Industria y Comercio

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54. **TÍTULO** *RECIPIENTE MULTICAPA INDEPENDIENTE FLEXIBLE Y METODO PARA FORMACION*

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71. **SOLICITANTE** *ENVIRONMENTAL PACKAGIN TECHNOLOGIES LTD*

DOMICILIO *HOUSTON TEXAS ESTADOS UNIDOS*

74. **APODERADO** *DILIA RODRIGUEZ D ALEMAN*

22. **BOGOTÁ, D. C.,** *DIC. 7, 2007*

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1) SOLICITUD DE:

☒ Patente de invención ☐ Patente de Modelo de Utilidad

☒ Capitulo I. ☒ Capitulo II. (Ver folio 141)

2) SOLICITANTE (71)	**Nombre: ENVIRONMENTAL PACKAGING TECHNOLOGIES, LTD.** **Dirección: 2200 Post Oak Blvd.. Suite 325 Houston, TX 77056 Estados Unidos de América** **Nacionalidad o domicilio: Houston, TX, Estados Unidos de América** **Lugar de constitución: Texas, Estados Unidos de América**	**IDENTIFICACIÓN** **C.C.** ☐ **NIT:** ☐ **C.E.** ☐ **OTRO** ☐ **Cual** _____ **NÚMERO** _____
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3) REPRESENTANTE O APODERADO	Nombre: DILIA MARÍA RODRÍGUEZ D´ALEMAN Dirección: Carrera 11 N°. 86-53 Piso 6 Bogotá D.C. Teléfono: 6181088 Fax: 6350824 E. Mail: info@clarkemodet.com.co	**IDENTIFICACIÓN** **C.C.** ☒ **NIT:** ☐ **C.E.** ☐ **OTRO** ☐ **NÚMERO:** 41.654.882 **TP:** 20824 CSJ
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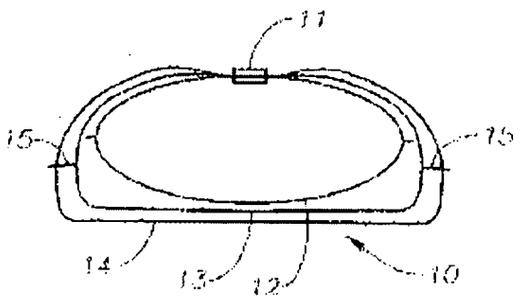
Instrucciones para el diligenciamiento del presente formulario. Ver reverso de esta pagina

10) ANEXOS

- ☒ Comprobante de pago de la tasa de presentación de la solicitud
- ☐ Comprobante de pago por reivindicación de prioridad
- ☐ Documento que acredita la existencia y representación legal cuando el solicitante sea persona Jurídica
- ☐ Poderes, si fuera el caso
- ☐ Documento de cesión del inventor al solicitante o a su causante
- ☐ Declaraciones
- ☒ Copia de la solicitud Internacional. (Resumen, descripción, reivindicación, Dibujos).
- ☒ Traducción de la solicitud internacional al castellano. (Resumen, descripción, reivindicación, Dibujos)
- ☐ Copia del examen preliminar efectuado por la IPEA
- ☐ De ser el caso, copia del contrato de acceso
- ☐ De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas
- ☐ De ser el caso, certificado de depósito del material biológico
- ☐ Arte final 12 x 12 y 6 x 6 cm
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionados parcial o totalmente con la invención de esta solicitud.
- ☒ Otros:
  1. Reporte internacional de búsqueda
  2. Cambio del solicitante
  3. Declaración IB/304,
  4. Opinión escrita
  5. IB/306

11) FIGURA CARACTERÍSTICA:



12) Solicitud concesión de la patente,

NOMBRE: DILIA RODRÍGUEZ D´ALEMAN

FIRMA:

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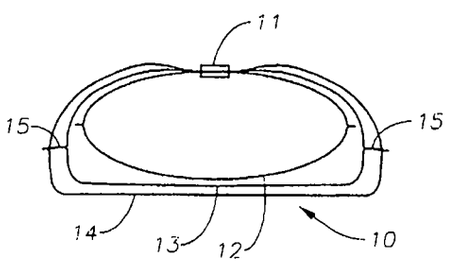
(54) Title: FLEXIBLE INDEPENDENT MULTI-LAYER CONTAINER AND METHOD FOR FORMING



(57) Abstract: Flexible independent multi-layer container and method for forming the flexible independent multi-layer container for retention and delivery of flowable materials having independent layers freely movable between each other and sealed off from each other with at least one fitting formed there through and compression seals formed between the flanges of the fitting and the flexible material of the independent multi-layer container by the at least one fitting formed there through for sealing the at least one fitting in place and for forming a compression seal between the independent multi-layer of the flexible materials and for forming a flexible multi-layer container.

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NON-PROVISIONAL PATENT APPLICATION

FLEXIBLE INDEPENDENT MULTI-LAYER CONTAINER AND METHOD FOR FORMING

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FLEXIBLE INDEPENDENT MULTI-LAYER CONTAINER AND METHOD FOR FORMING

FIELD OF THE INVENTION

[0001] This invention relates to the field of flexible multi-layer containers and methods for making the flexible multi-layer containers. The flexible multi-layer containers are used for transport and storage of flowable materials generally of container sized volumes, but can be used with smaller volumes. The flexible containers are readily foldable and can be unfolded and used to convert normally dry containers used in shipping into wet or flowable material containers or they may be used as stand alone containers. The flexible multi-layer containers are for retention and delivery of flowable materials and have independent layers which are freely movable between each other and are sealed off from each other, but have seals formed at fittings which are attached to these containers for filling, discharge, sampling, etc. These independent layers are generally sealed off from each other as the containers of this field of invention provide secondary containment of their content from leaking out and/or contamination within by penetration. Further in this field of invention these containers and fittings are readily reuseable/recyclable.

BACKGROUND OF THE INVENTION

[0002] The prior art has been in search of flexible containers for use in the shipment and storage of flowable materials, such as liquids, slurries, etc. and methods for making them which do not leak or fail in use and can be re-used multiple times. Some such prior art containers have been used solely for storage in stationary locations, which is a less rigorous use, because stationary use does not have the dynamic loading forces caused by motion in the shipping process on the flexible materials and the interface between the flexible materials and fittings mounted to these flexible containers. However, even stationary storage has dynamic loading forces caused by the liquid pulses of loading and unloading of these stationary flexible containers. These loading forces have caused prior art tanks to leak or fail.

[0003] The prior art has resorted to many different processes for solving the leak problems associated with these flexible tanks. In some cases the prior art tanks or containers used heat-welding technology for sealing the containers and attaching the fittings to the

flexible bodies of the containers. The problem of using heat welding is that it requires precise application of heat and pressure for a period of time and must be done in a very controlled environment. The order of difficulty of all these variables in the process of heat welding goes up dramatically in relation to the number of layers of material that is being heat welded at one time. If the heat welding process generates too much heat at the surface layer being welded the plastic material can become crystallized and become brittle which can cause failure of the weld and the container. If the heat welding process generates too little heat at the mid-layers being welded the plastic materials may not be sufficiently welded and the defective weld fails and the tank leaks. These defects in many cases would not be evident at the time of manufacture, but would become obvious when the container was loaded or shipped and the container fails completely or leaked product being shipped.

[0004] Other prior art has attempted to add chemical welding to the heat and pressure welding process of flexible materials used in the formation of flexible tanks and for attaching the fittings to the containers and tanks, but this has proved to be as unsuccessful as just the heat and pressure welding. These failures occur especially when the prior art containers are subjected to violent hydraulic motion, which is encountered in fluid shipments of containers. It should be realized that the containers are not baffled and the fluid inside can have full range of motion inside such containers, which can be 40 feet long and can produce great pressure on the flexible containers.

[0005] Further the prior art discovered that even if all the chemical, heat and pressure variables were perfect, failure to form a weld in the flexible container materials and securing the fitting could still occur because of body oil of workers, dust, powder or even light difference over the surfaces to be welded could cause failure.

[0006] The prior art provided mechanical members in addition to the welding process whether chemical and/or heat and pressure welding to form a seal for the securing the container and tank at the point where the fittings are mounted. In these applications the flexible materials were sealed about the hole made in the flexible materials where the fitting was to be inserted into the container and then the fitting was mechanically clamped on to the flexible tank or container. The sealed flexible materials about the hole did not rely on the

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mechanical clamping to seal the multiple layers about the hole nor did the mechanical clapping prevent the flexible materials forming the multiply layers from preventing movement creep in the flexible containers when they were filled and the flexible materials stretched or expanded because of filling or motion.

[0007] In yet other prior art flexible containers the fittings were created with specialized collars which could have the various layers of the flexible material being used for forming the flexible containers fitted about the collars both above and below and then chemically and/or heat and pressure welded to seal the fitting in place on the flexible tank or container. These welds of flexible material to more rigid materials of these collars created not only the typical problems of chemical, heat and pressure welds, but also stress razor points at the interface between the collar and the layers of materials being used in the flexible tank or container. These stress razor points produced failures when loading and/or discharging these tanks and containers, plus having failures during shipment thereof caused by dynamic wave actions in these flexible containers or tanks. Further these specialized collars tended to be some what rigid and hindered folding of the flexible containers for shipment.

[0008] The prior art in an effort to overcome some of these leak problems, at the fittings in flexible containers especially in severe operating conditions, attempted to develop additional special fitting, such as concentric cord and wire reinforced "doilies" about fittings which are used with flexible containers. These reinforced "doilies" then were chemically and/or heat and pressure welded to bind the flexible materials of various layers of flexible containers to these doilies. Finally, a metal clamp down was provided with fastener members who were fastened into the fitting, but not into the flexible materials of the flexible containers. This prior art was designed to provide hard non-compressible members to clamp down upon for a secure hold. This prior art was aimed at the problem of movement creep or "pulling out" of the flexible materials from the fittings. It never the less did not solve the problem of the failures of the flexible materials at the interface between the flexible materials and the more rigid fittings which occurred because of the wave action and other causes in the transport of these flexible containers and which occur at the time of loading and/or discharging from these containers.

[0009] Other prior art just formed a chemical weld and/or heat and pressure seal about the place in the wall of the flexible materials of the container and then put a fitting there through and attached the fitting with a screw down collar clamp. The screw down collar clamp attached the fitting securely about the chemical weld and/or heat and pressure seal already formed. However this type of fitting mount was subject to failure because of motion creep or out ward pulling forces which are generated by the stretching of the flexible materials used in the walls of the containers as they are filled or as motion waves are created in these containers shipment.

[0010] In addition to the above, the prior art used a flexible container of various materials having both the flexible material and reinforced material to prevent leaks so that when failures occurred in one layer of material, it did not get out of the container. Some of these flexible materials had woven fibers put into the inner layers of the flexible materials used to form layers of a flexible container, but these fibers created voids and provided friction points against the other smooth layers of flexible material. These voids and friction points caused creases and tucks in the smooth layer materials and became stress razors or pinching points for causing pinholes in the smooth layers of the flexible materials. Once a hole was formed then the woven fiber provided channels to allow the product to leak to other layers of the container or the container to leak.

[0011] The prior art has also tried using very thick flexible materials for providing strength, but these materials added weight to the containers and were not very flexible. Further these very thick flexible materials had a tendency to not fold out or fill smoothly and, if they did not, then stress pinches in the flexible material would cause these materials to have pin whole leaks through them. Once a leak occurs and the fluid product gets passed the thick flexible materials, which was provided for strength, the pressure of the fluid is transferred through to the next layer of flexible materials, which can lead to failure of the container. Further, if a thin walled flexible material of less than 15 mills thickness was used with a very thick flexible material as the inner layer then when this type container is discharged the pump suction at its intake can suck this thin walled flexible material into the intake and cut or damage that flexible material which would prevent the container further use.

[0012] Also the prior art used thick single flexible materials with re-enforcing materials built into the single flexible layers with compression seals and chemical welds to make tanks, but these tanks are very heavy and the re-enforcing materials are bound together with the tank materials to be come one layer of materials. In addition to being heavy these type tanks provided no environmental containment and the failure of the single wall was complete failure of these tanks. Also these tanks were in additional to being heavy, they were inflexible and could not be folded back on themselves for shipping multiple tanks in a shipping container.

[0013] As the prior art has added technology to solve these problems in multi layer flexible containers, the method of their manufacture became more complicated and more expensive. In many cases the added technology did not solve the problems of container failures in either shipment or static storage.

[0014] In addition to environmental containment problems, these prior art containers had recyclability problems because the fittings were so integrated into the materials, which might have been recyclable, that it was prohibitively expensive to recycle them.

[0015] The increases in shipping cost has demanded that the prior art flexible containers be easily folded and tightly packed to get as many folded containers shipped as possible to a site and then filled to save on the increasing costs of transportation. These prior art tanks with the bulky fitting and thick reinforced materials were not tightly foldable and were expensive to ship, which has made them less desirable.

[0016] The prior art did not recognize that the energy passed through the surface of flexible materials as these flexible tanks are moved and transported nor did they recognize the handling energies which are created upon filling and discharging materials from these flexible containers. As these fitting are directly in the path line of the energy being passed through the surface of the flexible container materials, many failures occurred at the interfaces between the flexible material and the fitting.

OBJECTS OF THIS INVENTION

[0017] The object of this invention is to create a flexible multi-layer container and to create a method for making a flexible multi-layer container for use in shipment and storage of flowable materials, such as liquids, slurries, mashes, etc which do not leak or fail in use and can be re-used repeated times.

[0018] Also an object of this invention is to provide a flexible container which may serve as a stationary tank or container and handle the dynamic loading forces caused by liquid pulses created during loading and unloading of these flexible multilayer containers with out leaking or failing.

[0019] Yet another object of the method of this invention is to use chemical and/or heat welding process on these compressible and elastic flexible material in their formation where as few layers are welded at once as possible. In a preferred embodiment, only one layer of the material is chemically and/or heat welded at once in the formation of these flexible containers for the prevention of crystallized materials being formed and for obtaining a good seal. At the point where the fittings are mounted through the walls of the flexible containers, no welding occurs between the compressible and elastic flexible materials and the fittings, which eliminates any crystallized materials formation. At these points only a compression seal is formed to fix the fitting in place and seal the compressible elastic flexible materials to form a flexible container, therefore brittleness does not occur and the compressible flexible material maintains it full range of flexibility.

[0020] Also an object of the method of this invention is to provide simplified steps for the formation of this flexible container which provide relatively easy control of the variables which can cause a chemical and/or heat weld to fail, such as body oil of workers, dust, powder, etc. and at the same time provide a method which provides a flexible container not subject to failure in its operation.

[0021] Yet another object of this invention is the formation of containers which can be used in the shipment of liquids and which can handle or withstand the violent hydraulic forces caused by the motion, which is encountered in shipping fluid in flexible containers.

This invention can endure the forces produced in shipment of a 40 foot flexile container without baffles therein.

[0022] Still a further object of this invention is a flexible container with fitting provided through the compressible elastic flexible multiple layer materials of the flexible container of this invention which do not have to have special collars for chemical or heat welding them to form seals for securing the fittings and for forming a seal between the multiple layer materials at the fitting for forming a flexible container with fittings.

[0023] A still further object of this invention is a flexible container with fitting provided through the compressible elastic flexible multiple layer materials of the flexible container of this invention which do not have specially prepared coils or ridge materials against which fittings can be mechanically clamped to hold the flexible materials against movement creep or pulling out motions by the flexible materials of these containers.

[0024] It is the object of this invention to provide fittings which have flanged surfaces for holding the compressible elastic flexible multiple layer materials of the flexible containers of this invention with sufficient force to have the compressible elastic flexible multiple layer materials form compression seals for sealing the fittings and the multiple layers of material for forming a flexible container. Further these flanges may have surfaces which assist in holding the multiple layers against motion creep or pulling the flexible material out of the flanged surfaces forming the compression seal. Also to assist against motion creep or pulling out of the flanged surfaces by multiple layers forming the compression seal are fasteners which pass through the multiple layers being held as a compression seal and are used with the flanges for tightening down the flanges for forming the compression seal between the flanges and the multiple layers.

[0025] Another object of this invention is to allow the smooth filling out of the internal layers of the flexible materials before fully engaging the next layer of flexible materials so that no stress razors or pinching points occur to eliminate the cause of hole formation in the smooth layers of the flexible materials and then driving the next layer of smooth flexible material to expand smoothly, driven by the layer below it after it is smoothly expanded with in its elastic limits.

[0026] Still a further object is to provide the outer most layer with a reinforcing fiber layer for abrasion resistance and having the smoother layers inside it so that if a failure occurs internal of the multiple smooth layers of material the reinforcing fiber layer will not serve as a channel to allow the product to leak to the other layers of the container or propagate tank failure or leaking.

[0027] It is the object of this invention to use relatively thin layers of the compressible elastic flexible material layers, but not so thin that a compression seal may not be formed and not so thick as to cause or allow the movement to creep or pulling out forces to cause the failure of the materials and to cause leaking of the flexible container at its fittings.

[0028] Also an object of this invention is to use multiple layers of relatively thin compressible elastic flexile materials to form these containers and to achieve the strength of a thick single flexible material with re-enforcing materials built into it. By using these independent layers in tight mechanical relationship with each other, the container formed with these multiple layers of compressible elastic flexible materials achieve superior strength without becoming inflexible. These tanks or containers are easily folded back on themselves for shipping multiple tanks in a shipping container. Further these multiple layered containers provide environmental containment by being composed of multiple layers should one layer develop a leak as well.

[0029] Also an object of this invention is to provide a flexible container that is recyclable because its fittings are easily removed for reuse and are not bounded to the flexible multiple layers but the fitting seal the multiple layers to provide secondary containment against leaks in this flexible container at the fitting and the independent layers provide containment throughout the flexible container.

[0030] Still a further object of this invention is to provide a highly flexible container which is relatively inexpensive and which is not bulky and easily folds into a small space for being shipped to a location for filling.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] The flexible multi-layer container and the methods for making the flexible multi-layer container of this invention may be practiced in certain physical forms and arrangements and adjustments of the variable parts herein described, but preferred embodiments of which will be described in detail in the specification and illustrated in the coming drawings which will form a part hereof.

[0032] FIG. 1 is a drawing of the flexible multi-layer container of this invention, containing flowable materials, formed from independent layers freely movable between each other and sealed off from each other with the at least one fitting formed there through for forming compression seals with the compressible and elastically flexible multi-layer materials at the at least one fitting.

[0033] FIG. 2 is a top drawing view of the flexible multi-layer container of this invention, void of flowable materials therein, formed from independent layers freely movable between each other and sealed off from each other with the at least one fitting formed there through for forming compression seals with the compressible and elastically flexible multi-layer materials at the at least one fitting.

[0034] FIG. 3 is a cross-section drawing of the flexible multi-layer container of this invention with at least a 1st bag layer formed from a compressible and elastically flexible material smoothly expanded within elastic limits upon having received some flowable materials, but before causing the at least a 2nd bag layer to be expanded.

[0035] FIG. 4 is a cross-section drawing of the flexible multi-layer container of this invention with the at least a 2nd bag layer formed from a compressible and elastically flexible material sized relative to the at least 1st bag layer formed from flexible material for allowing the at least 1st bag layer to smoothly expanded within elastic limits and for causing the 2nd bag layer to be expanded with in its elastic limits upon the 1st bag layer expanding, upon receiving flowable materials.

[0036] FIG. 5 is a cross-section drawing of the flexible multi-layer container of this invention with at least a 3rd bag layer formed from a flexible material having strength and

abrasion resistant properties sized relative to the at least 1st and 2nd bag layers for allowing the 1st and 2nd bag layers formed from flexible materials to smoothly expand within their elastic limits and for causing the at least 3rd bag layer to be expanded within its flexible limits upon the 1st and 2nd bag layers expanding, upon receiving flowable materials.

[0037] FIG. 6 is an exploded drawing of the flexible multi-layer container of this invention, showing the 1st flanged member of the at least one fitting internal of the at least 1st bag layer, and showing the 2nd flanged member of the at least one fitting external of the 2nd bag layer and showing the fasteners for passing through the aperture in the 1st and 2nd flange member and through the 1st and 2nd bag layers for forming a compression seal with the 1st and 2nd bag layers and holding 1st and 2nd bag layers against movement creep upon said fasteners being fastened.

