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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :		(11) International Publication Number:
B65D 88/16	A1	WO 93/12995
		(43) International Publication Date: 8 July 1993 (08.07.93)

(21) International Application Number: PCT/GB92/01447

(22) International Filing Date: 4 August 1992 (04.08.92)

(30) Priority data:
9127567.7 31 December 1991 (31.12.91) GB

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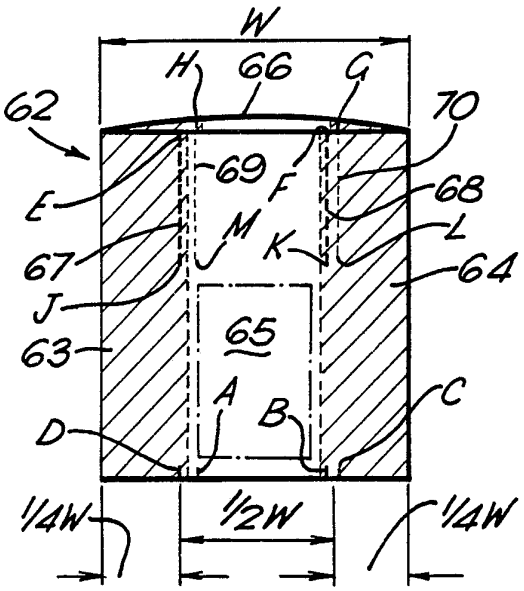
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(81) Designated States: AU, BB, BG, BR, CA, CS, FI, HU, JP, KP, KR, LK, MG, MN, MW, NO, PL, RO, RU, SD, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG).

Published
With international search report.

(54) Title: IMPROVEMENTS RELATING TO BULK CONTAINERS



(57) Abstract

A method of manufacturing a flexible bulk container (60) from one or more pieces of tubular fabric (62) is disclosed. One aspect of the invention concerns the provision of opposed reinforced zones (63, 64) in the tubular fabric which, in the finished container, form opposed side walls. The other aspect of the invention concerns the provision of a substantially weatherproof top for the container, utilising the upper regions of the front and rear walls (65, 66) of the container.

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IMPROVEMENTS RELATING TO BULK CONTAINERS

This invention relates to flexible bulk containers such as are used in the storage and transport of materials in granular, powder and other particulate forms.

Such containers are generally in the form of large bags or sacks which are often required to carry loads of half tonne, one tonne or more, with considerable safety margin above their rated working load. The containers are commonly made from woven fabric, particularly woven polypropylene or other synthetic material.

Typically, such a container comprises a base, a main body structure of front, rear and side walls extending upwardly from the base and one or more lifting loops formed from upward extensions of the side walls.

With flexible bulk containers of this type, a substantial proportion of the total load is borne by the base, the lifting loop and particularly the side walls inter-connecting the lifting loop and the base. The present invention seeks to improve the strength of such a container, particularly in these main load bearing areas, and additionally or alternatively seeks to maximise the use of the material in non load bearing areas to give an enclosed top cover.

According to a first aspect of the present invention there is provided a method of manufacturing a flexible bulk container of the type comprising a base, a main body structure of front, rear and side walls extending upwardly from the base, the method including the steps of providing a tubular fabric, providing in said tubular fabric at least two opposed reinforced zones, and assembling the container such that said reinforced zones form at least two opposed side walls of the container.

Whilst it is preferred that the tubular fabric is circular woven, it may alternatively be provided by taking a flat material and forming it into a tube by making a back seam, this option being particularly useful if a two side coated material is used to fabricate the container by say heat sealing or other gluing or welding techniques.

The lower edge of the main body structure may be joined to a separate base of strength characteristics similar to those of the reinforced zones (this embodiment will hereinafter be referred to as the "sewn-in base"), or alternatively the lower regions of the reinforced zones may form a part of the base (this embodiment will be referred to hereinafter as the "cross-sewn base"). The upper regions of the reinforced zones may be joined together (and sleeved if required) to form a lifting loop, or alternatively/additionally they may form upper channels or loops.

Conveniently, the container is manufactured from circular woven fabric which has two opposed reinforced zones of strong warp and lighter warp between said zones.

Preferably, the stronger warp is twice as strong as the lighter warp. Conveniently, the lighter warp is of normal strength or even lighter.

The extra strength in the strong warp regions may be formed in several ways, e.g. higher tex or denier tapes, double or "piggy back" tapes, crammed tapes or reinforcing filaments replacing or in addition to the tapes.

The "sewn-in base" embodiment is manufacture by joining (which term is to be interpreted as covering, stitching, gluing, heat-sealing or other similar treatments) the edges of a separate base to the lower edges of the main body structure, the separate base comprising a fabric tube or flat piece of fabric. To assist in joining the base to the main body structure,

marker tapes are attached or woven in to the lower edge of the main body structure at the boundaries between the reinforced and unreinforced zones, thereby defining the corners of the finished container.

The "cross-sewn base" embodiment is manufactured by making a second series of slits extending upwardly from the bottom edge of the fabric. The lighter warp panels at the bottom of the fabric are folded in to provide an inner ply at the base. The bottom edges of the two reinforced zones are then brought together and joined (which term is to be interpreted as covering, stitching, gluing, heat-sealing or other similar treatments) to form a seam in the base of the container.
In the case of the "cross-sewn base", the bottom edge of the tubular fabric may, if desired, be heat sealed in the region of the lighter warp, such that the inner ply of the base forms a unitary piece. This is particularly relevant if coated material is used and a maximum level of water resistance is desired.

If desired, sacrificial panels for use in testing for degradation due to exposure to ultraviolet radiation, as described in the Applicants' own co-pending UK patent application number 9118381.4, may be included either sewn to or forming an integral part of the lighter warp region.

According to a second aspect of the present invention there is provided a method of manufacturing a flexible bulk container of the type comprising a base and a main body structure of front, rear and side walls extending upwardly from the base, the method including the steps of providing a tubular fabric, making in said fabric at least four slits extending down from the top edge of the fabric thereby defining between said slits four flaps each being an upward extension of a side, front, side and rear wall respectively, and joining each of said front

and rear wall extension flaps together and to at least one respective adjacent side wall extension flap.

The greatest degree of weather protection is provided when the front and rear wall extension flaps are folded over each other and joined together and each joined to both adjacent side walls to form a container which is sealed or fully enclosed save for a filling slit or spout where this is required to enable the container to be filled from the top.

The preferred embodiments of the invention are those which incorporate the features of both aspects of the invention, namely a container having reinforced side walls and lighter warp front and rear walls, as well as having a substantially water resistant top provided by folding the lighter warp panel uppper extension flaps over each other and joining them together as well as to respective side walls of the container.

