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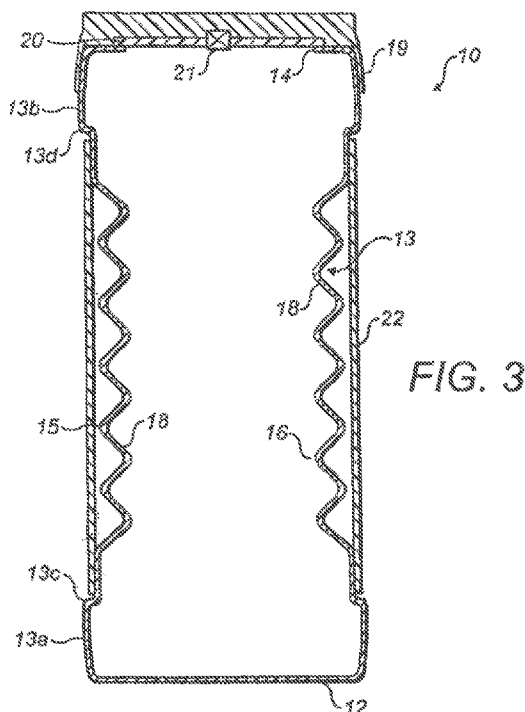
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[Continued on next page]

(54) Title: CONTAINER WHICH CAN EXTEND AND CONTRACT



(57) Abstract: The invention relates to a gas impermeable container (10) which can extend and contract. The container is formed from a gas impermeable material and comprises a body (11) having a base (12) and a wall member (13) extending from the base and terminating at an upper edge defining an aperture (14). The wall member comprises a corrugated section (15) which is able to extend and contract, at each end of said corrugated section is a shoulder (13c, 13d). A sealing member (19,20) is attached to the body to seal the aperture and a one way valve (21) enables gas to exit the sealed container. A collar (22) is located around the wall member (13) between the shoulders so that it conceals part or all of the corrugated section (15) when the container is in at least partially extended or contracted positions.



EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, **Published:**

LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,

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CONTAINER WHICH CAN EXTEND AND CONTRACT

The invention relates to improvements in containers,
and in particular to a gas impermeable container which can
5 extend and contract.

Some products, such as roasted coffee beans, give off
gases (degas) over a period of time after processing which
gives rise to problems in terms of packaging and transport.
10 With roasted coffee beans, for example, the roasting process
triggers chemical reactions which develop the flavour, aroma
and other characteristics you need to make the beans
suitable for producing coffee. Approximately 40% of the
carbon dioxide (CO₂) which is given off by roasted coffee
15 beans is given off in the first 24 hours, and the rest over
a period of weeks. Over time 285g of roasted beans can
release more than 14000 cm³ of CO₂. Coffee made immediately
from freshly roasted coffee beans would incorporate more CO₂
than is desirable, so it is considered preferable that
20 coffee beans should be allowed to degas for a time.

It is also important that coffee beans should be
allowed to degas without allowing oxygen to get to the
beans, as this leads to oxidation of the sugars and oils
25 (which contribute to the taste) within the beans. Oxidation
therefore causes staleness and a deterioration in the taste
of the coffee. Consequently roasted coffee beans are
generally vacuum sealed to prolong shelf life by preventing
oxidation, but this needs to be done after the most volatile
30 part of the degassing cycle. However, as the degassing
process continues for some time, it is preferable to allow
the degassing process to continue even after packaging.

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Historically coffee beans have been packaged in rigid tin cans and glass jars which, whilst protecting against oxidation prior to opening, are subject to deformation by expansion (blowing) damage, or breakage if the build up in internal pressure as the beans degas reaches sufficient levels. Such packaging materials are also more expensive than plastic or fibre based materials.

