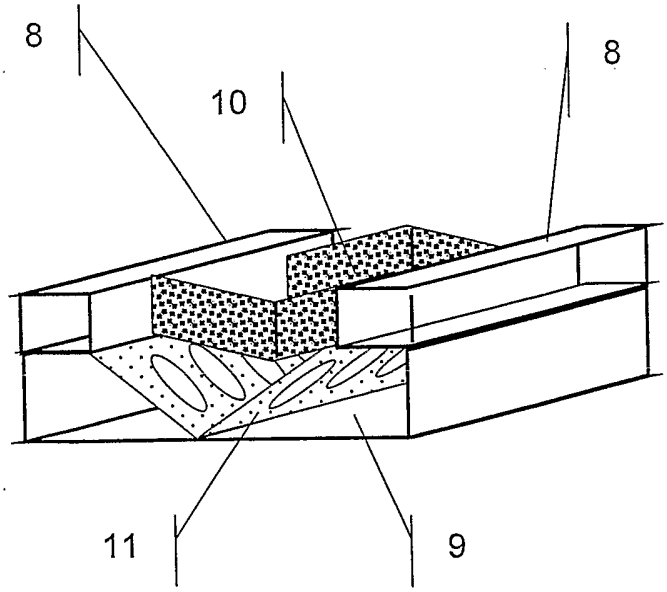


Fig. 4a

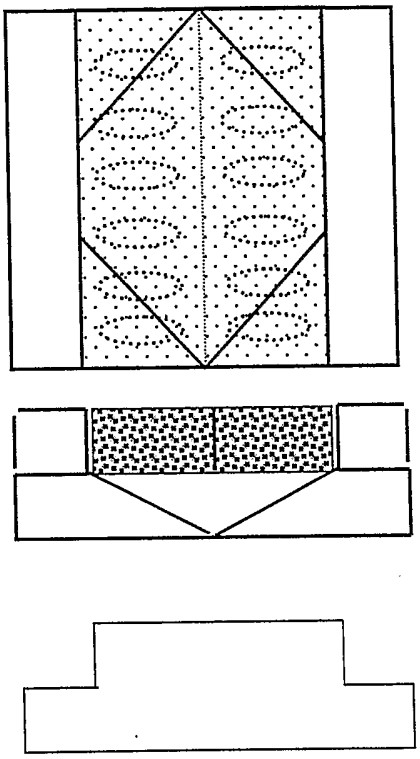


Fig. 4b

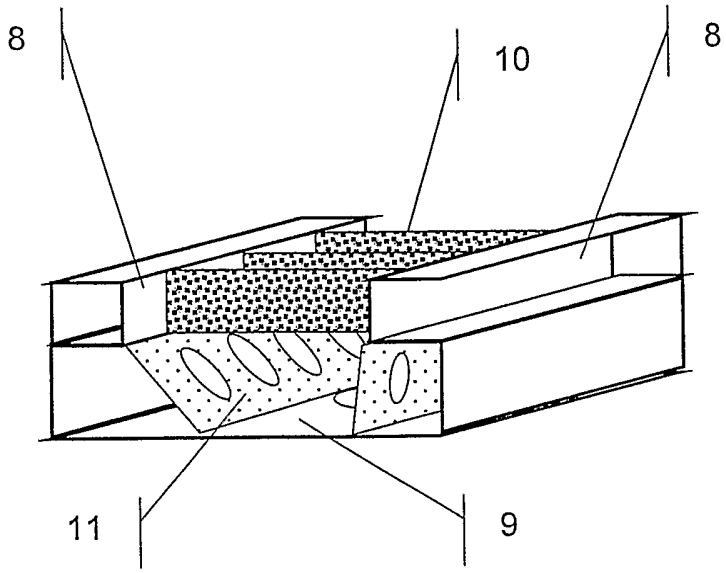
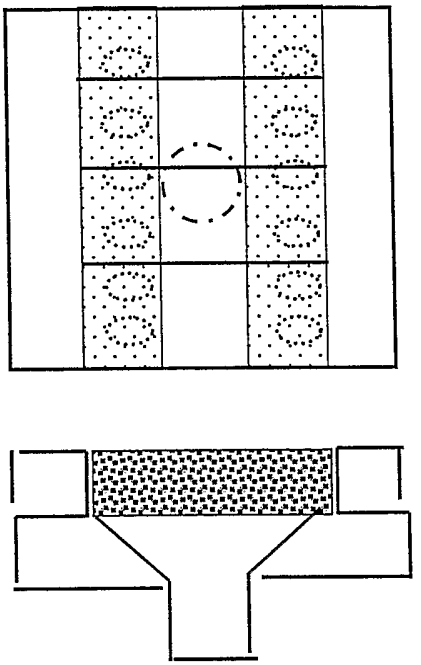


