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GAS-CONTAINING PRODUCT SUPPORTING STRUCTURE
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1. In combination, a supporting structure for positioning and supporting a product within an outer packing container, a product to be positioned and supported, and an outer packing container in which said supporting structure and said product are contained; wherein said supporting structure supports said product at least at a predetermined portion thereof which has a predetermined configuration; wherein said outer packing container has a predetermined configuration at least at a predetermined portion thereof whereby said supporting structure is to be placed, and wherein said supporting structure has a predetermined configuration supporting the product at the predetermined portion thereof; wherein said supporting structure includes:

a blow-moulded semi-rigid and self-supporting monolithic gas-containing bladder having an average wall thickness of about 0.8 mm, and having a preformed product receiving portion in a first region of said bladder, said product receiving portion having a predetermined configuration and dimensions so as to be co-operate with said predetermined portion of said product and so as to receive said predetermined configuration of said predetermined portion of said product;

a packing container contacting portion in a second region of said bladder which is remote from and generally opposed to said first region, said packing container contacting

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portion being such as to co-operate with said predetermined configuration of said predetermined portion of said outer packing container; and

wherein said product receiving portion of said gas-containing bladder retains its predetermined configuration and dimensions as a consequence of its own structure when said gas-containing bladder contains gas, and when the gauge pressure of that gas is approximately zero.



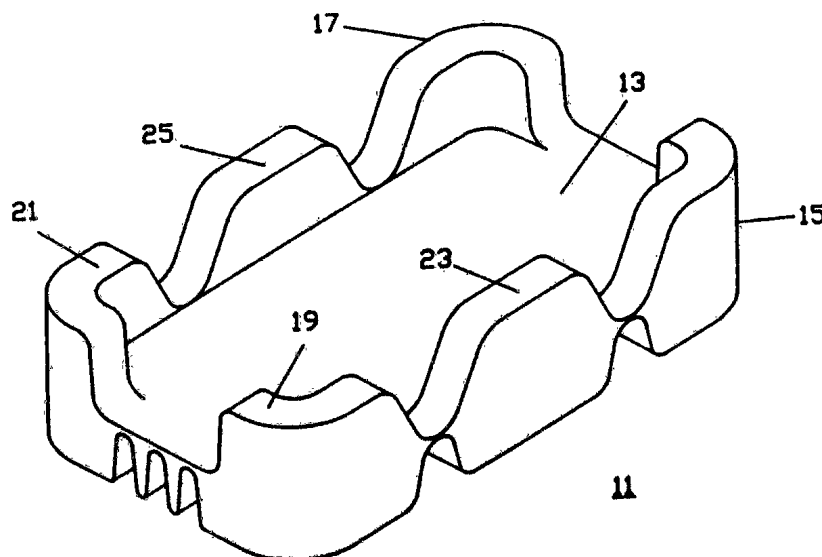
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(54) Title: GAS-CONTAINING PRODUCT SUPPORTING STRUCTURE



(57) Abstract

A supporting structure (11) for positioning a product within an outer shipping container takes the form of a plastic air bladder shaped on one side to provide a cavity (13) having internal dimensions matching external dimensions of the product and shaped on the other to have external dimensions matching internal dimensions of the shipping container. The air bladder may be either a vertical or a horizontal positioning element and is typically used in pairs within a single container. The air bladder is compact and can be discarded after use with minimal environment impact. In examples shown, the air bladder is of a plastic material such as polyethylene and is produced by blow molding, making it particularly suitable for disposal after use by a recycling process, thereby further reducing potential environmental impact.

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GAS-CONTAINING PRODUCT SUPPORTING STRUCTURE

TECHNICAL FIELD:

5 This invention relates generally to product support packaging inserts and more particularly to ecologically advantageous packing inserts for supporting products within outer shipping cartons and protecting the supported products against external shock.

BACKGROUND OF THE INVENTION:

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When shipping fragile products, it is desirable to provide protection against external shock which is as complete as possible and, at the same time, minimise both packaging and shipping costs. In the past, both expanded polystyrene (EPS or styrofoam) and polyurethane or polyethylene (flexible foam) inserts have been used for such purposes with considerable
15 success. In recent years, however, environmental concerns over both EPS and flexible foams have been growing. Both are very voluminous per pound and thus tend to exhaust landfill areas much too quickly. Any foamed plastic product is, moreover, both difficult and costly to reclaim or recycle back to its original non-foamed state. There is, therefore, an ongoing need for new packaging techniques which not only provide adequate protection to
20 products against external shock and minimise both packaging and shipping costs but also present minimal ecological problems in the disposal of packaging materials after they have served their intended purpose.