Such rigid packaging has further disadvantages when transported at altitude, for example by air, or by road/rail over mountain ranges. This can also apply to packaged products which do not degas, as air often remains in containers after filling, due to the nature of the filling process and apparatus. As the altitude increases during transit, any gas/air trapped in the containers expands providing a considerable internal force on the container which can also cause deformation, damage or, in extreme cases breakage. As the altitude decreases, the remaining gas/air contracts causing further deformation, such as crumpling or damage. The resulting deformed package is unsightly and not desirable for products to be displayed for consumer purchase.

One-way degassing valves have therefore been designed to enable products such as roasted coffee to degas after packaging, and to try to minimise the effect of pressure changes during transport. Examples of such valves are described in EP-A-0659657, EP-A-1213228 and US-B-5992442.

These valves can be incorporated in flexible foil bags, for example as described in US-B-6423356, US-B-6274181 and

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US-B-6021624. As the gas builds up inside the bag and/or expands at higher altitudes, it escapes through the valve, thus eliminating the initial distortion and damage described above. However, as the packages are brought back to lower altitudes, any gas remaining inside contracts and, as no more air can enter via the valve, the bags crumple until the head space is completely removed from the pack. Whilst this does not cause damage to the bags in the same way as it does to rigid containers, the resulting distorted shape of the packages makes them difficult to stack and display for sale and is not attractive to a potential purchaser. A further consequence of the crumpling is damage to the seals so that this type of package is prone to leakage in the top seal region, which allows air into the package and comprises the quality of the contents.

Such degassing valves have also been incorporated in the lids of rigid containers, as described in US-A-2004/0096552, US-A-2009/002199 and US-A-2006/0096982. However during transport at altitude, whilst the valves will allow gas out of the containers during ascent, they will not allow gas to re-enter so the containers are still prone to crumpling.

Other prior art degassing packs have utilized paperboard materials with one way valves. However, the pressure changes caused by transport at high altitudes leads to these packs becoming deformed and looking disordered on the shelf, which is again not desirable for a consumer product.

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Further and better solutions have therefore been sought for containers which are used to transport products through high altitudes without becoming deformed as a result, and in particular which allow degassing to continue after
5 packaging, and which prevents the ingress of air. Solutions are sought which help to maintain the stability, integrity and attractive appearance of the containers.

Over the past twenty years there has been a
10 considerable growth in the use of plastic materials for packaging. Plastic materials are generally lightweight, durable, impermeable, and easy to form. These are very useful characteristics for materials for packaging. In addition, they have good hygienic, safety, thermal and
15 insulation properties which makes them highly suitable for packaging food products. Above all plastics are generally fairly inexpensive. According to an information sheet produced by WasteOnline, a website managed by Waste Watch and funded by the New Opportunities Fund Digitise project,
20 packaging allegedly represents the largest single sector of plastics use in the UK. As a result, plastics unfortunately currently contribute approximately 7% of the average household waste. Whilst considerable efforts are being made to recycle plastic, there are a number of problems in doing
25 this. Consequently a significant amount of plastic is still disposed of in landfill sites.

To help ease the volume of waste, plastic bottles have been designed which are compressible, when empty, so that
30 they occupy significantly smaller volumes than when expanded. Examples are described in US 5,240,130, US-A-7,108,151 and US 5,662,397. Collapsible bottles are also

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advantageous in that they can be stored in a collapsed state, which reduces the requirement for storage space, as described in US 5,370,250.

5 The inventors therefore sought a way to utilise the disposal advantages provided by such compressible containers in a container which also overcomes the transport and degassing problems described above.

10 The invention therefore provides a container formed from a gas impermeable material comprising:

 a body having a base and a wall member extending from the base and terminating at an upper edge defining an aperture, the wall member comprising a corrugated section
15 which is able to extend and contract, at each end of said corrugated section is a shoulder;

 a sealing member attached to the body to seal the aperture;

 a one way valve to enable gas to exit the sealed
20 container; and

 a collar located around the wall member between the shoulders so that it conceals part or all of the corrugated section when the container is in at least partially extended or contracted positions.