Fig. 4c



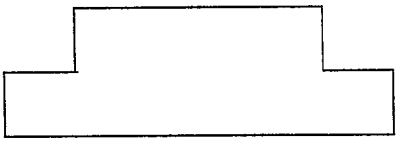


Fig. 4d

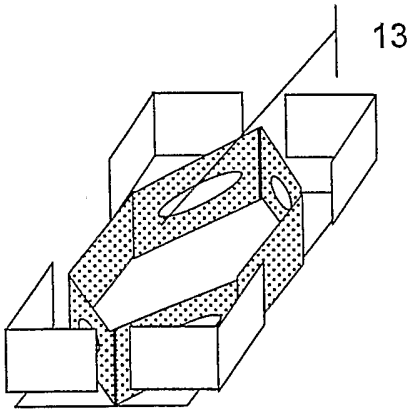


Fig. 5a

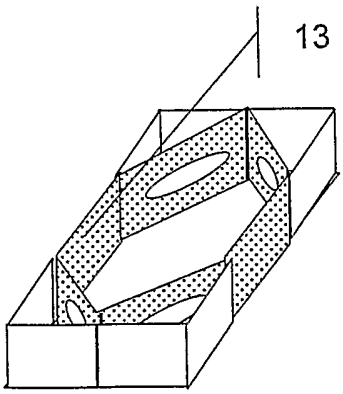


Fig. 5b

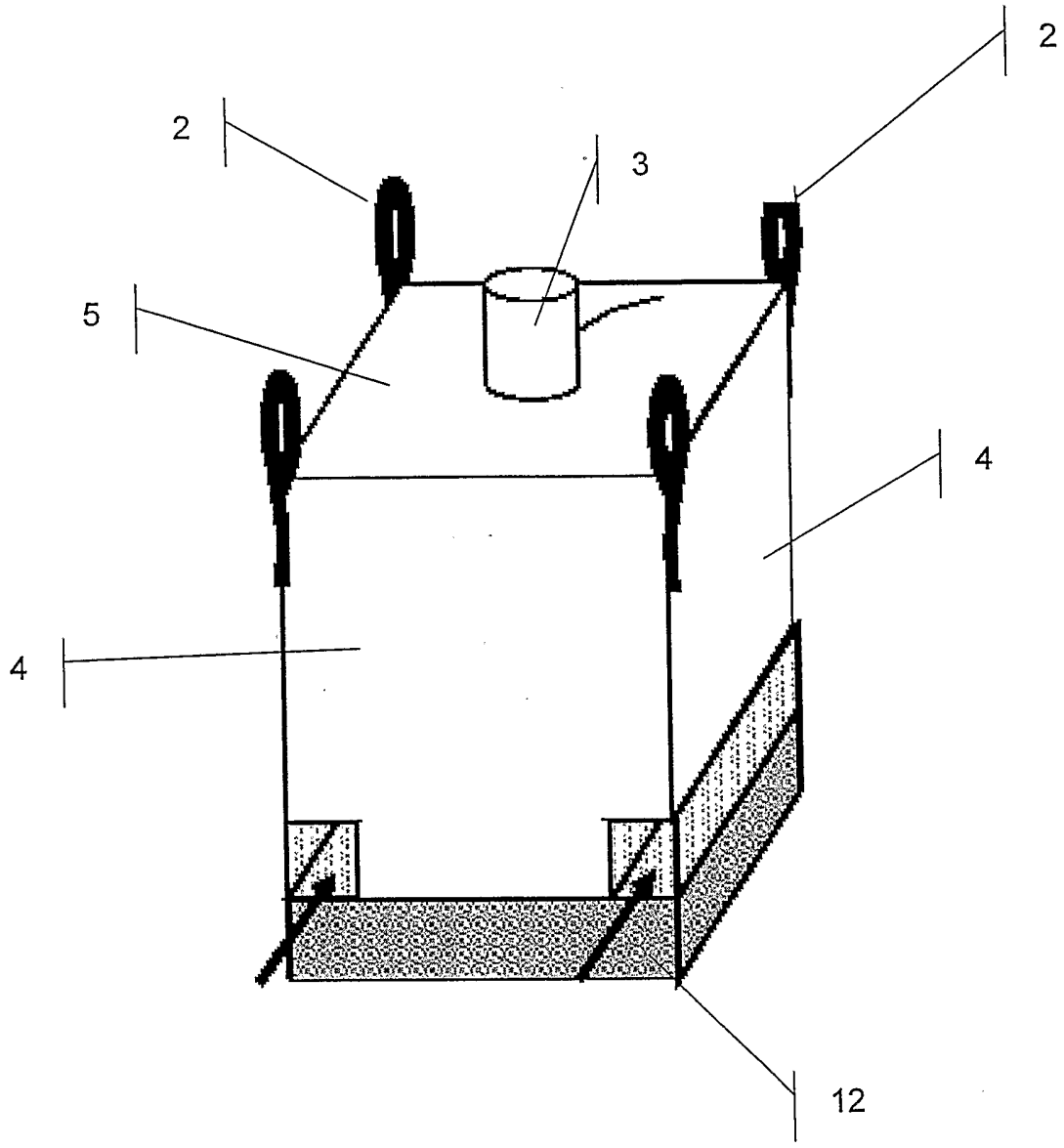


