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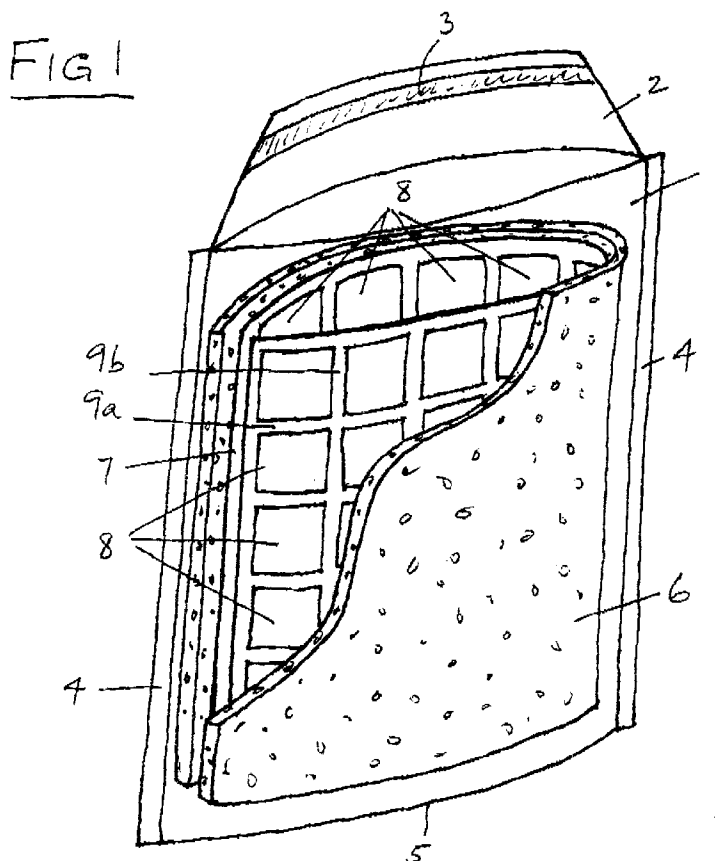
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**(54) Freezable protective pouch**

(57) A freezable flexible protective pouch comprising a flexible outer enclosure (1), a flexible energy absorbing layer (6) within the enclosure (1), and a flexible

lining (7) containing a freezable liquid. The product to be transported is placed inside or alongside the flexible freezable lining (7) which is located within the energy absorbing layer (6).



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## Description

This invention relates to a freezable flexible pouch for transporting "cold chain" products and keeping them cool in transit.

Fragile products are currently generally transported from place to place either using the postal or courier services in bags with double thickness walls filled with an energy absorbing material such as shredded paper. Whilst these bags provide protection against their contents 'being damaged in transit, they have no thermal insulating properties so they cannot be used to transport fragile products which need to be kept cool while in transit. Such products are known as "cold chain" products and up until now they have generally been transported in thermally insulated rigid containers (usually made from a rigid foam material) but these are bulky and therefore take up a large amount of storage space when not in use. Furthermore, they cannot adapt to the shape of the product to be transported so additional energy absorbing packing material has to be inserted into the container around the product to protect it and this adds to the cost of the transportation.

It is therefore an object of the invention to provide a transportation pouch which remains flexible when frozen, thermally insulates its contents and includes energy absorbing means to protect the contents against damage in transit.

According to the invention there is provided a freezable flexible protective pouch comprising:

- a) a flexible outer enclosure,
- b) a flexible energy absorbing layer within the enclosure, and
- c) a flexible lining containing a freezable liquid, the product to be transported being placed, in use, inside the flexible freezable lining which is located within the energy absorbing layer.

The invention also consists in a freezable flexible protective pouch comprising a flexible outer enclosure, a flexible energy absorbing layer within the enclosure, and a flexible layer containing a freezable liquid, the product to be transported being placed, in use, alongside the freezable flexible layer which is located within the energy absorbing layer.

At least one flexible thermal insulating layer may be located alongside the freezable flexible layer, the product to be transported being placed, in use, alongside the freezable flexible layer but spaced from it by said flexible thermal insulating layer.

