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(54) THERMOINSULATING PACKAGING FOR THERMOSENSITIVE PRODUCTS

(57) Said packaging comprises an accessible body (1) having one or more thermoinsulating walls surrounding said thermosensitive product (P) consisting of an envelope (2) made of an open cell type foamed flexible polymer, said envelope being delimited by an impermeable inner ply or cloth (3) and an impermeable outer ply or cloth (4), which consist of a metallized plastic sheet forming a barrier against gas and/or liquid diffusion exchange through the envelope (2), and at least one container (5) for a refrigerating element (6) forming and enclosure for the thermosensitive product (P). All elements forming part of said packaging are disposed separately for transportation and storage when they are not being used and have a flat compact configuration. They can be mounted and assembled for utilization by a user at a desired moment.

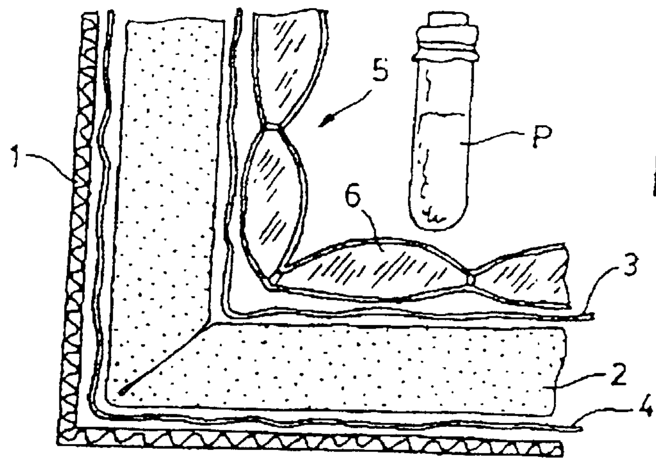

Fig.1

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Description

[0001] This invention relates to a thermally insulated packaging system for transporting temperature sensitive products such as medicines, vaccines, laboratory samples etc. comprising an outer shell with an opening, having one or more thermally insulated walls which surround the thermally sensitive product, alongside which is situated a refrigerant element, and whose walls form barriers impervious to flowable substances.

[0002] For a long time now, there have been many different types methods or types of packaging used for transporting thermally sensitive products such as medicines, vaccines, laboratories etc. each one with its own drawbacks.

[0003] One often used method involves the use of a conventional icebox, such as those used by campers. But, on the one hand, such ice-boxes are not designed to maintain cold temperatures over many hours (or even days) without renewing the refrigerant element placed inside them alongside the temperature-sensitive product being transported, and on the other hand, because their rigidity and large volume consume a great deal of space, especially so when being transported or in storage awaiting their use, all of which amounts to an increase in overall costs.

[0004] Another widely used method is to use packaging material, which need not necessarily be very impermeable, in order to enclose dry ice, which itself surrounds the temperature sensitive products being transported. As dry ice changes from solid to gaseous state without becoming a liquid i.e. it sublimes, it does not wet either the packaging or the product it contains. Nevertheless, the life of dry ice is very limited and, furthermore, its sublimation produces undesirable fumes and for this reason many haulage companies, including the airlines, forbid its use.

[0005] There currently also exist types of insulated box packaging that are composed of rigid polyurethane foam. This material is a closed-cell thermoplastic foam with excellent performance in terms of thermal insulation and impermeability as well as having a very low density. The main drawback of such packaging is its rigidity, which makes the structure of the box occupy so much space. This is especially inappropriate when the box is no longer being used, for example, during transportation of the empty box between it manufacturing site and the end user's location as well as during storage, both at its place of manufacture and at it end-user's site until the moment the package is filled and forwarded to its destination.

[0006] Consequently, there exists a great demand for a thermally insulated packaging system that permits a reduction in volume, and therefore cost, during the transport and storage phases of it life-cycle, while it is not being used. The aim of this invention is meet that demand.