Fig. 5

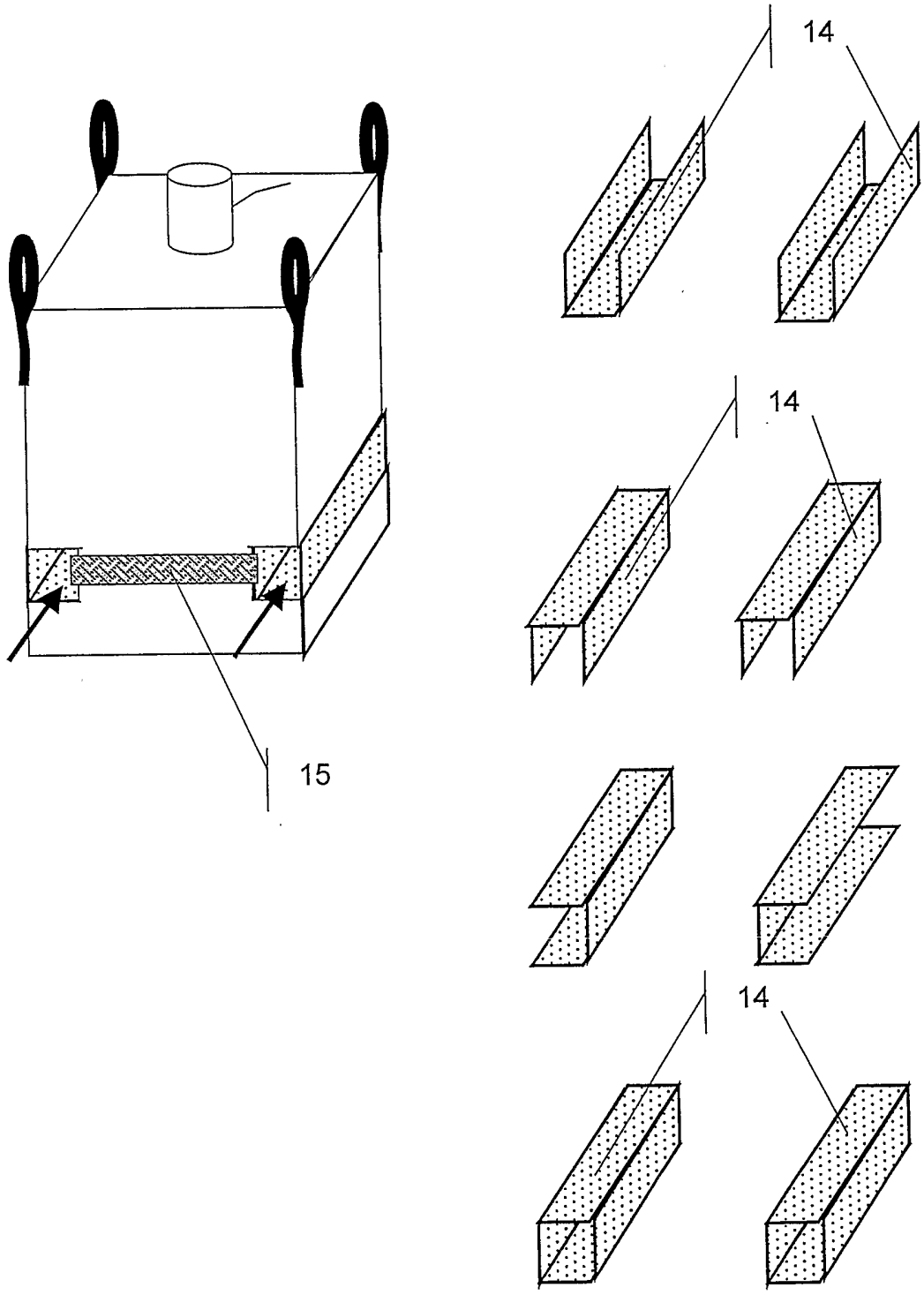


Fig. 6