In one embodiment, the outer enclosure is made from a metallised plastic material and the energy absorbing layer is a separate layer inserted within the outer enclosure. Suitably this separate layer is a sheet of foam material which is folded over into a U shape and inserted into the outer enclosure. However, the outer enclosure can be formed with a double thickness wall with the foam

material therebetween. Alternatively, the flexible energy absorbing layer is attached to the inner wall of the outer enclosure.

The energy absorbing layer can be made from any flexible deformable material, for instance a plastics foam or beads.

Preferably the freezable lining includes a plurality of discrete pockets provided in a sheet of flexible material, each pocket being filled with the freezable liquid.

In a preferred embodiment, the freezable lining comprises four layers of flexible material so that the walls of each pocket are double skinned. Suitably, the freezable lining is heat welded along seams to sealingly connect the various layers together, the seams intersecting longitudinally and laterally to provide a grid system with the pockets located between the longitudinal and lateral seams.

An additional thermal insulating layer can be provided around the outside of the freezable lining. In the preferred embodiment, this additional layer comprises a sheet of perforated plastics material which is incorporated into the freezable lining to provide an extra skin on the exterior surface thereof. Suitably, the additional layer is made of a plastics material such as polyethylene or foamed polyethylene.

Two preferred embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view, partly cut-away, illustrating a freezable flexible protective pouch of the first embodiment of the present invention,

Figure 2 is a cross-section of the pouch shown in Figure 1,

Figure 3 is similar to Figure 1 but illustrates a second embodiment of the present invention, and

Figure 4 is a cross-section of the pouch shown in Figure 3.

Referring to the drawings, there is shown a flexible outer enclosure or envelope 1 which is preferably made from a flexible plastics material which may have a metallised coating on its outer surface. The envelope is formed by heat sealing its side edges along weld lines 4 and along its bottom by a weld line 5. The envelope 1 has a flap 2 at one end thereof provided with means 3 for attaching it to the outer surface of the envelope to close it. In the illustrated embodiment, this attachment means 3 comprises an adhesive strip but any other suitable releasable attachment means could be used.

A flexible energy absorbing layer 6, preferably made from a plastics foam material, is inserted inside the outer envelope 1. In the illustrated embodiment, this layer 6 is shown as being a sheet of flexible foam which is folded in half and inserted into the envelope. However,

it could be tubular. Furthermore, although the lining 6 is shown as being separate in the drawings, it could be attached to the inner wall of the outer envelope 1 to form a part thereof. As an alternative, the outer envelope 1 can have double skinned walls with the foam layer 6 being provided between them as an integral part of the envelope.

A freezable lining 7 is positioned inside the energy absorbing lining 6 as illustrated. This freezable lining comprises a multi-layered sheet of flexible plastics material formed with a plurality of individual pockets 8 filled with a freezable liquid such as water. The pockets 8 are formed in known manner by applying heat welding bars (not shown) to the lining 7 in a grid pattern to heat seal the lining and form horizontal seams 9a and vertical seams 9b. It will be appreciated therefore that the pockets 8 can be formed in any configuration dependent on the way in which the welding bars are applied to it. For instance, they could be diamond shaped, square or rectangular.

The walls of each pocket 8 of the freezable lining 7 are preferably double skinned to give them added protection against being accidentally perforated. For this reason, the flexible freezable lining 7 would normally comprise four layers of material seam welded together to provide the pocket 8.

In order to improve the insulating properties of the freezable lining 7, its outer surface can be covered with an additional insulating layer (not shown). Any suitable thermally insulating material can be used but polyethylene or foamed polyethylene are preferred.

Preferably the insulating layer has a plurality of perforations in it, each hole having a generally tubular section projecting from one side of the layer around the hole which contacts the freezable layer of material immediately behind it thereby spacing the outer surface of the lining 7 from the adjacent insulating layer to form a space therebetween which entraps air and improves its insulating properties.

Although it is preferred to fill the pockets 8 with water, which will actually freeze and change into solid ice, they can be filled with a liquid such as ethylene glycol which does not actually freeze into a solid when subjected to temperatures between 0 and -10 degrees C, but instead changes to a semi-frozen slush.