[0007] The above objective is attained, according this invention by providing a temperature insulated packaging system for temperature sensitive products that is composed of several elements, each of which can be separated so as to permit a compact and flat shape whilst undergoing transportation or storage, with the component parts capable of being assembled and put into service by the user at any given moment.

[0008] This is achieved by the use in the general structure and in particular the insulating material composition, of flexible material that permits the components to be folded and unfolded, thus to reducing to the minimum their volume when they are not in use and, at the same time, reducing the costs of transportation and storage while awaiting use.

[0009] The reduction in volume mentioned above is brought about by the use, as material for the temperature insulated component of a flexible, open-cell copolymer foam, such isocyanate copolymer foam or polyurethane.

[0010] The flexibility of this material allows the production of a wrapping comprised of several flat panels, with it being possible for two or more of these panels to be joined together by split, articulated joint lines, so forming at least one flat panel and, by doing so, these panels and/or this flat panel assembly, only occupy a small volume during storage while awaiting use, and they permit user assembly prior to use at any moment

[0011] The thermal insulation properties of polymer foams derive from the existence within the material of small thin-walled cells having very low thermal conductivity, In closed cell foams, a gas derived from the chemical reaction occurring during their manufacture, remains inside these cells for a long time. In the case of open-cell foams, however, this gas diffuses and mixes with the air around it and is, therefore, renewed continually. This explains the inferior thermal insulation properties of the open-cell foams in comparison with those of closed-cell foams.

[0012] Therefore, so as to take make the most of the potential for packaging volume reduction of the flexibility of open-cell foams (whilst losing none of thermal insulation properties) when the packaging is not in use, it is necessary to introduce an additional element to stop the diffusion of liquid and/or gaseous material through the foam.

[0013] With this in mind the new invention incorporates an internal impermeable layer or fabric and an external impermeable layer or fabric which form continuous walls to both sides of the wrapping material. These layers or fabrics take the form of flexible internal and external bags whose size and shape conform to that of the internal and external dimensions of the filly assembled thermally insulating package.

[0014] The bags mentioned above can be sealed by using any standard method that would give a sufficiently hermetic seal e.g. thermal sealing, multiple crimping of its opening, folding and clamping of part of the opening, by means of a clamping ring or by means of a dovetail closure of the opening.

[0015] The bags are made of layers of metallic plastic which, in turn, are comprised of one layer of aluminium laminated to a layer of polythene with the thickness of the external polythene layer being greater than that of the internal bag. The aluminium layer guarantees an excellent hermetic seal against gaseous diffusion while the polythene layer forms a barrier against accidental leakage of the refrigerant or of the product being transported inside, not to mention the possibility of liquids penetrating from outside the package. Furthermore, the polythene/aluminium laminate offers very good mechanical resistance properties.

[0016] With this arrangement, when the foam wrapping is fully extended and with both the internal and external bags closed and in place, the result is a structure with thermally insulated walls surrounding an internal space which contains the temperature sensitive product and the refrigerant, which, typically, consists of water, mixed with an additive that lowers its freezing point. Said additive could be a salt such as sodium chloride.

[0017] The refrigerant is enclosed within at least one container comprised of a flattened, flexible plastic bag, with opposing walls joined together by spot welding and having some partially sealed welded join-lines which delimit joint lines of the various fillable panels. This bag, which has a removable stopper, is supplied empty but containing the appropriate amount of the additive mentioned above such that when it is not in use it occupies a limited volume during storage and transportation.

[0018] The bag can be filled with water when its user anticipates its use; it is then shaken in order to dissolve the additive, chilled in order to freeze its contents and then folded along the joint lines mentioned above in order to form the refrigerated closure for the temperature sensitive product.

[0019] In a preferred embodiment of the invention the package comprises two identical refrigerated bags as described above, each one having three fillable panels demarcated by joint lines, said bags being able to be folded creating a U-shape structure which can be joined together to create a closure with rectangular prismatic structure whose dimensions are suitable for it to be housed within the internal space delimited by the thermally insulated wrapping mentioned earlier. The temperature sensitive product being transported is placed within said refrigerated closure.

