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54 **Industrial containers.**

57 Container 46 having suspension loop 44 is made by folding flat a length of woven tube. One side portion of the tube, including folded or flattened edge 12 is tucked in as a gusset 20 and the open transverse edges of the tube are folded over and seamed along their lengths as at 26, 30 and 28, 32, leaving unseamed a side portion approximately equal in extent to the gusseted portion 20. This non-seamed non-gusseted portion is bunched and bound by a sleeve 42 to form the loop 44 with openings 38 to the interior of the container at each side thereof. The gusset 20 provides the bottom of the finished container 46 in which the continuous wefts extend endlessly through the bottom, the sides and the loop 44 to assure the strength of the construction. Plural loops 44 can be obtained by forming one or more cuts substantially parallel to the seams 30, 32 in the non-gusseted side.

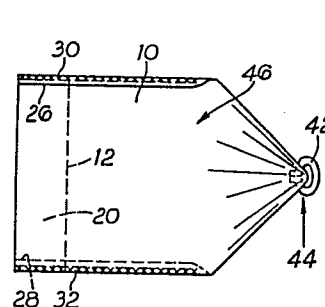


Fig. 5

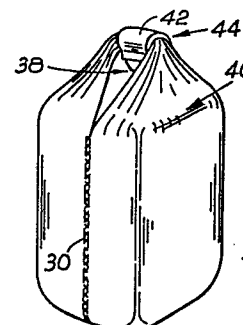


Fig. 6

Description

INDUSTRIAL CONTAINERS

This invention concerns industrial containers of the kind consisting of a fabric bag adapted for suspension (e.g. from a crane hook, derrick or the like) and which serves to contain bulk material in granular, particulate, flake or like form, such as chemicals, seeds, building materials, minerals, animal feedstuffs, fertilisers and so on, in relatively large quantities, for instance a half-tonne, or a tonne.

In the manufacture of such containers, it is quite usual to achieve the requisite bag shape, for instance substantially square or rectangular when viewed in plan, by seaming together panels of tough woven fabric, the weft and warp of the fabric being, for instance, narrow plastics tape, for instance polypropylene of the order of two or three millimetres in thickness. For attachment of suspension straps or harnesses, regions of the fabric may be reinforced by plating or weaving with tapes which are thicker than those of the rest of the fabric, the straps or webs of the harnesses being attached, for instance, by sewing.

It is also known to design containers of the kind with which the invention is concerned in such a way that a single panel of fabric forms one side panel of the bag, extends in an inverted-U-shaped bight over the top of the bag and then forms the opposite side panel of the bag, the bight being bunched up to form a lifting loop, or being bifurcated to form two lifting loops for the container.

All of these proposals are relatively expensive to manufacture, involving a considerable amount of skilled labour, and in the main each construction has one or more seams between its side panels and the bottom of the container, where the maximum of stress arises.

It is also known to form such bags by weaving a circular tube, and severing this tube into lengths correlated to the desired size of the eventual container. To achieve the desired rectangular configuration in plan, both ends of the tube length have to be severed and shaped. A seam has to be provided across the bottom of the bag to close it off there, and at the top corresponding seaming has to be provided for forming one or more lifting loops where two opposite panels connect together, the portions of the tube between these loops(s) being formed as flaps which may be folded inwards beneath the loops to overlie the container's contents. In this construction, it is usual to provide a liner, e.g. of polyethylene, within the bag.

Although this latter container construction possesses the advantages of strength arising from its circular woven construction, it will readily be understood that in the finished container, the strong continuous circular weft, from which the strength advantage arises, extends around the sidewalls of the bag. The bottom of the bag still incorporates one or more seams which are subjected to the full weight of the container's contents; the lifting loops also involve seaming, and these loops, too, are loaded with the full weight of the container and its contents,

when the container is being lifted and/or transported.

An object of the present invention is to provide a method of constructing a container which is generally of the kind above discussed, but which essentially comprises tubular woven fabrics, which container is simple to manufacture and has the particular advantage that the circular wefts extend continuously between the bottom of the container and the lifting loop or loops, so that there are no joins or seams in the bottom and loops which are encompassed in or provided by the strongest parts of the fabric. The invention further includes, of course, a container made by the method aforesaid, which is characterised by the simplicity with which it may be carried into effect.