It will be appreciated from the foregoing that the lining 7 will remain flexible after freezing because the seams 9a, 9b between adjacent pockets remain flexible when frozen so the pockets 8 can adapt themselves quite readily to the contours of a product 10 located inside the lining 7. Also, the layer 6 provides thermal insulation for the freezable inner lining 7 thereby keeping a product 10 contained within it cool for long periods in transit as well as protecting the product from impact damage.

The pouch 1 can be of any suitable size and shape and made of any suitable tear-resistant material.

Referring now to Figures 3 and 4, the second pre-

ferred embodiment shown therein is based on the same principles as the first preferred embodiment shown in Figure 1 and 2 and described, together with modifications and alternatives, above. Consequently, the same reference numerals are used for the same or similar parts, but with the suffix "a". However, the freezable lining 7 has been simplified to become a freezable layer 7a with the product 10a to be transported being placed, in use, alongside the flexible freezable layer 7a instead of being placed inside the flexible freezable lining 7.

Referring to Figure 3 and 4, there is shown a flexible outer enclosure or envelope 1a which is identical to the outer envelope 1 described above, having a flap 2a at one end and attachment means 3a, except that the weld lines 4a and 5a heat sealing its side edges and bottom incorporate gussets 12a which allow the envelope 1a to expand to accommodate a bulkier product 10a. The gussets 12a are equally applicable to the envelope 1 of the first preferred embodiment of Figures 1 and 2.

The envelope 1a has inserted inside it a flexible energy absorbing layer 6a which is folded in half and inserted in the envelope 1a. The layer 6 is made of a plastics foam material so that it also constitutes a flexible thermal insulating layer 6a. In this example a further flexible thermal insulating layer 6a accompanies the first layer 6a around the inside of the envelope 1a. If required, many more layers 6a may also be included, typically up to a total of eight in number to improve still further the insulating and energy absorbing properties of the pouch. For clarity, Figures 3 and 4 only show two layers 6a.

All of the energy absorbing linings 6a are enclosed within a flexible polyethylene bag 13, which is nearly twice as long as the length of each lining 6a. The linings 6a are slid together into the bag 13 and along its length to its closed bottom end. The open top end of the bag 13 is then tucked down into the inside of the innermost lining 6a, holding the linings 6a neatly together before they are inserted in the envelope 1a. The bag 13 is shown in Figure 4 and partly shown in Figure 3. The bag 13 is also applicable to the first preferred embodiment.

The freezable layer 7a is positioned inside the innermost energy absorbing lining 6a, and inside the tucked-in end of the bag 13, and is of the same construction as the freezable lining 7 with the identical seams 9a and 9b except that the layer 7a is a single layer. The freezable layer 7a may also have one or both of its surfaces covered with the additional insulating layer (not shown) described above for the first preferred embodiment.

In use, the product 10a to be transported is placed alongside the flexible freezable layer 7a within all of the layers 6a, and the tucked-in end of the bag 13, and is very quickly at the same temperature as the flexible freezable layer 7a. This is particularly so if the layer 7a does not have on its surface adjacent the product 10a the additional insulating layer (not shown) described in the last preceding paragraph.

If required, the layer 7a can be supplemented by one or more further layers 7a beside it, or the flexible freezable lining 7 of the first preferred embodiment can be used as a double layer but with the product 10a alongside it instead of being placed inside it.

Certain products 10a need to be kept cold in transport, but must not be allowed to freeze. A typical transport temperature range is 2 °C - 8 °C. For such products 10a, the pouch is provided with at least one flexible thermal insulating layer 14 (shown as a dotted line in Figure 4) located alongside the layer 7a. The product 10a is placed, in use, alongside the layer 7a but spaced from it by the flexible thermal insulating layer 14 to provide the required measure of insulation from the layer 7a. Hence the product 10a does not chill below 2 °C, and the insulation of the pouch outside the product 10a keeps its temperature below 8 °C for the required time for transport.

It is to be noted that the pouch of the present invention, implicitly including both of the preferred embodiments, may be wholly made of polyethylene, and therefore be easily recycled.