[0038] FIG. 7 is an exploded drawing of the flexible multi-layer container of this invention, showing the at least 1st flanged member of the at least one fitting internal of the at least 1st bag layer, and showing an at least 2nd bag layer and at least a 3rd bag layer and the at least 2nd flanged member of the at least one fitting external of the at least 3rd bag layer for forming a compression seal with the 1st, 2nd, and 3rd bag layers and holding the 1st, 2nd, and 3rd bag layer's against movement creep upon said fasteners being fastened.

[0039] FIG. 8 is a cross-sectional view taken through FIGS. 1 and 7 of the at least one fitting with the fasteners fastened through the at least 1st flanged member and 2nd flange member for forming a compression seal between the 1st, 2nd, and 3rd bag layers and holding the 1st, 2nd, and 3rd bag layers against movement creep. This cross-section also shows the orifice in the at least one fitting for filling and emptying the flexible multi-layer container.

[0040] FIG. 9 is a representational view of the 2nd flanged member of the at least one fitting member, showing the sufficient surface of the 2nd flanged member and gripping surface for holding the 1st, 2nd, and 3rd bag layers and forming a compression seal and holding of the 1st, 2nd, and 3rd bag layers against movement creep.

[0041] FIG. 10 is a representational view showing the beginning steps of the method of this invention for forming flexible multi-layer containers for containing flowable materials,

formed from independent layers freely movable between each other and sealed off from each other starting with a tube of a compressible and elastically flexible material.

[0042] FIG. 11 is a representational view showing the forming of a first seal on one end of the tube of FIG. 10 and indexing where the at least the 1st flange of the at least one fitting is to be located and showing holes sufficient for the orifice of the fitting and for leaving elastic flexible material with holes for fastener but in contact with the 1st flange of the fitting and the 1st flange of the fitting held in place inside the tube of FIG. 10.

[0043] FIG. 12 is a representational view showing a second seal formed on the other end of the tube of FIG. 11 tube for forming at least a 1st bag layer from the tube of FIG. 10.

[0044] FIG. 13 is a representational view showing the beginning steps forming a second bag layer by placing the first bag layer of FIG. 12 inside a tube of a compressible and elastically flexible material.

[0045] FIG. 14 is a representational view showing the forming of a first seal on one end of the tube of FIG. 13 and indexing where the 1st flange of the at least one fitting is located to align the hole sufficient for the orifice of the fitting and remaining elastic material with holes for fasteners but to be in contact with the material of the 1st bag layer.

[0046] FIG. 15 is a representational view showing a second seal on the other end of the tube of FIG. 14 for forming at least a 2nd bag layer from the tube of FIG. 13.

[0047] FIG. 16 is a representational view showing the 2nd bag layer of FIG. 15, but having tab members connected to the 2nd bag layer and projecting there from.

[0048] FIG. 17 is a representational view showing the beginning steps for forming a 3rd bag layer by placing the 1st and 2nd bag layer of FIG. 16 inside a tube of a flexible material having strength and abrasion resistant properties sized relative to said 1st and 2nd bag layers for allowing the at least 1st and 2nd bag layers to smoothly expand within their elastic limits and for causing the 3rd bag layer to expand within its flexible limits.

[0049] FIG. 18 is a representational view showing the forming of a first seal on one end of the tube of FIG. 17 which attaches the tab members thereto and indexing where the at least

2nd flange of the at least one fitting is to be located and showing a hole sufficient for the orifice of the fittings and aligned with the at least 1st flange internal of the at least 1st bag layer and aligned with the remaining elastic material with holes for fasteners but to be in contact with the material of the 3rd bag layer.

[0050] FIG. 19 is a representational view showing a second seal on the other end of the tube of FIG. 18 for forming at least a 3rd bag layer from the tube of FIG. 17 and attaching the tab members thereto.

[0051] FIG. 20 is an exploded drawing of another embodiment of the flexible multi-layer container of this invention using co-extruded materials, showing the at least 1st flanged member of the at least one fitting internal of the at least an interior bag layer formed from a compressible and elastically flexible material, and showing the at least 2nd flanged member of the at least one fitting external of the at least exterior bag layer formed from a co-extruded flexible material having strength and abrasion resistant properties and showing the fasteners for passing through the aperture in the 1st and 2nd flange member and through the interior and exterior bag layers for forming a compression seal and holding the interior and exterior bag layers against movement creep upon the fasteners being fastened.

[0052] FIG. 21 is an exploded drawing of the flexible multi-layer container of this invention using co-extruded materials, showing the at least 1st flanged member of the at least one fitting internal of the at least interior bag layer, and showing an at least intermediate bag layer formed from a co-extruded compressible and elastic flexible material between the interior and exterior bag layers and the at least 2nd flanged member of the at least one fitting external of the at least exterior bag layer for forming a compression seal and holding the interior, intermediate and exterior bag layers against movement creep upon the fasteners being fastened there through.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0053] The present invention relates to flexible multilayer containers for retention and delivery of flowable materials having independent layers freely movable between each other and sealed off from each other by each independent layer being sealed to form a bag with at

least one fitting formed there through and compression seals formed with the at least one fitting formed there through generally referred to at reference number 10 of FIG. 1. In at least one embodiment as shown in FIG. 1, the flexible multilayer container 10 is shown being filled with a flowable material and with at least one fitting 11 positioned on the top. In FIG. 2 the flexible multilayer container 10 is shown void of flowable materials but is shown as see through to show the independent layers as separate and freely movable between each other and sealed off from each other and have tabs 15. From FIG. 2 it can be seen that each bag layer is sized to allow it to smoothly expand within its elastic limits and then engage the next bag layer and also smoothly expand the next bag layer or layers, but still be within the elastic limits of all the bag layers. In FIG. 2 of this embodiment is shown a 1st bag layer 12, a 2nd bag layer 13, and a 3rd bag layer 14 with at least one fitting 11. These bag layers must be of sufficient thickness to give proper strength to a bag layer but not so thick as to be inflexible and not compressible. On the other hand no matter their strength they can not be so thin as to not be compressible for forming or acting as compression seals. To better understand this invention reference should be had to FIGS. 3, 4, and 5 which show the transition from FIG. 2 to FIG. 1 of this flexible multilayer container 10.

[0054] Referring to FIG. 3, the 1st bag layer 12 is formed from a compressible and elastically flexible material, such as polyethylene of 15 mils thickness, having the ability to expand within its elastic limits upon receiving flowable materials. This 1st bag layer 12 as shown in FIG. 3 is allowed to expand until it has smoothly expanded within its elastic limits prior to engaging the 2nd bag layer 13 as shown in FIG. 3. The 2nd bag layer 13 is mechanically separate as an independent layer from the 1st bag layer 12. Thus the 1st bag layer is formed as a smoothed walled container with no stress razors or pinching points to cause hole formation in this 1st bag layer 12 because it does not engage the 2nd bag layer 13 until it has fully formed as a smoothed walled container with in the 2nd bag layer 13 before it causes the 2nd bag layer to smoothly expand.

[0055] Referring to FIG. 4, the 2nd bag layer 13 is formed from a compressible and elastically flexible material, such as polyethylene of 15 mils thickness, having the ability to expand within its elastic limits, but is sized to allow the 1st bag layer to smoothly expand before it engages the 2nd bag layer 13 for then causing the 2nd bag layer 13 to smoothly

expanded within its elastic limits upon being engaged by the 1st bag layer 12. Thus the 2nd bag layer 13 is formed as a smoothed walled container with no stress razors or pinching points to cause hole formation in the 2nd bag layer 13 because it does not engage the 3rd bag layer 14 until it has fully formed as a smoothed walled container within the 3rd bag layer.

[0056] Referring to FIG. 5, the 3rd bag layer 14 is formed from a flexible material having strength and abrasion resistant, such as polypropylene woven fiber of 4oz. to 16oz. weight thickness, and sized to allow the 2nd bag layer 13 to smoothly expand within it elastic limits and be guided by tabs 15 before it engages the 3rd bag layer 14 for then causing the 3rd bag layer 14 to smoothly expand within its limits upon being engaged by the 2nd bag layer 13 for forming a flexible multilayer container 10. By each bag layer being expanded within its elastic limits into the next bag layer a flexible multilayer container 10 is formed which can handle violent hydraulic forces caused by motion in shipping fluids in these flexible containers as if they where made of much thicker flexible materials, but yet these flexible containers are much lighter and more flexible containers which allows them to be easily folded into small space for being shipped to a location for filling. Also these flexible containers are generally lighter than thicker walled flexible tanks.

[0057] These independent bag layers are formed from a compressible and elastically flexible material having the ability to expand within the elastic limits upon receiving flowable materials but must have at least one fitting 11 for receiving and discharging flowable materials. As shown in FIGS. 6 and 7, by these bag layers being independent of each other, there must be provision for mounting at least one fitting member 11 through each independent bag layer and forming a seal between each of these bag layers at the at least one fitting 11 to prevent leaks and make these containers useable. Any seal formed at the at least one fitting member 11 in the at least 1st bag layer is also subject to expansion within the elastic limits of the flexible material upon receiving the flowable materials which causes the stresses or movement creep associated with those elastic forces on filling or from violent movement forces produced at the fitting on such a container. Further, the at least 2nd bag layer 13, as shown in FIGS. 6 and 7, is formed from a compressible and elastically flexible material sized relative to the at least 1st bag layer 12 for allowing the at least 1st bag layer 12 formed to smoothly expand within the elastic limits of the flexible material upon receiving

flowable materials and for causing the at least 2nd bag layer 13 to be smoothly expanded with in its elastic limits also put stresses or movement creep associated with those elastic forces whether on filling or from violent movement forces produced in shipment on the at least 2nd bag layer 13 also. These forces of stress or movement creep are increased at the at least one fitting member 11 formed especially through the interface at least 1st and 2nd bag layers 12 and 13 formed at the at least one fitting 11. In this embodiment, as shown in FIG. 6, the at least one fitting member 11 to deal with the forces of stress or movement creep has a 1st flange member 16 internal of the at least 1st bag layer 12 formed and a 2nd flange member 17 external of the at least 2nd bag layer 13 formed for forming a compression seal between the flanges and the compressible and elastically flexible material. These flanges 16 and 17 have apertures 18 through them for accepting fasteners 22 for compressing the compressible and elastically flexible material of the at least 1st and 2nd bag layer material 12 and 13, between the 1st and 2nd flange members 16 and 17 sufficiently for forming a compression seal there between and for sealing the at least one fitting member 11 in place and thus forming a flexible multi-layer container 10. As those skilled in the art of seals and seal formation will recognize, if the material to be used as a seal is not compressible enough it will fail to form a seal. If the material is compressible enough, but is under compressed or over compressed the seal to be formed will fail. Further in the seals of this invention formed in this compression state must also deal with movement creep, which is the tendency for these elastically flexible materials to pull out from these fittings when violent motion occurs in shipment, which generates dynamic pressure spikes applied across the planes or surface of these elastically flexible materials. So the forces used on the fasteners 22 to form these compression seal must be adjusted for these materials and their applications, and the preferred range of 315 inch/lbs to 80 inch/lbs has been found to work, but a broader range of 400 inch/lbs. to 75 inch/lbs. has also been determined to work on most materials.

[0058] In yet another embodiment, this invention, as shown in FIG. 7, relates to including at least a 3rd bag layer 14 formed from a flexible material having strength and abrasion resistant properties and sized relative to the at least 1st and 2nd bag layers 12 and 13 for allowing the at least 1st and 2nd bag layers 12 and 13 formed from flexible materials to smoothly expand within their elastic limits and for causing the 3rd bag layer 14 to expand within its flexible limits. Also this invention relates to the at least one fitting member 11

having 1st and 2nd flanged members 16 and 17 having sufficient flange surface areas 19 and 20 for engaging the at least 1st bag layer formed 12 from the inside surface of the at least 1st bag layer 12 and sufficient flange surface 20 for engaging the at least 3rd bag layer 14 from the external surface of the at least 3rd bag layer 14 to form compression seals through the 1st, 2nd, and 3rd bag layer 12, 13, and 14 at the at least one fitting member 11. In some embodiments as shown in FIGS. 8 and 9 the flanged surfaces 19 and 20 in addition to having sufficient flanged surfaces 19 and 20 to create compression seals and hold against creep movement, they may also have provided gripping surfaces 21 such as shown in FIGS. 8 and 9 to aid in forming a compression seal and holding against creep movement of the materials at the fitting member 11 when fasteners 22 are tightened down. As shown in FIGS. 8 and 9 the gripping surface 21 is concentric circular grooves or ridges, but as those skilled in the art would know many non-smooth surfaces could be used to form a gripping surface to aid the compression seal for holding the materials against creep movement.

[0059] These fasteners 22, are provided for passing through apertures 18 in the flanges 16 and 17and holes 23 of the at least 1st, 2nd, and 3rd bag layers 12, 13, and 14 for functionally drawing the flanges 19 and 20 against the 1st, 2nd, and 3rd bag layers 12, 13, and 14 to form compression seals and for penetrating the 1st, 2nd, and 3rd bag layers 12, 13, and 14 through holes 23. Both the compression and penetrating as shown in FIG. 8 are used for preventing movement creep of the at least 1st, 2nd, and 3rd bag layers 12, 13, and 14 materials at the compression seal formed at the at least one fitting 11. As those skilled in the art of seals and seal formation will recognize, if the material to be used as a seal is not compressible enough it will fail to form a seal. If the material is compressible enough, but is under compressed or over compressed the seal to be formed will fail. Further, the seals formed in this invention must also deal with movement creep, which is the tendency for these elastically flexible materials to pull out from these fittings when violent motion occurs in shipment or other forces act on these materials. So the forces used on these fasteners 22 to form these compression seals must be adjusted for the material used and the preferred range of 315 inch/lbs. to 80 inch/lbs. with a broad range of from 400 inch/lbs. to 75 inch/lbs. has been determined to work with most such materials.

[0060] In some applications as shown in FIG. 2, where different materials are used in the bag layers having different surface frictions, as for example between the 2nd bag layer 13 made of polyethylene and 3rd bag layer 14 made of polypropylene, it has been found that to aid in the formation of smoothly expanding within elastic limits of 2nd bag layer 13 without forming stress razor or pinching points between the material of 3rd bag layer 14, that tabs 15 are provided on the 2nd bag layer 13 and fastened to the 3rd bag layer 14 for guiding alignment while the 2nd bag layer 13 is smoothly expanding within it elastic limits. These tabs 15 thus keep the 2nd bag layer 13 in rough alignment with the 3rd bag layer 14 as the 2nd bag layer 13 is smoothly expanding, but the 3rd bag layer 14 is still loose around the 2nd bag layer 13 until it expands into the 3rd bag layer 14 for causing the 3rd bag layer 14 to expand within its flexible limits for forming a flexible multilayer container 10.

[0061] In yet another embodiment of this invention as shown in FIG. 20 at least an interior bag layer 24 is formed as at least a single bag layer which is physically independent from other bag layers, but interior bag layer 24 may be made of co-extruded multiple layers, which in FIG. 20 are represented as having two layers 25 and 26 of compressible and elastically flexible materials being used as an interior bag layer 24. Whether a single layer of co-extruded multiple layers or a single 1st bag layer, these bag layers must be subject to the formation of a compression seal between the 1st flange member 16 and 2nd flange member 17 of the fitting 11. In that regard the combined thickness of the co-extruded materials, which in this embodiment are represented by layer 25 and 26, must be in the broad range of being no less thick than 04 mils and no thicker than 80 mils with a preferred range of no less thickness than 06 mils and no thicker than 70 mils. Further these co-extruded materials must be capable of being sealed or welded to form a interior bag layer 24, so in many embodiments these layers 25 and 26 will be of relatively thin materials for forming a good weld, but when combined as co-extruded materials they will fall within the above ranges. Also in this embodiment there is at least an exterior bag layer 29 formed as at least as a single layer which is physically independent but may be made of co-extruded or woven multiple layers, which in FIG. 20 are represented as having two layers 30 and 31 of flexible materials having strength and abrasion resistance properties being used as an exterior bag layer 29. Whether a single layer of co-extruded multiple layers or a single bag layer they are sized relative to each other for allowing the interior bag layers 24 to smoothly expand within its elastic limits and

for causing the exterior bag layer 29 to expand within its flexible limits, and allow at least one fitting 11 to be formed through the interior and exterior bag layers 24 and 29 for forming a compression seal between 1st and 2nd flanges 16 and 17 for sealing the at least one fitting 11 in place and for forming a flexible multi-layer container 10.

[0062] In yet other embodiment of this invention as shown in FIG. 21 at least an intermediate bag layer 32 is formed as at least a single bag layer which is physically independent from other bag layers, but the intermediate bag layer 32 may be made of co-extruded multiple layers, which in FIG. 21 are represented as having two layer 33 and 34 of compressible and elastically flexible materials. Whether composed of an interior bag layer 24, and an external bag layer 29 or having the intermediate bag layer 32 there would be provided at least one fitting member 11, which forms a compression seal about these layers for sealing these bag layers off from each other and mounting the at least one fitting member 11.

[0063] From all the forgoing embodiments described it should be apparent that these flexible containers would be recyclable because their fittings 11 are easily removed for re-use by removing the fasteners 22 and simply mechanically separating the 1st and 2nd flange members 16 and 17 from the multiple layers, as there is no welding or chemical fastening between these 1st and 2nd flange member 16 and 17 of fittings 11 and the flexible multi-layer bag materials. Further as the multiple bag layers are formed as independent bags sealed off from each other and sealed off from each other at the compression seals formed through them at the fitting 11 these flexible multilayer container provide environmental containment against leaks should one multiple bag layer fail.

[0064] At least one method embodiment for forming the flexible container 10 of this invention is shown in FIGS. 10 through 19. Starting at FIG. 10 with at least a 1st tube 35 of compressible and elastically flexible material, a 1st seal 36 is formed on one end of the tube as shown in FIG. 11. Then in FIG. 11, it can be seen that a 1st flange member 16 of the at least one fitting 11 is inserted and held for indexing of its orifice 37 and fastener apertures 18 in 1st flange member 16 are to be put through the 1st tube 35 while one end of the 1st tube 35 is held open. After indexing on the 1st tube 35 for the position of the orifice 37 through the

1st flange member 16 and fastener apertures 18 positions, then holes are made in the 1st tube 35 at the indexed positions in the elastically flexible material in contact with the 1st flange member 16 of the at least one fitting 11. Once the holes have been made the 1st flange member 16 of the at least one fitting 11 is held in place against the inside surface of the 1st tube 35 about the fastener and orifice holes made at the indexed position as shown in FIG. 11. Then as shown in FIG. 12 a seal is formed on the other end 39 of the 1st tube 35 of the compressible and elastically flexible material for forming at least a 1st bag layer 12. Those skilled in the art will appreciate that the quality control of forming a single weld through as single tube will provide a higher quality seal and improve the chance of not having a weld failure. The next step, as shown in FIG. 13, is positioning the 1st bag layer 12 into a second tube 40 of a compressible and elastically flexible material, which tube is sized to be larger than the 1st bag layer 12. Then as shown in FIG. 14 forming a 1st seal 41 on one end of the second tube 40 of a compressible and elastically flexible material, and then indexing on the second tube 40 for alignment with the position of the 1st flange member 16 of the at least one fitting 11 both for aligning the orifice 37 and fastener apertures 18 with those of the at least 1st bag layer 12. Once indexed, then making holes in the second tube 40 at the indexed positions sufficient for the orifice 37 of the 1st flanged member 16 of the at least one fitting 11 and fastener apertures 18 but leaving the elastically flexible maternal in alignment with the at least 1st bag layer 12 material about the orifice 37 and aperture holes 18. Then, as shown in FIG. 15, forming a 2nd seal on the other end 42 of the second tube 40 to form a 2nd sealed tube bag layer 13 sufficiently distant from the 1st bag layer 12 to allow the 1st bag layer 12 to smoothly expand within the 2nd bag layer within its elastic limits and for causing the 2nd bag layer to smoothly expand within it elastic limits when filled. In some embodiments of this method as show in FIG. 16 tabs 15 are attached to the 2nd bag layer and the at least 1st and 2nd bag layers 12 and 13 would be positioned, as shown in FIG. 17 inside a third tube 43 of material having strength and abrasion resistant propertied and a flexile limit. Then as shown in FIG. 18, indexing the third tube 43 material for the position of 1st flange member 16 of the at least one fitting 11 for aligning the orifice 37 with the apertures made in the 1st and 2nd bag layers 12 and 13. Once aligned and indexed, holes are made in the 3rd tube 43 material at the indexed position for the orifice 37 and fastener apertures 18 of the 1st flanged member 16 of the at least one fitting 11 and fastener apertures 18 but leaving the 3rd

tube 43 material in alignment with the 1st and 2nd bag layer 12 and 13 materials. Then one end 44 of 3rd bag layer 14 is sealed which fixes tabs 15. Then as shown in FIG. 19, the 3rd tube 43 is sealed 45 which fixes tabs 15 and tube 43 is formed in to a 3rd bag layer 14 about the 1st and 2nd bag layers 12 and 13 with sufficient distance from the at least 1st and 2nd bag layers 12 and 13 to smoothly expand within each other and to smoothly expand within the at least 3rd bag layer 14 to expand the at least 3 bag layer 14 to its flexible limits. Then as shown in FIG. 19 the 2nd flanged member 17 of the at least one fitting 11 is held against the outside surface of the at least 3rd bag layer 14 and fasteners 22 are inserted through the fastener apertures 18 in the 1st and 2nd flanged member 16 and 17 and the at least 1st, 2nd and 3rd bag layers 12,13, and 14 for forcing the 1st and 2nd flanged members 16 and 17 having flanged surfaces 19 and 20 of the at least one fitting 11 against the at least 1st, 2nd, and 3rd bag layer 12, 13, and 14 positioned between the 1st and 2nd flanged surfaces 16 and 17 for fastening the fasteners 22, for forming a compression seal there between and for prevention of movement creep of the at least 1st, 2nd and 3rd bag layers 12, 13, and 14 at the at least one fitting 11 for forming a flexible multi-layer container for retention and delivery of flowable materials. The range of fastening force can be from 75 inch/lbs to 400 inch/lbs, but as those skilled in the art will appreciate it will vary within that range depending upon the material being used. It has been found that a range of from 80inch/lbs to 315 inch/lbs will work with polyethylene and polypropylene materials, but again depending on the thicknesses and weights of these materials falling between 04 mils to 80 mils and a preferred range of 06 mils to 70 mils and weights of 04 oz. to 16 oz. Also the 1st and 2nd flanged surface 19 and 20 must have sufficient surface to provide a sufficient seating surface against the bag layer materials to form a compression seal, and if different flanged surfaces are used it may vary the fastening forces as those skilled in the art will appreciate.