25

 The container of the present invention is capable of being used to transport a variety of different types of product at varying altitudes without its appearance being affected deleteriously, as it eliminates the problems caused
30 by the expansion and contraction of air within the container as controlling the deformation of the container. It is also especially suitable for products, such as roast coffee and

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roast coffee beans, which continue to degas after packaging, without the need for decanting. Furthermore it provides a unique shelf presence which differs from the prior art containers on the market. This new container takes into
5 account the transportation requirements and builds into the design the ability to "flex" under pressure without being noticeable on shelf. Additionally the container can be crushed after use to reduce the amount of waste to landfill.

10 The body material may be rigid or semi rigid.

 Preferably the collar is attached at one end to the wall member.

15 Alternatively the collar is not attached to the wall member.

 Movement of the collar relative to the wall member is preferably restrained between the shoulders.

20

 The body may be formed from a plastic material, paper or card.

 Preferably the sealing member is a detachable sealing
25 membrane.

 The container may further comprise a removable lid and the sealing member may be the removable lid.

30 Preferably the corrugated section comprises a series of transverse corrugations formed from a plurality of inner and outer folds connected by connecting walls.

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The collar may be formed from paper or card or a plastic material.

5 Preferably the shoulders comprise planar sections located adjacent each end of the corrugated section and the collar conceals at least a part of at least one of the planar sections when the container is in an extended position and more of the planar sections when the container
10 is in a contracted position.

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

15 Figure 1 is a front elevation of a container according to the present invention without a collar in an extended position;

Figure 2 is the container of Figure 1 showing in a compacted position without a collar;

20

25

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Figure 3 is a cross-sectional front elevation of an alternative design of the container of the present invention in a partially extended position with a collar; and

Figure 4 is a pictorial view of a further alternative
5 container according to the present invention also in a partially extended position including a collar.

The container 10 of the present invention is constructed in a manner to enable it to be free standing and
10 to have the ability to extend and contract between a fully extended condition (Figure 1) and a fully compacted condition (Figure 2). The container 10 is therefore preferably made of a rigid or a semi-rigid material which is gas impermeable. The material is chosen so that container
15 10 is essentially self-supporting and maintains its shape, although it can deform in a controlled manner under force by virtue of the corrugated section as described below. Suitable plastics materials include polypropylene or polyethylene, especially high density polyethylene (HDPE).
20 Alternatively laminated or coated paper or card may be used, especially those coated with plastic. The container 10 is preferably manufactured by a moulding process, such as blow moulding, or another suitable forming process.

25 The container 10 has a body 11, which may be oval, cylindrical, square, rectangular, or any other suitable shape in cross-section. The body 11 has a base 12, which is preferably flat to enable the container 10 to stand upright on a shelf or other flat surface. Extending from the base
30 12 is a wall member 13, which terminates in an upper edge defining an aperture 14. The aperture 14 is of a size

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suitable for filling the container 10 with product and for extracting the product from the container 10.

The wall member 13 of the illustrated embodiment has a
5 lower wall section 13a adjacent the base 12, an upper wall
section 13b adjacent the aperture 14 and a middle wall
section located between the lower and upper wall sections
13a, 13b. The middle wall section includes a corrugated
section 15. The middle section is narrower than the lower
10 and upper sections 13a, 13b in one or more of its external
dimensions. The middle section also has a planar section on
either side of the corrugated section 15. The change in
dimension between the middle and lower/upper sections 13a,
13b results in outwardly projecting shoulders 13c, 13d.
15 These shoulders 13c, 13d are preferably, although not
necessarily, continuous around the full periphery of the
container 10. The structure of the wall member 13 may be
varied in a number of ways. For example the wall member 13
may be wholly corrugated with short planar sections on
20 either side. Alternatively, there may be a lower wall
section 13a and a corrugated section 15, but no upper
section 13b.

The corrugated section 15 comprises a number of
25 transverse corrugations formed from a series of inner folds
16 and outer folds 17 connected by connecting wall portions
18 which enable the container to extend and contract. The
folds 16, 17 may be formed by thinner sections of material
than the rest of the wall member 13. However, they must be
30 sufficiently rigid to maintain the angle of fold once any
force has been removed.