With this object in view the present invention provides, as a first feature, a method of making, from a woven fabric tube length, an industrial container in the form of a fabric bag adapted for suspension characterised in that it comprises, in the flattened condition of the tube length, forming a gusset by folding in or pleating one of the flattened folded edges of the tube length and thereupon seaming the flattened and gusseted tube length along each of its two open edges, so that in each case such edge is closed from its gusseted end to a position adjacent to but short of the other (non-gusseted) flattened tube edge to leave thereat openings to the interior of the container, the gusset serving, in the operative orientation of the container as the bottom thereof and the said other (non-gusseted) flattened tube edge then serving as or being available for use as suspension loop means of the container.

The suspension loop means may simply be formed by bunching together the fabric of the said non-gusseted tube edge and, if desired, wrapping it with a fabric band or sleeve, which may, if desired, be sewn to secure it. Alternatively, the fabric of the bag may be cut or severed, parallel to the weft direction of the fabric by a short distance from the said non-gusseted edge thereby to bifurcate it and provide two side by side portions each of which is bunched and sleeved, thus providing two suspension loops on the container.

In seaming the open edges of the tube length, in carrying the method of the invention into effect, the seaming may be achieved by sewing. This is preferably effected by folding over the superimposed open edges of the flattened tube length and overlocking or machine stitching with any other suitable reliable stitch which will not readily loosen or unravel. The folding over is conveniently effected oppositely, that is to say with one of the folded over hems lying against one outer surface of the flattened tube and the other of such folded hems lying against the other outer surface of said flattened tube. This contributes to an aesthetically acceptable product of good practical strength.

In the case where a particularly strong container construction is required, this can be achieved very

conveniently and with the minimum of inconvenience by making the tube length multi-ply in its initial form, by the simple expedient of starting with, for instance, a tube of double the required eventual length and pulling one half into the other to achieve a starting tube length of double-ply fabric.

It can readily be appreciated that in the container of the invention one does not have a fabric tube in which the effectively endless encircling weft is disposed to extend around and around the body of the bag or container when the latter is in its normal upright condition ready to receive contents, or when filled; which the top and suspension loops of the container having to be formed separately in some suitable way. On the contrary, one has a construction wherein such effectively endless wefts extend through the suspension loops, vertically in the sidewalls of the container, and across the bottom thereof as continuous elements or loops, thereby providing for a particularly enhanced strength in the container. The two seams, of course, extend vertically of the sidewalls of the container at two opposite locations and are not subjected to the entire loading of the contents of the container, and of course the extent and configuration of the gusset will determine the overall plan configuration of the container.

The invention further includes, of course, as a further feature thereof, an industrial container made by the method(s) above discussed. Such a container may be differently defined by expressing it as being composed of a woven fabric tube length seamed along what would be its two open edges were it in a flattened condition so as to be closed along said edges from a gusseted end formed by folding in or pleating one flattened folded edge of the tube to a position short of the other (non-gusseted) tube edge whereby to define openings to the interior of the container, the gusset serving, in the operative orientation of the container, as the bottom thereof and the other flattened tube edge serving as or being available for use as suspension loop means of the container.

The invention will be described further, by way of example, with reference to the accompanying drawings which illustrate schematically two preferred ways of carrying the method into effect, and the containers obtained thereby, and wherein:

Fig. 1 illustrates a length of woven tube used for making a container in accordance with the invention;

Fig. 2 is a view comparable with Fig. 1, but illustrating the tube length prepared ready for seaming, as a stage in making the container therefrom;

Fig. 3 is a view comparable with Fig. 2, but illustrating the tube length having been seamed along its two opposed open edges;

Fig. 4 is a view comparable with Figs. 2 and 3, but showing the gusset at the non-seamed side thereof unfolded or pulled out to enable it to be used to form suspension loop means;

Fig. 5 is a view comparable with Fig. 4, but showing the non-seamed gusset portions bunched up and sleeved to form suspension loop

means as a final stage in forming the container;

Fig. 6 is a perspective view illustrating the container of Fig. 5 in its upright disposition and in the configuration it will assume when filled with contents;

Fig. 7 is a view comparable with Fig. 4, but showing a modification in which the seamed tube is severed at its non-seamed gusset portion, to enable it to form bifurcated suspension loop means; and

Fig. 8 is a perspective view illustrating the container finally obtained after forming the suspension loop means on the arrangement of Fig. 7.