SUMMARY OF THE INVENTION:

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According to one aspect of the present invention there is provided in combination, a supporting structure for positioning and supporting a product within an outer packing container, a product to be positioned and supported, and an outer packing container in which said supporting structure and said product are contained; wherein said supporting structure
30 supports said product at least at a predetermined portion thereof which has a predetermined



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configuration; wherein said outer packing container has a predetermined configuration at least at a predetermined portion thereof whereby said supporting structure is to be placed, and wherein said supporting structure has a predetermined configuration supporting the product at the predetermined portion thereof; wherein said supporting structure includes: a blow-
5 moulded semi-rigid and self-supporting monolithic gas-containing bladder having an average wall thickness of about 0.8 mm, and having a preformed product receiving portion in a first region of said bladder, said product receiving portion having a predetermined configuration and dimensions so as to be co-operate with said predetermined portion of said product and so as to receive said predetermined configuration of said predetermined portion of said
10 product; a packing container contacting portion in a second region of said bladder which is remote from and generally opposed to said first region, said packing container contacting portion being such as to co-operate with said predetermined configuration of said predetermined portion of said outer packing container; and wherein said product receiving portion of said gas-containing bladder retains its predetermined configuration and dimensions
15 as a consequence of its own structure when said gas-containing bladder contains gas, and when the gauge pressure of that gas is approximately zero.

The said gas-containing bladder may in one preferred form be sealed to its ambient surroundings. In another arrangement the gas-containing bladder may have a sealable
20 opening therein.

The gas-containing bladder may have an inflation opening therein and include a plug adapted to fit within the opening in sealed relation thereto so as to seal said gas-containing bladder.

25

The gas-containing bladder may be pressurised and the gauge pressure of the gas within the gas-containing bladder may be positive, and within the range of about 0.01 to about 2.0 atmospheres above ambient pressure. Preferably, the gauge pressure may be in the range of about 0.01 to about 0.5 atmospheres above ambient pressure.



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Preferably, the predetermined configuration and dimensions of the supporting structure may conform to the predetermined configuration of the predetermined portion of the product, and wherein the predetermined portion of the product is a portion of a corner of the product.

- 5 In another arrangement the predetermined configuration and dimensions of the supporting structure conform to the predetermined portion of the product, and wherein the predetermined portion of the product is a portion of an edge of the product.

The material that forms the supporting structure may be chosen from the group of
 10 blow mouldable plastics consisting of polyethylene, polypropylene and co-polymers thereof; vinyl, polyvinyl chloride and nylon.

Preferably, the gas in the gas-containing bladder is a damping gas chosen from the group of pressurisable gases consisting of air, nitrogen, carbon dioxide, sulphur hexafluoride,
 15 argon and krypton and most preferably air.

In one preferred form the gas-containing bladder comprises a plurality of discrete chambers in fluid communication with one another. Preferably, at least an adjacent pair of the plurality of discrete chambers in the gas-containing bladder are in fluid communication
 20 with one another. There may further be provided means for restricting gas flow between chambers, wherein the means are dimensioned so as to at least partially constrict the fluid communication.

According to another aspect of the present invention there is provided in combination,
 25 a supporting structure for positioning a product within an outer packing container, product to be supported, and an outer packing container into which said supporting structure and said product are inserted; wherein the product to be supported has predetermined external dimensions, and the outer packing container has predetermined internal dimensions; wherein said supporting structure includes : an at least partially inflated blow-moulded and sealed
 30 semi-rigid and self-supporting monolithic plastic resin gas-containing bladder having an



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average wall thickness of 0.8 mm, and having a preformed external product receiving cavity at one side thereof, said external cavity having a predetermined shape and predetermined dimensions so as to fit said predetermined external dimensions of the product; wherein the exterior of said gas-containing bladder at the other side remote from said external cavity has
5 a predetermined shape and predetermined dimensions so as to fit said predetermined internal dimensions of the packing container; and wherein said product receiving portion of said gas-containing bladder retains its predetermined configuration and dimensions as a consequence of its own structure when said gas-containing bladder contains gas, and when the gauge pressure of that gas is approximately zero.

10

Preferably, the material that forms the supporting structure is chosen from the group of blow mouldable plastics consisting of polyethylene, polypropylene and co-polymers thereof; vinyl, polyvinyl chloride and nylon.

15

Preferably, the at least partially inflated gas-containing bladder contains a plurality of interior chambers.

Preferably, the at least partially inflated gas-containing bladder contains a plurality of interior sub-chambers formed by baffle members extending into the interior of the gas-
20 containing bladder whereby a damping effect on gas moving from one of the interior sub-chambers to another is exerted by said baffle members.

In another arrangement the at least partially inflated gas-containing bladder contains a plurality of interior sub-chambers formed by baffle members extending into the interior of
25 the gas-containing bladder whereby a damping effect on gas moving from one of the interior sub-chambers to another is exerted by said baffle members; and wherein the supporting structure has a plurality of corners, and at least some of the interior sub-chambers are position at the corners.