[0065] From the above method it can be seen that when forming a seal on the bag layers, which can be a heat weld and/or chemical, the welds are formed with only one layer of material being welded at one time to provide the highest quality seal possible and when a seal is formed across multiple layers a compression seal is formed through these bag layers. That the fitting 11 being formed in the bag layers to fasten the at least one fitting and the bag layer off from each other and against creep movement of the bag layers is the compression seal. However, if a bag layer is formed of co-extruded materials with independent layers these

individual layers are very thin such that their collective layers are within the range of 04mils to 80mils or the preferred range of 06mils to 70mils then these co-extruded materials may be treated as a 1st bag layer, but in fact they may be an interior bag layer, intermediate bag layer, and exterior bag layer.

[0066] While the referenced embodiments of the invention of this flexible container and the method for there formation has been disclosed it will be appreciated that other embodiments and process may be used without departing form the sprit of the invention and from the methods herein claimed.

THAT CLAIMED IS:

1. A flexible multi-layer container for retention and delivery of flowable materials having independent layers freely movable between each other and sealed off from each other with at least one fitting formed there through and compression seals formed with the at least one fitting formed there through comprising;

   a. At least a 1st bag layer formed from a compressible and elastically flexible material having the ability to expand within the elastic limits of said flexible material upon receiving flowable materials,

   b. At least a 2nd bag layer formed from a compressible and elastically flexible material sized relative to said at least 1st bag layer for allowing said at least 1st bag layer formed from an elastically flexible material to smoothly expand within the elastic limits of said flexible material upon receiving flowable materials and for causing said at least 2nd bag layer to be smoothly expanded within its elastic limits, and

   c. At least one fitting means formed through said at least 1st and 2nd bag layers formed having a flange member internal of said at least 1st bag layer formed and a flange external of said at least 2nd bag layer formed for forming a compression seal between said flanges and said compressible and elastically flexible material by compressing the compressible and elastically flexible material of said at least 1st and 2nd bag layer materials sufficiently for forming a compression seal there between and for sealing said at least one fitting means in place and for forming a flexible multi-layer container.

2. A flexible multi-layer container for retention and delivery of flowable materials of Claim 1 comprising,

   a. At least a 3rd bag layer formed from a flexible material having strength and abrasion resistant properties sized relative to said at least 1st and 2nd bag layers for allowing said at least 1st and 2nd bag layers formed from

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flexible materials to smoothly expand within their elastic limits and for causing said 3rd bag layer to expand within its flexible limits.

3. A flexible multi-layer container for retention and delivery of flowable materials of Claim 2 wherein said at least one fitting means formed through said bag layers further comprises,

a. A 1st flanged member internal of said at least1st bag layer having sufficient flange surface for engaging said at least 1st bag layer formed from the inside surface of said at least1st bag layer;

b. A 2nd flanged member external of said at least 3rd bag layer having sufficient flange surface for engaging said at least 3rd bag layer formed from the external surface of said at least 3rd bag layer and for functional engagement with said 1st flanged portion means; and

c. Means for driving said 1st and 2nd flanged members toward each other and said at least 1st, 2nd and 3rd bag layers for forming a compression seal there between and sealing said at least one fitting means in place and for forming a flexible multi-layer container.

4. A flexible multi-layer container for retention and delivery of flowable materials of Claim 3 wherein said 1st and 2nd flanged portion means further comprises,

a. A sufficient surface on said 1st flanged member portioned on said inside surface of said at least 1st bag layer for providing a seating surface against said inside surface of said at least 1st bag layer and

b. A sufficient surface on said 2nd flanged member having a gripping surface positioned on said outside surface of said at least 3rd bag layer for holding said bag layers surface against movement and for engaging said flanged surfaces toward each other and against said at least 1st, 2nd and 3rd bag layer surfaces for forming a compression seal and holding said at least 1st, 2nd, and 3rd bag layer materials against movement creep.

5. A flexible multi-layer container for retention and delivery of flowable materials of Claim 4 wherein said 2nd flanged member gripping surface further comprises,

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a. concentric grooved surfaces on said flanged portion against said outside surface of said 3rd bag layer for holding said bag layers surfaces against movement creep and for being driven toward said 1st flange member and against said at least 1st, 2nd and 3rd bag layer surfaces for forming a compression seal and holding said at least 1st, 2nd, and 3rd bag layer materials against movement creep.

6. A flexible multi-layer container for retention and delivery of flowable materials of Claim 4 wherein said means for driving said at least 1st, 2nd and 3rd bag layer layers to form a compression seal there between and holding said at least 1st, 2nd, and 3rd bag layer materials against movement creep comprises,

a. At least two apertures through said at least 1st, 2nd, and 3rd bag layers and said 2nd flanged member,

b. At least two fastener receiving means within said 1st flanged member, and

c. At least two fastener means through said at least two apertures in said 2nd flanged member, said at least 1st, 2nd, and 3rd bag layers and into said at least two fastener receiving means within said 1st flanged member for compressing said 1st and 2nd flanged members toward each other and against said at least 1st, 2nd, and 3rd bag layer materials there between as said fasteners are tightened for forming a compression seal at said at least 1st, 2nd, and 3rd bag layer materials and for preventing movement creep of said at least 1st, 2nd, and 3rd bag layers at said formed compression seal.

7. A flexible multi-layer container for retention and delivery of flowable materials of Claim 6 wherein said means for driving said at least 1st, 2nd and 3rd bag layer layers to form a compression seal there between comprises,

a. At least two apertures through said at least 1st, 2nd, and 3rd bag layers and said 1st and 2nd flanged member, and

b. At least two fastener means through said at least two apertures for compressing the 1st and 2nd flanged members toward each other and against said at least 1st, 2nd, and 3rd bag layer materials there between as said fasteners are tightened for forming a compression seals at said 1st,2nd,

and 3rd bag layer materials and for preventing movement creep at said at least 1st, 2nd, and 3rd bag layer materials from pulling out of said sealing engagement and for forming a compression seals at said 1st, 2nd, and 3rd bag layer materials.

8. A flexible multi-layer container for retention and delivery of flowable materials of Claim 7 wherein said at least 2nd bag layer further comprises,

a. Aligning means on said at least 2nd bag layer connected to said at least 3rd bag layer for holding said at least 1st and 2nd bag layers in alignment with said at least 3rd bag layer as said at least 1st and 2nd bag layers are allowed to smoothly expand within their elastic limits within said at least 3rd bag layer and cause said at least 3rd bag layer to expand within its flexible limits.

9. A flexible multi-layer container for retention and delivery of flowable materials of Claim 8 wherein said aligning means further comprises,

a. Tab members connected to said at least 2nd bag layer and projecting therefrom and connected to said 3rd bag layer for causing said at least 1st and 2nd bag layers to align with said at least 3rd bag layer as said 1st and 2nd bag layers smoothly expand within their elastic limits and cause said at least 3rd bag layer to expand within its flexible limits.

10. A flexible multi-layer container for retention and delivery of flowable materials of Claim 9 wherein said 1st and 2nd compressible and elastically flexible material further comprise,

a. A material of a thickness at its thinnest sufficient for allowing compression into a compression seal, and

b. A material of a thickness at its thickest sufficient for allowing compression into a compression seal and for preventing creep of said material at the point of compression into a seal about said at least one fitting means.

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11. A flexible multi-layer container for retention and delivery of flowable materials of Claim 10 wherein said at least 1st and 2nd compressible and elastically flexible materials at its thinnest and thickest further comprises,

a. A thinness of no less than 04 mils, and

b. A thickness of no more than 80 mils.

12. A flexible multi-layer container for retention and delivery of flowable materials of Claim 11 wherein said at least 1st and 2nd compressible and elastically flexible materials at its thinnest and thickest further comprises,

a. A thinness of no less than 06 mils, and

b. A thickness of no more than 70 mils.

13. A method of forming a multi-layer container for retention and delivery of flowable material comprising;

a. Forming at least a 1st seal on one end of a tube of a compressible and elastically flexible material,

b. Indexing on said tube for the position of a fitting having an orifice and a flange surface for aligning an aperture to be made at said orifice,

c. Making at least one hole in said tube at said indexed position sufficient for the orifice of the fitting and for leaving said elastically flexible material in contact with said flange of said fitting,

d. Holding said flanged surface of said fitting against said inside surface of said tube about said hole made at said indexed position,

e. Forming a 2nd seal on the other end of said tube of said compressible and elastically flexible material for forming at least a 1st bag layer,

f. Positioning said 1st bag layer into a second tube of a compressible and elastically flexible material,

g. Forming a 1st seal on one end of said second tube of a compressible and elastically flexible material,

h. Indexing on said second tube for the position of said fitting for aligning an aperture to be made there through with said at least 1st bag layer aperture,

i. Making at least one hole in said second tube at said indexed position sufficient for the orifice of said fitting and for leaving said elastically flexible material in alignment with said at least 1st bag layer material about said aperture,

j. Forming a 2nd seal on the other end of said second tube to form a 2nd bag layer independent of said 1st bag layer and sufficiently distant therefrom to allow said 1st bag layer to smoothly expand within said 2nd bag layer within its elastic limits and for causing said 2nd bag layer to smoothly expand within its elastic limits,

k. Positioning said at least 1st and 2nd bag layers into a 3rd bag layer material having strength and abrasion resistant properties and a flexible limit,

l. Indexing on said 3rd bag layer material for the position of said fitting for aligning aperture with said aperture of said at least 1st and 2nd bag layers,

m. Making a hole in said 3rd bag layer material at said indexed position for the orifice of said fitting and for leaving said 3rd bag layer material in alignment with said at least 1st and 2nd bag layer material about said apertures,

n. Forming a 3rd bag layer about said at least 1st and 2nd bag layers with sufficient distance from said at least 1st and 2nd bag layers to allow said at least 1st and 2nd bag layers to smoothly expand within each other and to smoothly expand within said at least 3rd bag layer to its flexible limits,

o. Holding said 2nd flanged surface of said fitting against said outside surface of said at least 3rd bag layer,

p. Inserting fasteners through said apertures in said flanged surfaces and said at least 1st, 2nd, and 3rd bag layers and

q. Forcing said 1st flanged and 2nd flanged members of said fitting against said at least 1st, 2nd, and 3rd bag layer portions between said 1st and 2nd flanged portions by fastening said fasteners for forming a compression seal there between and for preventing movement creep of said at least 1st, 2nd, and 3rd bag layers at said fitting for forming a flexible multi-layer container for retention and delivery of flowable materials.

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14. A method of forming a multi-layer container for retention and delivery of flowable material of Claim 13 wherein said forcing of said 1st flanged and 2nd flanged members of said fitting against said at least 1st, 2nd, and 3rd bag layers further comprises,

a. Fastening said fasteners with a force of 75 inch/lbs to 400 inch/lbs for forming a compression seal and for preventing movement creep of said at least 1st, 2nd, and 3rd bag layers and pulling away from said at least one fitting.

15. A method of forming a multi-layer container for retention and delivery of flowable material of Claim 14 wherein said forcing of said 1st flanged and 2nd flanged members of said fitting against said at least 1st, 2nd, and 3rd bag layers further comprises,

a. Fastening said fasteners with a force of 80 inch/lbs to 305 inch/lbs for forming a compression seal and for preventing movement creep of said at least 1st, 2nd, and 3rd bag layers and pulling way from said at least one fitting.

16. A flexible multi-layer container for retention and delivery of flowable materials having independent layers freely movable between each other and sealed off from each other with at least one fitting formed there through and compression seals formed at the at least one fitting formed there through comprising;

a. At least an interior bag layer formed from a compressible and elastically flexible material having the ability to expand within the elastic limits of said flexible material upon receiving flowable materials,

b. At least an exterior bag layer formed from a flexible material having strength and abrasion resistant properties sized relative to said at least interior bag layers for allowing said at least interior bag layers formed from flexible materials to smoothly expand within its elastic limits and for causing said exterior bag layer to expand within its flexible limits, and

c. At least one fitting means formed through said at least interior and exterior bag layers formed having a flange member internal of said at least interior bag layer formed and a flange external of said at least exterior bag layer formed for forming a compression seal between said flanges and said compressible and elastically flexible material by compressing the compressible and elastically flexible material of said at least interior and exterior bag layer materials sufficiently for sealing said at least one fitting means in place and for forming a flexible multi-layer container.

17. A flexible multi-layer container for retention and delivery of flowable materials of Claim 16 wherein said at least one fitting means formed through said bag layers further comprises,

a. A 1st flanged member internal of said at least interior bag layer having sufficient flange surface for engaging said at least interior bag layer formed from the inside surface of said at least interior bag layer,

b. A 2nd flanged member external of said at least exterior bag layer having sufficient flange surface for engaging said at least exterior bag layer formed from the external surface of said at least exterior bag layer and for engaging with said 1st flanged portion means, and

c. Means for driving said 1st and 2nd flanged members toward each other and said at least interior and exterior bag layers for forming a compression seal there between and sealing said at least one fitting means in place and for forming a flexible multi-layer container.

18. A flexible multi-layer container for retention and delivery of flowable materials of Claim 17 wherein said 1st and 2nd flanged portion means further comprises,

a. A sufficient surface on said 1st flanged member portioned on said inside surface of said at least interior bag layer for providing a seating surface against said inside surface of said at least interior bag layer, and

b. A sufficient surface on said 2nd flanged member having gripping surface positioned on said outside surface of said at least exterior bag layer for holding said bag layers surface against movement and for engaging said

flange surfaces toward each other and against said at least interior and exterior bag layer surfaces for forming a compression seal and holding said at least interior and exterior bag layer materials against movement creep.

19. A flexible multi-layer container for retention and delivery of flowable materials of Claim 18 wherein said 2nd flanged member gripping surface further comprises,

a. Concentric grooved surfaces on said flanged portion against said outside surface of said exterior bag layer for holding said bag layers surfaces against movement creep and for being driven toward said 1st flange member and against said at least interior and exterior bag layer surfaces for forming a compression seal.

20. A flexible multi-layer container for retention and delivery of flowable materials of Claim 18 wherein said means for driving said at least interior and exterior bag layer layers for forming a compression seal there between comprises,

a. At least two apertures through said at least interior and exterior bag layers and said 2nd flanged member,

b. At least two fastener receiving means within said 1st flanged member and,

c. At least two fastener means through said at least two apertures in said 2nd flanged member, said at least interior and exterior bag layers, and into said at least two fastener receiving means within said 1st flanged member for compressing the 1st and 2nd flanged members against each other and said at least interior and exterior bag layer materials there between as said fasteners are tightened for forming a compression seal at said at least interior and exterior bag layer materials and for preventing movement creep at said formed compression seal.

21. A flexible multi-layer container for retention and delivery of flowable materials of Claim 20 wherein said means for driving said at least interior and exterior bag layers to form a compression seal there between comprises,

a. At least two apertures through said at least interior and exterior bag layers and said 1st and 2nd flanged member and,

b. At least two fastener means through said at least two apertures for compressing the 1st and 2nd flanged members against each other and said at least interior and exterior bag layer materials there between and for preventing movement creep resistance against said at least interior and exterior bag layer materials from pulling out of said sealing engagement and for forming compression seals at said interior and exterior bag layer materials.

22. A flexible multi-layer container for retention and delivery of flowable materials of Claim 21 further comprising,

a. At least an intermediate bag layer formed from a compressible and elastically flexible material sized relative to said at least interior bag layer for allowing said at least interior flexible bag layer formed from an elastically flexible material to smoothly expand within the elastic limits of said flexible material upon receiving flowable materials and for causing said at least intermediate bag layer to be smoothly expanded within its elastic limits.

23. A method of forming a multi-layer container for retention and delivery of flowable material comprising;

a. Forming at least a 1st seal on one end of a tube of a compressible and elastically flexible material,

b. Indexing on said tube for the position of a fitting having an orifice and a flange surface for aligning an aperture to be made at said orifice,

c. Making at least one hole in said tube at said indexed position sufficient for the orifice of the fitting and for leaving said elastically flexible material in contact with said flange of said fitting,

d. Holding said flanged surface of said fitting against said inside surface of said tube about said hole made at said indexed position,

e. Forming a 2nd seal on the other end of said tube of said compressible and elastically flexible material for forming at least an interior bag layer,

f Positioning said at least interior bag layers into a exterior bag layer material having strength and abrasion resistant properties and a flexible limit,

g. Forming a 1st seal on one end of said exterior bag layer material,

h. Indexing on said exterior bag layer material for the position of said fitting for aligning an aperture to be made with said aperture of said at least interior bag layers,

i. Making at least one hole in said exterior bag layer material at said indexed position for the orifice of said fitting and for leaving said exterior bag layer material in alignment with said at least interior bag layer material about said aperture,

j Forming a 2nd seal on said exterior bag layer for forming an exterior bag layer about said interior bag layers with sufficient distance from said at least interior bag layers to allow said at least interior bag layers to smoothly expand within said exterior bag layer to its flexible limits,

k. Holding said 2nd flanged surface of said fitting against said outside surface of said at least exterior bag layer,

l. Inserting fasteners through said apertures in said flanged surfaces and said at least interior and exterior bag layers, and

m. Forcing said 1st flanged and 2nd flanged members of said fitting against said at least interior and exterior bag layer portions between said 1st and 2nd flanged portions by fastening said fasteners for forming a compression seal there between and for preventing movement creep of said at least interior, and exterior bag layers at said fitting for forming a flexible multi-layer container for retention and delivery of flowable materials.

24. A method of forming a multi-layer container for retention and delivery of flowable material of Claim 23 further comprising;

a. Positioning said interior bag layer formed in steps (a) thru (e) into a second tube of a compressible and elastically flexible material,

b. Forming a 1st seal on one end of said second tube of a compressible and elastically flexible material,

c. Indexing on said second tube for the position of said fitting for aligning aperture with said aperture of said at least interior bag layer,

d. Making a hole in said second tube at said indexed position sufficient for the orifice of said fitting and for leaving said elastically flexible material in alignment with said at least interior bag layer material about said aperture,

e. Forming a 2nd seal on the other end of said second tube for forming an intermediate bag layer independent of said interior bag layer and sufficiently distant therefrom to allow said interior bag layer to smoothly expand within said intermediate bag layer within its elastic limits and for causing said intermediate bag layer to smoothly expand within its elastic limits,

f. Positioning said at least interior and intermediate bag layers into an external bag layer material having strength and abrasion resistant properties and a flexible limit and completing steps (f) thru (m) of Claim 23.