A filling aperture may be formed by bringing together the free top edges of the lighter warp regions to form a filling spout, or alternatively these edges may be folded over each other or joined together to form a single or double cover. In the case of a single or double cover, a filling slit is cut in the cover. If a discharge spout or similar mechanism is employed in the base, the top may be completely sealed and the container may be filled through the base in its inverted position. This application is particularly relevant when coated fabric is used to make the bag and a largely rainproof water resistant top is required.

Typically, the container manufactured in accordance with either or both aspects of the present invention may be provided with an impervious liner which is simply closed at its upper end after filling and then folded into the interior of the container. Usually, these liners are bottle-shaped, i.e. the upper region of the liner is much narrower than the lower region, manufactured by taking a flat square or rectangular

liner, heat sealing at each side of the neck and shoulder regions and cutting away the excess liner. Conventionally, the cut-away portions are discarded, but according to the present invention the excess liner section on either side of the neck/shoulder regions are only partially cut away from the main liner and may be sewn into the filling spout to retain the liner in position, or, in the case of single/double cover, opened out and attached with the top flaps during the fabrication of the top part of the container to provide secure liner positioning and retention, and at least a partially waterproof cover for the container.

In order that the invention may be better understood embodiments of containers in accordance therewith will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:-

Figure 1 illustrates the circular woven fabric used to manufacture the "sewn-in base" embodiment of the container in accordance with the invention;

Figure 1A(i) illustrates a separate base in the form of a single piece of fabric;

Figure 1A(ii) illustrates a separate base in the form of a fabric tube;

Figure 1B illustrates the completed "sewn-in base" container;

Figure 1C is a view of the "sewn-in base" of the container of Figure 1B;

Figure 2 illustrates the circular woven fabric used to manufacture the "cross-sewn base" embodiment;

Figure 2A illustrates the completed "cross-sewn base" container;

Figure 3 illustrates the "cross-sewn base" of the container of Figure 2A;

Figure 4 illustrates the various different steps involved in folding and sewing the "cross-sewn base";

Figure 5 illustrates the various different steps involved in folding and sewing the "double cover" top;

Figure 6 to 9(c) illustrate the various different designs of top cover and filling apertures;

Figure 9(d) illustrates utilisation of excess regions of a bottle-shaped liner for sewing into the spout of a spouted container;

Figures 9(e) and 9(f) illustrate utilisation of excess regions of a bottle-shaped liner for forming the liner retention/waterproof cover during fabrication of the single/double cover container;

Figure 10 illustrates, in Figure 10(i), the single handled double cover version of the container and, in Figure 10(ii), the single handled spouted version;

Figure 11 illustrates, in Figure 11(i), the two handled spouted version, and, in Figures 11(ii) and 11(iv), the steps involved in forming the handles and the spout and, in Figures 11(iii) and 11(v) the steps involved in forming the base discharge spout;

Figure 12 illustrates the principal design of a multi-lift bag in accordance with the present invention;

Figure 13 through 17 illustrate variants of the multi-lift bag shown in Figure 12;

Figures 18 and 18(a) illustrate two different base options which may be used on any of the containers shown in Figures 12 to 17;

Figures 19 through 21 illustrate the manufacture of a square bag in accordance with the present invention; and

Figures 22 through 24 illustrate variants of the square bag as shown in Figures 19 through 21.

Referring to Figure 1, the "sewn-in base" embodiment of the container according to the invention, indicated generally by 60 in Figure 1B, is manufactured from a single piece of tubular fabric 62. The fabric 62 has a width W and is woven such that there are two reinforced zones 63,64 of a stronger and/or stiffer warp, which occupy approximately half the total area of the tubular fabric, these being separated by two central regions of lighter warp 65,66. A series of four slits (67,68,69,70) formed in the fabric, extending from the top edge of the fabric to points J, K, M and L at the boundaries between the strong warp and lighter warp regions. At the lower edge of the fabric, marker tapes are woven in at points A, B, C and D to define the eventual corners of the container. A separate base comprising a flat piece of fabric as shown in Figure 1A()i) or a piece of tubular fabric as shown in Figure 1A(ii) is sewn to the lower edge of the fabric 62 between the marker tapes, as shown in Figures 1B and 1C. It is important that the strength of the base material is comparable, in each direction, to the panels of fabric 62 to which it is sewn, so that in the case of a flat piece of material, this would have to be of the same or similar strength as the reinforced panels of fabric 62, at least in those regions which are joined to the reinforced panels 63,64, whereas the tubular base need only be of normal strength as the double ply structure gives added strength to the base. As shown in Figure 1C, the base is sewn in with turned-over hems along tube ends AD and BC.

Referring to Figures 2 to 4, the "cross-sewn base" embodiment of a container according to the invention, indicated generally by 60A in Figure 2A is manufactured from a single piece of tubular fabric 62 similar to that shown in Figure 1. Two series of four slits are formed in the fabric, a first series of slits 67, 68, 69 and 70 extending from the top edge of the fabric to points J,K,M and L at the boundaries between the strong warp and the lighter warp regions, and the second series of slits 71, 72, 73, 74 extending upwardly from the bottom edge of the fabric to points N, P, R and Q at those same boundaries.

The bottom edges of the two lighter warp regions 65, 66 are folded in as shown in Figures 3 and 4(ii) and sewn with hem type A (see Figure 4(iv)) to form an inner ply which provides base padding. Then, the bottom edge of stronger warp region 63 is then sewn using hem type B (see Figure 4(b)) between points A, D, to the bottom edge of the other stronger warp region 64 between points B & C, to form the main outer base support seam AB-DC shown in Figures 3 and 4(iii). If desired, the bottom edges of the lighter warp region 65, 66 may be heat sealed together as shown in Figure 1 at the cutting stage, to form a more puncture proof double base and the base side apertures may be sewn up to form a sealed double base with no internal sharp fabric edges.

For both "sewn-in base" and "cross-sewn base" embodiments, the central lighter warp regions at the top of the fabric are brought together to form a top cover which can take the form of various different arrangements shown in Figures 6 through 9(c). The top edge of stronger warp region 63 is sewn between points E & H to the top edge of the stronger warp region 64 between points F and G to form the lifting loop 75 in the finished container, this lifting loop being sleeved if required.

Figures 5(i) through 5(v) illustrate in more detail the construction of one particular type of top cover, the fully-

sewn double cover. First, the lighter warp panels 65, 66 are folded down and sewn using hems M-J, L-K, J-K and M-L as shown in Figures 5(ii) and 5(iii). Next, the reinforced, stronger warp panels 63, 64 are brought together as shown in Figure 5 (iv) and the tops of these panels are sewn together and lashed to form the handle 75 shown in Figure 5(v).

Thus, in the finished container shown in Figures 2 and 5(v) the stronger warp regions 63, 64 form a "lifting cradle" comprised of the outer base ply, the side walls and the lifting loop, whereas the lighter warp regions form a secondary hoop which offers top protection and further base padding as a second ply at the base.