For purposes of this patent application, use of the term "inflated" to refer to gas within



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an air bladder or other gas-containing bladder shall mean that there is gas within the bladder. The gas may be at ambient pressure (zero gauge pressure), or somewhat above or below zero gauge pressure. Generally, the bladder is not purposely inflated above atmospheric pressure, either during manufacture or at the time of use. Correspondingly, the term deflated shall
 5 mean that the bladder has been collapsed, with a small amount of gas remaining therein. Likewise, semi-inflated or semi-deflated means that the bladder is in a partially collapsed condition with a corresponding amount of gas therein.

As discussed earlier the air bladder may contain such interior chambers, when present,
 10 provide location controllable damping by way of separate air shock absorbers in areas such as corners subject to potentially higher impacts. When a passage is provided between one chamber and another, the size of the passage is controlled by baffling and has a direct influence on the rapidity with which those chambers will deflate under load. A high degree of controllable damping is thus provided. Alternatively, multiple air bladder chambers may
 15 be entirely sealed from one another in order to provide maximum isolation if needed to meet directional load requirements. When air bladder chambers are sealed from ~~one~~ another in this manner, the blow moulding process makes use of a separate inflation nozzle for each chamber. This allows smaller and effective protective packing containers or shipping cartons.

20

Damping is also realised due to the increased pressure of the gas within the bladder. Special gases such as sulphur hexafluoride may be used to maximise the damping capacity of the gas. Further, damping may also be obtained as a result of the resiliency of the plastic that constitutes the air bladder and also from the relatively small amount of elasticity of that
 25 plastic. In terms of damping, it is detrimental to have too much elasticity in the plastic material because this amount of elasticity could cause motion to be returned to the product being supported. Other gases that may be used include carbon dioxide, nitrogen, argon and krypton.

The air bladder may be further inflated with air or other gases as desired either before



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or after the air bladder has been sealed, and even after assembly of the product and the air bladder within the packing container. The air bladder may thus, when required, be only partially inflated or even fully deflated after manufacture, allowing the air bladder to take up less room during shipping of the air bladder per se and also making final assembly of the product and one or more air bladders within the container easier to accomplish. After final assembly, inflation needles can be forced through the outer container at one or more predetermined inflation points, where they penetrate the designated air bladder chambers and inflate them to designated pressure levels.

10 The supporting structure may be a semi-rigid self supporting monolith that is made from relatively thick polyethylene plastics material or similar, preferably by a blow moulding process. The structure has been designed with the properties of typical polyethylene plastics in mind. Polyethylene plastic having a thickness 1/32" (0.8mm) is resilient and slightly elastic, and is also stiff enough to support an appreciable load if used in a suitably designed load bearing structure.

The load bearing supporting structure may perform the following functions:

- support a static vertically oriented load (all or at least a portion the weight of the product);
- 20 - support a vertically oriented dynamic load due to vertically displaced motion of the product or outer package;
- support a horizontally oriented (in the other two dimensions) dynamic load due to horizontally displaced motion of the product or outer package;
- deform so to cushion the product from high accelerative or decelerative forces,
- 25 with such deformation being realised over as large a displacement as reasonably possible, so as to minimize the forces transmitted to and therefore absorbed by the product.

The product supporting structure of the present invention has been designed so as to have walls thick enough to support a static load of several pounds so that a product may be supported by the strength of the walls alone, and also to absorb the extra forces caused by



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dynamic loading.

The product supporting structure of the present invention has also been designed so as to have walls that are thin enough to be at least partially deformable under typical loading conditions, so that the overall structure will deform and thus absorb the force of the load over a relatively large displacement, at least as large as reasonably possible. Such large displacement deformation helps to minimise the deceleration forces encountered in receiving and supporting a load and in damping the motion of dynamic loading.

10 Preferably, the walls must be thin enough to be resiliently and somewhat elastically deformable so that the structure will non-permanently deform under a static or dynamic load caused by the weight of the material and the movement of the material to be absorbed without permanently deforming the material. The elasticity allows the structure to return to its original shape after it has been deformed by a load, within limits. If the walls are too thick, 15 then the structure will not deform by a significant amount, and therefore will not be able to minimise the accelerative or decelerative forces imparted to it. Further, the structure will be less resilient and be more likely to be permanently deformed if it is deformed by at least a certain amount, and will be less likely to elastically return to its original shape.

20 The invention may be better understood from the following more detailed description of preferred embodiments, taken in light of the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

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Figure 1 is an exploded isometric view of a preferred embodiment of the present invention showing a discrete product supporting structure co-operating with the corner of a product and the corner of an outer package; and

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Figure 2 is a cross-sectional view of the product supporting structure of Figure 5.