[0020] The whole assembly is protected by an outer shell formed by a conventional cardboard box, such as a foldable box of corrugated cardboard. Text or logos can be printed on the outer surfaces of this cardboard box, which, should preferably be pale in colour so as to avoid, as much as possible, the absorption of external thermal radiation.

[0021] These and other characteristics will become more apparent through the following detailed description of an example of embodiment of the newly invented thermally insulated packaging, which makes reference to the drawings attached in which:

Fig. 1 is a partial view of an enlarged transverse section showing the positions of the various components comprising the packaging invention.

Fig. 2 is a perspective view of a flat sheet component of the thermally insulated wrapping of the Fig. 1.

Fig. 3 is a perspective exploded view of the thermally insulated wrapping of the Fig. 1.

Figs. 4 and 5 respectively show the internal and external flexible bags that make up the respective impermeable layers or fabrics of the Fig. 1.

Fig. 6 is a plan view of the container for the refrigerant of the Fig. 1.

Fig. 7 is a perspective exploded view of the refrigerated closure of the Fig. 1 accomplished using 2 containers, as in Fig. 6.

[0022] In the transversal cross-section in Fig. 1 can be seen a corner of the thermally insulated package for temperature sensitive products according to the present invention. Such temperature sensitive products could include e.g. medicines, vaccines, laboratory samples, etc.

[0023] The packaging comprises an accessible shell -1-, insulated walls made from a flexible, open-cell foam polymer or copolymer which form a wrapping -2-, with impermeable internal -3- and external -4- layers or fabrics that delimit the wrapping -2-, each of said layers or fabrics -3-, -4- being comprised of a plastic laminate which forms a barrier against the gaseous and/or liquid diffusing exchange across the wrapping -2-. This wrapping -2- marks the boundary of an internal space suitable for locating the temperature sensitive product -P- being transported, alongside which there is a refrigerant -6- enclosed in a container -5-.

[0024] The accessible shell -1-, wrapping -2-, external and internal layers or fabrics - 3,4- and the container -5- for the refrigerant element -6- are held separately during their transport and storage while awaiting use, in a compact and flattened state and lend themselves to being assembled and put into service whenever the user so chooses.

[0025] The flexible polymer or copolymer foam mentioned above should preferably be an either an isocyanate polymer foam or an open-cell urethane copolymer foam. The metallic plastic laminates mentioned above are used on both sides of the wrapping -2-, in order to counter the adverse thermal insulation properties of open-cell foams. These laminates -3- and -4- are comprised of a laminated polythene layer and aluminium layer, which impede the gas found within the polymer foam from diffusing at the air around it as well as providing a hermetic barrier against liquids. The thickness of the polythene layer of the external laminate -4- is greater than that of the internal laminate -3-.

[0026] The aforementioned foamy copolymer wrapping -2- is comprised of at least six panels -8- with bevelled edges -9- such that they can be fitted together to form a prismatic rectangular structure that demarcates the aforementioned internal space.

[0027] Figs. 2 and 3 show a practical example of the use of such a wrapping -2-, which is shown to be formed by two flat sections -11-, each one forming part of two jointed panels -8- and another two single-panel pieces -12-. The flat sheets -11- include a split joint -10- which separates the two panels -8-, it being possible to fold over the panels along the joint -10-, forming an "L"-shape and with these panels capable of being joined to each other and to said single panel portions -12- in order to form the rectangular prismatic structure.

[0028] It is obvious that although in this example the prismatic structure has been obtained through two double-panelled pieces and two single-panelled pieces, the same results could have been obtained using differently configurations such as, for example, two three-panelled pieces, one four-panelled piece, two single-panelled pieces, or even one single piece with six jointed panels. Nevertheless, the factor common to all of these is their flat configuration such that said flat pieces -11- and -12- occupy a relatively small volume whilst in transport or in storage awaiting their use. They can even be compressed, given their flexible foam construction, and can be assembled by the user at any given moment when he so desires.