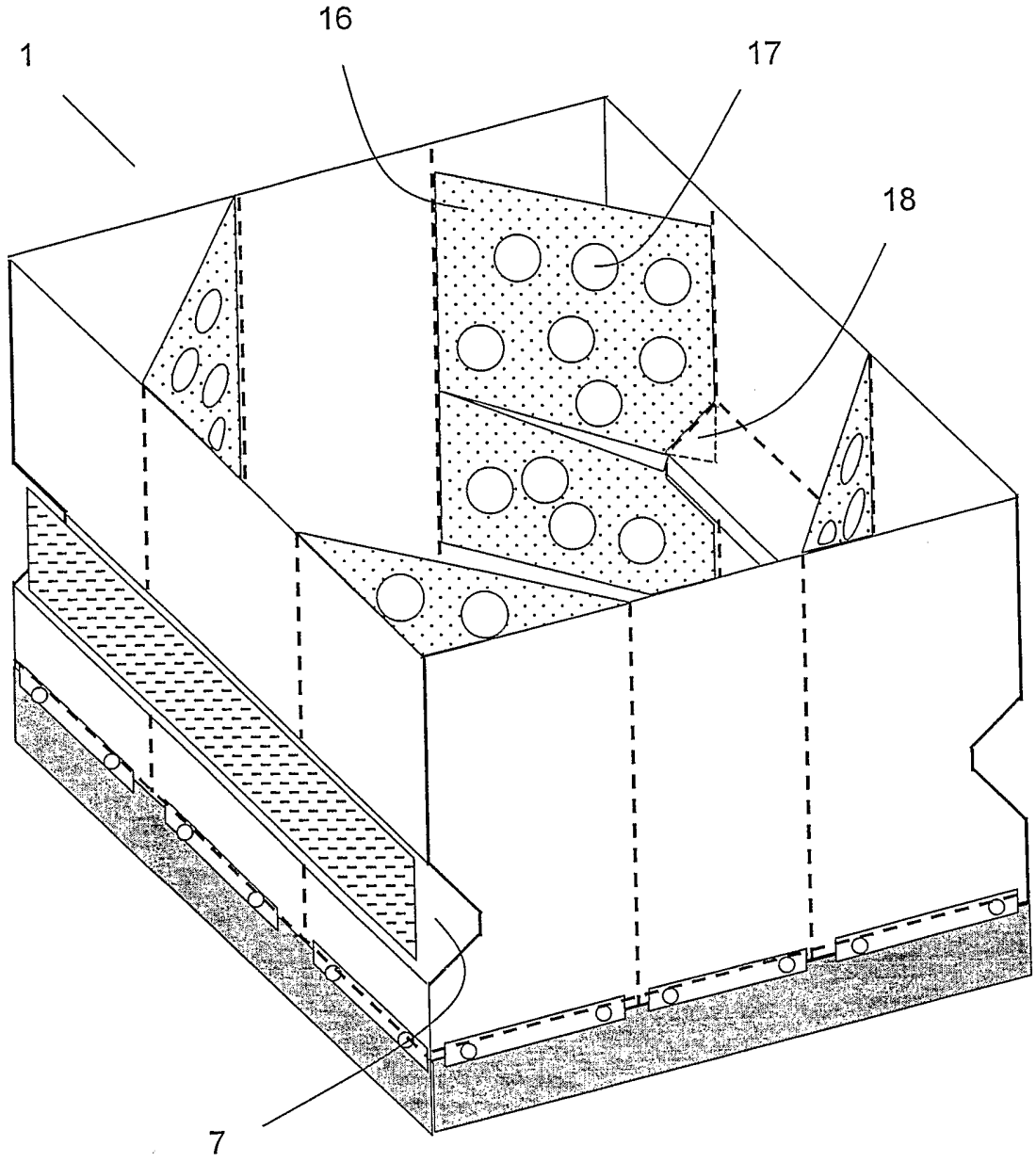


Fig. 7

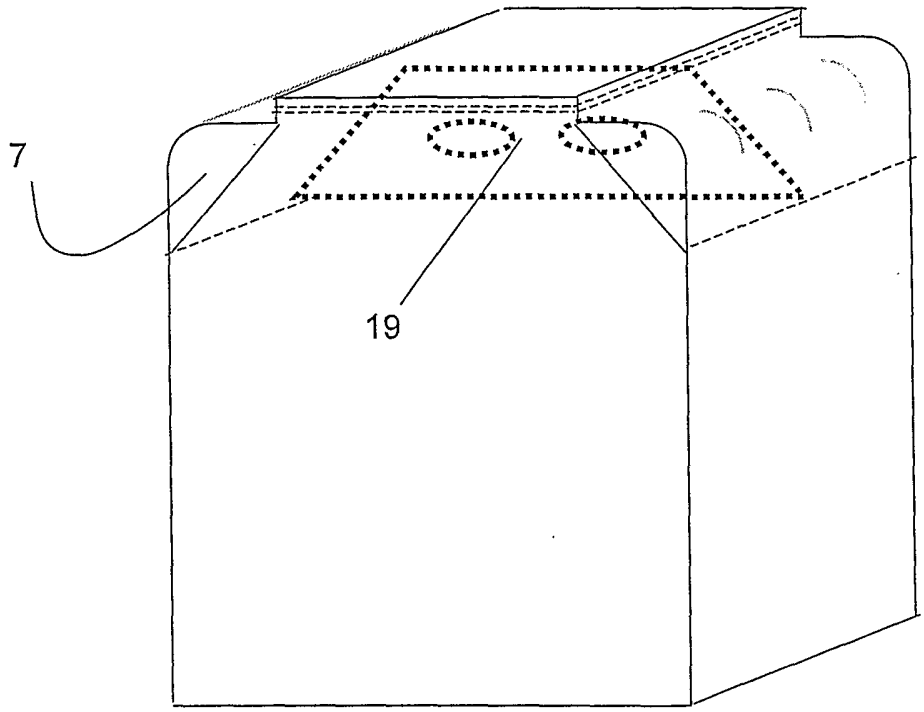


Fig. 8