26. A method of forming a multi-layer container for retention and delivery of flowable material of Claim 25 wherein said forcing of said 1st flanged and 2nd flanged members of said fitting against said at least interior, intermediate, and external bag layers further comprises,

a. Fastening said fasteners with a force of 75 inch/lbs to 400 inch/lbs for forming a compression seal and for preventing movement creep of said at least interior, intermediate, and external bag layers and pulling away from said at least one fitting.

27. A method of forming a multi-layer container for retention and delivery of flowable material of Claim 26 wherein said forcing of said 1st flanged and 2nd flanged members of said fitting against said at least internal, intermediate, and external bag layers further comprises,

a. Fastening said fasteners with a force of 80 inch/lbs to 315 inch/lbs for forming a compression seal and for preventing movement creep of said at least internal, intermediate, and external bag layers and pulling away from said fitting.

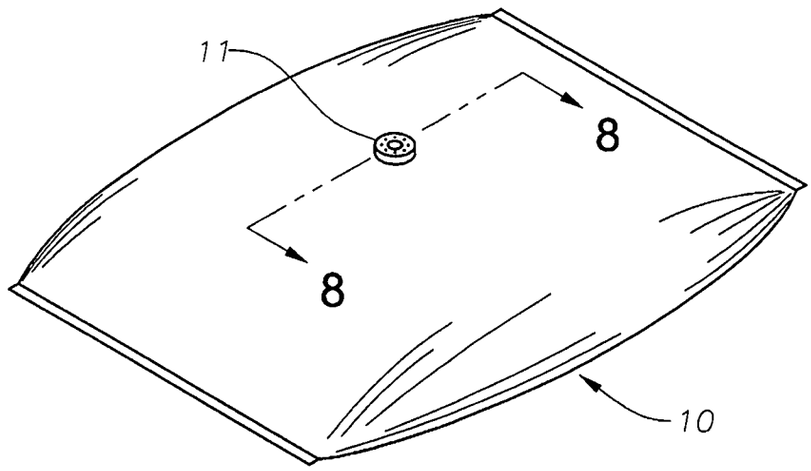


Fig. 1

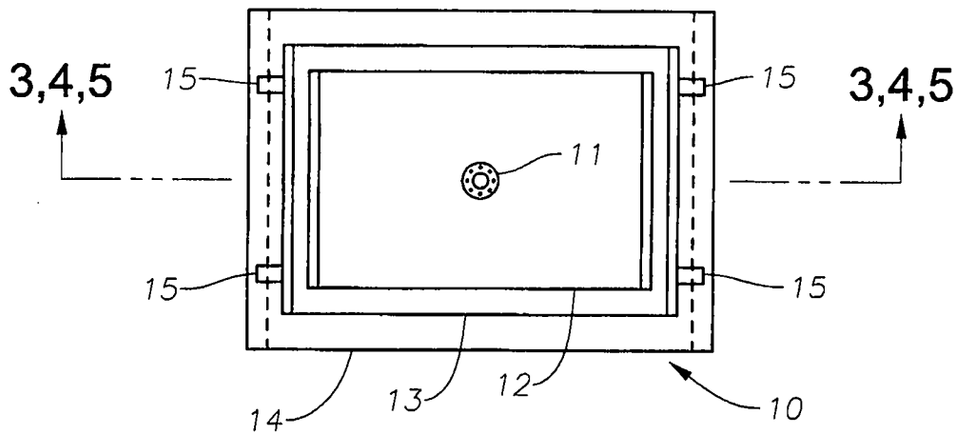


Fig. 2

Fig. 3

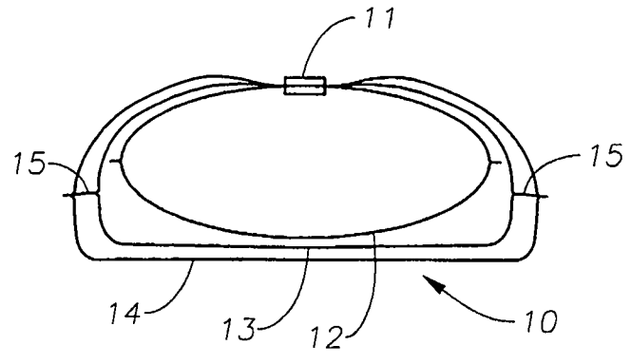


Fig. 4

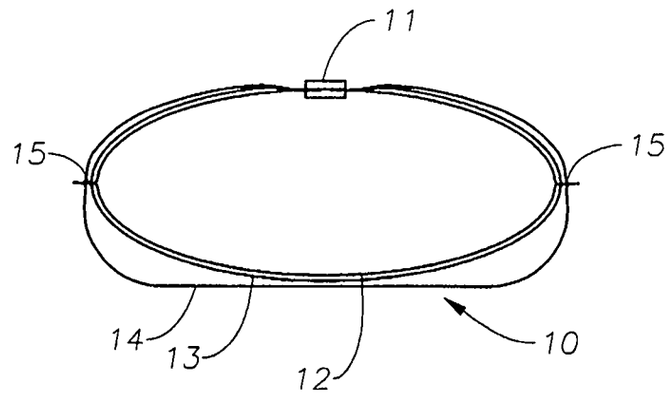
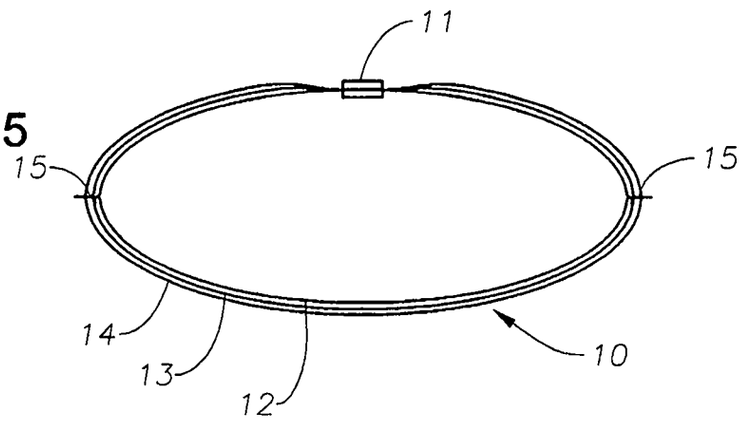


Fig. 5



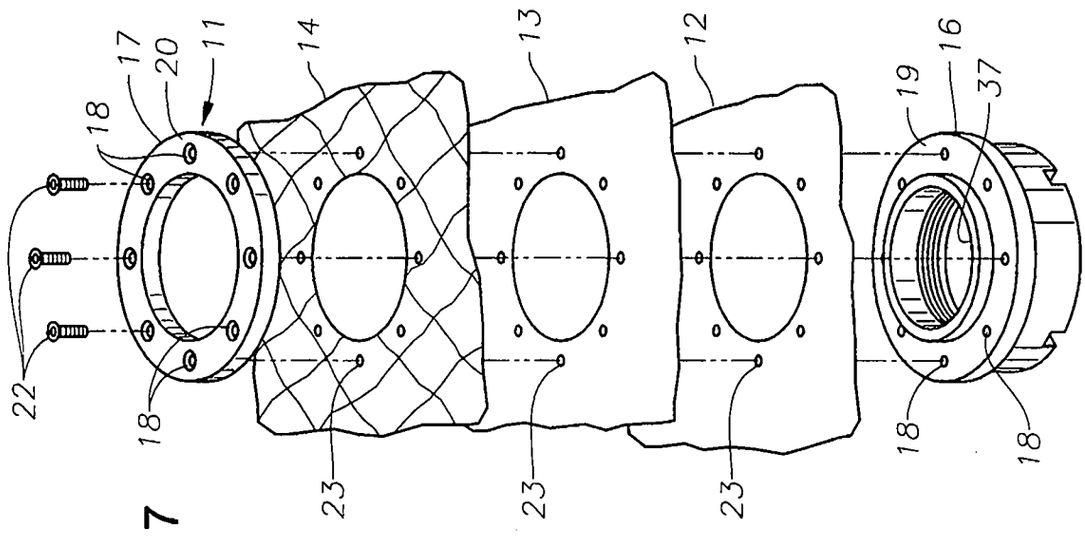

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Fig. 7

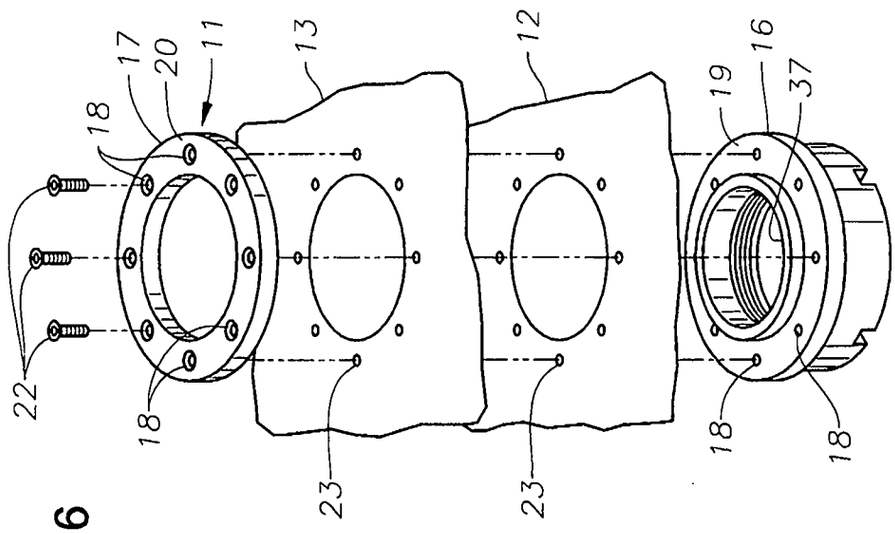
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Fig. 6

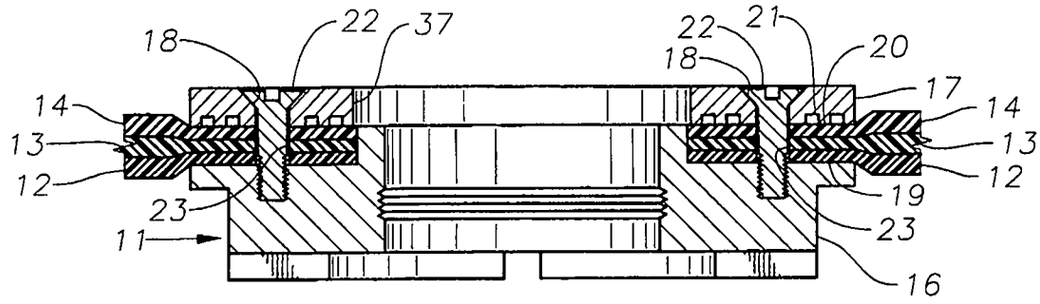

Fig. 8

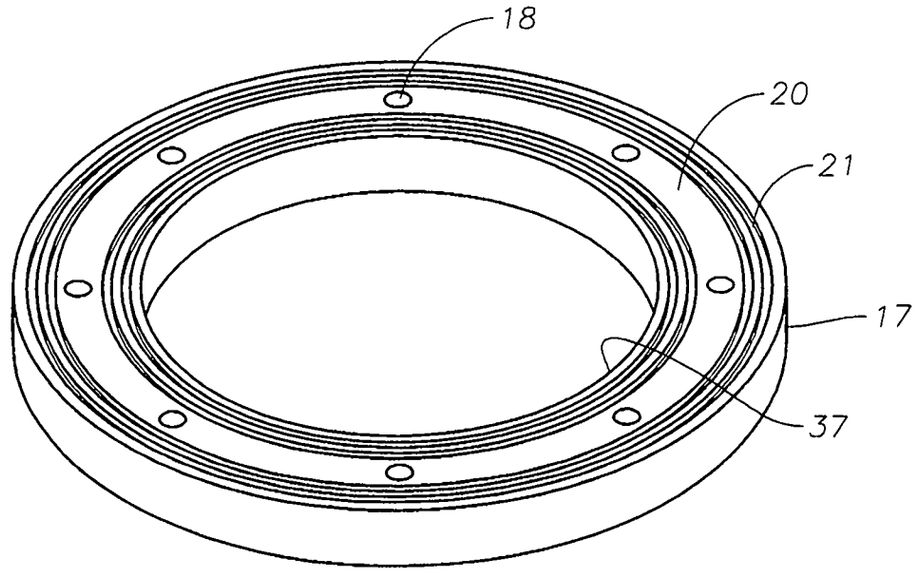

Fig. 9

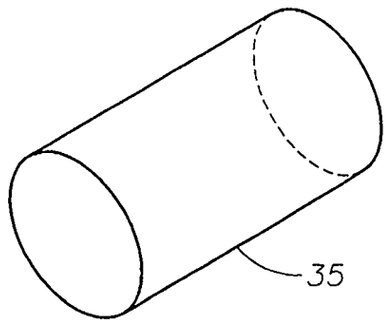

Fig. 10

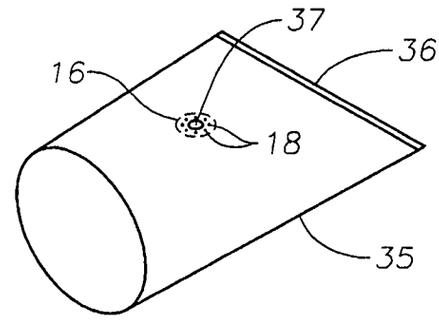

Fig. 11

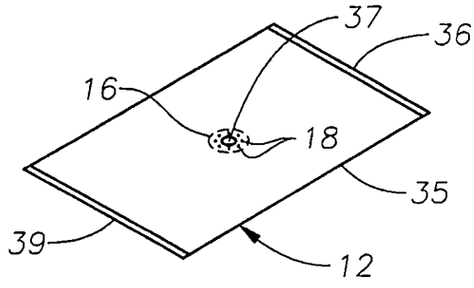

Fig. 12

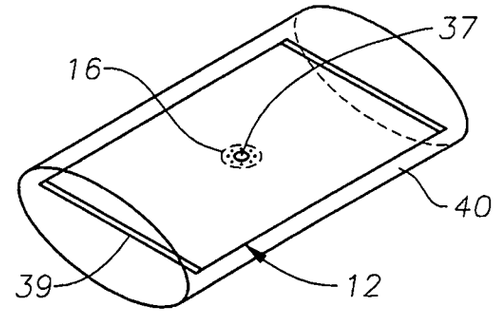

Fig. 13

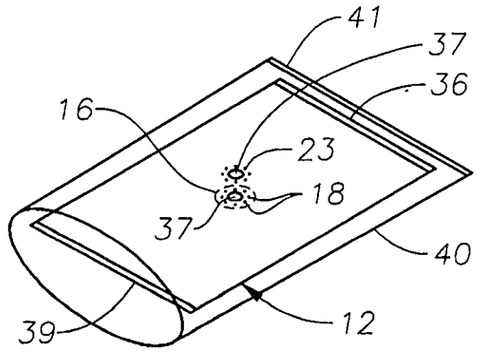

Fig. 14

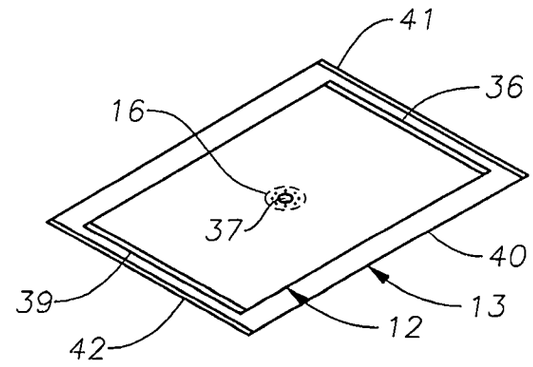

Fig. 15

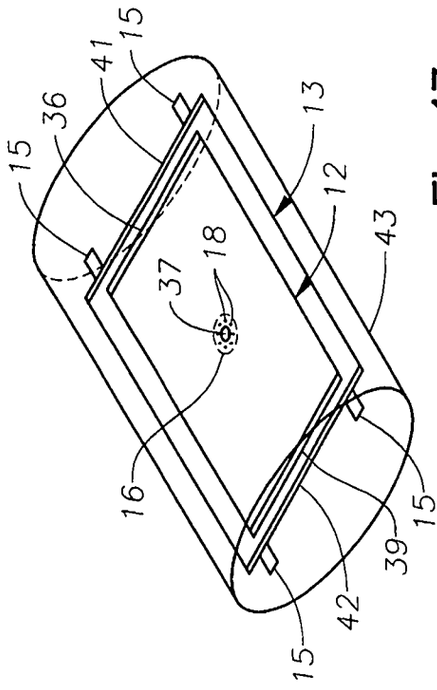

Fig. 17

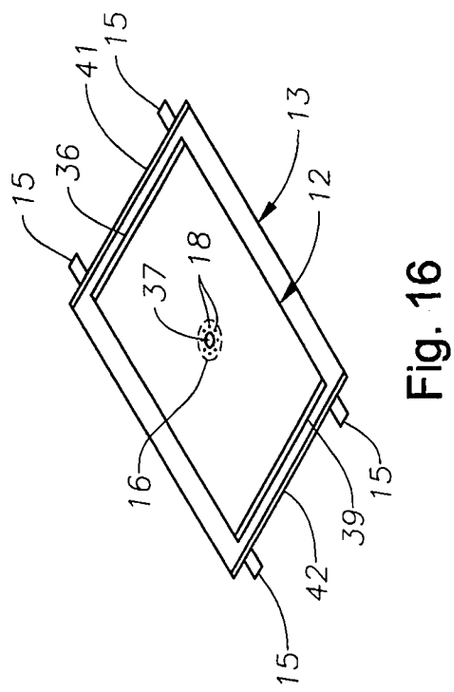

Fig. 16

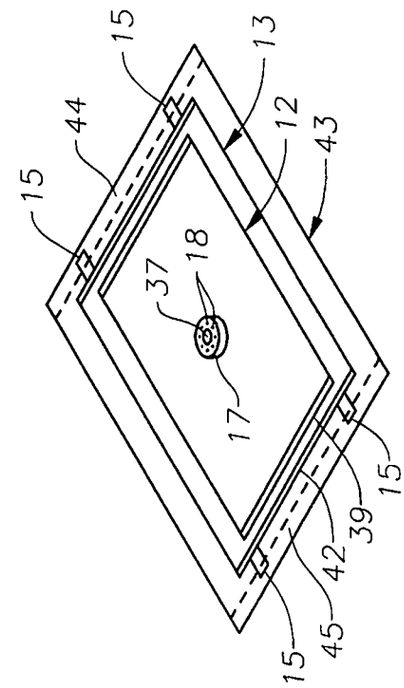

Fig. 19

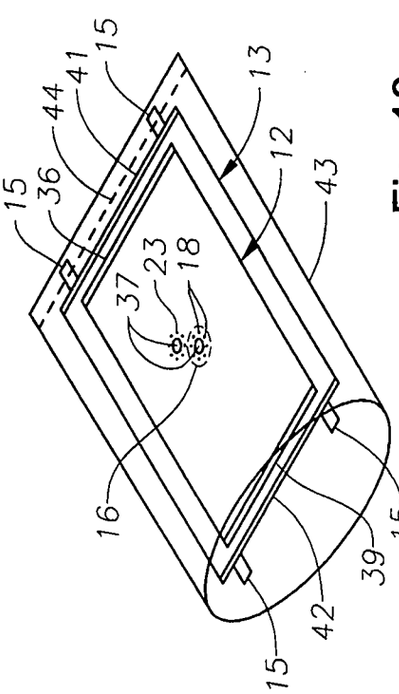

Fig. 18

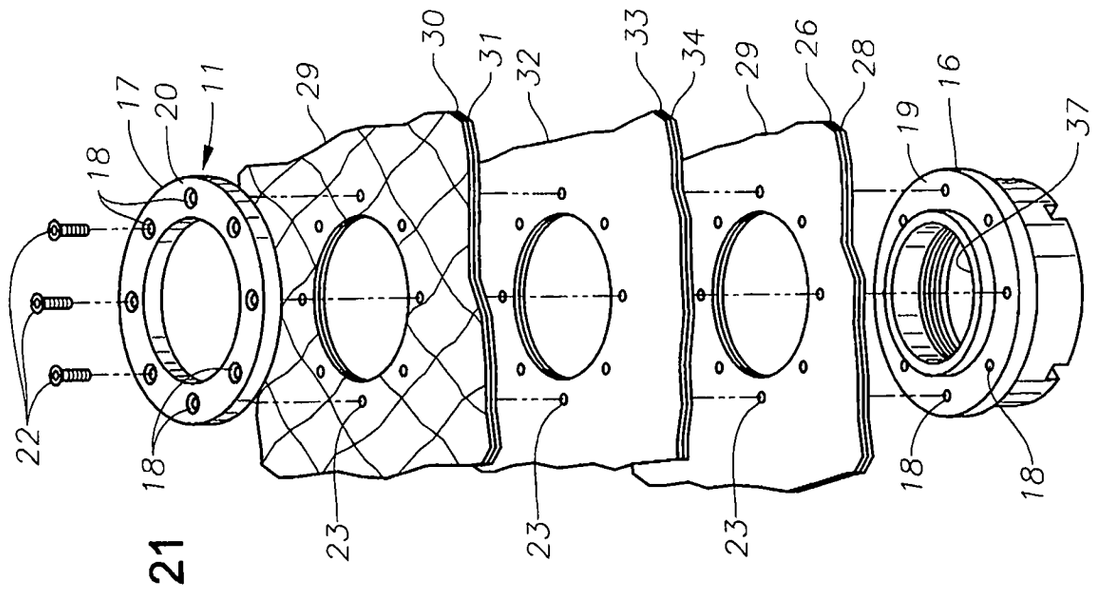
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Fig. 21