[0029] So as to realise, practically, economically and simply, the impermeable internal -3- and external -4- layers, which demarcate both the interior and exterior of the wrapping -2-, said layers -3-,-4- are respectively composed of flexible internal bag -13-and a flexible external bag -14- (see Figs. 4 and 5) with dimensions that adjust, respectively, to the internal and external dimensions of the fully assembled wrapping -2-and prone to be close once assembled. It is evident that these bags can be transported and stored in a folded state so that they take up a minimum amount of space when they are not in use.

[0030] The closing of the aforementioned internal and external bags -13, 14-, once they are in place may be accomplished by means of any of the commonly used methods e.g. thermal sealing, multiple crimping of its opening, folding and clamping of part of the opening, be means of a clamping ring or by means of a dovetail closure of its opening.

[0031] Figs 6 and 7 show the aforementioned container -5- for the refrigerant -6-, which comprises a flattened, flexible plastic bag -15- with opposing walls linked together by welded joins -16- having partially sealed, soldered joint lines -17- that define the joint lines of various fillable panels -18-.

[0032] The refrigerant used -6- is composed of water and an additive -7- in order to lower its freezing point. The additive used could be a salt, such as sodium chloride.

[0033] The bag -5- comprises a removable stopper -19- and is supplied empty of water but containing the aforementioned additive -7- so that it occupies a reduced volume during transportation and storage while awaiting use, and enabling the user to fill it with water, to shake, chill it to freeze its contents and then fold it along said joint lines -17-thus forming a refrigerated closure for the temperature sensitive product -P- as and when it should be required.

[0034] In the practical example illustrated, two identical bags -15- of the aforementioned type as used, each one having two articulated joint lines -17- that demarcate three of the said fillable panels -18- and being capable of folding into a U-shape and of being fitted together, thus forming the aforementioned closure with a rectangular prismatic structure. It is apparent that said configuration could be accomplished using a different number or bags comprising a different number of fillable panels in a manner similar to that previously explained in relation to the wrapping -2-.

[0035] Finally, all the aforementioned elements, once filly assembled are placed within the aforementioned shell, -1- (shown in a transverse section partial view in Fig. 1) which in the example of preferred use is constructed from a conventional cardboard box that, as with the rest of the package components, can be separately transported and stored in a flat state while awaiting its use so occupying a minimum amount of space.

[0036] A series of tests have been carried out in order to determine the capacity of the packaging according to this invention to maintain a low temperature within its interior.

[0037] The tests were conducted on two different package specimens, namely: Type 1, designed to maintain temperatures of -20°C (-4°F) and Type 2, designed to maintain temperatures of 0°C (32°F), the specifications of which be seen in Table 1, below.

Table 1

Packaging Specifications		
	Type I -20°C (-4°F)	Type II 0°C (32°F)
External dimensions (cm)	68x58,5x53,3	31,5x27,5x30

Table 1 (continued)

Packaging Specifications		
	Type I -20°C (-4°F)	Type II 0°C (32°F)
Dimensions of internal space (cm)	32x27x21	23x18,5x20,5
External volume (dm^3)	196	26
Volume of the internal space (dm^3)	18	9
External surface area (m^2)	2,03	0,53
Surface area of internal space (m^2)	0,42	0,26
Average surface area (m^2)	0,93	0,37

[0038] In these tests refrigerant elements conforming to standard EKS 21 have been used, i.e. the containers previously described and shown in the drawings have not been used. Therefore, the dimensions of the internal space refer to the dimensions of the internal space of the thermally insulated wrapping.

[0039] The test conditions for the Type I packaging were as follows:

Specimen:	Type I: For Temperatures of -20°C (-4°F)
Refrigerant:	22 Refrigerant elements EKS 21 Eutectic Temperature approx. -21, 1°C (-6°F) Refrigerant Energy: 2600 kJ
Sample:	Test Tube filled with ice (diameter 24 mm, length 90 mm, volume: approx. 40 cm^3)
Transducer:	Fe-Co thermocouple.
External Temperature:	23°C (73°F)

[0040] The resulting increase in temperature over time is shown in Table 2.