Referring now to Figures 6 through 9(c), these illustrate different ways in which the edges of the two upper lighter warp regions may be arranged so as to provide top protection for the container.

Referring to Figure 6 each slit edge of lighter warp regions 65 and 66 is sewn or heat-sealed to a respective side wall of the container, and a spout is formed by sewing together remaining unsewn portions adjacent to the upper edge of each region 65, to point F1 in figure 6, points E,H, correspond to point E1. A tying rope 80 for tying off the spout may be incorporated as shown in Figure 6. The top cover arrangement shown in Figure 6 is referred to as a "fully sewn spout", but the arrangement shown in Figure 7, which is constructed in a similar manner as shown in Figure 6, is a "partially sewn spout", that is to say only the edges of the spout are sewn or heat sealed, with the sides K-L and J-M left open.

In Figure 8, a partially sewn single cover is shown, in which the edges E-F and H-G of lighter warp regions 65, 66 are brought together and heat sealed or sewn between points E1, F1 to close the cover, with the liner sealed through the fabric and both stitched above the seal line. A filling slit 82 is

incorporated in the cover of Figure 8.

Figure 8(a) illustrates a simple double cover in which the two upper regions 65, 66 are simply overlapped and aligned fulling slits 83 are provided in each layer. This may be fixed before or after filling by stitching, gluing, "velcro", tying tape or similar.

Figures 9 through 9(c) illustrate a fully sewn double cover, and in this arrangement the two filling slits 84,85 may, if desired, be out of register, to give a self closing action after filling. The upper regions 65,66 are overlapped as in Figure 8(a), the inner layer is sewn to the side wall structure along edges M-L and L-K, and the upper (outer) layer is sewn to the side wall structure along edges M-J and J-K. This opposed method of sewing the top cover to the side wall structure permits flexing when the container is under strain.

Figures 9(b) and 9(c) illustrate further alternative top cover options. Both inner and outer layers are sewn simultaneously to the side wall structure along any two sides (e.g. along sides J-M and K-L shown in Figure 9(b) or on all four sides as shown in Figure 9(c).

Referring now to Figures 9(d) and 9(e), where the container is provided with a bottle-shaped impervious liner 150, the excess regions to each side of the neck/shoulders of the liner are utilised to improve the performance of either the spouted container of the double/single cover container. In Figure 9(d) and 9(e), where the container is provided with a bottle-shaped impervious liner 150, the excess regions to each side of the neck/shoulders of the liner are utilised to improve the performance of either the spouted container or the double/single cover container. In Figure 9(d) the liner is cut along lines x-x on each side of the neck, and the upper edges of the shaded regions are sewn into the spout to retain the liner in position within the container. In Figure 9(e),

the liner is cut along lines x-x and y-y on each side of the liner, and the shaded regions are pulled through the filling slit of the double cover and opened out to provide a waterproof cover as shown in Figure 9(f).

Referring now to Figure 10, this illustrates, for the purposes of comparison, a double cover container 160 in Figure 10(i) and a spouted container 162 in Figure 10(ii) both of these having a single lifting loop or handle 160a, 162a. In each case, the lighter warp regions may be provided with a print area 160b, 162b.

Referring now to Figures 11(i) through 11(v), this illustrates a two-handled spouted container 164 having two handles 164a and 164b located one either side of the spout. The handles are formed from the reinforced panels which also form the main base panel 164d, the latter can be sewn with a slit 164f to house and allow a discharge spout 164e, formed from the lighter warp panels, to protrude. The discharge spout can be tied off using an optional tie cord 164g and/or tucked in the base cover.

Referring now to Figure 12, a variation on the container shown in Figure 1B or Figure 2 is designated generally by 90 and is made from the same type of reinforced tubular fabric 91 as that shown in Figures 1 and 2, but includes built-in auxiliary channels or loops 92, 93 of reinforced material and a filling spout 94 or slotted top. This type of container, known as a "multi-lift" bag allows low level (height restricted) container loading, and can be filled on most 4-loop or 1-loop filling rigs. The design, which should be compatible with UN Hazardous Goods requirements, offers maximum cloth utilisation. Assembly is simple, with an average of nine lines of sewing per bag, all on the same machine. During filling through the central spout/slit, the lifting loop 95 can be pushed out of the way. The design is suitable for many different applications, including long haul use where containerisation

would be followed by various handling operations e.g. cranes, hooks, tractors etc.

In Figure 13 the channels 96, 97 are located at the base of the container, whereas in Figure 14 the channels 92, 93 are located as shown in Figure 12 but the container includes a double thickness cover with filling slits 98, 99.

Figure 15 illustrates a variant in which there is no lifting loops and instead there is provided four corner loops 100, 101, 102, 103, as well as auxiliary channels 104. Figure 16 shows a container having internal channels 105, 106, i.e. arranged internally of the lifting loop, and Figure 17 illustrates a version having no lifting loop, only channels 107, 108. Figure 18 shows a cross-sewn option for a plain base, similar to that shown in Figure 3 and Figure 18(a) illustrates sewn-in base option for a plain or discharge spout base, the latter having a hole 109 for location of a discharge spout.

Figures 19 through 21 illustrate a different type of container in which two pieces of tubular fabric 110, 111 are stitched together along line A-B to form a four-compartment container 112. Each piece of tubular fabric has a series of holes 113 which are aligned in the assembled container to form communicating passageways between the compartments. The reinforced zones 110A, 110B and 111A, 111B of each fabric piece 110, 111 together from the side walls of the container. For this embodiment, square sewn in tops are required. In Figure 22, upper regions of reinforced zones 110A, 110B, 111A and 111B are each slit and sewn and bound together to form four corner lifting loops 114, 115, 116, 117. In Figure 23, half the width of upper regions of zones 110B and 111B are sewn together and, folded back to form a channel 118 at one side, half the width of upper regions of zones 110A and 111A are similarly sewn together and folded back to form a channel 119 at the other side of the container. The remaining portions of reinforced zones 110A, 111B are sewn together and bound to give

a single point lifting loop 120. In Figure 24, lower regions of zones 110A, 110B, and 111A, 111B are arranged in a similar manner to that just described to form base lifting channels 121, 122, and upper regions of zones 110A, 110B, 111A and 111B are sewn and bound to form two lifting loops 123, 124. In the case of the container variants shown in Figures 22 and 23, a separate, square sewn in top 125 is required, but in the case of the variant shown in Figure 24, the remaining portions of the upper regions of the reinforced zones can be folded over and sewn to form a top 126.

CLAIMS

1. A method of manufacturing a flexible bulk container of the type comprising at least a base and a main body structure of front, rear and side walls extending upwardly from the base, the method including the steps of providing a tubular fabric, providing in said tubular fabric at least two opposed reinforced zones, and assembling the container in such a manner that the reinforced zones form at least two opposed side walls of the container.