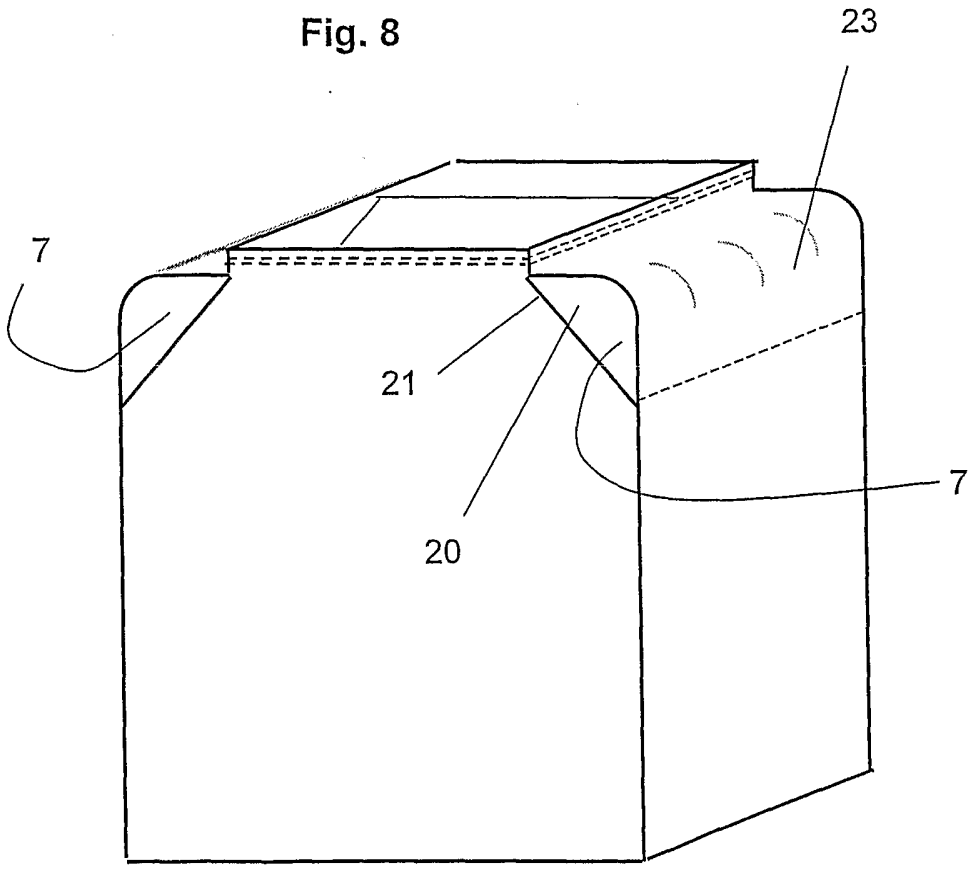


Fig. 9

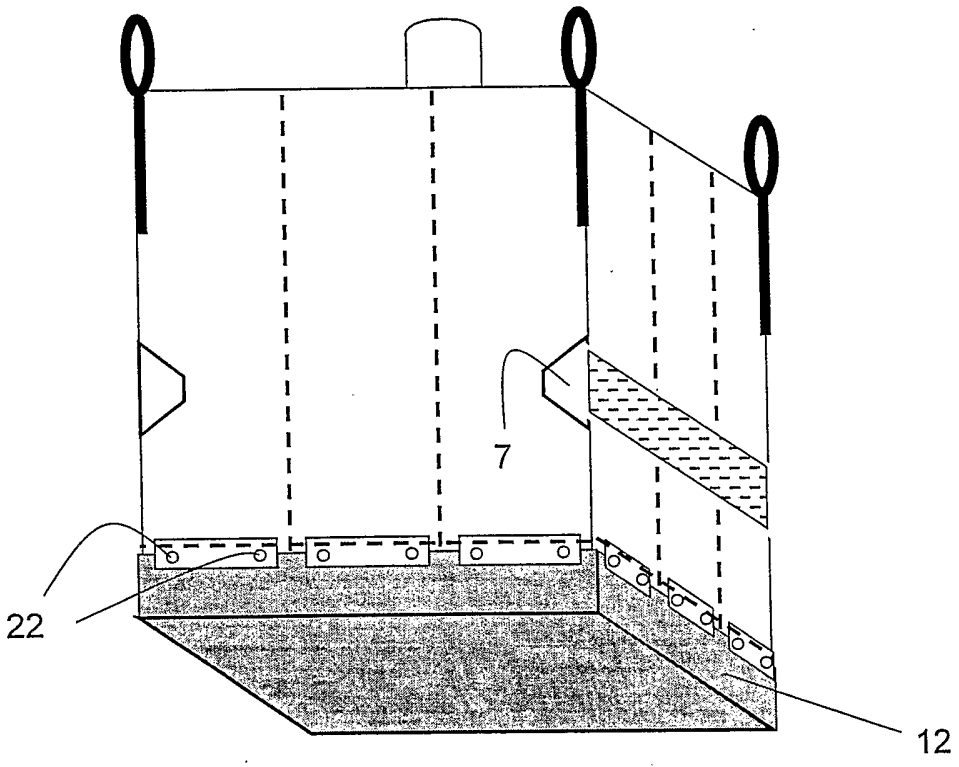


Fig. 10