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DETAILED DESCRIPTION:

In order to properly understand the present invention, it is necessary to first understand the applied physics of the situation where impact forces would be experienced by the outer package containing the product and also experienced by the supporting structures and the product itself. There are essentially two types of situations. The first situation involves an outer package in motion, which has been impacted by an external object that may or not be moving, and which decelerates the package. The second situation involves a package that may or may not be moving, and which is impacted by an external object that is moving which in turn accelerates the packing. The former case is more common in the handling and shipment of packages of goods and typically occurs when a package is dropped. In either case, there is a change of speed of the package and of the product therein.

In the first situation, inertial forces of the product are transmitted to the supports, to the outer package and to the external object. The supporting structure absorbs as much as possible of the forces. The supporting structure transmits a force to the product, which causes the product to decelerate. In the second situation, accelerative forces are transmitted from the external object to the outer package, to the supports and then to the product. The supporting structure absorbs as much as the force as possible. Some of the force is transmitted to the product, which in turn accelerates the product.

In either case, there are forces transmitted to the product, and the product must absorb energy being transmitted by these forces. If the forces are too high, damage to the product could result. It is therefore necessary to minimise the forces that reach the product so that it will not be damaged.

It must be realised that basically what is happening is that kinetic energy is being transferred to the product. When an outer package is hit by a moving external object, the kinetic energy of the external moving object must be absorbed. When an outer package is dropped and subsequently impacts onto a surface such as a floor, the kinetic energy of the



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product inside at the time of the impact must be absorbed from the product by the supporting structure, and so on.

In order to absorb kinetic energy while realising a minimum amount of force
5 transmitted to the product, it is necessary to distribute the energy absorption over time as much as possible and to keep the acceleration and deceleration of the product as close to constant as possible. In order to accomplish this, it is necessary to, among other things, maximise the displacement over which the acceleration takes place. Thus, a relatively resilient supporting structure is preferable.

10

In use, when an object is introduced to the supporting structure, the relatively stiff yet resilient plastic that forms the supporting structure supports the initial weight loading of the object placed thereon. As more of the weight of the object is borne by the supporting structure, the weight of the object causes the structure to deform and correspondingly causes
15 the pressure of the gas inside to increase. As the pressure of the gas inside the supporting structure, the gas provides a correspondingly increased support for the load. The structure continues to deform, in a resilient manner, until the resistive force provided by the supporting structure and the increase pressure of the gas therein are equal and opposite to the load thereon equilibrium is reached. In this manner, a relatively large displacement of the
20 supporting structure is possible before equilibrium is reached, which provides relatively low supporting or damping forces for the object being supported.

In a dynamic load situation, the supporting structure and the pressure of the gas therein supports the changing load of a supporting object in a manner analogous to that
25 described immediately above.

If the supporting structure were inflated to a positive gauge pressure of perhaps 2-5 p.s.i. (0.14 - 0.34 atmospheres), then the pressure of the gas in the supporting structure would help support the weight of a load placed on the supporting structure virtually as soon
30 as the load is placed thereon. This means that there would be comparatively less displacement



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of the supporting structure when a load is placed thereon and correspondingly the load would not be damped over as great a distance -- that is to say that the energy from the product being supported would be absorbed within a short distance and therefore over a relatively short period of time, which in turn would cause relatively high forces to be transmitted to the product, which may be undesirable.

In comparison if the supporting structure does not have a positive gauge pressure, then the structure would deform for a greater distance after receiving a load, all the while absorbing energy during the deformation due to the resiliency of the plastic. By the time the air pressure was sufficiently high to help support the load, the energy from the placement of the load would already be partially absorbed and correspondingly lower forces would be transmitted to the product.

Reference will now be made to Figure 1, which shows a preferred embodiment of the present invention. In this alternative embodiment, a supporting structure 100 is used to position and support a product 102 within an outer packing container 104. Typically, a total of eight such supporting structures 100 would be used, one in each corner of the product 102. The product supporting structure 100 supports the product 102 at a predetermined portion thereof. The supporting structure 100 has a predetermined configuration and predetermined dimensions such that it supports the product at the predetermined portion -- which is of a predetermined configuration. Further, the outer packing container 104 has a predetermined configuration, with the supporting structure 100 to be placed at a predetermined portion thereof.

When in use in combination with the product 102 and the outer packing container 104, the supporting structure comprises a gas-containing bladder 110 that has a product receiving portion 112 in a first region of the gas-containing bladder 110. The product receiving portion 112 has a predetermined configuration and dimensions so as to be co-operative with the predetermined portion of the product 102 and so as to receive in generally intimate and co-operating relation thereto the predetermined configuration of the predetermined portion



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of the product 102. The predetermined configuration and dimensions of the supporting structure 100 are adapted to fit the predetermined configuration of the predetermined portion of the product. Typically, the predetermined portion of the product is a portion of a corner of the product 102.