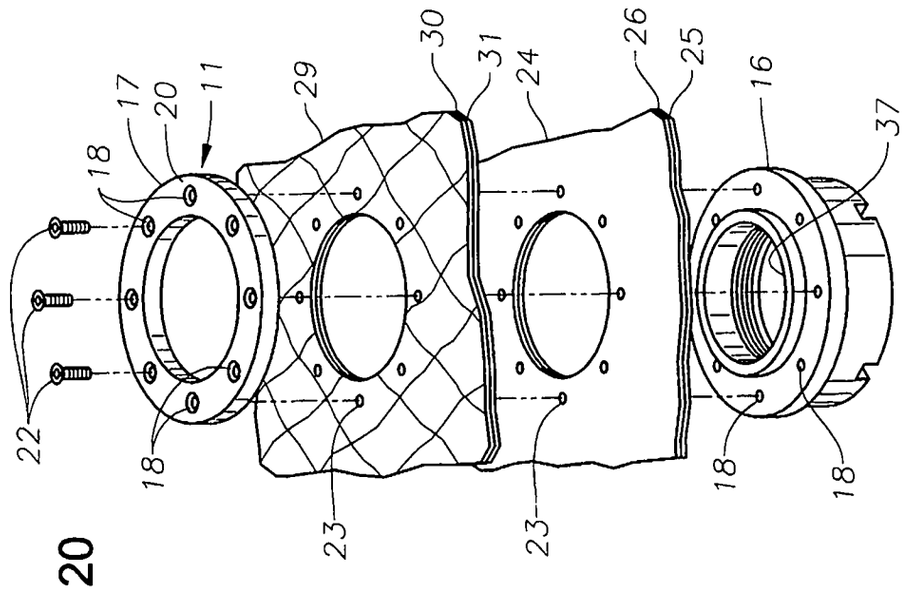
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Fig. 20

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(74) Agent: **PARKS, Michael, L.**; Parks & Associates P.C., 3131 West Alabama, Suite 101, Houston, TX 77098 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

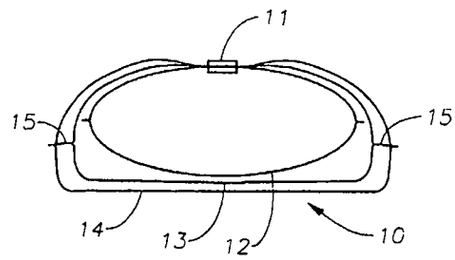
Declaration under Rule 4.17:
— *of inventorship (Rule 4.17(iv))*

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:
15 November 2007

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FLEXIBLE INDEPENDENT MULTI-LAYER CONTAINER AND METHOD FOR FORMING



(57) Abstract: Flexible independent multi-layer container and method for forming the flexible independent multi-layer container for retention and delivery of flowable materials having independent layers freely movable between each other and sealed off from each other with at least one fitting formed there through and compression seals formed between the flanges of the fitting and the flexible material of the independent multi-layer container by the at least one fitting formed there through for sealing the at least one fitting in place and for forming a compression seal between the independent multi-layer of the flexible materials and for forming a flexible multi-layer container.

WO 2006/121470 A3

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US05-43694

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - B65D 30/08 (2007.01)
USPC - 383/112
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)
IPC(8) - B65D 30/08 (2007.01)
USPC - 383/112

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 practicable, search terms used)
USPTO EAST System (US, USPG-PUB, EPO, DERWENT), MicroPatent, IP.com, DialogPro

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3,750,730 A (DORSCH) 07 August 1973 (07.08.1973) figure 3	1-24, 26, 27
Y	US 6,626,312 B2 (MATURANA) 30 September 2003 (30.09.2003) entire document	1-24, 26, 27
Y	US 3,783,920 A (WEIKERT) 08 January 1974 (08.01.1974) figure 4	5, 19
Y	US 6,481,239 B2 (HODOSH et al) 19 November 2002 (19.11.2002) figure 11b	6-15, 20-24, 26, 27
Y	US 3,520,503 A (MCGEHEE) 14 July 1970 (14.07.1970) figure 1	9-12
Y	US 5,693,412 A (WALTERS) 02 December 1997 (02.12.1997) entire document	14, 15, 26, 27
Y	US 5,337,638 A (COSS et al) 16 August 1994 (16.08.1994)column 1, lines 40-42	14, 15, 26, 27

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

* 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 application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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"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 when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 August 2007	26 SEP 2007
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (April 2007)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US05-43694

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 25
because they relate to subject matter not required to be searched by this Authority, namely:
There is no claim 25.

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

RECIPIENTE MULTICAPA INDEPENDIENTE FLEXIBLE Y MÉTODO PARA FORMACIÓN

CAMPO DE LA INVENCIÓN

[0001] Esta invención se relaciona con el campo de los recipientes multicapa flexibles y método para hacer los recipientes multicapa flexibles. Los recipientes multicapa flexibles son utilizados para transportar y almacenar materiales fluibles generalmente de volúmenes del tamaño del recipiente, pero se pueden utilizar con volúmenes más pequeños. Los recipientes flexibles son fácilmente doblables y se pueden desdoblar y utilizar para convertir recipientes normalmente secos utilizados en el embarque en recipientes de material húmedo o fluible o se pueden utilizar como recipientes aislados. Los recipientes multicapa flexibles son para la retención y el suministro de los materiales fluibles y tiene capas independientes que son libremente movibles una entre la otra y se sella uno del otro, pero tiene sellos formados en accesorios que están unidos a éstos recipientes para llenado, descarga, muestreo etc. Estas capas independientes son generalmente selladas una de la otra en la medida en que los recipientes del campo de la invención suministran contención secundaria de su contenido de chorreaduras y/o contaminación hacia el interior mediante penetración. Además en este campo de la invención estos recipientes y accesorios son fácilmente reutilizables/reciclables.

ANTECEDENTES DE LA INVENCIÓN

[0002] La técnica anterior ha estado en la búsqueda de recipientes flexibles para uso en el embarque de almacenamiento de materiales fluibles, tales como líquidos, suspensiones, etc y métodos para elaborarlos que no chorreen o fallen en el uso y se pueda reutilizar múltiples veces. Algunos de los tales recipientes de la técnica anterior se han utilizado solamente para almacenamiento en sitios estacionarios, que es un uso menos riguroso, en razón a que el uso estacionario no tiene unas fuerzas de carga dinámicas originadas por el movimiento en el proceso de embarque sobre los materiales flexibles y la interfase entre los materiales flexibles y los accesorios montados en estos recipientes flexibles. Sin embargo, aún el almacenamiento estacionario tiene fuerzas de carga dinámica causadas por lo pulsos líquidos de cargar y descargar estos recipientes flexibles. Estas fuerzas de carga ha sido la causa de que los tanques de la técnica anterior chorreen o fallen.

[0003] La técnica anterior a recurrido a muchos diferentes procesos para resolver los problemas de chorreadura asociados con estos tanques flexibles. En algunos casos los tanques o los recipientes de la técnica anterior utilizaron tecnología de soldadura en caliente para sellar los recipientes y unir los accesorios a los cuerpos flexibles de los recipientes. El problema de utilizar soldadura en caliente es que ésta requiere la aplicación precisa del calor y la presión durante un periodo de tiempo y se debe hacer en ambiente muy controlado. El orden de dificultad de todas

estas variables en el proceso de soldadura en calor se incrementa dramáticamente en relación con el número de capas de material que están siendo soldadas con calor a la vez. Si el proceso de soldadura con calor genera demasiado calor en la capa superficial que está siendo soldada el material plástico se puede cristalizar y volverse quebradizo lo cual puede originar la falla de la soldadura y del recipiente. Si el proceso de soldado en caliente genera demasiado poco calor en las capas medias que están siendo soldadas los materiales plásticos pueden ser no suficientemente soldados y la soldadura defectuosa falla y el tanque chorrea. Estos defectos en muchos casos no serian evidentes al momento de la elaboración, pero serian obvios cuando el recipiente fuera cargado o embarcado y el recipiente fallara completamente o chorreará el producto que esta siendo embarcado.

[0004] Otra técnica anterior ha intentado agregar soldadura química al proceso de soldado con calor y presión de los materiales flexibles utilizados en la formación de los tanques flexibles y para unir los accesorios a los recipientes y tanques, pero esto ha probado ser tan poco exitoso como lo es la soldadura con calor y presión. Estas fallas ocurren especialmente cuando los recipientes de la técnica anterior son sometidos a movimiento hidráulico violento, el cual es encontrado en los embarques de fluido de los recipientes. Se debe conocer que los recipientes no son estorbados y el fluido interno puede tener un rango completo de movimiento dentro de tales recipientes, el cual puede ser de 40 pies de largo puede producir una presión grande sobre los recipientes flexibles.

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[0005] Además la técnica anterior descubrió que aún si todos de todas las variables químicas, de calor y presión fueran perfectas, la falla para formar una soldadura y los materiales del recipiente flexibles de asegurar los accesorios pondrían a un ocurrir en razón a que el aceite del cuerpo de los trabajadores, el polvo, o aún la diferencia del uso de las superficies a ser soldadas podrían originar la falla.

[0006] La técnica anterior suministra miembros mecánicos además del proceso de soldadura sea de soldado químico y/o de calor y presión para formar un sello para asegurar el recipiente y el tanque en el punto donde los accesorios están montados. En estas aplicaciones los materiales flexibles son sellados alrededor de hueco hecho en los materiales flexibles donde el accesorio iba a ser insertado en el recipiente y luego los accesorios fueran mecánicamente sujetados al tanque o recipiente flexible. Los materiales flexibles sellados alrededor del hueco no cuentan con la sujeción mecánica para sellar las capas múltiples alrededor del hueco ni el palmoteo mecánico evita que los materiales flexibles formen las capas múltiples evitando el movimiento de arrastre en los recipientes flexibles cuando ellos se llenan y los materiales flexibles se estiran o expanden en razón del llenado o movimiento.

[0007] En aún otros recipientes flexibles de la técnica anterior los accesorios fueron creados con collares especializados que podrían tener las varias capas del

material flexible que es utilizado para formar los recipientes flexibles ajustados alrededor de los collares tanto por encima como por debajo y luego químicamente y/o con calor y soldado con presión para sellar el accesorio en el lugar sobre el tanque flexible o recipiente. Estas soldaduras de material flexible a materiales más rígidos de estos collares crearon no solo los problemas típicos de las soldaduras química, de calor y presión, si no también juntos de rasurado de tensión en la interfase entre el collar y las capas de material que están siendo utilizadas en el tanque flexible o recipiente. Estos puntos de rasurado de tensión o producen fallas cuando se cargan y/o descargan estos tanques y recipientes, más tienen fallas durante el embarque de estos causado por las acciones de olas dinámicas en estos recipientes o tanques flexibles. Además estos collares especializados tienden hacer un poco rígidos e impiden el doblez de los recipientes flexibles para embarque.

[0008] La técnica anterior en un esfuerzo por solucionar algunos de estos problemas de chorreadura, en los accesorios en los recipiente flexibles especialmente en condiciones de operación severa intentaron desarrollar accesorios especiales adicionales, tales como la cuerda concéntrica y el alambre reforzado "doilies" alrededor de los accesorios que son utilizados con recipiente flexibles. Estos "doilies" reforzados fueron entonces soldados químicamente y/o con calor y presión para unir los materiales flexibles de las varias capas de recipientes flexibles a estos doilies. Finalmente, una sujeción firme del metal se suministró con los miembros sujetadores que fueron asegurados en el

accesorio, pero no en los materiales flexibles de los recipientes flexibles. Esta técnica anterior fue diseñada para suministrar miembros no compresibles duros para sujetarse de manera firme para un sostenimiento seguro. Esta técnica anterior se enfocó en el problema del movimiento de arrastre o "empuje hacia afuera" de los materiales flexibles de los accesorios. No obstante no resuelve el problema de las fallas de los materiales flexibles en la interfase entre los materiales flexibles y los accesorios más rígidos que ocurrieron en razón de la acción de la ola y otras causas en el transporte de estos recipientes flexibles y que ocurrieron al momento de cargar y/o descargar estos recipientes.

[0009] Otra técnica anterior solo formó una soldadura química y/o un sello de calor y presión alrededor del lugar en la pared de los materiales flexibles del recipiente y luego puso un accesorio atravesado y unido al accesorio con un tornillo por debajo del sujetador de collar. El tornillo por debajo del sujetador de collar unió el accesorio de manera segura alrededor de la soldadura química y/o el sello de calor y presión ya formado. Sin embargo este tipo de montaje de accesorio estuvo sometido a falla en razón del movimiento de arrastre o de las fuerzas de empuje hacia fuera que son generadas por el estiramiento de los materiales flexibles utilizados en las paredes de los recipientes en la medida en que ellos son llenados o en la medida en que son creadas olas de movimiento en estos contenedores o recipientes de embarque.

[0010] Además de lo anterior, la técnica anterior utilizó un recipiente flexible de varios materiales que tiene tanto material flexible como material reforzado para evitar la chorreadura de tal forma que cuando ocurrieron fallas en una capa de material, este no se salio del recipiente. Algunos de estos materiales flexibles tuvieron fibras tejidas puestas en las capas interiores de los materiales flexibles utilizados para formar las capas de un recipiente flexible, pero estas fibras crearon espacios y suministraron puntos de fricción contra las otras capas lisas del material flexible. Estos espacios y los puntos de fricción originaron arrugas y pliegues en los materiales de capa lisa y se volvieron puntos de rasurado o pellizco de tensión por originar huecos de aguja en las capas lisas de los materiales flexibles. Una vez que el hueco se forma entonces la fibra tejida suministra canales para permitirle al producto chorrear a las otras capas del recipiente o al recipiente chorrear.

[0011] La técnica anterior también ha ensayado utilizar materiales flexibles muy gruesos para suministrar resistencia pero estos materiales agregaron peso a los recipientes y no fueron muy flexibles. Además estos materiales flexibles muy gruesos tuvieron la tendencia a no doblarse y a llenarse suavemente y, si ellos no lo hacen, entonces los pellizcos de tensión en el material flexibles causarían que estos materiales tuvieran chorreaduras completas de pasador a través de ellos. Una vez que ocurra la chorreadura y el producto de fluido consigue pasar los materiales flexibles gruesos, que se suministraron para resistir, la presión del fluido es transferida a través de la siguiente capa de

materiales flexibles, que puede conducir a la falla del recipiente. Además, si un material flexible de pared delgada es de menos de 15 mil de grosor se utiliza con un material flexible muy grueso como la capa interior entonces cuando éste tipo de recipiente se descarga la succión de la bomba en su toma puede chupar éste material flexible de pared delgada hacia la admisión y cortar o dañar ese material flexible que evitaría el uso adicional del recipiente.

[0012] También la técnica anterior utilizó materiales flexibles gruesos simples con materiales de refuerzo construidos en capas flexibles simples con sellos de compresión y soldaduras químicas para hacer tanques, pero estos tanques son muy pesados y los materiales de refuerzo se unen con los materiales del tanque para volverse una capa de material. Además de ser pesador estos tipos de tanques no suministran contención ambiental y la falla de la pared simple fue la falla completa de estos tanques. También estos tanques fueron además de ser pesados, ellos eran inflexibles y no se podían desdoblar sobre ellos mismos para embarcar tanques múltiples en un recipiente de embarque.

[0013] Como la técnica anterior ha agregado tecnología para resolver estos problemas en recipiente flexibles multicapa, el método de elaboración se volvió más complicado y más costoso. En muchos casos la tecnología agregada no resolvió los problemas de las fallas del recipiente en el embarque o en almacenamiento estático.

[0014] Además de los problemas de contención ambiental, estos recipientes de la técnica anterior tenían problemas de reciclabilidad en razón a que los accesorio no estaban tan integrados a los materiales, que podrían haber sido reciclados, esto es prohibitivamente costoso al reciclarlos.

[0015] Los incrementos en los costos de embarque a demandado que los recipientes flexibles de la técnica anterior sean fácilmente doblados y estrechamente empacados para conseguir tantos recipientes doblados embarcados como sea posible a un sitio y luego llenados para ahorrar los costos crecientes de transporte. Estos tanques de la técnica anterior con los accesorios en masa y los materiales de refuerzo gruesos no eran estrechamente doblables y eran costosos de embarcar, lo cual los hacia menos deseables.

[0016] La técnica anterior no reconoce que la energía pasaba a través de la superficie de los materiales flexibles en la medida en que estos tanques flexibles son movidos y transportados ni ellos reconocían las energías de manejo que son creadas luego de llenar y descargar los materiales de éstos recipientes flexibles. Como estos accesorios están directamente en la línea de senda de la energía que está pasando a través de la superficie de los materiales de recipiente flexible, ocurrían muchas fallas en las interfases entre el material flexible y el accesorio.

OBJETO DE LA INVENCIÓN

[0017] El objeto de ésta invención es crear un recipiente multicapa flexible y crear un método para elaborar un

recipiente multicapa flexible para uso en embarque de almacenamiento de materiales fluidos, tales como líquidos, suspensión, mezclas, etc. que no chorrean o fallan en el uso y se pueden reutilizar repetidas veces.

[0018] También un objeto de ésta invención es suministrar un recipiente flexible que puede servir como tanque o recipiente estacionario y manejar las fuerzas de carga dinámicas causadas por lo pulsos líquidos creados durante la carga y descarga de éstos recipientes multicapa flexibles sin chorreadura o falla.

[0019] Aún otro objeto del método de ésta invención es utilizar procesos de soldado químico y/o de calor sobre éstos materiales flexibles compresibles y elásticos en su formación donde tan pocas capas son soldadas de una vez como sea posible. En una modalidad preferida, solamente una capa del material es soldada químicamente y/o con calor de una vez en la formación de éstos recipientes flexibles para evitar que los materiales cristalizados se formen y para obtener un buen sello. En el punto donde los accesorios se montan a través de las paredes de los recipientes flexibles, no ocurre soldeo entre los materiales flexibles compresibles y elásticos y los accesorios, que elimina cualquier formación de materiales cristalizados. En estos puntos solamente se forma un sello de compresión para fijar el accesorio en su lugar y sellar los materiales flexibles elásticos compresibles para formar un recipiente flexible, por lo tanto el resquebrajamiento no ocurre y los materiales flexibles compresibles se mantienen con el rango completo de flexibilidad.

[0020] También un objeto del método de ésta invención es suministrar las etapas simplificadas para la formación del recipiente flexible que suministra un control relativamente fácil de las variables que pueden causar que una soldadura química y/o de calor fallé, tal como el aceite del cuerpo de los trabajadores, el polvo, etc. y al mismo tiempo suministre un método que provea un recipiente flexible no sujeto a falla en su operación.