It is also to be noted that the linings 6 and 6a provide so much thermal insulation that the outside of the envelope 1 or 1a does not feel cold to the touch or develop any condensation.

## Claims

1. A freezable flexible protective pouch comprising a flexible outer enclosure, a flexible energy absorbing layer within the enclosure, and a flexible lining containing a freezable liquid, the product to be transported being placed, in use, inside the flexible freezable lining which is located within the energy absorbing layer.
2. A freezable flexible protective pouch comprising a flexible outer enclosure, a flexible energy absorbing layer within the enclosure, and a flexible layer containing a freezable liquid, the product to be transported being placed, in use, alongside the freezable flexible layer which is located within the energy absorbing layer.
3. A pouch according to Claim 2 wherein at least one flexible thermal insulating layer is located alongside the freezable flexible layer, the product to be transported being placed, in use, alongside the freezable flexible layer but spaced from it by said flexible thermal insulating layer.
4. A pouch according to any one of the preceding claims wherein the freezable flexible lining or layer includes a plurality of discrete pockets provided in a sheet of flexible material, each pocket being filled with the freezable liquid.
5. A pouch according to Claim 4 wherein the flexible freezable lining or layer comprises four layers of flexible material so that the walls of each pocket are double-skinned.
6. A pouch according to Claim 5 wherein the freezable flexible lining or layer is heat welded along seams to sealingly connect the various layers together, the seams intersecting longitudinally and laterally to provide a grid system with the pockets located between the longitudinal and lateral seams.
7. A pouch according to any one of the preceding claims wherein the energy absorbing layer is made from a flexible deformable material, for instance a plastics foam or beads.
8. A pouch according to any one of Claims 1 and 4 - 7 wherein an additional flexible thermal insulating layer is provided around the outside of the freezable flexible lining.
9. A pouch according to Claim 8 wherein the additional layer is made of a plastics material such as polyethylene or foamed polyethylene.
10. A pouch according to Claims 8 or 9 wherein the additional layer comprises a sheet of perforated plastics material which is incorporated into the freezable flexible lining to provide an extra skin on the exterior surface thereof.
11. A pouch according to Claim 10 wherein each perforation has a generally tubular section projecting from one side of the layer around the hole which contacts the freezable layer of the material immediately behind it thereby spacing the outer surface of the lining from the adjacent insulating layer to form a space therebetween which entraps air and improves its insulating properties.
12. A pouch according to any one of the preceding claims wherein the flexible energy absorbing layer is a sheet of foam material which is folded over into a U shape and inserted into the outer enclosure.
13. A pouch according to any one of Claims 1 - 11 wherein the outer enclosure is formed with a double thickness wall with the flexible energy absorbing layer therebetween.
14. A pouch according to any one of Claims 1 - 11 wherein the flexible energy absorbing layer is attached to the inner wall of the outer enclosure.
15. A pouch according to any one of the preceding claims wherein the outer enclosure is formed by heat sealing its side edges and bottom by weld

lines.

16. A pouch according to Claim 15 wherein each side edge and/or bottom includes a gusset.

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17. A pouch according to any one of the preceding claims wherein at least one further flexible thermal insulating layer is provided around the inside of the flexible outer enclosure.