2. A method according to claim 1 in which the reinforced zones are composed of strong warp and the regions between said reinforced zones are composed of lighter warp.

3. A method according to claim 1 or claim 2 in which slits are made in the tubular fabric to define the boundaries between the reinforced and unreinforced zones.

4. A method according to claim 3 in which four slits are made, each extending downwardly from the upper edge of the fabric.

5. A method according to any of claims 1 to 4 in which the lower edge of the side wall structure is joined to a separate base.

6. A method according to claim 3 in which two series of slits are made in the fabric, a first series of four slits extending downwardly from the upper edge of the fabric and a second series of four slits extending upwardly from the lower edge of the fabric.

7. A method according to claim 6 in which the lower edges of the two reinforced zones are brought together and joined to form at least a part of the base.

8. A method according to claim 7 in which the lower edges of the unreinforced zones are brought together and joined to form at least a further part of the base.

9. A method according to any of the preceding claims in which the upper edges of the reinforced zones are brought together and joined to form one or more lifting loops.

10. A method according to any of the preceding claims in which the upper edges of the unreinforced zones are configured so as to provide a top cover for the container.

11. A method according to any of the preceding claims in which two or more pieces of tubular fabric, each having at least two opposed reinforced zones, are joined together and assembled to provide a container in which the reinforced zones collectively form at least the exterior side wall structure and the unreinforced zones collectively form dividing walls between separate compartments of the container interior.

12. A container manufactured in accordance with any of the preceding claims.

13. A method of manufacturing a flexible bulk container substantially as hereinbefore described and as illustrated in the accompanying drawings.

14. A container substantially as hereinbefore described and as illustrated in the accompanying drawings.

15. A method of manufacturing a flexible bulk container of the type comprising at least a base and a main body structure of front, rear and side walls extending upwardly from the base, the method including the steps of providing a tubular fabric, making in said fabric at least four slits extending down from the top edge of the fabric thereby defining between said slits four flaps each being an upward extension of a side, front,

side and rear wall respectively, and joining each of said front and rear wall extension flaps together and to at least one respective adjacent side wall extension flap.

16. A method according to claim 15 and including the steps of providing in said tubular fabric at least two opposed reinforced zones and assembling the container such that said reinforced zones form at least two opposed side walls of the container.

17. A methodaccording to Claim 16 in which the reinforced zones are composed of strong warp and the regions between said reinforced zones are composed of lighter warp.

18. A method according to any of Claims 15 to 17 in which the slits are made in the tubular fabric at the boundaries between the reinforced and unreinforced zones.

19. A method according to any of Claims 15 to 18 in which the lower edge of the main body structure is joined to a separate base.

20. A method according to any of Claims 15 to 18 in which two series of slits are made in the fabric, a first series of four slits extending downwardly from the upper edge of the fabric and a second series of four slits extending upwardly from the lower edge of the fabric.

21. A method according to Claim 20 in which the lower edges of the two reinforced zones are brought together and joined to form at least a part of the base.

22. A method according to Claim 21 in which the lower edges of the unreinforced zones are brought together and joined to form at least a further part of the base.

23. A method according to any of Claims 16 to 22 in which the

upper edges of the reinforced zones are brought together and joined to form a lifting loop.

24. A container manufactured in accordance with any of Claims 15 to 24.

25. A method of manufacturing a flexible bulk container substantially as hereinbefore described and as illustrated in the accompanying drawings.

26. A container substantially as hereinbefore described and as illustrated in the accompanying drawings.

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FIG. 1

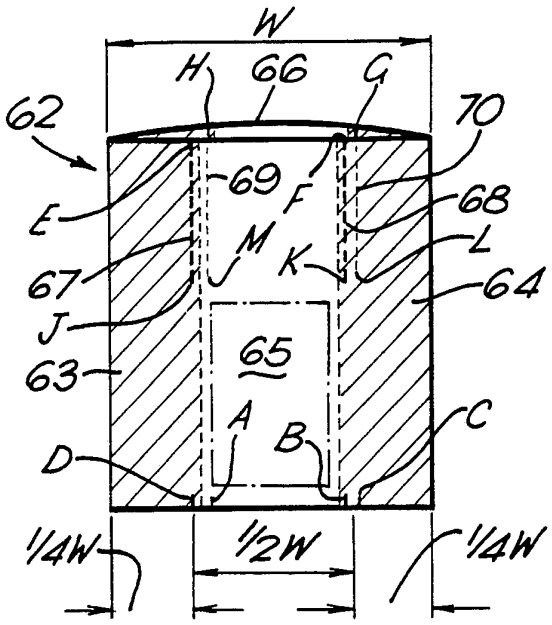


FIG. 1A(I)

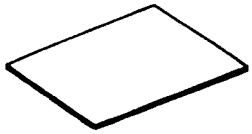


FIG. 1A(II)