Table 2

Increase in Temperature over time for Type I package			
TIME		TEMPERATURE	
hours	(days)	°C	(°F)
0,0	(0,00)	-25,7	(-14,3)
0,5	(0,02)	-25,6	(-14,1)
1,2	(0,04)	-25,2	(-13,4)
2,0	(0,08)	-24,9	(-12,8)
18,5	(0,77)	-22,6	(-8,7)
21,0	(0,88)	-22,4	(-8,3)
90,0	(3,75)	-22,0	(-7,6)
96,0	(4,00)	-22,0	(-7,6)
114,5	(4,77)	-20,7	(-5,3)
118,5	(4,94)	-20,3	(-4,5)
121,0	(5,04)	-19,8	(-3,6)

[0041] The trial conditions for the Type II package where as follows:

Specimen:	Type II: For Temperatures of 0°C (32°F)

Refrigerant:	8 Refrigerant elements EKS 21 Eutectic Temperature approx. 0°C (32°F) Refrigerant Energy: 1340 kJ
Sample:	Test Tube filled with ice (diameter 24 mm, length 90 mm, volume: approx. 40 cm^3)
Transducer:	Fe-Co thermocouple.
External Temperature:	23°C (73°F)

[0042] The results of increase in temperature over time are shown in Table 3.

Table 3

Increase in Temperature over time for Type II package	
TIME hours (days)	TEMPERATURE °C (°F)
0,0 (0,00)	-17,1 (1,2)
0,5 (0,02)	-15,0 (5,0)
1,0 (0,04)	-13,5 (7,7)
1,5 (0,06)	-12,1 (10,2)
2,0 (0,08)	-11,0 (12,2)
5,0 (0,21)	-5,1 (22,8)
6,0 (0,25)	-3,5 (25,7)
7,0 (0,29)	-2,0 (28,4)
8,0 (0,33)	-1,4 (29,5)
9,0 (0,38)	-0,7 (30,7)
18,0 (0,75)	-0,6 (30,9)
19,0 (0,79)	-0,6 (30,9)
20,0 (0,83)	-0,6 (30,9)
21,0 (0,88)	-0,6 (30,9)
22,0 (0,92)	-0,6 (30,9)
24,0 (1,00)	-0,6 (30,9)
26,0 (1,08)	-0,6 (30,9)
28,0 (1,17)	-0,6 (30,9)
30,0 (1,25)	-0,6 (30,9)
42,0 (1,75)	-0,5 (31,1)
44,0 (1,83)	-0,6 (30,9)
46,0 (1,92)	-0,6 (30,0)
72,0 (3,00)	-0,6 (30,9)
110,0 (4,58)	-0,3 (31,5)
113,5 (4,73)	2,1 (35,8)
114,5 (4,78)	3,6 (38,5)
115,5 (4,81)	6,3 (41,5)
116,5 (4,85)	6,2 (43,2)
117,5 (4,90)	7,0 (44,6)

[0043] The results of the tests show that both in Type I package as well as in Type II package the desired limit temperatures, -20°C (-4°F) and 0°C (32°F) were not surpassed until more than 4 days from the start of the tests had lapsed.

[0044] The total thermal permeability coefficient (value k) of the packages is calculated as being the quotient of the refrigerant power and the product of the mean surface area and the temperature difference between the internal and external surfaces. The refrigerant power is derived from the quotient of the refrigerant energy used and the length of time during which the refrigeration temperature is maintained.

Table 4

Coefficient of Thermal Permeability (Value k)		
Package	Type I -20°C (-4°F)	Type II 0°C (32°F)
Refrigerant Power (W)	7,3	3,6
Internal Temperature (°F)	-22,3	-0,6
External Temperature (°F)	73	73
Coefficient of Thermal Permeability [W/(m^2xK)]	0,17	0,41

[0045] Knowing the coefficient of thermal permeability enables calculation of the necessary refrigerant power, in other words, the number and type of refrigerant elements needed, as well as the period of desired temperature maintenance for each type of package.