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The gas-containing bladder 110 has a package containing portion 114 in a second region thereof. The second region is remote from and generally opposed to the first region. The package containing portion 114 is such as to be co-operative with the predetermined configuration of the outer packing container 104.

10

The supporting structure 100 has a predetermined size and shape when it is manufactured. The supporting structure 100 is typically manufactured with an opening 116 therein. A plug 118 is adapted to fit into the opening in sealed relation thereto and is inserted therein either immediately after manufacture or just before use. Thus, a sealable
 15 opening into the gas-containing bladder 110 is provided. When the plug 118 is in place, the gas-containing bladder 110 is sealed to its ambient surroundings. For shipping purposes, the supporting structure may be shipped without the plug in, in which case it is somewhat collapsible if necessary, or it may be shipped with the plug 118 in the opening 116. The supporting structure 100 retains its size and shape when the gauge pressure of the gas within
 20 the gas-containing bladder 100 is zero, irrespective of whether the gas-containing bladder 110 is sealed or open to the ambient surroundings.

The supporting structure 100 is capable of supporting a load thereon even when the interior of the gas-containing bladder 110 is in fluid communication with the ambient
 25 surroundings.

The gas-containing bladder 110 may be sealed so as to have a gauge pressure of the gas therein that is about zero. This will allow for relatively soft cushioned damping of the product 102. It is also possible to inflate the gas-containing bladder 110 to a gauge pressure
 30 above zero, typically within a range of about 0.01 to about 2.0 atmospheres. Such additional



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gas pressure would cause the air bladder 110 to provide firmer damping for the product 102.

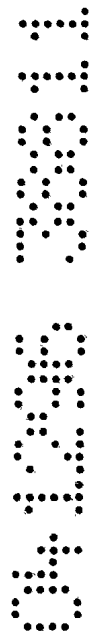
In a further alternative embodiment of the invention, the predetermined configuration and dimensions of the supporting structure 100 may be adapted to fit a predetermined configuration of a predetermined portion of a product, with the predetermined portion of the product being an edge of the product. For example, a long slender item may be supported at its centre, or a plate or a drum at selected places around its circumference.

Preferably, the supporting structure 100 is made of a plastics material having an average wall thickness in the order of about 0.8 mm. The material that forms the supporting structure 100 can be chosen from the group consisting of polyethylene, polypropylene, and co-polymers thereof; as well as vinyl, polyvinyl chloride, or nylon. The gas within the gas-containing bladder 110 is most commonly air, but also may be chosen from the group consisting of nitrogen, carbon dioxide, sulphur hexafluoride, argon and krypton.

The gas-containing bladder 110 may comprise a plurality of discrete chambers therein, with the discrete chambers being in fluid communication with one another through small openings, which are means for restricting gas flow between chambers. These openings allow a small amount of gas to pass therethrough in a given time, thereby providing a baffling effect which ultimately aids in the cushioning effect provided by the gas-containing bladder 110. Preferably, contiguous chambers within the gas-containing bladder are in fluid communication with one another.

Reference will now be made to Figure 2 which shows the supporting structure 100 of the present invention having the product 102 placed thereon. It can be seen that the portion of the product 102 that is supported by the supporting structure 100 is a somewhat complicated shape, and the predetermined configuration and dimensions of the supporting structure are adapted to fit to the predetermined configuration of the predetermined portion of this product.

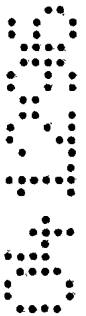
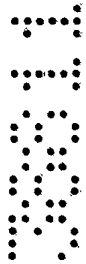
When the product 102 is placed on the supporting structure 100, there is a static force, indicated by arrow 120, which of course is in a downward direction. This static force 120



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causes the supporting structure 100 to deform somewhat as shown by the dash lines 122.
If, as usual, the gas-containing bladder 110 is sealed, then the deformation causes an increase in pressure of the gas within the gas-containing bladder 110.

- 5 It is to be understood that the embodiments of the invention which have been described are illustrative. Numerous other arrangements and modifications may be readily devised by those skilled in the art without departing from the spirit and scope of the invention.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. In combination, a supporting structure for positioning and supporting a product within an outer packing container, a product to be positioned and supported, and an outer packing
5 container in which said supporting structure and said product are contained; wherein said supporting structure supports said product at least at a predetermined portion thereof which has a predetermined configuration; wherein said outer packing container has a predetermined configuration at least at a predetermined portion thereof whereby said supporting structure is to be placed, and wherein said supporting structure has a predetermined configuration
10 supporting the product at the predetermined portion thereof; wherein said supporting structure includes:

a blow-moulded semi-rigid and self-supporting monolithic gas-containing bladder having an average wall thickness of about 0.8 mm, and having a preformed product receiving portion in a first region of said bladder, said product receiving portion having a
15 predetermined configuration and dimensions so as to co-operate with said predetermined portion of said product and so as to receive said predetermined configuration of said predetermined portion of said product;

a packing container contacting portion in a second region of said bladder which is remote from and generally opposed to said first region, said packing container contacting
20 portion being such as to co-operate with said predetermined configuration of said predetermined portion of said outer packing container; and

wherein said product receiving portion of said gas-containing bladder retains its predetermined configuration and dimensions as a consequence of its own structure when said gas-containing bladder contains gas, and when the gauge pressure of that gas is approximately
25 zero.

2. The combination of claim 1, wherein said gas-containing bladder is sealed to its ambient surroundings.

30 3. The combination of claim 1, wherein said gas-containing bladder has a sealable



opening therein.

4. The combination of claim 1, wherein said gas-containing bladder has an inflation opening therein and includes a plug adapted to fit within said opening in sealed relation thereto so as to seal said gas-containing bladder.

5. The combination of claim 2, wherein said gas-containing bladder may be pressurised and the gauge pressure of said gas within said gas-containing bladder is positive, and is within the range of about 0.01 to about 2.0 atmospheres above ambient pressure.

10

6. The combination of claim 5, wherein the gauge pressure of said gas within said gas-containing bladder is positive, and is within the range of about 0.01 to about 0.5 atmospheres above ambient pressure.

15 7. The combination of claim 1, wherein said predetermined configuration and dimensions of said supporting structure conform to said predetermined configuration of said predetermined portion of said product, and wherein said predetermined portion of said product is a portion of a corner of said product.

20 8. The combination of claim 1, wherein said predetermined configuration and dimensions of said supporting structure conform to said predetermined portion of said product, and wherein said predetermined portion of said product is a portion of an edge of said product.

9. The combination of any preceding claim, wherein the material that forms said supporting structure is chosen from the group of blow mouldable plastics consisting of polyethylene, polypropylene and co-polymers thereof; vinyl, polyvinyl chloride and nylon.

10. The combination of any preceding claim, wherein the gas in said gas-containing bladder is a damping gas chosen from the group of pressurisable gases consisting of air, nitrogen, carbon dioxide, sulphur hexafluoride, argon and krypton.



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11. The combination of any preceding claim, wherein the gas in said gas-containing bladder is air.

12. The combination of any preceding claim, wherein said gas-containing bladder
5 comprises a plurality of discrete chambers in fluid communication with one another.

13. The combination of claim 12, wherein at least an adjacent pair of said plurality of discrete chambers in said gas-containing bladder are in fluid communication with one another.

10 14. The combination of claim 12, further including means for restricting gas flow between chambers, wherein said means are dimensioned so as to at least partially constrict said fluid communication.

15 15. In combination, a supporting structure for positioning a product within an outer packing container, product to be supported, and an outer packing container into which said supporting structure and said product are inserted; wherein the product to be supported has predetermined external dimensions, and the outer packing container has predetermined internal dimensions;

20 wherein said supporting structure comprises:
an at least partially inflated blow-moulded and sealed semi-rigid and self-supporting monolithic plastic resin gas-containing bladder having an average wall thickness of 0.8 mm, and having a preformed external product receiving cavity at one side thereof, said external cavity having a predetermined shape and predetermined dimensions so as to fit said predetermined external dimensions of the product;

25 wherein the exterior of said gas-containing bladder at the other side remote from said external cavity has a predetermined shape and predetermined dimensions so as to fit said predetermined internal dimensions of the packing container; and

30 wherein said product receiving portion of said gas-containing bladder retains its predetermined configuration and dimensions as a consequence of its own structure when said gas-containing bladder contains gas, and when the gauge pressure of that gas is approximately



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zero.

16. The combination of claim 15, wherein the material that forms said supporting structure is chosen from the group of blow mouldable plastics consisting of polyethylene, polypropylene and co-polymers thereof; vinyl, polyvinyl chloride and nylon.

17. The combination of claim 15, in which :
said at least partially inflated gas-containing bladder contains a plurality of interior chambers.

10

18. The combination of claim 15, in which:
said at least partially inflated gas-containing bladder contains a plurality of interior sub-chambers formed by baffle members extending into the interior of said gas-containing bladder whereby a damping effect on gas moving from one of said interior sub-chambers to another is exerted by said baffle members.

19. The combination of claim 15, in which:
said at least partially inflated gas-containing bladder contains a plurality of interior sub-chambers formed by baffle members extending into the interior of said gas-containing bladder whereby a damping effect on gas moving from one of said interior sub-chambers to another is exerted by said baffle members; and

wherein said supporting structure has a plurality of corners, and at least some of said interior sub-chambers are position at said corners.