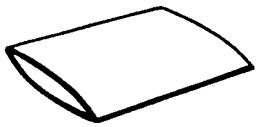


FIG. 1B

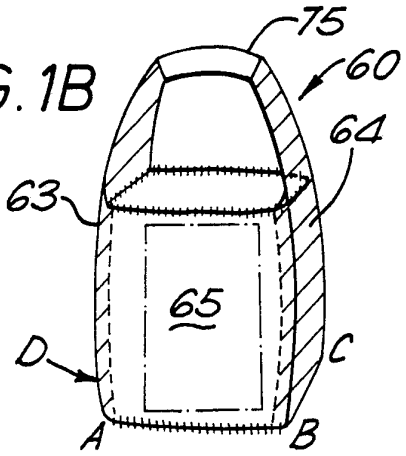


FIG. 1C

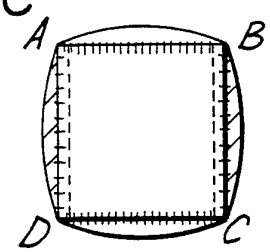


FIG. 2

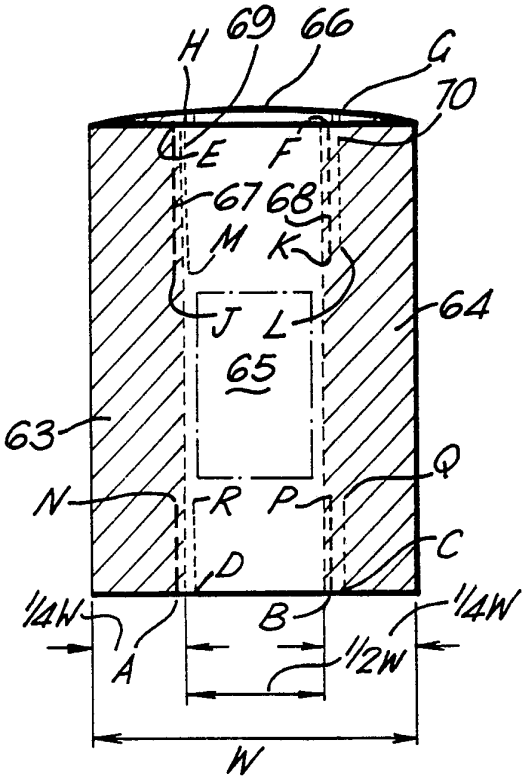


FIG. 2A

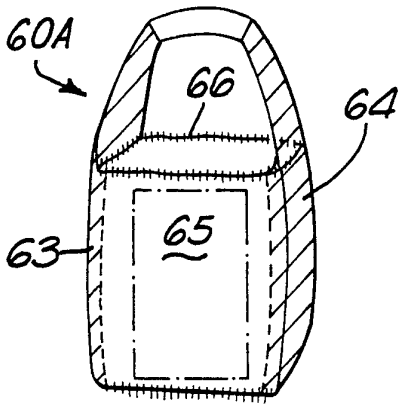


FIG. 3

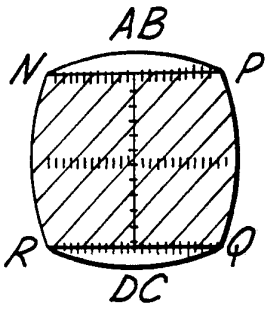


FIG. 4(I)

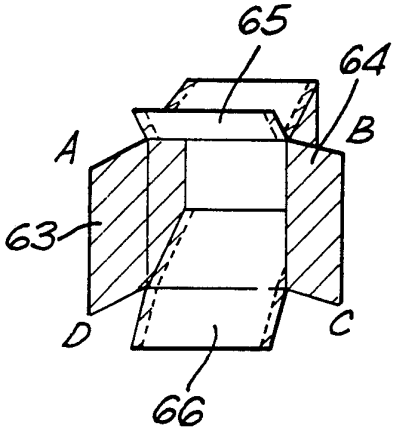


FIG. 4(II)

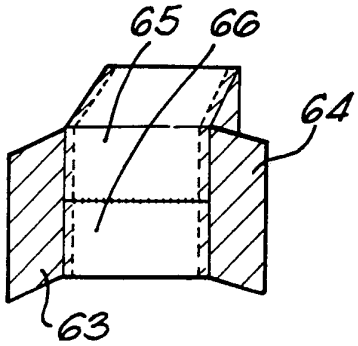


FIG. 4(IV)

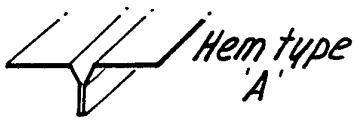


FIG. 4(III)

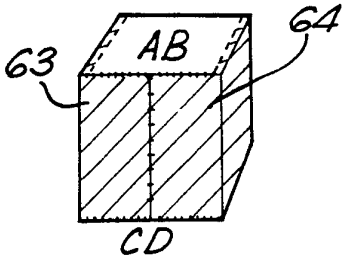


FIG. 4(V)



3110

FIG. 5(I)

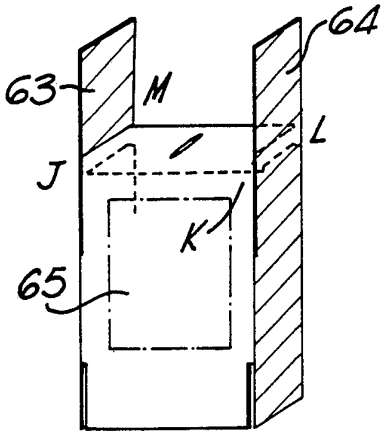


FIG. 5(II)

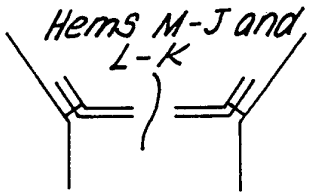


FIG. 5(III)

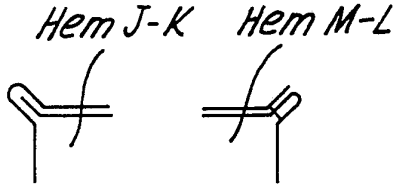


FIG. 5(IV)

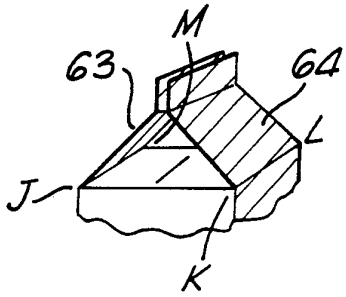


FIG. 5(V)

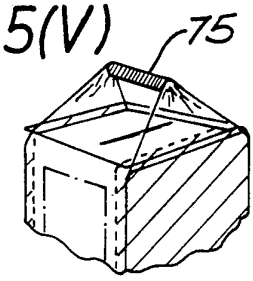


FIG. 6

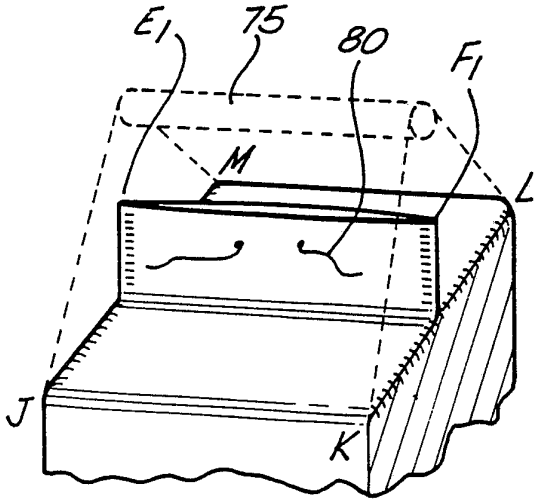


FIG. 7

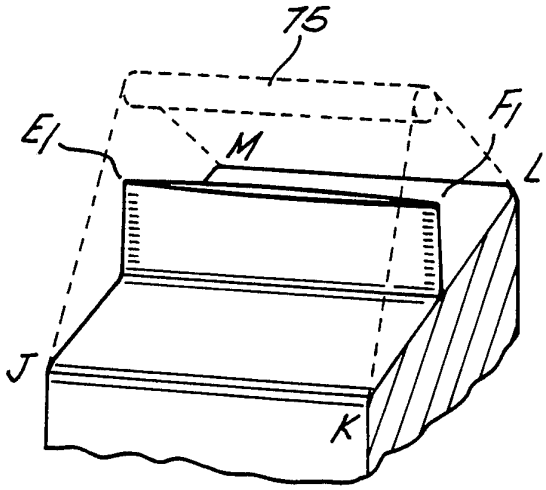


FIG. 8

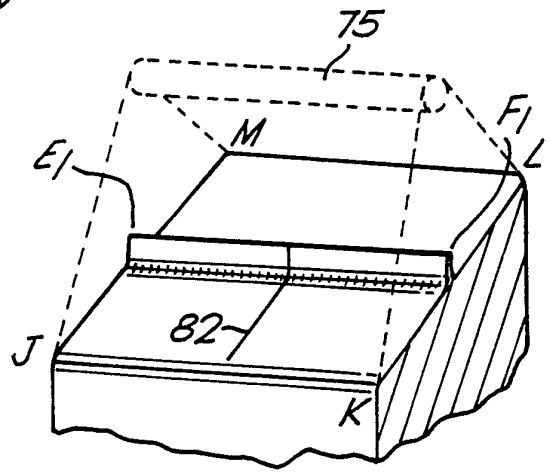


FIG. 8(a)