[0046] An expert in the field could make some changes and variations without straying too far from the scope of this invention, which is defined in the claims below.

Claims

1. Thermally insulated packaging for temperature sensitive products such as medicines, vaccines, laboratory samples, etc. comprised of an accessible shell (1) with one or more thermally insulated walls surrounding the aforementioned temperature sensitive product (P) adjacent to which is a refrigerant element (6) and whose walls form a barrier against the passage of flowable substances, said insulating walls being manufactured from a wrapping (2) made of flexible, open cell foamy polymer or copolymer with both internal (3) and external (4) impermeable layers or fabrics that form the boundary of said wrapping (2), each of said layers or fabrics being made from a metallic plastic laminate that forms a barrier against the exchange by diffusion of gases and/or liquids across the wrapping (2), said accessible shell (1), said wrapping (2), said internal and external layers or fabrics (3, 4) are separately arranged in a compact flat condition for transport and storing while not in use and are able to be assembled and put into service by the user when so desired, characterised in that said refrigerant element (6) comprises at least one container also arranged in a compact flat condition for transport and storing while not in use and in that said impermeable internal (3) and external (4) impermeable layers or fabrics that form the boundary of said wrapping (2) are respectively formed from a flexible internal bag (13) and from a flexible external bag (14) which are capable of being closed once in assembled position and whose dimensions are adjusted respectively to the internal and the external dimensions of the fully assembled wrapping (2).

2. Thermally insulated package according to claim 1, characterised in that the closure of said internal and external bags (13) and (14), once in position is accomplished by thermal sealing, multiple crimping of its opening, folding and clamping of part of its opening, by means of a clamping ring or by means of a dovetail closure of its opening.

3. Thermally insulated package according to claim 1, characterised in that said at least one container (5) holding the refrigerant (6) comprises a flattened, flexible plastic bag (15) with opposing walls linked together by welded joints (16), having partially sealed, soldered joints (17) that define the joint lines of various fillable panels (18) having the bag the possibility of being chilled to freeze its contents and then fold it along said joint lines (17) thus forming a refrigerated closure for the temperature sensitive product (P).

4. Thermally insulated package according to claim 3, characterised by the fact that it comprises two of the aforementioned identical bags (15) each one having joint lines (17) demarcating three of said fillable panels (18) thus allowing the panels of each bag (15) to be folded creating a U-shape structure so that two of these bags (15) can match creating a closure having a rectangular prismatic structure.

5. Thermally insulated package according to claim 3 or 4, characterised by the fact that said bag (15) comprises a removable stopper (19) and is supplied empty of water but containing an additive (7) so that it occupies a reduced volume during transportation and storage while awaiting use, and enables the user to fill it with water, shake it and chill it to freeze when it should be required

6. Thermally insulated package according to claim 5, characterised in that said additive (7) is sodium chloride.

7. Thermally insulated package according to claim 1 characterised in that said wrapping (2) made from flexible copolymer foam is comprised of at least six panels (8) with bevelled edges (9) capable of being fitted together to form a rectangular prismatic structure that constitutes the boundaries of an inner space, with provision having been made for two or more of said panels (8) being joined together by split joint lines (10) forming at least one flat piece (11) in such a manner that the said panels (8) and/or said at least one flat piece (11) occupy a small amount space whilst in storage or whilst being transported and awaiting use and they can be user-assembled when this is desired.

8. Thermally insulated package according to claim 7, characterised in that said wrapping (2) comprises two of the aforementioned identical flat pieces (11) each one including two articulated pieces (8) and another two single-panel pieces (12), with the flat pieces (11) capable of being folded in to an "L" shape and joined to each other in abutment as well as to the aforementioned single panel pieces (12) in order to form said rectangular prismatic structure.

9. Thermally insulated package according to any of the preceding claims, characterised by the fact that said shell (1) is formed by a conventional cardboard box, such as corrugated cardboard.