Throughout the various figures of the drawings, similar reference numerals have been allocated to similar parts.

Referring firstly to Figs. 1 to 6, in carrying out the preferred method of the invention in one way, one starts with polypropylene or like tough plastics tape, made for instance by extrusion and, for example in the range of 1 to 4 mm in width and 100 to 250 tex, preferably approximately 3 mm in width and 170 tex. This tape is used to form both the warp and the weft in a circular loom constructed to weave a tube of diameter, for instance, of the order of 1.2 to 1.5 metres, a typical example being approximately 1.3 metres, it being understood that the weft extends circumferentially around the woven tube, and the warps extend longitudinally thereof. The tube issuing from the loom is flattened, and in a typical example with a 1.3 metre diameter tube, the layflat width is of the order of 2.05 metres. If not required immediately to be converted into containers, the flattened tube can be wound up as a continuous length in a roll.

For producing one container, one severs, for the flattened tube, an appropriate tube length which is determined by the desired capacity of the finished container. For a container of approximately a half tonne capacity one would take, for instance, a tube length, such as has been shown diagrammatically at 10 in Fig. 1, whose dimension in the longitudinal direction (i.e. warpwise or axially of the tube) is of the order of 140 cms. This flattened tube length 10 is accordingly rectangular in configuration with folded or flattened edges 12, 14 along two opposite longitudinal sides, each measuring of the order of 140 cms, and two open or cut edges 16, 18 extending across the two other opposite or transverse sides, each measuring of the order of 205 cms.

A gusset 20 is now formed by folding in or pleating the flattened tube length 10 at the portion adjacent the folded or flattened edges 12, the gusset 20 projecting inwards of the tube length to an extent, indicated at 22 in Fig. 2, determined by the desired eventual plan dimensions of the finished container. A typical example, is, for instance 45 cm. Gussetting so as to achieve the gusset 20 may be effected as the tube comes off the loom and is being flattened, and may be effected 'double' that is to say to produce respective gussets 20 and 24 along the two folded or flattened edges 12, 14, as shown in Fig. 2, e.g. by appropriate shaping tools (not shown) past which the woven tube progresses, with the gusset 24 subsequently being pulled out or folded out again

at a suitable subsequent stage in the steps of making the container, as will be understood from the following description.

The tube length, with at least the gusset 20 folded in with its respective folded or flattened edge 12, is now seamed along its two open or cut edges, that is to say along the above-discussed transverse sides, 16, 18. This is done, along each edge 16, 18, by folding over the coinciding fabric edges along a respective marginal or hem portion 26, 28 of width of the order of 2 to 3 cms, and overlocking or otherwise machine sewing, using secure stitching as at 30, 32 which will not readily unravel, to hem the portions 26, 28 to the adjacent tube fabric. The folding over of the two marginal or hem portions 26 and 28 is effected in opposite directions so that they lie against the opposite faces of the flattened tube length 10. The seaming is effected in each case so as to close the respective open edge 16, 18 from the end of the tube length including the gusset 20 to a position spaced from the folded or flattened tube edge 14 by an extent corresponding substantially to the extent of the gusset 24, thereby leaving non-seamed portions 34, 36 (Fig. 3) for forming openings 33, 40 (Fig. 4) to the interior of the seamed-up tube length, of approximately 45 cms in length along the two opposite sides 16 and 18 of the assembly, remote from the gusset 20.

It will be understood from consideration of Fig. 3 that the seaming can be effected whilst the gusset 24 is maintained in its folded-in disposition as shown in this figure, the stitching 30 and 32 being terminated just prior to reaching the folded edge 14 of the gusset 24. Thus, the seaming can be effected with stitching starting at the ends corresponding to the gusset 20 and running off the tube length just prior to the gusset 24 which is subsequently pulled out to achieve the configuration of Fig. 4.

Alternatively, as will be understood from consideration of Fig. 4, the seaming can be effected with only the gusset 20 in place, the gusset 24 having been unfolded or pulled out prior to the seaming.