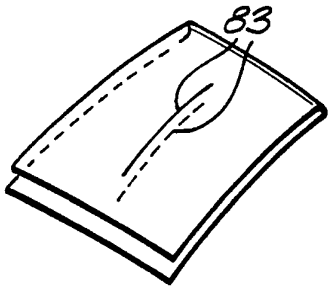


FIG. 9

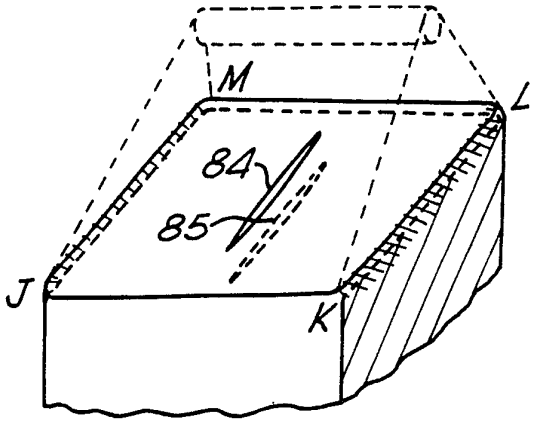


FIG. 9(a)

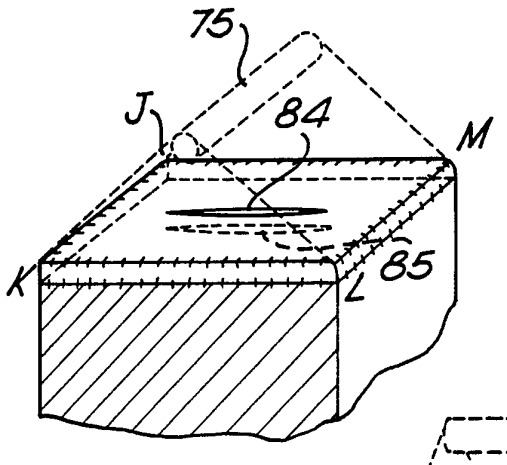
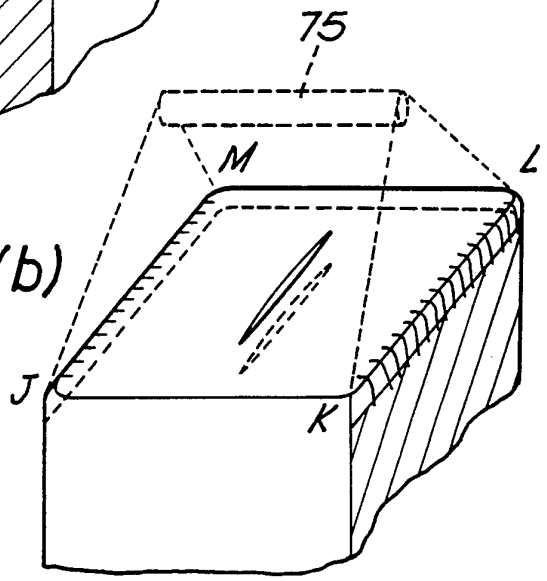


FIG. 9(b)



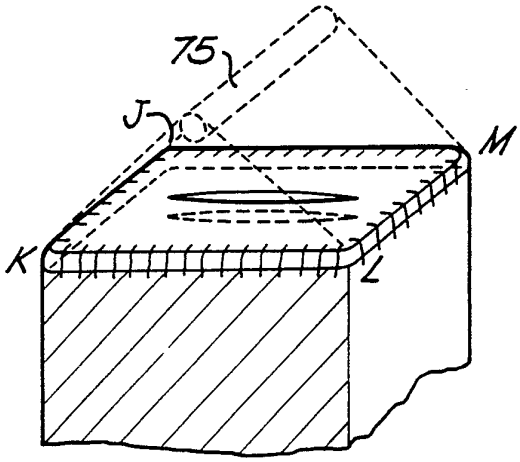


FIG. 9(c)

FIG. 9(d)

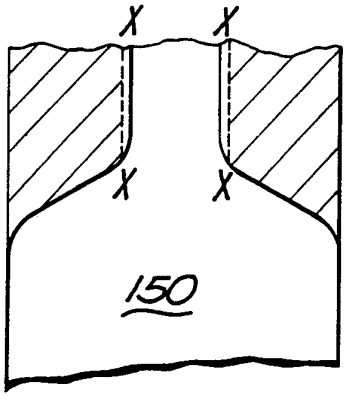


FIG. 9(e)

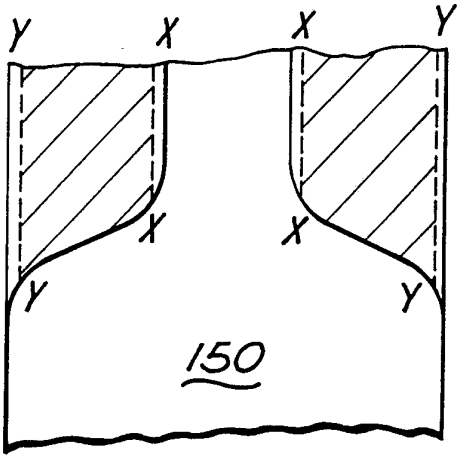


FIG. 9(f)

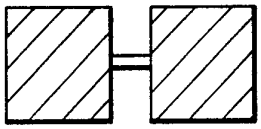


FIG. 10(I)

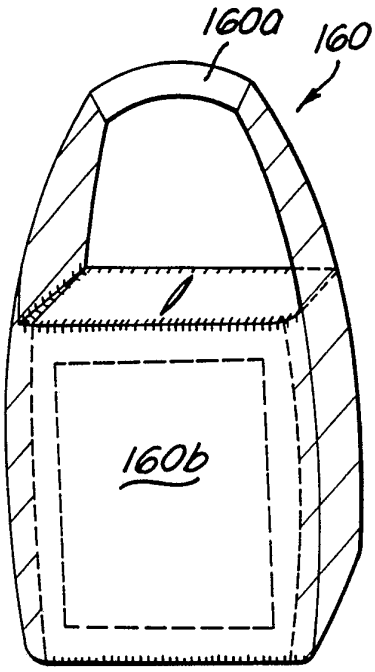


FIG. 10(II)