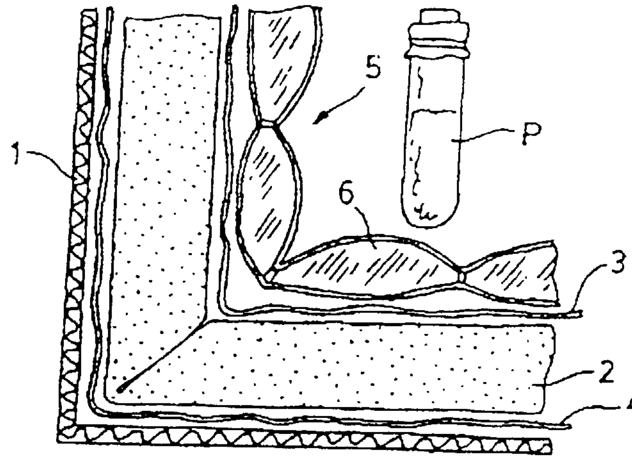

Fig.1

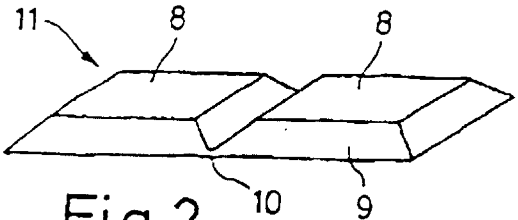

Fig.2

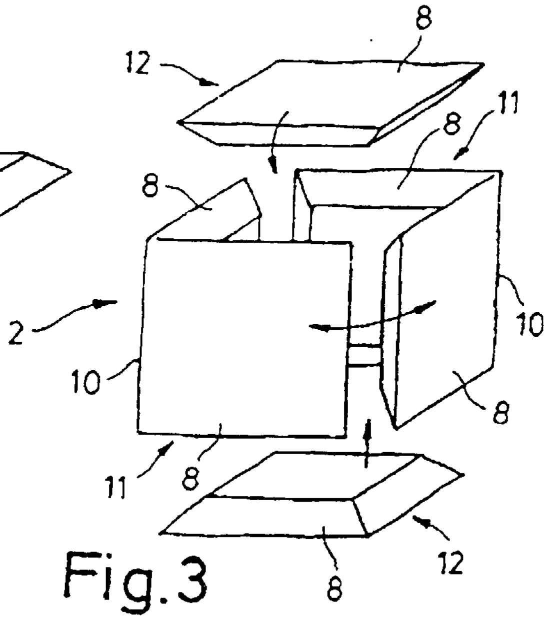

Fig.3

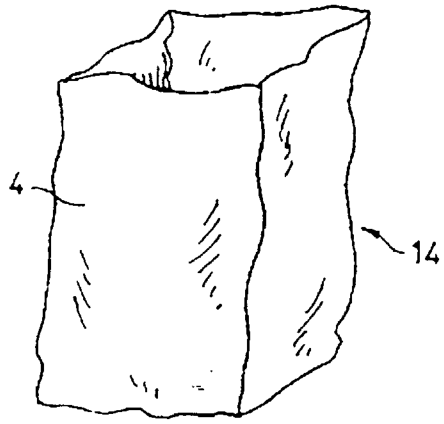

Fig.4

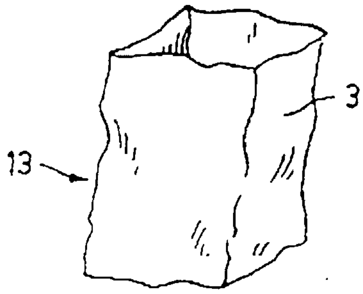

Fig.5

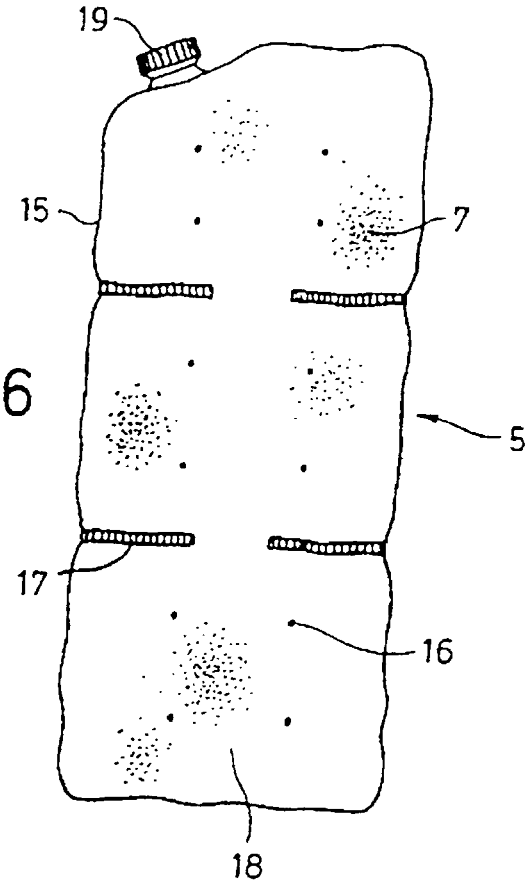

Fig.6

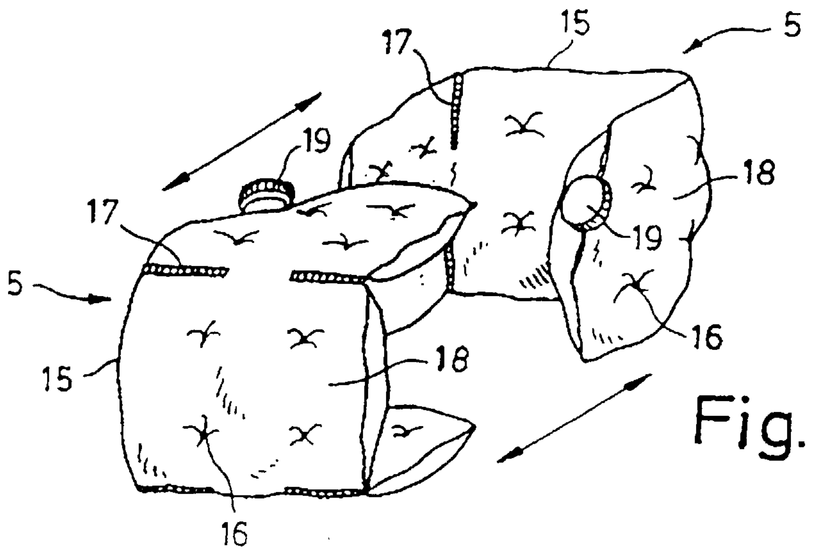

Fig.7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ ES 99/00128

A. CLASSIFICATION OF SUBJECT MATTER
IPC6 : B65D 81/38 // B65D 201 :00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
IPC6

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPODOC ; WPI ; PAJ ; CIBEPAT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 5111957 A (HOLLANDER et al.) 12 May 1992 (12.05.92) column 1, line 45- column 4, line 2 ; figures	1,2,3,5,13 4, 9, 10, 12
Y	EP 711964 A (N.R. DEVELOPMENT LIMITED) 15 May 1996 (15.05.96) column 1, line 26- column 3, line 53 ; figures	1-5, 9, 10, 12, 13
Y	EP 109890 A (DUREYSEN DEVELOPPEMENT, S.A.) 30 May 1984 (30.05.84) ; page 2, line 20 – page 6, line 23 ; figures	1-5, 9, 10, 12, 13

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

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Date of the actual completion of the international search	Date of mailing of the international search report
29 November 1999 (29.11.99)	**28 December 1999 (28.12.99)**
Name and mailing address of the ISA S.P.T.O	Authorized officer Telephone No.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/ ES 99/00128

Patent document cited in search report	Publication date	Patent familiy member(s)	Publication date
US 5111957 A	12.05.1992	NONE	
EP 711964 A	15.05.1996	NONE	
EP 109890 A	30.05.1984	FR 2535689 A,B	11.05.1984

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