The tube length 10 having been seamed and the gusset 24 having been unfolded or pulled out, so that the Fig. 4 configuration is achieved the fabric of the tube length corresponding to the gusset 24 is now bunched up along the edge 14 so as to bring the extremities of the openings 38 and 40 into close proximity with one another, and the resultant bunched-up fabric is wound around with a sleeve 42 of suitable fabric (e.g. the same as that of the tube 10) simply to hold it so bunched and maintain it as a suspension loop 44 of the resultant container 46 (see Fig. 6) in which the gusseted end constitutes the bottom of the container, and the loop 44 serves, in practical use, for suspension thereof. The container 46 can, of course, be filled by way of the openings 38, 40 to the interior, which openings 38, 40 are present at each side of the suspension loop 44. The container is very simple to make as it requires only the formation of the two seams 30 and 32 and the application of the sleeve 42, which is optional, to the suspension loop 44.

The configuration of the bottom of the container 46, when considered in plan, is determined by the

extent 22 by which the gusset 20 is folded into the respective side of the tube 10 prior to seaming. In general the amount of fold-in of the gusset will normally be selected to give a container whose configuration is approximately square in plan, as has been shown in Fig. 6, but of course oblong or rectangular configurations are possible. In spite of its simplicity of manufacture, the container 46 is particularly strong and reliable in use (e.g. in the shipping of granular, pulverulent or like material) since the endless weft tapes employed in the weaving of the fabric of the tube 10 extend in continuous runs through the suspension loop 44, the sides of the container 46, and the bottom thereof, so that in the lifting direction there are no discontinuities in the tapes from which the container is made. The seams 30, 32, of course, extend vertically at two opposite locations in the sidewalls of the container.

The invention is not confined to the precise details of the foregoing, which has been given only by way of example, and variations may be made thereto. Thus, for example, in the above described case, there is only a single suspension loop 44. However, as illustrated in Figs. 7 and 8, provision can be made for there to be two suspension loops 50, 52 for instance, by forming a cut 54 (Fig. 7) (e.g. heat sealed along the severed edges thereof) in the weftwise direction of the fabric approximately midway between the openings 38 and 40 at the end remote from the gusset 20, so that there are two fabric parts 56, 58 which can be bunched (and if desired sleeved or wrapped (as at 60, 62) separately to form the respective suspension loops 50, 52. In this case access can be had to the interior of the container by way of opening 68 provided by the cut 54, as well as by the openings 38 and 40.

The specific dimensions given above are, of course, purely exemplary and the dimensions and other parameters may be chosen as may be desired or dictated by practical considerations.

Claims

1. A method of making, from a woven fabric tube length, an industrial container in the form of a fabric bag adapted for suspension, characterised in that it comprises, in the flattened condition of the tube length (10) forming a gusset (20) by folding-in or pleating one of the flattened folded edge (12) of the tube length (10) and thereupon seaming the flattened and gusseted tube length along each of its two open edges (16,18,) so that in each case such edge (16,18) is closed from its gusseted end (12) to a position adjacent to but short of the other flattened tube edge (14) to leave thereat openings (38,40) to the interior of the container, the gusset (20) serving, in the operative orientation of the container as the bottom thereof and the said other flattened tube edge (14) then serving as or being available for use as suspension loop means of the container.

2. A method according to claim 1 wherein the suspension loop is formed by bunching together the fabric of the non-gusseted tube edge (14).

3. A method according to claim 2 wherein the bunched together tube edge (14) is wrapped with a fabric band or sleeve (42).

4. A method according to claim 3 wherein the band or sleeve (42) is sewn to secure it.

5. A method according to claim 1 wherein the fabric of the bag is cut or severed (54), parallel to the weft direction of the fabric, by a short distance from the non-gusseted edge (14) thereby to bifurcate it and provide two side by side portions (56,58) each of which is bunched, thus to provide two suspension loops (50,52) on the container.

6. A method according to claim 5 wherein each said suspension loop (50,52) is sleeved (60,62).

7. A method according to any preceding claim wherein the seaming is effected by folding over the superimposed open edges (16,18) of the flattened tube length (10) and overlocking or machine stitching with any suitable stitch which will not readily loosen or unravel.

8. A method according to claim 7 wherein the folding over is effected oppositely, with one of the folded over hems (26) lying against one outer surface of the flattened tube and the other of such folded hems (28) lying against the other outer surface of said flattened tube (10).