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The container 10 further comprises a removable lid (also known as an over cap) 19 which covers the aperture 16. The lid 19 is affixed to the container 10 in a suitable manner (e.g. screw thread, moulded snap-fit detents or the like) which allows the container 10 to be opened and closed. Immediately covering the aperture 14 at the upper edge of the wall member 13 is an impermeable flexible membrane 20, preferably in the form of a foil or laminate, which hermetically seals the aperture 14. The membrane 20 is typically formed from a metallised polymer film, such as polyethylene terephthalate (PET) and is provided with a one way valve 21 which allows gas from within the container 10 to bleed out. A suitable valve 21 is, for example, the PLI-VALV [™] supplied by Plitek LLC or such as described in EP-A-0659657, EP-A-1213228 and US-B-5992442. These generally comprise a valve body, a diaphragm and a filter. The porous layers making up the filter are selected to allow the passage of low molecular weight gases, such as carbon dioxide, but not those of high molecular weight, so as to retain the product aroma. The filter may also include one or more adsorbent layers, for absorbing oxygen and carbon dioxide. However the invention is not restricted to any particular construction of valve.

Where the lid 19 is fitted securely and in a sealing manner, the membrane 20 may be omitted and the valve 21 may be located in the lid 19.

The container 10 also comprises a collar 22 which is located around the wall member 13, as shown in Figures 3 and 4. The size of the collar 22 is such that it fits around the wall member 13 covering the corrugated section 15 when the

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container 10 in a partially compacted or extended position with a small tolerance. The partially compacted or extended position is the one which the container 10 will be put in for filling. The container 10 is able to extend at least
5 some way further from this position. The collar 22 is preferably not attached to the wall member 13 and is sized so that it can slide relative thereto, between the shoulders 13c, 13d. Alternatively the collar 22 may be attached at one end to the wall member 13. This allows the corrugated
10 section 15 to contract or expand by a limited amount whilst remaining hidden behind the collar 22 and without causing the collar 22 to distort. The shoulders 13c, 13d restrain the movement of the collar 22 there between, and prevent the collar 22 from sliding too far along the wall member 13 to
15 expose the corrugated section 15.

The collar 22 is preferably made of paper, card or a plastics material and preferably provides a suitable surface for printed information and branding.

20

When ready for use, the container 10, in the partially extended condition, is filled with a product via the aperture 14. The aperture 14 is sealed with the laminate 20 and/or the lid 19 and the collar 22 placed around the middle
25 section of the wall member 13 concealing the corrugated section 15. Parts of the planar sections on either side of the corrugated section 15 will be visible at the top and/or bottom of the collar 22.

30 An amount of gas generally remains in the container 10 after filling, for example between particles of the product or in the head space left by the filling process. The

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quantity of gas may increase if the product is one which continues to degas after packaging. During degassing the gas is able to bleed out of the one way valve 21 as the internal pressure increases. During transit at altitude, any gas in
5 the container 10 expands due to the change in pressure and escapes through the one way valve 21. As the container 10 is returned to normal altitude and pressure the air inside the container 10 contracts which in turn causes the corrugated section 15 to contract. For a typical coffee container 10
10 having a height of 195 millimetres, this contraction may be of the order of about 10 millimetres. However, if the headspace left by the filling process is minimal the contraction is limited to the point at which the membrane 20/lid 19 meets the top of the product. The presence of the
15 corrugated section 15, however, means that unlike prior art containers the container 10 contracts in a controlled manner, behind the collar 22 which will conceal this deformation. After contraction a smaller proportion of the planar sections on either side of the corrugated section 15
20 will be visible at the top and/or bottom of the collar 22. If the contraction is more significant, the planar sections may be wholly covered by the collar 22. Thus when the filled containers 10 are displayed for purchase, the consumer is unable to see the deformation which has been effected
25 through the corrugated section 15.