[0021] Aún otro objeto de ésta invención es la formación de recipientes que se pueden utilizar en el embarque de líquidos y que pueden manejar o soportar las fuerzas hidráulicas violentas causadas por movimiento que se encuentra en los fluidos de embarque en los recipientes flexibles. Esta invención puede aguantar las fuerzas producidas en el embarque de un recipiente flexible de 40 pies sin obstrucción en éstos.

[0022] Aún un objeto adicional de ésta invención es un recipiente flexible con accesorios suministrados a través de los materiales de capa múltiple flexible elástica compresible del recipiente flexible de la invención que no tienen que tener collares especiales para soldarlos con químico o calor para formar sellos para asegura los accesorios y para formar un sello entre los materiales de capa múltiple en el accesorio para formar un recipiente flexible con los accesorios.

[0023] Aún un objeto adicional de ésta invención es un recipiente flexible con un accesorio suministrado a través de los materiales de capa múltiple flexible elástica compresible del recipiente flexible de ésta invención que no tienen unas bobinas especialmente preparadas o materiales de cresta contra los cuales los accesorios puedan ser mecánicamente sujetados para mantener los materiales flexibles contra movimiento de arrastre o movimiento de empuje hacia fuera de los materiales flexibles de éstos recipientes.

[0024] Es el objeto de ésta invención suministrar accesorios que tengan superficies rebordeadas para mantener los materiales de capa múltiple flexibles elásticos compresibles de los recipientes flexibles de la invención con suficiente fuerza para tener los materiales de capa múltiple flexibles elásticos compresibles formando sellos de compresión para sellar los accesorios y las capas múltiples de material para formar un recipiente flexible. Además estos rebordes pueden tener superficies que ayudan a sostener las capas múltiples contra movimiento de arrastre o empujar el material flexible hacia afuera de la superficies rebordeadas que forman el sello de compresión. También para ayudar contra el movimiento de arrastre o empujar hacia afuera las superficies rebordeadas por múltiples capas que forman el sello de compresión están los aseguradores que pasan a través de las capas múltiples que son mantenidas en un sello de compresión y son utilizadas con los rebordes para apretar hacia abajo los rebordes para formar el sello de compresión entre los rebordes y las capas múltiples.

[0025] Otro objeto de ésta invención es permitir el llenado suave de las capas internas de los materiales flexibles antes de acoplar completamente la siguiente capa de materiales flexibles de tal forma que no se presenten puntos de rasurado o pellizco por tensión para eliminar la causa de la formación de huecos en las capas lisas de los materiales flexibles y luego hacer que la siguiente capa de material flexible lizo se expanda suavemente, impulsada por la capa de debajo de ésta después de que ésta es suavemente expandida con sus limites elásticos.

[0026] Aún un objeto adicional es suministrar la capa más exterior con una capa de fibra de refuerzo para la resistencia a la abrasión y tener las capas más lisas dentro de ésta de tal forma que si ocurre una falla interna en las capas lisas múltiples de materiales la capa de fibra de refuerzo no servirá como canal para permitirle al producto chorrear a las otras capas del recipiente o propagar la falla o chorreadura del tanque.

[0027] Es el objeto de ésta invención utilizar capas relativamente delgadas de capas de material flexible elástico compresible, pero no tan delgadas que no se pueda formar un sello de compresión y no tan gruesas que puedan originar o permitir el movimiento de arrastre o fuerzas de empujado hacia afuera para originar la falla de los materiales y originar la chorreadura del recipiente flexible y sus accesorios.

[0028] También un objeto de ésta invención es utilizar capas múltiples de materiales flexibles elásticos compresibles relativamente delgados para formar éstos recipientes y para lograr la resistencia de un material flexible siempre grueso con materiales de refuerzo construidos en éste. Al utilizar estas capas independientes en relación mecánica estrecha una con la otra, el recipiente formado con estas capas múltiples de materiales flexibles elásticos compresibles logran resistencia superior sin volverse inflexibles. Estos tanques o recipientes son fácilmente desdoblados sobre ellos mismos para embarcar múltiples tanques en un recipiente de embarque. Además estos recipientes de capa múltiple suministran contención ambiental al estar compuestos por capas múltiples si una capa genera chorreadura también.

[0029] También un objeto de ésta invención es suministrar un recipiente flexible que sea reciclable en razón a que sus accesorios son fácilmente removidos para reutilizar y no están unidos a las capas múltiples flexibles si no que el accesorio sella las capas múltiples para suministrar contención secundario contra chorreaduras en su recipiente flexibles en el accesorio y las capas independientes suministran contención a través del recipiente flexible.

[0030] Aún un objeto adicional de ésta invención es suministrar un recipiente altamente flexible que sea relativamente poco costoso y que no es voluminoso y fácil de doblar en un espacio pequeño para ser embarcado a un sitio para llenado.

BREVE DESCRIPCIÓN DE LOS DIBUJOS

[0031] El recipiente multicapa flexible y los métodos para elaborar el recipiente multicapa flexible de ésta invención se puede practicar en ciertas formas físicas y arreglos y ajustes de las partes variables aquí descritas, si no que las modalidades preferidas las cuales se describirán con detalle en la especificación y se ilustraran en los dibujos que vienen formaran parte de ésta.

[0032] La Figura 1 es un dibujo de un recipiente multicapa flexible de ésta invención, que contiene materiales fluibles, formados de capas independientes libremente movibles una entre la otra y sellados uno del otro con por lo menos un accesorio formado a su través para formar sellos de compresión con materiales multicapa compresibles y elásticamente flexibles y por lo menos un accesorio.

[0033] La Figura 2 es una vista de un dibujo desde arriba del recipiente multicapa flexible de ésta invención, libre de materiales fluibles allí, formados de capas independientes libremente movibles una entre la otra y sellados uno del otro con por lo menos un accesorio formado a su través para formar sellos de compresión con los materiales de multicapa compresibles y elásticamente flexibles en por lo menos un accesorio.

[0034] La Figura 3 es un dibujo en sección transversal de recipiente multicapa flexible de ésta invención con por lo menos una 1ra capa de bolsa formada de un material compresible y elásticamente flexible suavemente expandido entre los limites elásticos luego de haber recibido algo de los materiales fluibles, pero antes de originar que la por lo menos la 2da capa de bolsa se expenda.

[0035] La Figura 4 es un dibujo en sección transversal del recipiente multicapa flexible de ésta invención con por lo menos una 2da capa de bolsa formada de un material compresible y elásticamente flexible de un tamaño relativo a por lo menos la 1ra capa de la bolsa formada en material flexible para permitirle a la 1ra capa de la bolsa expandirse suavemente dentro de limites elásticos para hacer que la 2da capa de la bolsa se expanda con sus limites elásticos luego de que la 1ra capa de la bolsa se expanda al recibir los materiales fluibles.

[0036] La Figura 5 es un dibujo en sección transversal del recipiente multicapa flexible de ésta invención con por lo menos una 3ra capa de bolsa formada de un material flexible que tiene propiedades fuertes y resistentes a la abrasión de un tamaño relativo a por lo menos la 1ra y 2da capas de la bolsa para permitir que la 1ra y 2da capas de la bolsa formadas de materiales flexibles se expandan suavemente dentro de sus limites elásticos para hacer que la 3ra capa de la bolsa se expanda dentro de sus limites elásticos luego de

que la 1ra y 2da capas de bolsas se expandan al recibir los materiales fluibles.

[0037] La Figura 6 es un dibujo en explosión del recipiente multicapa flexible de ésta invención, que muestra el 1er miembro de reborde de por lo menos un accesorio interno de por lo menos la 1ra capa de bolsa, y que muestra el 2do miembro de reborde por lo menos un accesorio externo de la 2da capa de bolsa y que muestra los aseguradores para pasar a través de la abertura en el 1er y 2do miembro de reborde y a través de la 1ra y 2da capas de bolsa para formar un sellos de compresión con la 1ra y 2da capas de bolsa y mantener las 1ra y 2da capas de bolsa contra movimiento de arrastre luego de que dichos aseguradores son asegurados.

[0038] La Figura 7 es un dibujo en explosión del recipiente multicapa flexible de ésta invención que muestra por lo menos un 1er miembro de reborde de por lo menos un accesorio interno de por lo menos la 1ra capa de bolsa, y que muestra una por lo menos 2da capa de bolsa y una por lo menos 3ra capa de bolsa y por lo menos un 2do miembro del reborde del por lo menos un accesorio externo de por lo menos la 3ra capa de bolsa para formar un sello de compresión con las capas de bolsa 1ra, 2da y 3ra y mantener la 1ra, 2da y 3ra contra movimiento de arrastre luego de que dichos aseguradores son asegurados.

[0039] La Figura 8 es una vista en sección transversal tomada a través de las Figuras 1 y 7 de por lo menos un accesorio con los aseguradores asegurados a través de por lo

menos 1er miembro de reborde y el 2do miembro de reborde para formar un sello de compresión entre la 1ra, 2da, y 3ra capas de bolsa y mantener la 1ra, 2da, 3ra capa de bolsa contra movimiento de arrastre. Esta sección transversal también muestra el orificio en por lo menos un accesorio para llenar y vaciar el recipiente multicapa flexible.

[0040] La figura 9 es una vista de representación del 2do miembro de reborde de por lo menos un miembro de accesorio, que muestra la superficie suficiente del 2do miembro de reborde para agarrar la superficie para mantener la 1ra, 2da y 3ra capas de bolsa y formar un sello de compresión y mantenerlos en la 1ra, 2da y 3ra capas de bolsa contra movimiento de arrastre.

[0041] La Figura 10 es una vista de representación que muestra las etapas de inicio del método de ésta invención para formar recipientes multicapas flexibles para contener materiales fluibles, formados de capas independientes libremente movibles una entre la otra y sellados uno del otro iniciando con un tubo de un material compresible y elásticamente flexible.

[0042] La Figura 11 es una vista de representación que muestra la formación de un primer sello sobre un extremo del tubo de la Figura 10 y la indexación donde por lo menos el 1er reborde de por lo menos un accesorio va a ser localizado y que muestra huecos suficientes para el orificio del accesorio y para dejar el material elástico flexible con huecos para asegurar pero en contacto con el 1er reborde del accesorio y

el 1er reborde del accesorio mantenido en su lugar dentro del tubo de la Figura 10

[0043] La Figura 12 es una vista de representación que muestra un segundo sello formado en el otro extremo del tubo de la Figura 11 el tubo para formar por lo menos una 1ra capa de bolsa del tubo de la Figura 10.

[0044] La Figura 13 es una vista de representación que muestra las etapas de inicio que forman una segunda capa de bolsa al colocar la primer capa de bolsa de la Figura 12 dentro del tubo de un material compresible y elásticamente flexible.

[0045] La Figura 14 es una vista de representación que muestra la formación de un primer sello y un extremo del tubo de la Figura 13 e indexación donde el 1er reborde de por lo menos un accesorio se localiza para linear el hueco suficiente para el orificio del accesorio y permanecer el material elástico con huecos para los aseguradores pero para están en contacto con el material de la 1ra capa de bolsa.

[0046] La Figura 15 es una vista de representación que muestra un segundo sello sobre el otro extremo del tubo de la Figura 14 para formar por lo menos una 2da capa de bolsa del tubo de la Figura 13.

[0047] La Figura 16 es una vista de representación que muestra la 2da capa de bolsa de la Figura 15 pero que tiene

miembros de lengüeta conectados a la 2da capa de bolsa y proyectados desde ésta.

[0048] La Figura 17 es una vista de representación que muestra las etapas de inicio para formar una 3ra capa de bolsa al colocar la 1ra y 2da capa de bolsa de la Figura 16 dentro del tubo de un material flexible que tiene propiedades fuertes y resistentes a la abrasión de un tamaño relativo a dicha 1ra y 2da capas de bolsa para permitir que la 1ra y 2da capas de bolsa se expandan suavemente dentro de sus limites elásticos y para hacer que la 3ra capa de bolsa se expanda dentro de sus limites flexibles.

[0049] La Figura 18 es una vista en representación que muestra la formación de un primer sello en un extremo del tubo de la Figura 17 que une los miembros de lengüeta a ésta e indexación donde por lo menos el 2do reborde de por lo menos un accesorio va ha estar localizado y mostrando un hueco suficiente para el orificio de los accesorio y alineado con por lo menos un 1er reborde interno de por lo menos una 1ra capa de bolsa y alineado con el material elástico restante con huecos para los aseguradores pero para estar en contacto con el material de la 3ra capa de bolsa.

[0050] La Figura 19 es una vista de representación que muestra un segundo sello en el otro extremo del tubo de la Figura 18 para formar por lo menos una 3ra capa de bolsa del tubo de la Figura 17 y unir los miembros de lengüeta a ésta.

[0051] La Figura 20 es un dibujo en explosión para otra modalidad de recipiente multicapa flexible de ésta invención utilizando materiales construidos, que muestran el por lo menos el 1er miembro rebordeado y por lo menos un accesorio interno de por lo menos una capa de bolsa interior formada de un material compresible y elásticamente flexible, y que muestra el por lo menos 2dc miembro de reborde de por lo menos un accesorio externo de por lo menos la capa de bolsa exterior formada de material flexible coextruído que tiene propiedades fuertes y resistentes a la abrasión y que muestran los aseguradores para pasar a través de la abertura en el 1er y 2do miembro de reborde y a través de las capas de bolsa interior y exterior para formar un sello de compresión y mantener las capas de bolsa interior y exterior contra movimiento de arrastre luego de que los aseguradores son asegurados.

[0052] La Figura 21 es un dibujo en explosión del recipiente multicapa flexible de esta invención que utiliza materiales coextruídos, que muestra el por lo menos 1er miembro de reborde de por lo menos un accesorio interno de por lo menos la capa de bolsa interior, y que muestra una por lo menos capa de bolsa intermedia formada de material compresible coextruído y elástico flexible entre las capas de bolsa interior y exterior y por lo menos el 2do miembro de reborde del por lo menos un accesorio externo de por lo menos la capa de bolsa exterior para formar un sello de compresión y mantener las capas de bolsa interior, intermedia y exterior contra movimiento de arrastre luego de que los aseguradores son asegurados a su través.

DESCRIPCIÓN DE LAS MODALIDADES PREFERIDAS

[0053] La presente invención se relaciona con recipientes multicapa flexibles para la retención y suministro de materiales fluibles que tiene capas independientes libremente movibles una entre la otra y sellados uno del otro por cada capa independiente que es sellada para formar una bolsa con por lo menos un accesorio formado a su través y sellos de compresión formados con por lo menos un accesorio formado a su través generalmente indicado con el número de referencia 10 de la Figura 1. En por lo menos una modalidad como se muestra en la Figura 1, el recipiente de multicapa flexible 10 se muestra siendo llenado con un material fluible y con por lo menos un accesorio 11 ubicado en la parte superior. En la Figura 2 el recipiente multicapa flexible 10 se muestra vacío de materiales fluibles pero se muestra como se ve a través para mostrar las capas independientes separadas y libremente movibles una entre la otra y selladas una de la otra y tiene las lengüetas 15. De la Figura 2 se puede ver que cada capa de bolsa es de un tamaño que le permite expandirse suavemente dentro de sus limites elásticos y luego acoplar la siguiente capa de bolsa y también expandir suavemente la siguiente capa o capas de bolsa, pero aún dentro de los limites elásticos de todas las capas de bolsa. En la Figura 2 de esta modalidad se muestra una 1ra capa de bolsa 12, una 2da capa de bolsa 13, una 3ra capa de bolsa 14, con por lo menos un accesorio 11. Estas capas de bolsa deben ser suficientemente gruesas para dar una resistencia adecuada a una capa de bolsa pero no tan gruesa para ser inflexible y

no compresible. De otra parte no importa su resistencia ellos pueden no ser tan delgados como para no ser compresibles para formar o accionar como sellos de compresión. Para entender mejor ésta invención se debe hacer referencia a las Figuras 3, 4, y 5 que muestran la transición de las Figura 2 a la Figura 1 del recipiente multicapa flexible 10.

[0054] En relación a la Figura 3, la 1ra capa de bolsa 12 se forma de un material compresible y elásticamente flexible, tal como polietileno de un grosor de 15 mils, que tiene la capacidad de expandirse dentro de los mismos limites elásticos luego de recibir los materiales fluibles. Esta 1ra capa de bolsa 12 como se muestra en la Figura 3 se le permite expandirse hasta que esta se expande sumamente dentro de sus limites elásticos antes de acoplar la 2da capa de bolsa 13 como se muestra en la Figura 3. La 2da capa de bolsa 14 es mecánicamente separada como una capa independiente de la 1ra capa de bolsa 12. Así la primer capa de bolsa se forma como un recipiente de pared lisa sin puntos de rasurado o pellizcado de tensión para originar la formación de huecos en ésta 1ra capa de bolsa 12 en razón a que ésta no acopla la 2da capa de bolsa 13 hasta que ésta se ha formado completamente como un recipiente de pared lisa con la 2da capa de bolsa 13 antes de que ésta origine que la 2da capa de bolsa se expanda suavemente.

[0055] En relación a la Figura 4, la 2da capa de bolsa 13 se forma de un material compresible y elásticamente flexible, tal como polietileno de un grosor de 15 mils, que tiene la capacidad de expandieres dentro de sus limites elásticos,

pero de un tamaño para permitir que la 1ra capa de bolsa se expanda suavemente antes de que ésta acople la 2da capa de bolsa 13 y luego originar que la 2da capa de bolsa 13 se expanda suavemente dentro de sus limites elásticos luego de ser acoplada por la 1ra capa de bolsa 12. Así la 2da capa de bolsa 13 se forma como un recipiente de pared lisa sin puntos de rasurado o pellizcado de tensión para originar la formación del hueco en la 2da capa de bolsa 13 porque ésta no acopla la 3ra capa de bolsa 14 hasta que ésta se haya formado completamente como un recipiente de pared lisa dentro de la 3ra capa de bolsa.

[0056] En relación a la Figura 5, la 3ra capa de bolsa 14 se forma de un material flexible que tiene fuerza y resistencia a la abrasión, tal como una fibra tejida de polipropileno de 4oz a 16oz de grosor de peso, y un tamaño para permitir que la 2da capa de bolsa 13 se expanda suavemente dentro de sus limites elásticos y sea guiada por las lengüetas 15 antes de que ésta acople la 3ra capa de bolsa 14 para luego hacer que 3ra capa de bolsa 14 se expanda suavemente dentro de sus limites al ser acoplada con la 2da capa de bolsa 13 para formar un recipiente multicapa flexible 10. Al ser cada capa de bolsa expandida dentro de sus limites elásticos en la siguiente capas de bolsa se forma un recipiente multicapa flexible 10 el cual puede manejar las fuerzas hidráulicas violentas causadas por el movimiento en los fluidos de embarque en estos recipientes flexibles como si ellos fueran hechos de materiales flexibles mucho más gruesos, pero aún estos recipientes flexibles son mucho más ligeros y los recipientes más flexibles que les permiten ser

fácilmente doblados en espacio pequeño para ser embarcados a un sitio para llenado. También estos recipientes flexibles son generalmente más ligeros que los tanques flexibles de paredes más gruesas.