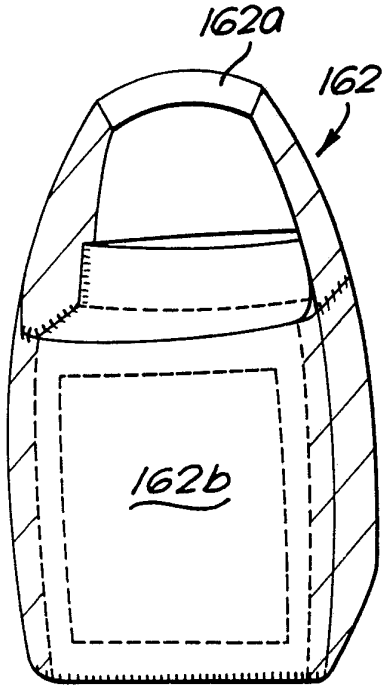


FIG. 11(I)

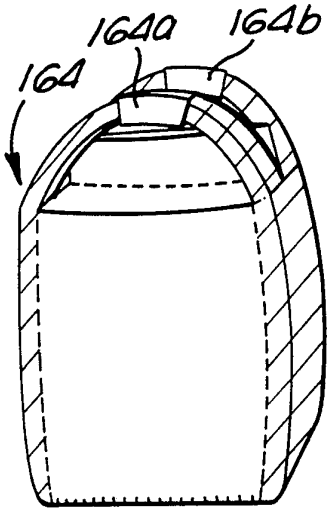


FIG. 11(II)

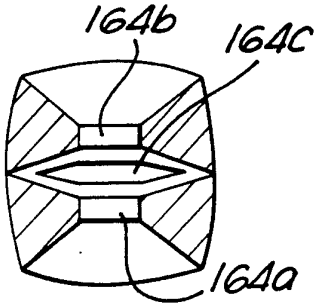


FIG. 11(III)

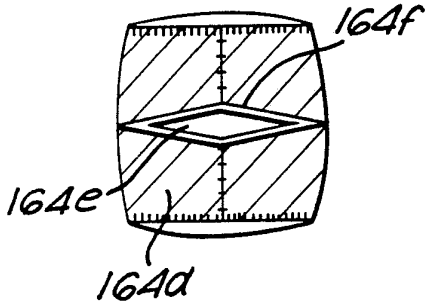


FIG. 11(IV)

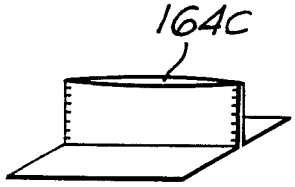
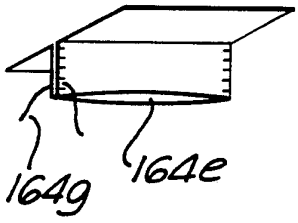


FIG. 11(V)



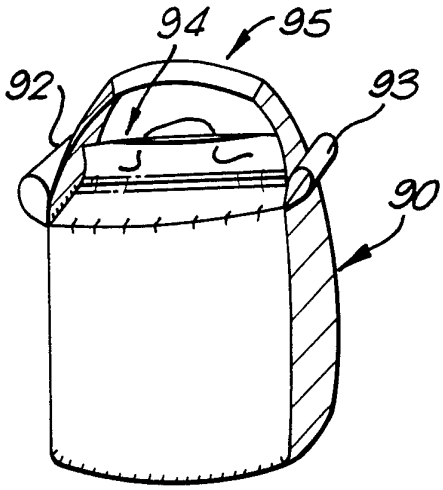


FIG. 12

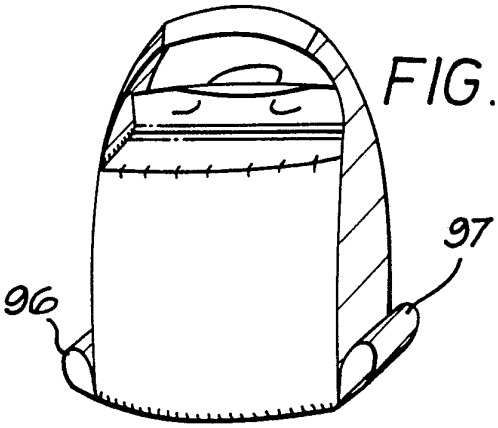


FIG. 13

FIG. 14

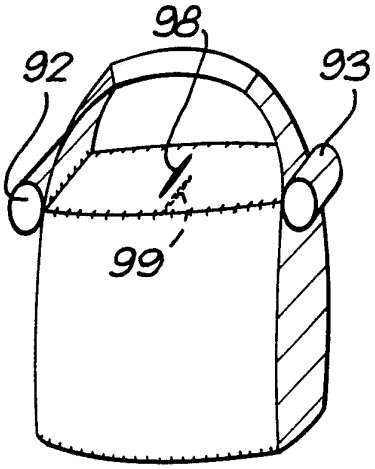


FIG. 15

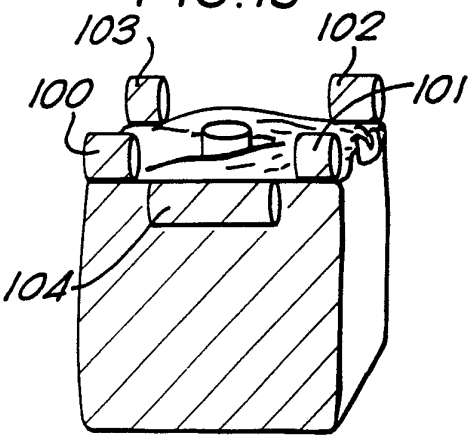


FIG. 16

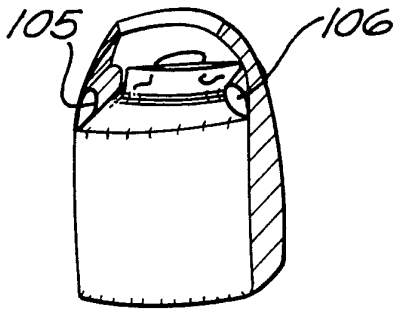


FIG. 17

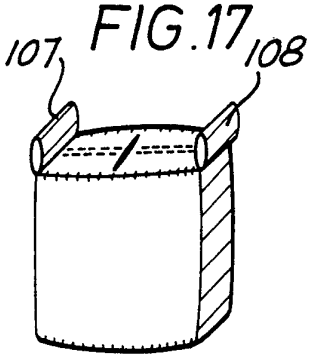


FIG. 18

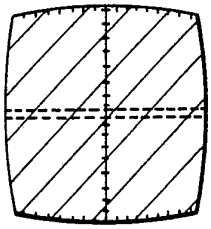


FIG. 18(a)