The application of a vacuum prior to sealing is one way of minimising the air/gas in the container 10 prior to transport. The container of the present invention 10
30 advantageously contracts during the application of a vacuum, which means that the number of containers 10 which can be stacked on a pallet for transport can be increased.

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The ability of the containers 10 of the present invention to extend and contract can also be used to resolve another problem associated with the filling of containers with particulate products, such as coffee. It is known from US-A-2008/0156765 that some particulate products are able to provide substantial resistance to a top load, such as from other containers stored above in a pallet during shipping. As a result if the container is filled leaving a minimal or no headspace the product assists in resisting inwardly directed forces. With the added structural strength provided by the product, the wall thickness of the container can be reduced since the container itself need not be sufficiently rigid on its own to withstand such a large top load.

Unfortunately most types of filling apparatus for particulate products are unable to provide the headroom necessary to achieve this. A container 10 having a wall member 13 incorporating a corrugated section 15 as described above, a sealing member 20 and a one way valve 21 would enable the desired head space to be achieved prior to (or even during) transportation. Once the extended container 10 has been filled with product and sealed, sufficient force applied to the top will cause the container 10 to contract until the membrane rests on the product.

Thus containers 10 being stacked for transport will advantageously compress during stacking due to the weight of containers 10 supported above, with those at the bottom of the stack being the most compacted. This provides the advantage described in US-A-2008/0156765 that the containers

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10 at the bottom of the stack are the most stable as the product takes some of the load.

After purchase, the consumer removes the lid 19 and the
5 membrane 20 (if present) to enable the contents to be
extracted via the aperture 14.

When the container 10 is empty, the application of
force by pushing the ends of the container together will
10 compress the container 10 down into its contracted state
(Figure 2). The collar 22 will also be compressed, if it has
not first been removed. As such force is applied, i.e. in a
direction perpendicular to the corrugations 15, the folds
16, 17 allow the wall portions 18 to fold together in a
15 horizontal manner. For a container 10 which has a height of
195 millimetres in its extended condition, this could reduce
to, say, 115 millimetres in its compacted condition. The
container 10 can therefore then be disposed of by taking up
a significantly smaller volume than previously.

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CLAIMS

1. A container formed from a gas impermeable material comprising:

5 a body having a base and a wall member extending from the base and terminating at an upper edge defining an aperture, the wall member comprising a corrugated section which is able to extend and contract, at each end of said corrugated section is a shoulder;

10 a sealing member attached to the body to seal the aperture;

a one way valve to enable gas to exit the sealed container; and

15 a collar located around the wall member between the shoulders so that it conceals part or all of the corrugated section when the container is in at least partially extended or contracted positions.

2. A container as claimed in claim 1 in which the body
20 material is semi rigid.

3. A container as claimed in claim 1 in which the body material is rigid.

25 4. A container as claimed in any one of the preceding claims in which the collar is attached at one end to the wall member.

5. A container as claimed in any one of claims 1 to 3 in
30 which the collar is not attached to the wall member.

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6. A container as claimed in any one of the preceding claims in which movement of the collar relative to the wall member is restrained between the shoulders.

5 7. A container as claimed in any one of the preceding claims in which the body is formed from a plastic material.

8. A container as claimed in any one of claims 1 to 6 in which the body is formed from paper or card.

10

9. A container as claimed in any one of the preceding claims in which the sealing member is a detachable sealing membrane.

15 10. A container as claimed in claim 9 in which the container further comprises a removable lid.

11. A container as claimed in any one of claims 1 to 8 in which the sealing member is a removable lid.

20

12. A container as claimed in any one of the preceding claims in which the corrugated section comprises a series of transverse corrugations formed from a plurality of inner and outer folds connected by connecting walls.

25

13. A container as claimed in any one of the preceding claims in which the collar is formed from paper or card.

14. A container as claimed in any one of claims 1 to 12 in
30 which the collar is formed from a plastic material.

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15. A container as claimed in any one of the preceding
claims in which the shoulders comprise planar sections
located adjacent each end of the corrugated section and the
collar conceals at least a part of at least one of the
5 planar sections when the container is in an extended
position and more of the planar sections when the container
is in a contracted position.