9. A method according to any preceding claim wherein the tube length (10) is multi-ply in its initial form.

10. A method according to claim 9 characterised in that one starts with a tube of double the required eventual length and pulls one half through into the other to achieve a starting tube length (10) of double-ply fabric.

11. An industrial container made by the method of any of claims 1 to 10.

12. An industrial container comprising a woven fabric tube length (10) seamed along what would be its two open edges (16, 18), were it in a flattened condition, so as to be closed along said edges (16, 18) from a gusseted end (20) formed by folding in or pleating one flattened folded edge (12) of the tube to a position short of the other or non-gusseted tube edge (14) whereby to define openings (38, 40) to the interior of the container, the gusset (20) serving, in the operative orientation of the container, as the bottom thereof and the other flattened tube edge (14) serving as or being available for use as suspension loop means of the container.

13. An industrial container according to claim 12 wherein the material of the container at said other tube edge (14) is severed (54) to bifurcate it, thereby to provide two suspension loops (50, 52).

14. An industrial container according to claim 12 or 13 wherein the or each suspension loop (14, 50, 52) is wrapped or sleeved (42, 60, 62).

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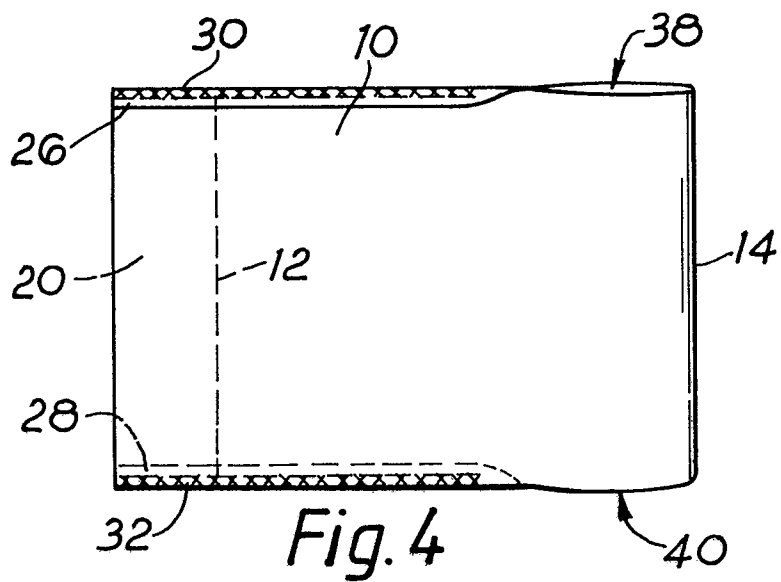
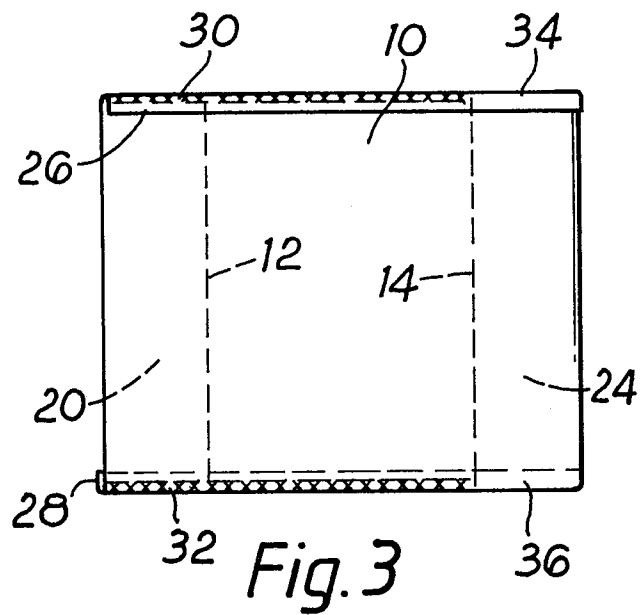
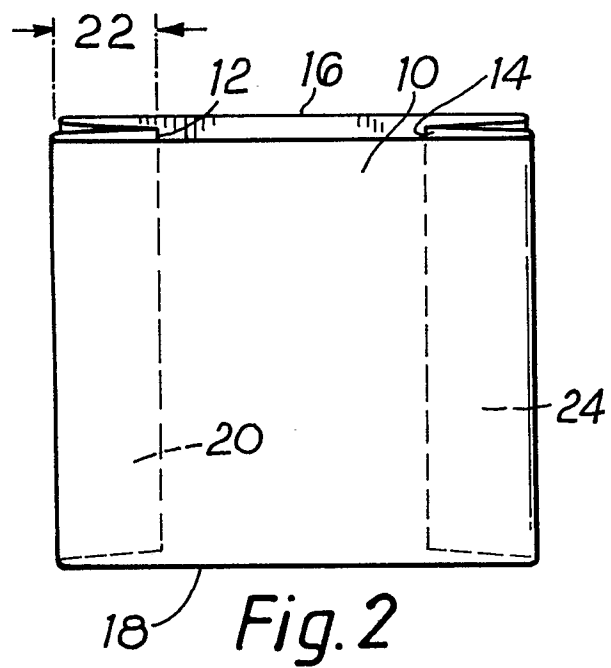
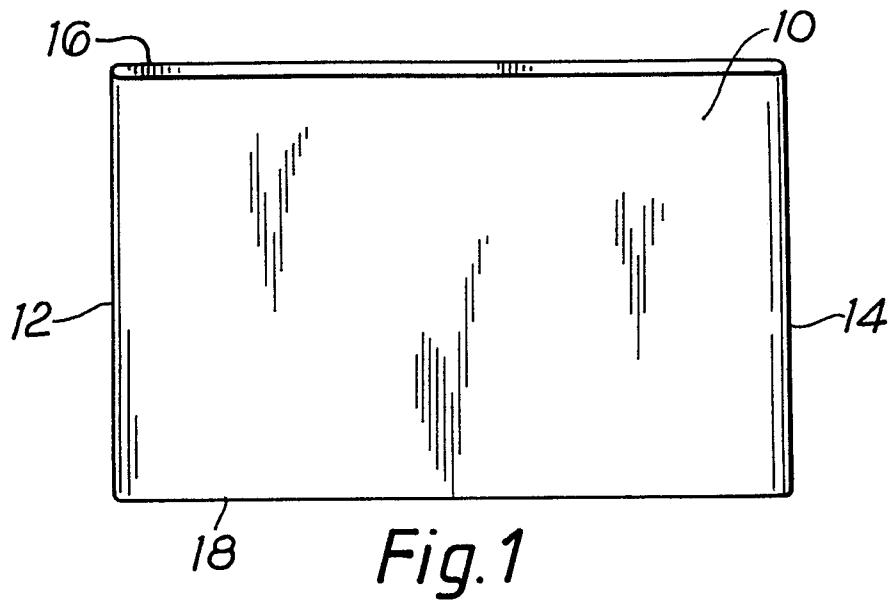
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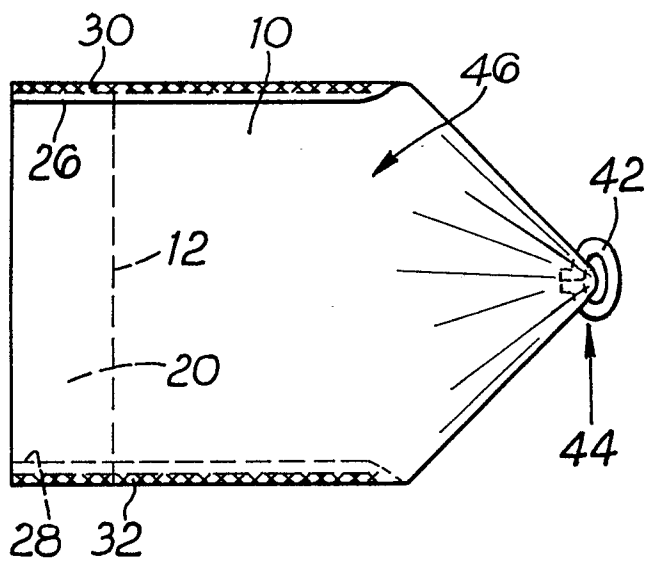