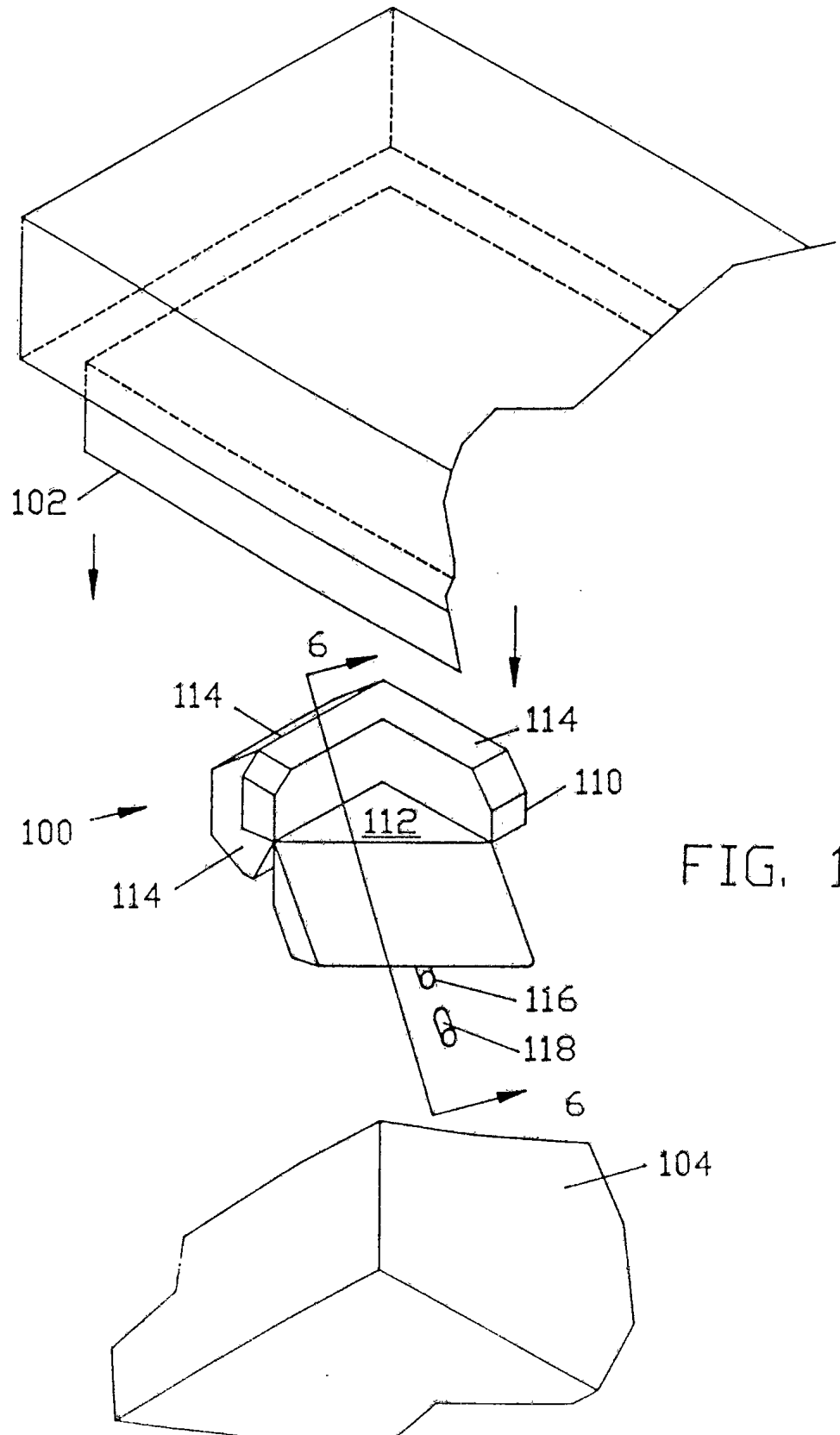
25 Dated this 29th day of November, 1996