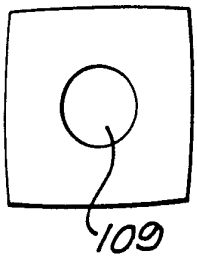


FIG. 19

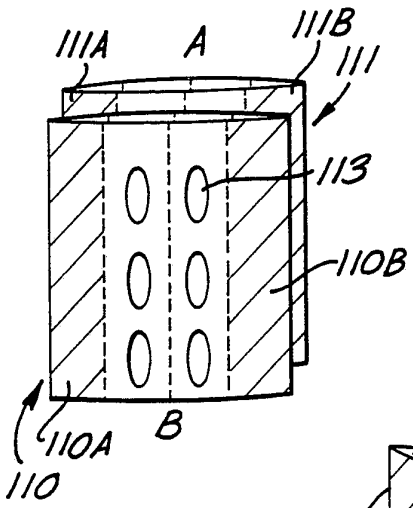
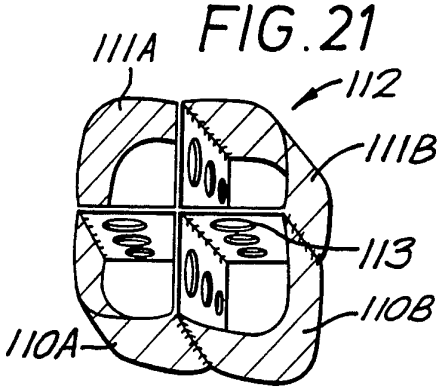


FIG. 21



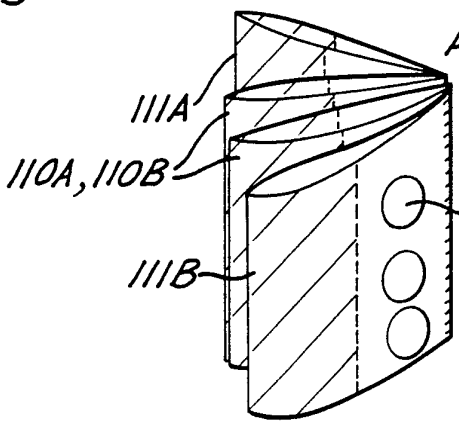


FIG. 20

FIG. 22

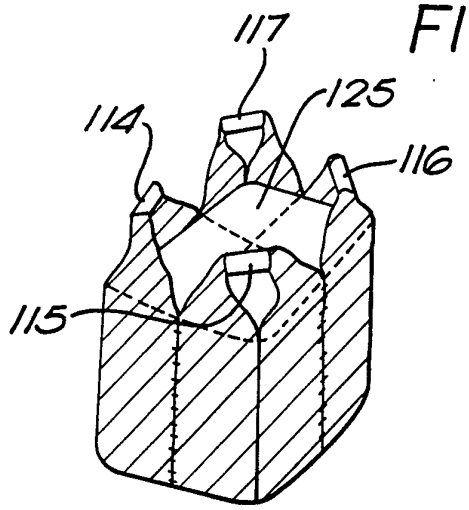


FIG. 23

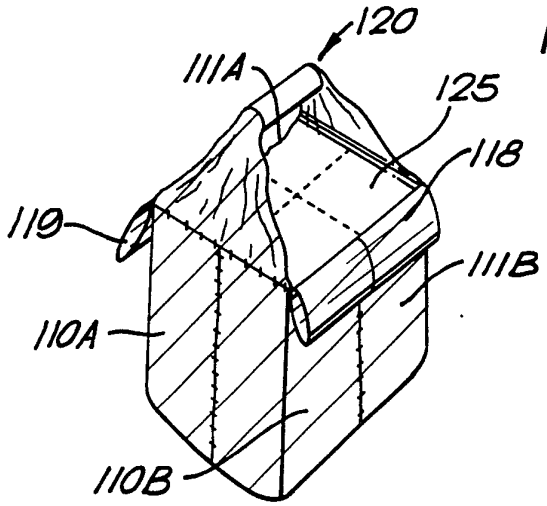
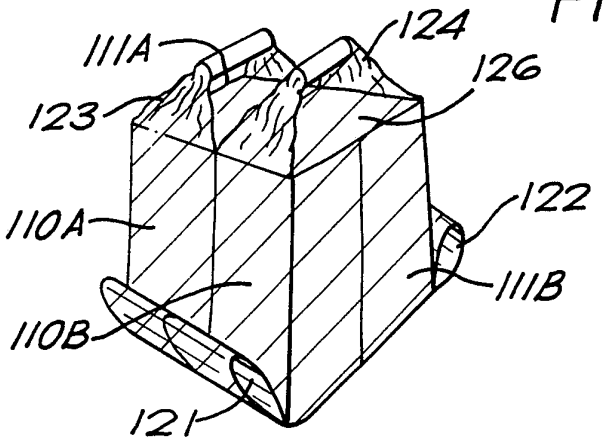


FIG. 24



INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 92/01447

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B65D88/16

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	B65D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X A	DE,A,3 736 859 (KIELBASSA H.) 18 May 1989 see the whole document	1,2 9,11-14, 16-18, 23-26

A	FR,A,2 356 569 (NORSK HYDRO A.S.) 27 January 1978 see page 3, line 26 - page 4, line 32; figures	3,4,7,8, 12-14, 20-22, 24-26

A	EP,A,0 030 652 (NORSK HYDRO A. S.) 24 June 1981 see page 4, line 31 - page 5, line 5; figures	5,12-14, 19,24-26

	-/--	

° Special categories of cited documents :[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
28 OCTOBER 1992	09. 11. 92
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	VAN ROLLEGHEM F.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category*	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	GB,A,1 581 438 (LOLIFT LIM.) 17 December 1980 see the whole document	10, 12-15, 24-26

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. GB 9201447 SA 62928

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 28/10/92

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
DE-A-3736859	18-05-89	None		
FR-A-2356569	27-01-78	AT-B-	350463	11-06-79
		AU-B-	513347	27-11-80
		BE-A-	856203	17-10-77
		CA-A-	1069470	08-01-80
		CH-A-	624902	31-08-81
		DE-A,C	2729155	05-01-78
		GB-A-	1580577	03-12-80
		GB-A-	1580576	03-12-80
		JP-C-	1151041	14-06-83
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		LU-A-	77620	03-10-77
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		SE-B-	445333	16-06-86
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		US-A-	4136723	30-01-79
		US-A-	4191229	04-03-80
EP-A-0030652	24-06-81	None		
GB-A-1581438	17-12-80	None		