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Fig 1

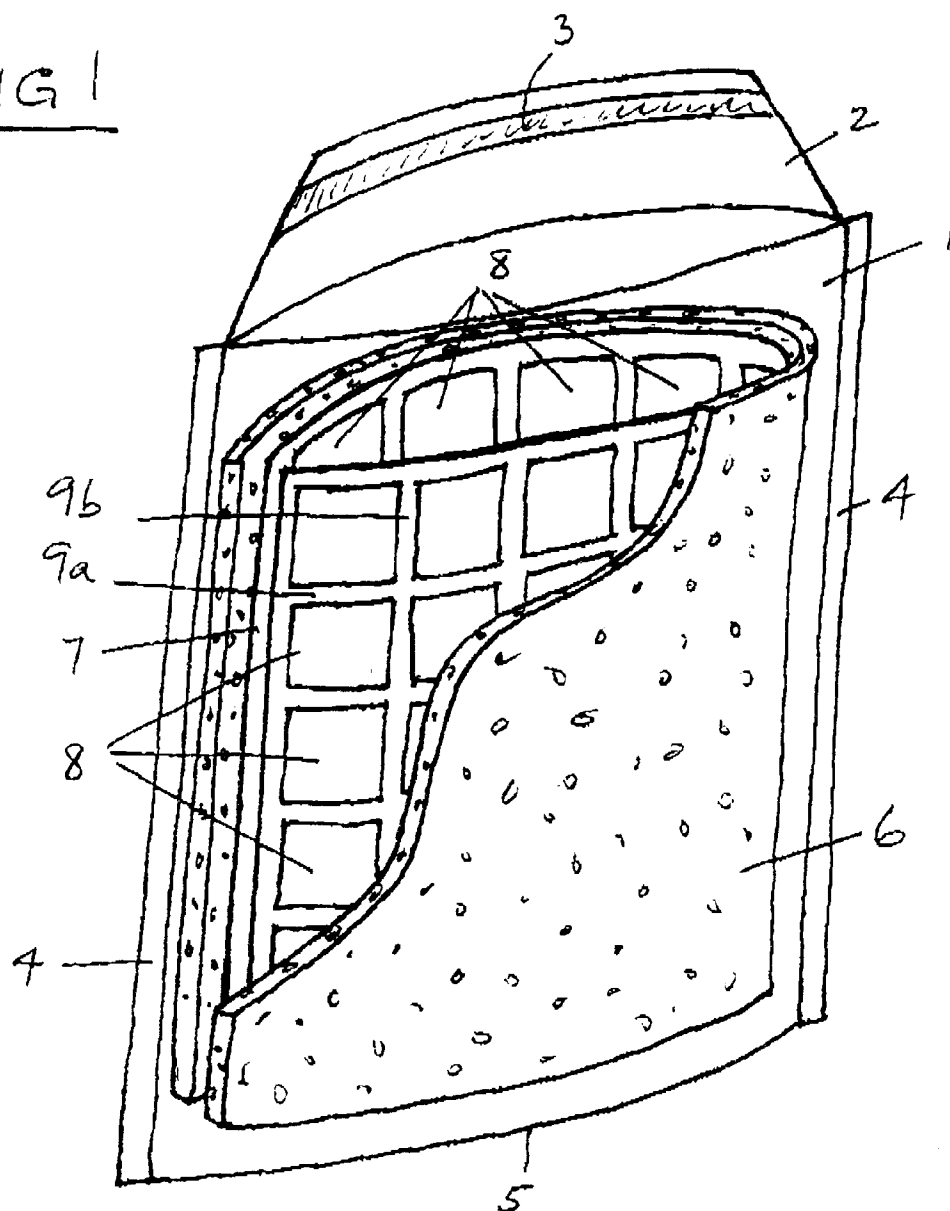