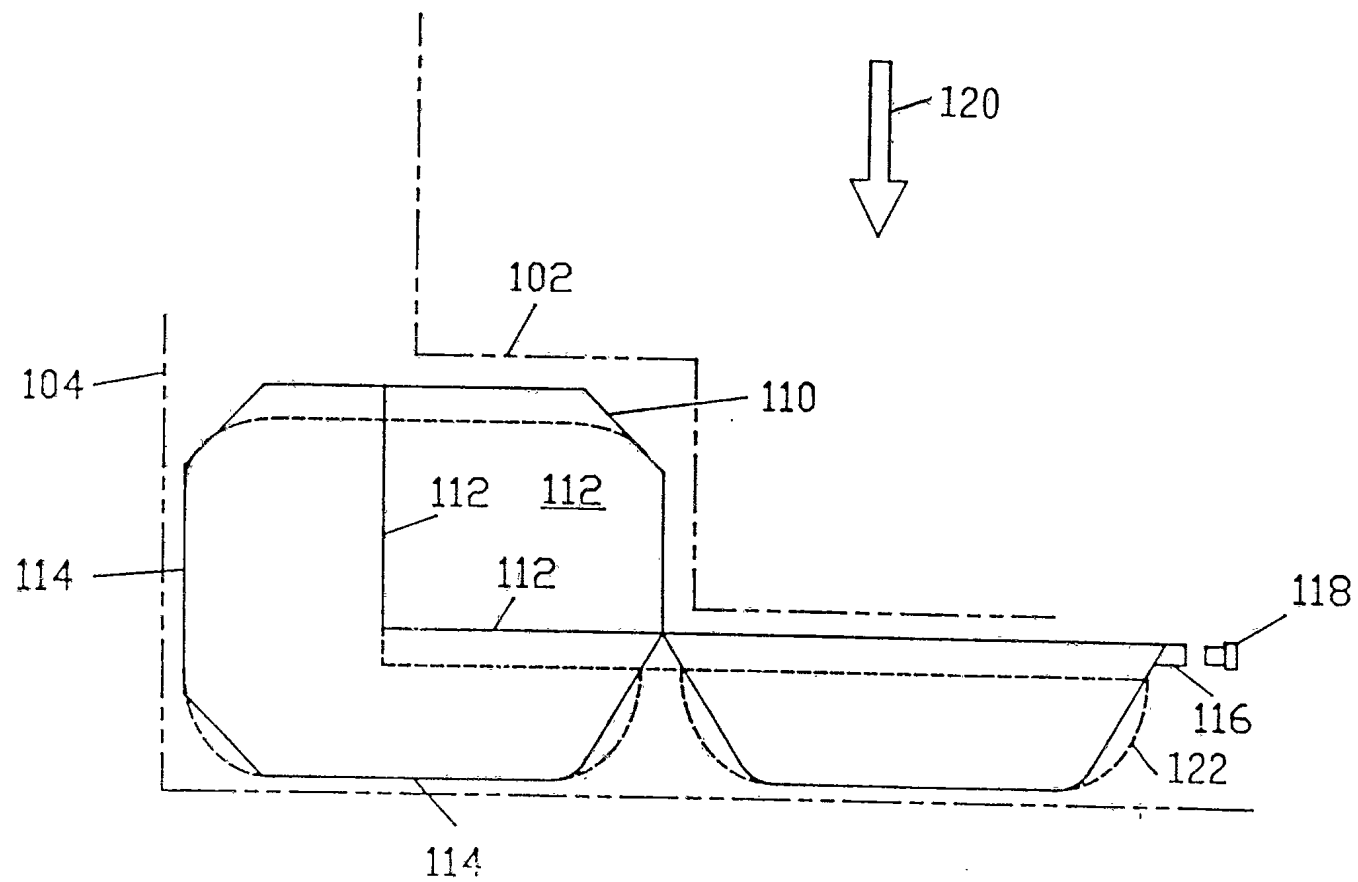
INTEPAC TECHNOLOGIES, INC.

By Their Patent Attorneys

DAVIES COLLISON CAVE







INTERNATIONAL SEARCH REPORT

PCT/CA 93/00106

International Application No

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 B65D81/00		
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 RELEVANT⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	DE,A,4 034 038 (W.BEYER) 2 April 1992 see column 5, line 2 see column 5, line 49 - line 53 see abstract; claims 1,15; figure 1 ---	1-4,7,8, 11-14, 17,18, 21-23, 25,28
A	EP,A,0 398 345 (LOIDOLD - ELLESSER) 22 November 1990 see claim 1; figures 1,2 ---	1,11,16, 24
A	US,A,4 801 213 (M.FREY) 31 January 1989 see abstract; figures ---	1
-/--		
¹⁰ Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "I" 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. "A" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search 08 JULY 1993		Date of Mailing of this International Search Report 29. 07. 93
International Searching Authority EUROPEAN PATENT OFFICE		Signature of Authorized Officer Amedeo ZANGHI

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	US,A,3 403 713 (E.H.GOOD) 1 October 1968 see column 3, line 38 - line 47; figures ---	1
A	EP,A,0 325 070 (APPLE COMPUTER) 26 July 1989 see abstract; figures ---	1
P,A	DE,U,9 205 804 (S.RUST) 6 August 1992 see figure 5 ---	1,16
P,X	WO,A,9 207 774 (IPETAC) 14 May 1992 see the whole document -----	1

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

CA 9300106
SA 72357

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. 08/07/93

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