Fig. 5

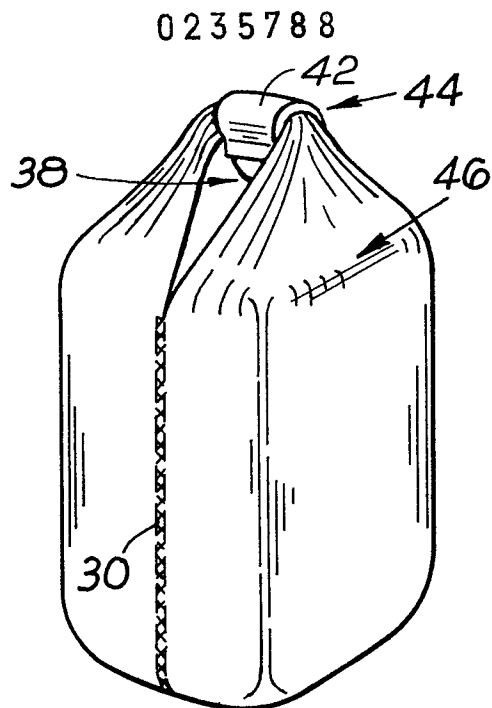


Fig. 6

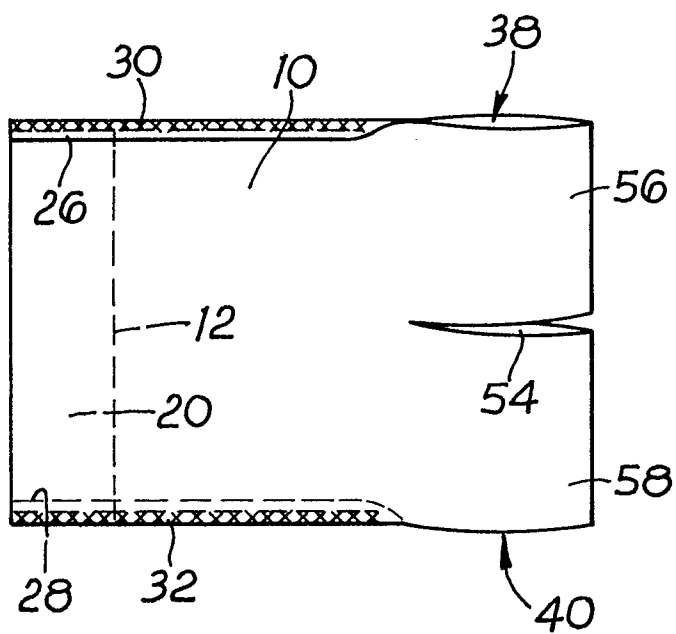


Fig. 7

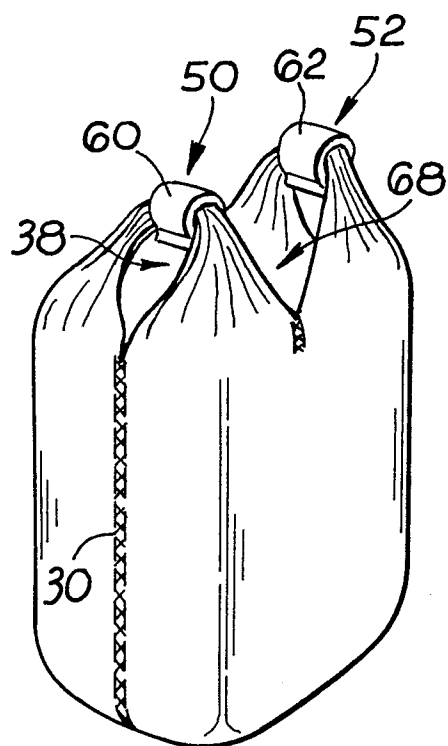


Fig. 8





EP 87 30 1093

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	GB-A-2 078 199 (A/S NYBORG PLAST) * Page 1, lines 1-38; figures *	1,7,8, 11,12	B 65 D 88/16
A	--- GB-A-1 581 437 (LOLIFT LTD.) * Page 2, lines 77-100; figures 3,4 *	2-6,13, 14	
A	--- GB-A- 356 489 (W.H. SHORT) * Whole document; figure * -----	1,13	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 65 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26-05-1987	Examiner VAN ROLLEGHEM F.M.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	