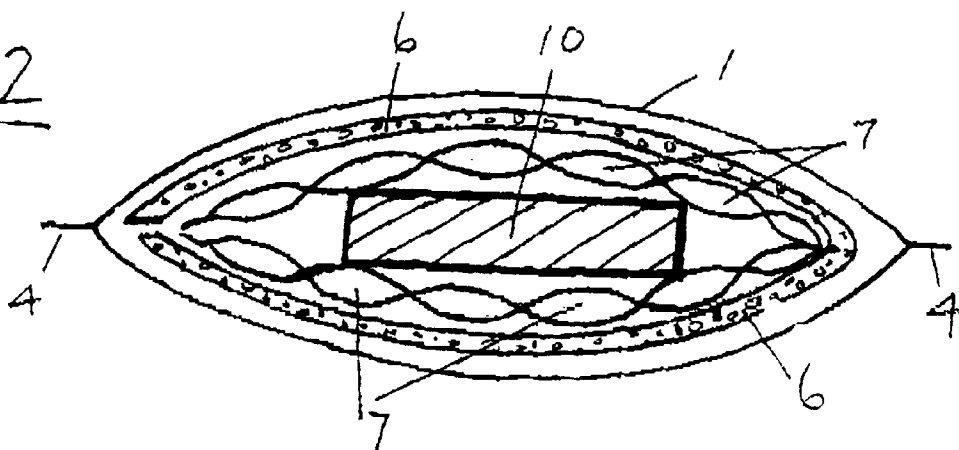
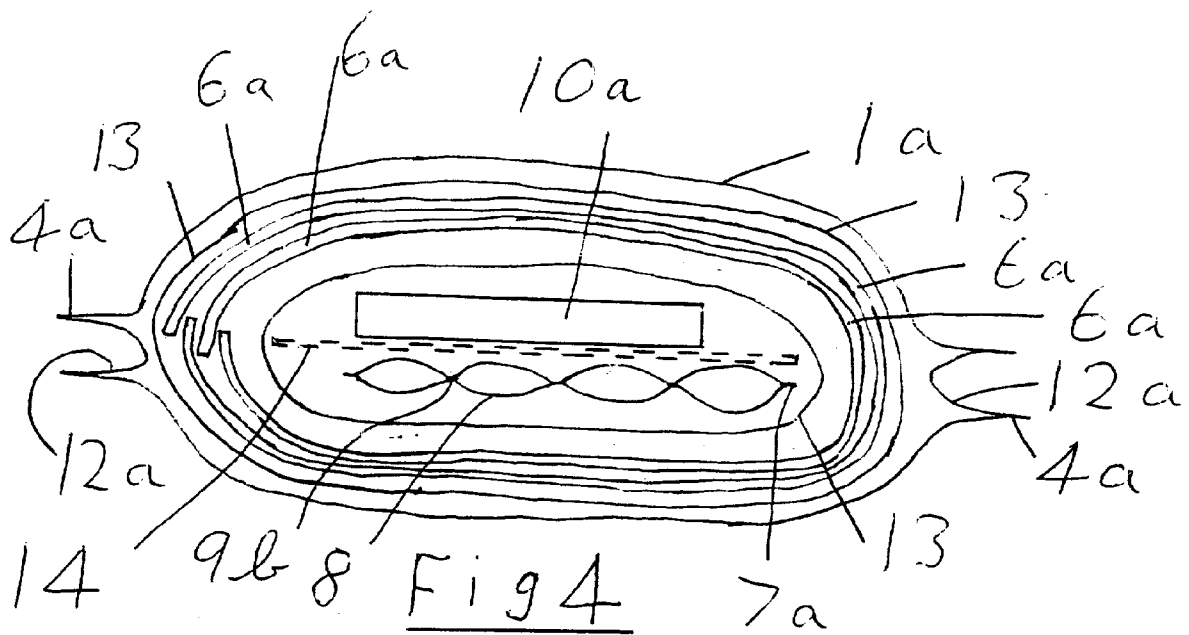
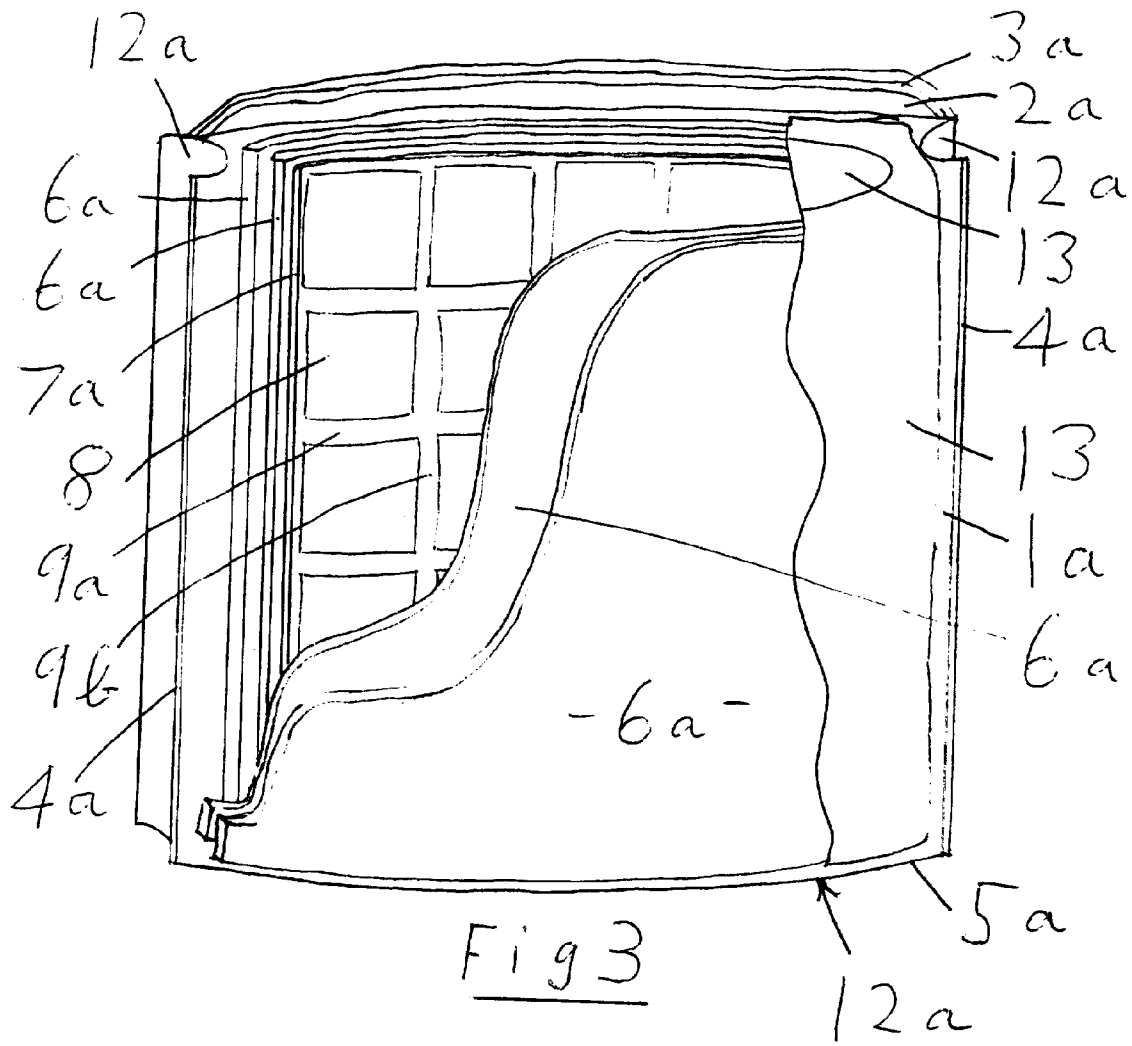