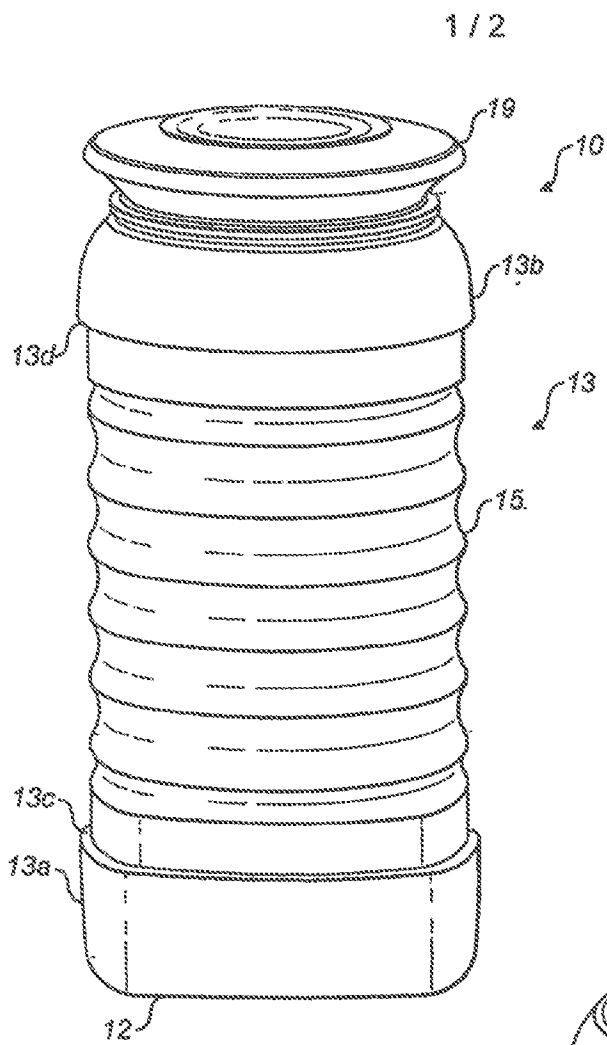


FIG. 1

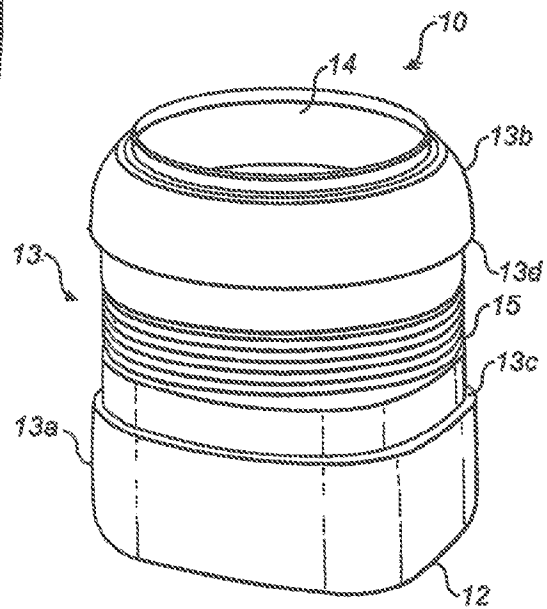
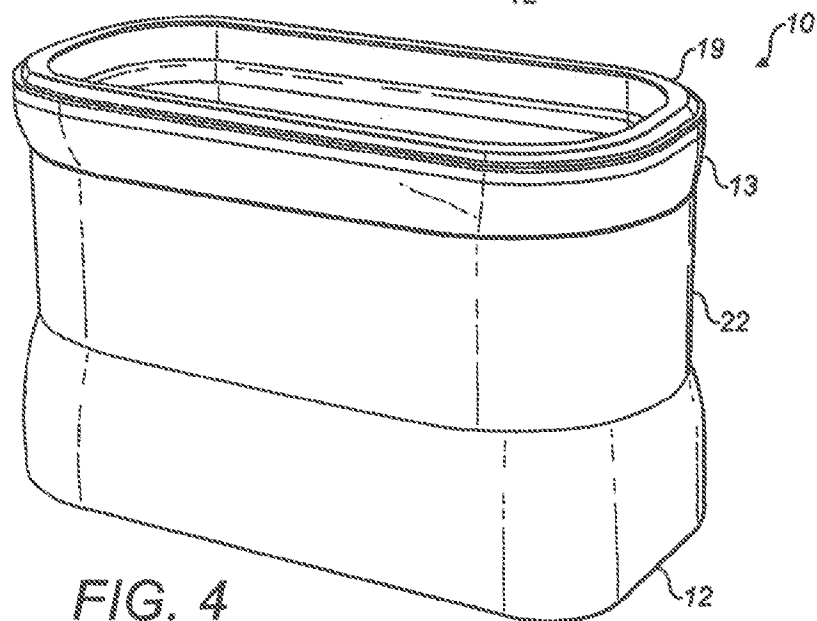
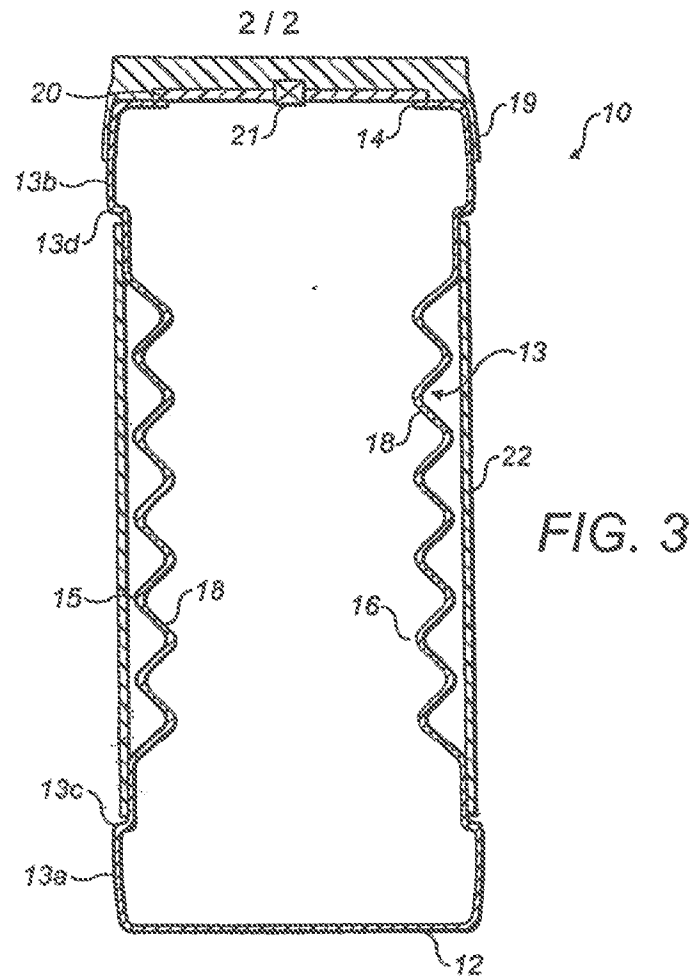


FIG. 2



INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/053117

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65D21/08 B65D25/34 B65D51/16
 ADD. B65D51/20

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)

B65D A45D

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)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 2 129 119 A (CHARLES DAVIS) 6 September 1938 (1938-09-06) figures 13,14 -----	1-15
A	EP 0 406 134 A1 (SARL AGC DESIGN [FR]; CHOLLET JEAN LOUIS [FR]) 2 January 1991 (1991-01-02) figures 1,2,4 -----	1-15
A	US 2007/007233 A1 (BROWN SCOTT L [AU]) 11 January 2007 (2007-01-11) paragraph [0037] - paragraph [0040]; figures 2,4-7 -----	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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