FIG 2







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# EUROPEAN SEARCH REPORT

Application Number  
EP 97 30 9097

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.6)
X	US 5 237 838 A (MERRITT-MUNSON CAROLANN)	2-9, 13-15, 17	B65D81/18 B65D81/38
Y	* claim 1 * * column 2, line 56 - column 3, line 65 * * figures 1-4 *	1, 10, 12, 16	F25D3/08
Y	US 4 738 364 A (YEAGER STEVE) * column 3, line 61 - column 4, line 23 * * figures 1-7 *	1	
Y	WO 89 09913 A (BETHUNE JOHN KENNETH)	10	
A	* page 2, last paragraph - page 5, last paragraph * * figures 1-5 *	11	
Y	US 4 343 158 A (CAMPBELL JUNE H) * column 2, line 52 - line 63 * * figures 1-4 *	12	
Y	DE 31 44 702 A (LP PLAST GES ZUR VERARBEITUNG) * figures 1-4 *	16	
A	US 4 311 022 A (HALL JOHN M) * column 2, line 19 - line 23 * * figures 1,2 *	10, 11	
A	WO 96 13447 A (VIANIN CLAIRE) * page 6, paragraph 2 * * figure 4 *	15	
P, X	WO 97 28064 A (INSTAR PTY LTD ; MITCHELL BARRY TREVOR (AU)) * page 7, line 4 - page 9, line 5 * * figures 1-23 *	1, 2, 4, 7, 13-15	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 18 February 1998	Examiner Wennborg, J
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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 &amp; : member of the same patent family, corresponding document</p>			

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