[0057] Esta capas de bolsa independiente se forman de un material compresible y elásticamente flexible que tiene la capacidad de expandirse dentro de los limites elásticos luego de recibir los materiales fluibles pero deben tener por lo menos un accesorio 11 para recibir y descargar los materiales fluibles. Como se demuestra en las Figuras 6 y 7, mediante éstas capas de bolsa que son independientes una de la otra, debe haber un suministro para montar por lo menos un miembro de accesorio 11 a través de cada capa de bolsa independiente y formar un sello entre cada una de éstas capas de bolsa en por lo menos un accesorio 11 para evitar las chorreaduras y hacer estos recipientes utilizables. Cualquier sello formado en por lo menos un miembro de accesorio 11 en la por lo menos 1ra capa de bolsa esta también sometida a expansión dentro de los limites elásticos del material flexible luego de recibir los materiales fluibles que originan la tensión o movimiento de arrastre asociado con aquellas fuerzas elásticas al llenado o las fuerzas de movimiento violentas producidas en el accesorio sobre tal recipiente. Además, la por lo menos 2da capa de bolsa 13 como se muestran en las Figura 6 y 7 se forma de un material compresible y elásticamente flexible de un tamaño relativo con la 1ra capa de bolsa 12 para permitir que la 1ra capa de bolsa 12 formada para expandirse suavemente dentro de limites elásticos del material flexible luego de recibir los materiales fluibles y para hacer que la 2da capa

de bolsa 13 sea suavemente expandida dentro de sus limites elásticos también pone tensión o movimiento de arrastre asociado con aquellas fuerzas elásticas sea al llenado o de las fuerzas de movimiento violentas producidas en el embarque en por lo menos la 2da capa de bolsa 13 también. Estas fuerzas de tensión o movimiento de arrastre se incrementan en por lo menos un miembro de accesorio 11 formado especialmente a través de la interfase de por lo menos la 1ra y 2da capas de bolsa 12 y 13 formadas en por lo menos un accesorio 11. En esta modalidad, como se muestra en la FIG. 6, el por lo menos un miembro de accesorio 11 para tratar con las fuerzas de tensión o movimiento de arrastre tiene un 1er miembro de reborde 16 interno de la por lo menos 1er capa de bolsa 12 formada y un 2do miembro de reborde 17 externo de la por lo menos 2da capa de bolsa 13 formada para formar un sello de compresión entre los rebordes y el material compresible y elásticamente flexible. Estos rebordes 16 y 17 tienen aberturas 18 a través de ellas para aceptar los aseguradores 22 para comprimir el material compresible y elásticamente flexible de por lo menos la 1er y 2do material de capa de bolsa 12 y 13, entre el 1er y 2do miembros de reborde 16 y 17 suficientemente para formar un sello de compresión entre ellos para sellar el por lo menos un miembro de accesorio 11 en su lugar y así formar un recipiente multi-capa flexible 10. Como aquellos expertos en la técnica de los sellos y la formación de sello reconocerán, si el material a ser utilizado como un sello no es suficientemente compresible fallará la formación de un sello. Si el material es suficientemente compresible, pero está infra-comprimido o sobre-comprimido el sello a ser formado fallará. Además en

los sellos de esta invención formados en este estado de compresión también deben tratar con el movimiento de arrastre, que es la tendencia para estos materiales elásticamente flexibles a empujarse hacia fuera de estos accesorios cuando ocurre un movimiento violento en el embarque, que genera puntos de presión dinámica aplicados a través de los planos o superficie de estos materiales elásticamente flexibles. Así las fuerzas utilizadas en los aseguradores 22 para formar estos sellos de compresión se debe ajustar para estos materiales y sus aplicaciones, y el rango preferido de 315 pulgadas/libras a 80 pulgadas/libras ha sido encontrado para trabajar, pero un rango más amplio de 400 pulgadas/libras a 75 pulgadas/libras también ha sido determinado para trabajar en la mayoría de los materiales.

[0058] En aún otra modalidad, esta invención, como se muestra en la FIG. 7, se relaciona con la inclusión de por lo menos una 3ra capa de bolsa 14 formada de un material flexible que tiene propiedades fuertes y resistentes a la abrasión y un tamaño relativo al por lo menos 1ra y 2da capas de bolsa 12 y 13 para permitir que por lo menos la 1ra y 2da capas de bolsa 12 y 13 formadas de materiales flexibles se expanda suavemente dentro de sus límites elásticos y para hacer que la 3ra capa de bolsa 14 se expanda dentro de sus límites flexibles. También esta invención se relaciona con por lo menos un miembro de accesorio 11 que tiene 1rcs y 2dos miembros de reborde 16 y 17 que tienen suficientes áreas de superficies de reborde 19 y 20 para acoplar la por lo menos 1ra capa de bolsa formada 12 de la superficie interior de por lo menos la 1ra capa de bolsa 12 y una superficie de reborde

suficiente 20 para acoplar la por lo menos 3ra capa de bolsa 14 de la superficie externa de por lo menos la 3ra capa de bolsa 14 para formar los sellos de compresión a través de la 1ra, 2da, y 3ra capa de bolsa 12, 13, y 14 en por lo menos un miembro de accesorio 11. En algunas modalidades como se muestra en las FIGS. 8 y 9 las superficies de reborde 19 y 20 además de tener suficientes superficies de reborde 19 y 20 crean sellos de compresión y se mantienen contra el movimiento de arrastre, ellos también han suministrado superficies de agarre 21 tal como se muestra en las FIGS. 8 y 9 para ayudar a formar un sello de compresión y mantenerse contra el movimiento de arrastre de los materiales en el miembro de accesorio 11 cuando los aseguradores 22 son apretados. Como se muestra en las FIGS. 8 y 9 la superficie de agarre 21 son ranuras o aristas circulares concéntricas, pero como aquellos expertos en la técnica lo sabrían muchas superficies no lisas se podrían utilizar para formar una superficie de agarre para ayudar al sello de compresión para mantener los materiales contra el movimiento de arrastre.

[0059] Estos aseguradores 22, se suministran para pasar a través de las aberturas 18 en los rebordes 16 y 17 y los huecos 23 de por lo menos la 1ra, 2da, y 3ra capas de bolsa 12, 13, y 14 para arrastrar funcionalmente los rebordes 19 y 20 contra la 1ra, 2da, y 3ra capas de bolsa 12, 13, y 14 para formar los sellos de compresión y para penetrar la 1ra, 2da, y 3ra capas de bolsa 12, 13, y 14 a través de los huecos 23. Tanto la compresión como la penetración como se muestra en la FIG. 8 se utilizan para evitar el movimiento de arrastre de por lo menos la 1ra, 2da, y 3ra capas de bolsa 12, 13, y 14

materiales en el sello de compresión formados en por lo menos un accesorio 11. Como aquellos expertos en la técnica de sellos y formación de sello lo reconocerán, si el material a ser utilizado como un sello no es suficientemente compresible fallará para formar un sello. Si el material es suficientemente compresible, pero está infra-comprimido o sobre-comprimido el sello a ser formado fallará. Además, los sellos formados en esta invención también deben tratar con el movimiento de arrastre, que es la tendencia para estos materiales elásticamente flexibles a empujarse hacia fuera desde estos accesorios cuando ocurre un movimiento violento en el embarque u otras fuerzas actúan sobre estos materiales. Así las fuerzas utilizadas sobre estos aseguradores 22 para formar estos sellos de compresión se deben ajustar para el material utilizado y el rango preferido de 315 pulgadas/libras a 80 pulgadas/libras con un rango amplio de desde 400 pulgadas/libras a 75 pulgadas/libras se ha determinado para trabajar con la mayoría de tales materiales.

[0060] En algunas aplicaciones como se muestra en la FIG. 2, donde se utilizan diferentes materiales en las capas de bolsa que tienen diferentes fricciones de superficie, como por ejemplo entre la 2da capa de bolsa 13 hecha de polietileno y la 3ra capa de bolsa 14 hecha de polipropileno, se ha encontrado que ayuda en la formación de la expansión suave dentro de los límites elásticos de la 2da capa de bolsa 13 sin formar puntos de rasurado o pellizco de tensión entre el material de la 3ra capa de bolsa 14, que las lengüetas 15 se suministran en la 2da capa de bolsa 13 y aseguradas a la 3ra capa de bolsa 14 para guiar el alineamiento mientras que la

2da capa de bolsa 13 es suavemente expandida dentro de sus límites elásticos. Estas lengüetas 15 mantienen así la 2da capa de bolsa 13 en alineamiento aproximado con la 3ra capa de bolsa 14 en la medida en que la 2da capa de bolsa 13 es suavemente expandida, sino que la 3ra capa de bolsa 14 está aún suelta alrededor de la 2da capa de bolsa 13 hasta que ésta se expande en la 3ra capa de bolsa 14 para hacer que la 3ra capa de bolsa 14 se expanda dentro de sus límites flexibles para formar un recipiente multicapa flexible 10.

[0061] En aún otra modalidad de esta invención como se muestra en la FIG. 20 por lo menos una capa interior de bolsa 24 se forma como por lo menos una capa de bolsa simple que está físicamente independiente de otras capas de bolsa, pero el interior de la capa de bolsa 24 se puede hacer de capas múltiples co-extrudidas, las cuales en la FIG. 20 se representan como teniendo dos capas 25 y 26 de materiales compresibles elásticamente flexibles que se utilizan como la capa interior de bolsa 24. Si una capa simple de capas múltiples co-extrudidas o una 1ra capa de bolsa simple, estas capas de bolsa se deben someter a la formación de un sello de compresión entre el 1er miembro de reborde 16 y el 2do miembro de reborde 17 del accesorio 11. A este respecto los grosores combinados de los materiales co-extrudidos, que en esta modalidad se representan por la capa 25 y 26, deben estar en amplio rango de no ser de menos grosor que 04 mils y no mayor de 80 mils con un rango preferido de no menos grosor de 06 mils y no mayor de 70 mils. Además estos materiales co-extrudidos deben ser capaces de ser sellados o soldados para formar una capa interior de bolsa 24, con el fin de que en

muchas modalidades esas capas 25 y 26 serán de materiales relativamente delgados para formar una buena soldadura, pero cuando se combinan como materiales co-extrudidos ellos caerán dentro de los rangos anteriores. También en esta modalidad existe por lo menos una capa de bolsa exterior 29 formada como por lo menos una capa simple que está físicamente independiente pero se puede hacer de capas múltiples co-extrudidas o tejidas, las cuales en la FIG. 20 están representadas por tener dos capas 30 y 31 de materiales flexibles que tienen propiedades fuertes y resistentes a la abrasión que se utilizan como una capa de bolsa exterior 29. Si una capa simple de capas múltiples co-extrudidas o una capa de bolsa simple ellas pueden ser de un tamaño relativo una a la otra para permitir que las capas de bolsa interior 24 se expandan suavemente dentro de sus límites elásticos y para hacer que la capa de bolsa exterior 29 se expanda dentro de sus límites flexibles, y permitir que por lo menos un accesorio 11 se forme a través de las capas de bolsa interior y exterior 24 y 29 para formar un sello de compresión entre el 1er y el 2do reborde 16 y 17 para sellar el por lo menos un accesorio 11 en su lugar y formar un recipiente multi-capa flexible 10.

[0062] En aún otra modalidad de esta invención como se muestra en la FIG. 21 por lo menos una capa de bolsa intermedia 32 se forma como por lo menos una capa de bolsa simple que está físicamente independiente de las otras capas de bolsa, pero la capa de bolsa intermedia 32 se puede hacer de capas múltiples co-extrudidas, que en la FIG. 24 se representan por tener dos capas 33 y 34 de materiales

compresibles y elásticamente flexibles. Si se compone de una capa de bolsa interior 24, y una capa de bolsa externa 29 o tiene la capa de bolsa intermedia 32 se suministraría por lo menos un miembro de accesorio 11, que forma un sello de compresión alrededor de estas capas para sellar estas capas de bolsa una de la otra y montar por lo menos un miembro de accesorio 11.

[0063] De todas las modalidades anteriores descritas debe ser evidente que estos recipientes flexibles serían reciclables en razón a que sus accesorios 11 son fácilmente removidos para reutilizarse al remover los aseguradores 22 y simplemente separar mecánicamente el 1er y 2dc miembro de reborde 16 y 17 de las capas múltiples, en razón a que no existe un aseguramiento de soldado o químico entre estos 1er y 2do miembro de reborde 16 y 17 de los accesorios 11 y los materiales de bolsa multi-capa flexibles. Además las capas de bolsa múltiples se forman como bolsas independientes selladas una de la otra y sellada una de la otra en sellos de compresión formados a través de ellos en el accesorio 11 este recipiente multicapa flexible suministra contención ambiental contra chorreaduras si falla una capa de bolsa múltiple.

[0064] Por lo menos una modalidad del método para formar el recipiente flexible 10 de esta invención se muestra en la FIG. 10 a 19. Partiendo de la FIG. 10 con por lo menos el 1er tubo 35 de material compresible y elásticamente flexible, un 1er sello 36 se forma en un extremo del tubo como se muestra en la FIG. 11. Entonces en la FIG. 11, se puede ver que el 1er miembro de reborde 16 de por lo menos un accesorio 11 se

inserta y se mantiene para indexación de su orificio 37 y las aberturas del asegurador 18 en su 1er miembro de reborde 16 se debe poner a través del 1er tubo 35 aunque un extremo del 1er tubo 35 se mantiene abierto. Después de la indexación del 1er tubo 35 para la posición del orificio 37 a través del 1er miembro de reborde 16 y las aberturas del asegurador 18 se posiciona, entonces los huecos se hacen en el 1er tubo 35 en las posiciones indexadas en el material elásticamente flexible en contacto con el 1er miembro de reborde 16 de por lo menos un accesorio 11. Una vez que los huecos se han hecho del 1er miembro de reborde 16 de por lo menos un accesorio 11 se mantiene en su lugar contra la superficie interior del 1er tubo 35 alrededor del asegurador y de los huecos del orificio hechos en la posición indexada como se muestra en la FIG. 11. Entonces como se muestra en la FIG. 12 se forma un sello en el otro extremo 39 del 1er tubo 35 del material compresible y elásticamente flexible para formar por lo menos una 1ra capa de bolsa 12. Aquellos expertos en la técnica apreciarán que el control de calidad para formar una soldadura simple a través de un tubo simple suministrará un mayor sello de calidad y mejorar la oportunidad de no tener una falla de soldadura. La siguiente etapa, como se muestra en la FIG. 13, es colocar la 1ra capa de bolsa 12 en un segundo tubo 40 de un material compresible y elásticamente flexible, cuyo tubo es de un tamaño para ser mayor de la 1ra capa de bolsa 12. Entonces como se muestra en la FIG. 14 formar un 1er sello 41 sobre un extremo del segundo tubo 40 de un material compresible y elásticamente flexible, y luego indexar el segundo tubo 40 para alineamiento con la posición del 1er miembro de reborde 16 de por lo menos un accesorio 11 ambos

para alinear el orificio 37 y las aberturas del asegurador 18 con aquellas de por lo menos la 1ra capa de bolsa 12. Una vez indexado, entonces hacer los huecos en el segundo tubo 40 en las posiciones indexadas suficientes para el orificio 37 del 1er miembro de reborde 16 de por lo menos un accesorio 11 y las aberturas del asegurador 18 pero dejando el material elásticamente flexible en alineamiento con la por lo menos 1ra capa de bolsa 12 el material alrededor del orificio 37 y los huecos de abertura 18. Entonces, como se muestra en la FIG. 15, formando un 2do sello en el otro extremo 42 del segundo tubo 40 para formar un 2da capa de bolsa de tubo sellada 13 suficientemente distante de la 1ra capa de bolsa 12 para permitirle a la 1ra capa de bolsa 12 expandirse suavemente dentro de la 2da capa de bolsa dentro de sus límites elásticos y para hacer que la 2da capa de bolsa se expanda suavemente dentro de sus límites elásticos cuando se llena. En algunas modalidades de esta método como se muestra en la FIG. 16 las lengüetas 15 están unidas a la 2da capa de bolsa y la por lo menos 1ra y 2da capa de bolsa 12 y 13 se ubicarían, como se muestra en la FIG. 17 dentro de un tercer tubo 43 de material que tiene propiedades fuertes y resistentes a la abrasión y un límite flexible. Luego como se muestra en la FIG. 18, la indexación del tercer tubo 43 de material para la posición del 1er miembro de reborde 16 de por lo menos un accesorio 11 para alinear el orificio 37 con las aberturas hechas en la 1ra y 2da capas de bolsa 12 y 13. Una vez alineadas e indexadas, los huecos se hacen en el 3er tubo 43 de material en la posición indexada para el orificio 37 y las aberturas del asegurador 18 del 1er miembro de reborde 16 de por lo menos un accesorio 11 y asegurar las aberturas 18 pero dejando el 3er

tubo 43 de material en alineamiento con la 1ra y 2da capa de bolsa 12 y 13 de materiales. Entonces un extremo 44 de la 3ra capa de bolsa 14 se sella el cual fija las lengüetas 15. Luego como se muestra en la FIG. 19, el 3er tubo 43 se sella 45 el cual fija las lengüetas 15 y el tubo 43 se forma en una 3ra capa de bolsa 14 alrededor de la 1ra y 2da capa de bolsa 12 y 13 con suficiente distancia de por lo menos la 1ra y 2da capas de bolsa 12 y 13 para expandirse suavemente una dentro de la otra y para expandirse suavemente dentro de por lo menos la 3ra capa de bolsa 14 para expandir por lo menos la 3ra capa de bolsa 14 a sus límites flexibles. Luego como se muestra en la FIG. 19 el 2do miembro de reborde 17 de por lo menos un accesorio 11 se mantiene contra la superficie exterior de por lo menos la 3ra capa de bolsa 14 y los aseguradores 22 se insertan a través de las aberturas del asegurador 18 en el 1er y 2do miembro de reborde 16 y 17 y por lo menos la 1ra, 2da y 3ra capa de bolsa 12, 13, y 14 para forzar el 1er y 2do miembro de reborde 16 y 17 que tienen superficies rebordeadas 19 y 20 de por lo menos un accesorio 11 contra por lo menos la 1ra, 2da y 3ra capa de bolsa 12, 13, y 14 ubicada entre la 1ra y 2da superficie de reborde 16 y 17 para asegurar los aseguradores 22, para formar un sello de compresión entre ellos y para evitar el movimiento de arrastre de por lo menos la 1ra, 2da y 3ra capa de bolsa 12, 13, y 14 en por lo menos un accesorio 11 para formar un recipiente multi-capa flexible para retención y suministro de los materiales fluibles. El rango de la fuerza de aseguramiento puede ser de 75 pulgadas/libras a 400 pulgadas/libras, pero como aquellos expertos en la técnica apreciarán ésta variará dentro del rango dependiendo del

material que esté siendo utilizado. Se ha encontrado que un rango de 80 pulgadas/libras a 315 pulgadas/libras trabajará con materiales de polietileno y polipropileno, pero de nuevo dependiendo del grosor y los pesos de estos materiales que caen entre 04 mils y 80 mils y un rango preferido de 06 mils a 70 mils y pesos de 04 onzas a 16 onzas. También la 1ra y 2da superficie rebordeada 19 y 20 debe tener suficiente superficie para suministrar una superficie de sentado suficiente contra los materiales de la capa de bolsa para formar un sello de compresión, y si diferentes superficies rebordeadas se utilizan puede variar las fuerzas de aseguramiento como aquellos expertos en la técnica apreciarán.

[0065] Del método anterior se puede ver que cuando se forma un sello sobre las capas de bolsa, el cual se puede soldar con calor y/o químicos, las soldaduras se forman con solamente una capa de material siendo soldada a la vez para suministrar el sello de más alta calidad posible y cuando el sello se forma a través de múltiples capas se forma un sello de compresión a través de estas capas de bolsa. Que el accesorio 11 que se forma en las capas de bolsa para asegurar por lo meno un accesorio y la capa de bolsa separada una de la otra y contra el movimiento de arrastre de las capas de bolsa es el sello de compresión. Sin embargo, si una capa de bolsa se forma de materiales co-extrudidos con capas independientes estas capas individuales son muy delgadas de tal forma que sus capas colectivas están dentro del rango de 04 mils a 80 mils o un rango preferido de 06 mils a 70 mils entonces estos materiales co-extrudidos se pueden tratar como

una 1ra capa de bolsa, pero de hecho ellas pueden ser una capa de bolsa interior, una capa de bolsa intermedia, y una capa de bolsa exterior.

[0066] Aunque las modalidades referenciadas de la invención de este recipiente flexible y el método para su formación se ha descrito se apreciará que otras modalidades y procesos se pueden utilizar sin apartarse del espíritu de la invención y de los métodos aquí reivindicados.

REIVINDICACIONES:

1. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles que tienen capas independientes libremente movibles una entre la otra y selladas una de la otra con por lo menos un accesorio formado a su través y sellos de compresión formados con por lo menos un accesorio formado a su través que comprende:

   a. Por lo menos una 1ra capa de bolsa formada de un material compresible y elásticamente flexible que tiene la capacidad de expandirse dentro de los límites elásticos de dicho material flexible al recibir materiales fluibles,

   b. Por lo menos una 2da capa de bolsa formada de un material compresible y elásticamente flexible de un tamaño relativo a dicha 1ra capa de bolsa para permitir que dicho por lo menos 1ra capa de bolsa se forme de un material elásticamente flexible para expandirse suavemente dentro de los límites elásticos de dicho material flexible al recibir materiales fluibles y para hacer que dicha por lo menos 2da capa de bolsa se expanda suavemente dentro de sus límites elásticos, y

   c. Por lo menos unos medios de accesorio formados a través de dicha por lo menos 1ra y 2da capa de bolsa formada que tiene un miembro de reborde interno de dicha por lo menos 1ra capa de bolsa formada y un reborde externo de dicha por lo menos 2da capa de

bolsa formada para formar un sello de compresión entre dichos rebordes y dicho material compresible y elásticamente flexible al comprimir el material compresible y elásticamente flexible de dichas por lo menos 1ro y 2do materiales de capa de bolsa suficientemente para formar un sellos de compresión entre ellos y para sellar dicho por lo menos unos medios de accesorio en su lugar y para formar un recipiente multi-capa flexible.

2. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 1 que comprende,

   a. Por lo menos una 3ra capa de bolsa formada de un material flexible que tiene propiedades fuertes y resistentes a la abrasión de un tamaño relativo a dichas por lo menos 1ra y 2da capas de bolsa para permitir que dichas por lo menos 1ra y 2da capas de bolsa formadas de materiales flexibles se expanda suavemente dentro de sus límites elásticos y para hacer que la 3ra capa de bolsa se expanda dentro de sus límites flexibles.

3. Un recipiente multi-capa flexible para la retención y suministro de los materiales fluibles de la Reivindicación 2 en donde dicho por lo menos unos medios de accesorio formados a través de dichas capas de bolsa comprenden además,

a. Un 1er miembro rebordeado interno de dicha por lo menos 1ra capa de bolsa que tiene suficiente superficie de reborde para acoplar dicha por lo menos 1ra capa de bolsa formada de la superficie interior de dicha por lo menos 1ra capa de bolsa;

b. Un 2do miembro de rebordeado externo de dicha por lo menos 3ra capa de bolsa que tiene una superficie de reborde suficiente para acoplar dicha por lo menos 3ra capa de bolsa formada de la superficie externa de dicha por lo menos 3ra capa de bolsa y para acoplamiento funcional con dichos 1eros medios de porción rebordeados; y

c. Medios para manejar dicho 1er y 2do miembros rebordeados uno hacia el otro y dicha por lo menos 1ra, 2da y 3ra capa de bolsa para formar un sello de compresión entre ellas y sellar dicho por lo menos unos medios de accesorio en su lugar y para formar un recipiente multi-capa flexible.

4. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 3 en donde dichos 1ros y 2dos medios de porción rebordeados comprenden además,

a. Una superficie suficiente sobre dicho 1er miembro rebordeado porcionado sobre dicha superficie interior de dicha por lo menos 1ra capa de bolsa para suministrar una superficie de sentado contra dicha superficie interior de dicha por lo menos 1ra capa de bolsa y

b. Una superficie suficiente sobre dicho 2do miembro rebordeado que tiene una superficie de agarre ubicada sobre dicha superficie exterior de dicho por lo menos 3ra capa de bolsa para mantener dicha superficie de capas de bolsa contra movimiento y para acoplamiento de dichas superficies rebordeadas una hacia la otra y contra dicha por lo menos 1ra, 2da y 3ra superficie de capa de bolsa para formar un sello de compresión y mantener dichos por lo menos 1ro, 2do y 3er materiales de capa de bolsa contra movimiento de arrastre.

5. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 4 en donde dicho 2do miembro rebordeado que agarra la superficie comprende además,

a. superficies concéntricas ranuradas sobre dicha porción de reborde contra dicha superficie exterior de dicha 3ra capa de bolsa para mantener dichas superficies de capas de bolsa contra el movimiento de arrastre y para ser conducido hacia dicho 1er miembro de reborde y contra dicha por lo menos 1ra, 2da y 3ra superficies de capa de bolsa para formar un sello de compresión y mantener dicho por lo menos 1ro, 2do y 3er materiales de capa de bolsa contra el movimiento de arrastre.

6. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 4

en donde dichos medios para manejar dicha por lo menos 1ra, 2da y 3ra capa de bolsa capas para formar un sello de compresión entre ellas y mantener dichos por lo menos 1er, 2do y 3er materiales de capa de bolsa contra movimiento de arrastre comprende,

a. Por lo menos dos aberturas a través de dicha por lo menos 1ra, 2da, y 3ra capa de bolsa y dicho 2do miembro rebordeado,

b. Por lo menos dos medios de recepción de asegurador dentro de dicho 1er miembro rebordeado, y

c. Por lo menos dos medios aseguradores a través de dicha por lo menos dos aberturas en dicho 2do miembro rebordeado, dicho por lo menos 1ra, 2da y 3ra capa de bolsa y en dicho por lo menos dos medios de recepción aseguradores dentro de dicho 1er miembro rebordeado para comprimir dicho 1er y 2do miembro de reborde uno hacia el otro y contra dichos por lo menos 1ro, 2do y 3er materiales de capa de bolsa entre ellos en la medida en que dichos aseguradores son apretados para formar un sello de compresión en dichos por lo menos 1ro, 2do y 3er materiales de capa de bolsa y para evitar el movimiento de arrastre de dicha por lo menos 1ra, 2da y 3ra capa de bolsa de dicho sello de compresión formado.

7. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 6 en donde dichos medios para manejar dicha por lo menos

1ra, 2da y 3ra capas de capa de bolsa para formar un sello de compresión entre ellas comprende,

a. Por lo menos dos aberturas a través de dichas por lo menos 1ra, 2da y 3ra capas de bolsa y dicho 1er y 2do miembro rebordeado, y

b. Por lo menos dos medios de aseguramiento a través de dichas por lo menos dos aberturas para comprimir el 1er y 2dc miembro rebordeado uno hacia el otro y contra dichos por lo menos 1ro, 2do y 3er materiales de capa de bolsa entre ellos en la medida en que dichos aseguradores son apretados para formar unos sellos de compresión de dichos 1ro, 2do y 3er materiales de capa de bolsa y para evitar el movimiento de arrastre en dichos por lo menos 1ro, 2do y 3er materiales de capa de bolsa al empujar hacia fuera de dicho acoplamiento sellante y para formar unos sellos de compresión en dichos 1ro, 2do y 3er materiales de capa de bolsa.

8. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 7 en donde dicho por lo menos 2da capa de bolsa comprende además,

a. Alinear medios sobre dicha por lo menos 2da capa de bolsa conectada a dicha por lo menos 3ra capa de bolsa para mantener dichas por lo menos 1ra y 2da capa de bolsa en alineamiento con dicho por lo menos 3ra capa de bolsa a dichas por lo menos 1ra y 2da capas de bolsa se les permite expandirse

suavemente dentro de sus límites elásticos dentro de dicha por lo menos 3ra capa de bolsa y hacer que dicha por lo menos 3ra capa de bolsa se expanda dentro de sus límites flexibles.

9. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 8 en donde dichos medios de alineamiento comprenden además,

a. Miembros de lengüeta conectados a dicha por lo menos 2da capa de bolsa y proyectándose desde éstos y conectados a dicha 3ra capa de bolsa para hacer que dicha por lo menos 1ra y 2da capas de bolsa se alineen con dicha por lo menos 3ra capa de bolsa en la medida en que dicha 1ra y 2da capas de bolsa se expanden suavemente dentro de sus límites elásticos y hacer que dicha por lo menos 3ra capa de bolsa se expanda dentro de sus límites flexibles.

10. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 9 en donde dichos 1er y 2do material compresible y elásticamente flexible comprende además,

a. Un material de un grosor en su parte más delgada suficiente para permitir la compresión en un sello de compresión, y
b. Un material de un grosor en su parte más gruesa suficiente para permitir la compresión en un sello

de compresión y para evitar el arrastre de dicho material al punto de compresión en un sello alrededor de dichos por lo menos unos medios de accesorio.

11. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 10 en donde dicho por lo menos el 1er y 2do material compresible y elásticamente flexible en su parte más delgada y más gruesa comprende además,

a. Una parte más delgada de no menos de 04 mils, y
b. Una parte más gruesa de no más de 80 mils.

12. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 11 en donde dicho por lo menos 1er y 2do material compresible y elásticamente flexible en su parte más delgada y más gruesa comprende además,

a. Una parte más delgada de no menos de 06 mils, y
b. Una parte más gruesa de no más de 70 mils.

13. Un método para forma un recipiente multi-capa para la retención y suministro de material fluible que comprende;

a. Formar por lo menos un 1er sello sobre un extremo de un tubo de un material compresible y elásticamente flexible,

b. Indizar sobre dicho tubo para la posición de un accesorio que tiene un orificio y una superficie de reborde para alinear una abertura para ser hecha en dicho orificio,

c. Hacer por lo menos que un hueco en dicho tubo en dicha posición indizada suficiente para el orificio del accesorio y para sacar dicho material elásticamente flexible en contacto con dicho reborde de dicho accesorio,

d. Mantener dicha superficie de reborde de dicho accesorio contra dicha superficie interna de dicho tubo alrededor de dicho hueco hecho en dicha posición indizada,

e. Formar un 2do sello en el otro extremo de dicho tubo de dicho material compresible y elásticamente flexible para formar por lo menos una 1ra capa de bolsa,

f. Ubicar dicha 1ra capa de bolsa en un segundo tubo de un material compresible y elásticamente flexible,

g. Formar un 1er sello en un extremo de dicho segundo tubo de un material compresible y elásticamente flexible,

h. Indizar sobre dicho segundo tubo para la posición de dicho accesorio para alinear una abertura para ser hecha a su través con dicha por lo menos 1ra abertura de capa de bolsa,

i. Hacer por lo menos un hueco en dicho segundo tubo en dicha posición indizada suficiente para el orificio de dicho accesorio y para dejar dicho material elásticamente flexible en alineamiento con

dicho por lo menos 1er material de capa de bolsa alrededor de dicha abertura,

j. Formar un 2do sello en el otro extremo de dicho segundo tubo para formar una 2da capa de bolsa independiente de dicha 1ra capa de bolsa y distancia suficiente de ésta para permitir que dicha 1ra capa de bolsa se expanda suavemente dentro de dicha 2da capa de bolsa dentro de sus límites elásticos y para hacer que dicha 2da capa de bolsa se expanda suavemente dentro de sus límites elásticos,

k. Ubicar dicha por lo menos 1ra y 2da capa de bolsa en un 3er material de capa de bolsa que tiene unas propiedades fuertes y resistentes a la abrasión y un límite flexible,

l. Indizar sobre dicho 3er material de capa de bolsa para la posición de dicho accesorio para alinear la abertura con dicha abertura de dicha por lo menos 1ra y 2da capa de bolsa,

m. Hacer un hueco en dicho 3er material de capa de bolsa en dicha posición indizada para el orificio de dicho accesorio y para sacar dicho 3er material de capa de bolsa en alineamiento con dicho por lo menos 1er y 2do material de capa de bolsa alrededor de dichas aberturas,

n. Formar una 3ra capa de bolsa alrededor de dicha por lo menos 1ra y 2da capa de bolsa con suficiente distancia de dicha por lo menos 1ra y 2da capa de bolsa para permitir que dicha por lo menos 1ra y 2da capa de bolsa se expandan suavemente una dentro de la otra y para expandirse suavemente dentro de

dicha por lo menos 3ra capa de bolsa a sus límites flexibles,

o. Mantener dicha 2da superficie rebordeada de dicho accesorio contra dicha superficie exterior de dicha por lo menos 3ra capa de bolsa,

p. Insertar aseguradores a través de dichas aberturas en dichas superficies rebordeadas y dicha por lo menos 1ra, 2da, y 3ra capas de bolsa y

q. Forzar dicho 1er miembro rebordeado y 2do miembro rebordeado de dicho accesorio contra dichas por lo menos 1ra, 2da, y 3ra porciones de capa de bolsa entre dicha 1ra y 2da porciones rebordeadas al asegurar dichos aseguradores para formar un sello de compresión entre ellos y para evitar el movimiento de arrastre de dichas por lo menos 1ra, 2da, y 3ra capa de bolsa en dicho accesorio para formar un recipiente multi-capa flexible para la retención y suministro de materiales fluibles.

14. Un método para forma un recipiente multi-capa para la retención y suministro de material fluible de la Reivindicación 14 en donde dicho forzado de dicho 1er y 2do miembros rebordeados de dicho accesorio contra dichas por lo menos 1ra, 2da, y 3ra capas de bolsa comprende además,

a. Asegurar dichos aseguradores con una fuerza de 75 pulgadas/libras a 400 pulgadas/libra para formar un sello de compresión y para evitar el movimiento de arrastre de dicha por lo menos 1ra, 2da, y 3ra capas

de bolsa y halar hacia fuera de dicho por lo menos un accesorio.

15. Un método para forma un recipiente multi-capa para la retención y suministro de material fluible de la Reivindicación 14 en donde dicho forzado de dicho 1er y 2do miembros rebordeados de dicho accesorio contra dichas por lo menos 1ra, 2da, y 3ra capas de bolsa comprende además,

    a. Asegurar dichos aseguradores con una fuerza de 80 pulgadas/libras a 305 pulgadas/libra para formar un sello de compresión y para evitar el movimiento de arrastre de dicha por lo menos 1ra, 2da, y 3ra capas de bolsa y halar hacia fuera de dicho por lo menos un accesorio.

16. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles que tiene capas independientes libremente movibles una entre la otra y selladas una de la otra con por lo menos un accesorio formado a su través y sellos de compresión formados en por lo menos un accesorio formado a su través que comprende;

    a. Por lo menos una capa de bolsa interior formada de un material compresible y elásticamente flexible que tiene la capacidad de expandirse dentro de los límites elásticos de dicho material flexible al recibir materiales fluibles,

b. Por lo menos una capa de bolsa exterior formada de un material flexible que tiene propiedades fuertes y resistentes a la abrasión de un tamaño relativo a dichas por lo menos capas de bolsa interior para permitir que dichas por lo menos capas de bolsa interior formadas de materiales flexibles se expanda suavemente dentro de sus límites elásticos y para hacer que dicha capa de bolsa exterior se expanda dentro de sus límites flexibles, y

c. Por lo menos unos medios de accesorio formados a través de dichas por lo menos capas de bolsa interior y exterior formadas que tienen un miembro de reborde interno de dicha por lo menos capa de bolsa interior formada y un reborde externo de dicha por lo menos capa de bolsa exterior formada para formar un sello de compresión entre dichos rebordes y dicho material compresible y elásticamente flexible al comprimir el material compresible y elásticamente flexible de dichos por lo menos materiales de capa de bolsa interior y exterior suficientemente para sellar dichos por lo menos unos medios de accesorio en su lugar y formar un recipiente multi-capa flexible.

17. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 16 en donde dichos por lo menos unos medios de accesorio formados a través de dichas capas de bolsa comprenden además,

a. Un 1er miembro rebordeado interno de dicha por lo menos capa de bolsa interior que tiene suficiente superficie de reborde para acoplar dicha por lo menos capa de bolsa interior formada de la superficie interior de dicha por lo menos capa de bolsa interior,

b. Un 2do miembro rebordeado externo de dicha por lo menos capa de bolsa exterior que tiene suficiente superficie de reborde para acoplar dicha por lo menos capa de bolsa exterior formada de la superficie externa de dicha por lo menos capa de bolsa exterior y para acoplar con dichos 1ros medios de porción rebordeados, y

c. Medios para manejar dicho 1ro y 2do miembros rebordeados uno hacia el otro y dichas por lo menos capas de bolsa interior y exterior para formar un sello de compresión entre ellos y sellar dichos por lo menos unos medios de accesorio en su lugar y para formar un recipiente multi-capa flexible.

18. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 17 en donde dicho 1ro y 2do medios de porción rebordeada comprenden además,

a. Una superficie suficiente de dicho 1er miembro rebordeado porcionado sobre dicha superficie interna de dicha por lo menos capa de bolsa interior para suministrar una superficie de asiento

contra dicha superficie interna de dicha por lo menos capa de bolsa interior, y

b. Una superficie suficiente de dicho 2do miembro rebordeado que tiene una superficie de agarre ubicada sobre dicha superficie exterior de dicha por lo menos capa de bolsa exterior para mantener dicha superficie de capas de bolsa contra movimiento y para acoplamiento de dichas superficies de reborde uno hacia el otro y contra dichas por lo menos superficies de capa de bolsa interior y exterior para formar un sello de compresión y mantener dichos por lo menos materiales de capa de bolsa interior y exterior contra movimiento de arrastre.

19. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 18 en donde dicha 2da superficie de agarre de miembro de reborde comprende además,

a. Superficies ranuradas concéntricas en dicha porción rebordeada contra dicha superficie exterior de dicha capa de bolsa exterior para mantener dichas superficies de capas de bolsa contra movimiento de arrastre y para ser impulsado hacia dicho 1er miembro de reborde y contra dichas por lo menos superficies de capa de bolsa interior y exterior para formar un sello de compresión.

20. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 18 en donde dichos medios para manejar dichas por lo menos capas de capa de bolsa interior y exterior para formar un sello de compresión entre ellos comprende,

a. Por lo menos dos aberturas a través de dichas por lo menos capas de bolsa interior y exterior y dicho 2do miembro rebordeado,

b. Por lo menos dos medios de recepción aseguradores dentro de dicho 1er miembro rebordeado y,

c. Por lo menos dos medios aseguradores a través de dicho por lo menos dos aberturas en dicho 2do miembro rebordeado, dichas por lo menos capas de bolsa interior y exterior, y en dichos por lo menos dos medios receptores aseguradores dentro de dicho 1er miembro rebordeado para la compresión del 1ro y 2do miembros rebordeados uno contra el otro y dichos por lo menos materiales de capa de bolsa interior y exterior entre ellos en la medida en que dichos aseguradores son apretados para formar un sello de compresión en dichos por lo menos materiales de capa de bolsa interior y exterior y para evitar el movimiento de arrastre en dicho sello de compresión formado.

21. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 20 en donde dichos medios para manejar dichas por lo

menos capas de bolsa interior y exterior para formar un sello de compresión entre ellos comprende,

a. Por lo menos dos aberturas a través de dichas por lo menos capas de bolsa interior y exterior y dicho 1er y 2do miembro rebordeado y,

b. Por lo menos dos medios aseguradores a través de dichas por lo menos dos aberturas para comprimir el 1ro y 2do miembro rebordeado uno contra el otro y dichos por lo menos materiales de capa de bolsa interior y exterior entre ellos y para evitar el movimiento de resistencia al arrastre contra dichos por lo menos materiales de capa de bolsa interior y exterior de halar hacia fuera de dicho acoplamiento sellante y para formar sellos de compresión en dichos materiales de capa de bolsa interior y exterior.

22. Un recipiente multi-capa flexible para la retención y suministro de materiales fluibles de la Reivindicación 21 que comprende además,

a. Por lo menos una capa de bolsa intermedia formada de un material compresible y elásticamente flexible de un tamaño relativo a dicha por lo menos capa de bolsa interior y permitiendo que dicha por lo menos capa de bolsa flexible interior formada de un material elásticamente flexible se expanda suavemente dentro de los límites elásticos de dicho material flexible al recibir materiales fluibles y

para hacer que dicha por lo menos capa de bolsa intermedia sea suavemente expandida dentro de sus límites elásticos.

23. Un método para formar un recipiente multi-capa para la retención y suministro del material fluible que comprende;

a. Formar por lo menos un 1er sello sobre un extremo de un tubo de un material compresible y elásticamente flexible,

b. Indizar sobre dicho tubo la posición de un accesorio que tiene un orificio y una superficie de reborde para alinear una abertura para hacerla en dicho orificio,

c. Hacer por lo menos un hueco en dicho tubo en dicha posición indizada suficiente para el orificio del accesorio y para sacar dicho material elásticamente flexible en contacto con dicho reborde de dicho accesorio.

d. Mantener dicha superficie rebordeada de dicho accesorio contra dicha superficie interior de dicho tubo alrededor de dicho hueco hecho en dicha posición indizada,

e. Formar un 2do sello en el otro extremo de dicho tubo de dicho material compresible y elásticamente flexible para formar por lo menos una capa de bolsa,

f. Ubicar dichas por lo menos capas de bolsa interior en un material de capa de bolsa exterior que tiene

unas propiedades fuertes y resistentes a la abrasión y un límite flexible,

g. Formar un 1er sello sobre un extremo de dicho material de capa de bolsa exterior,

h. Indizar sobre dicho material de capa de bolsa exterior para ubicar dicho accesorio para alinear una abertura para hacerse con dicha abertura de dichas por lo menos capas de bolsa interior,

i. Hacer por lo menos un hueco en dicho material de capa de bolsa exterior en dicha posición indizada para el orificio de dicho accesorio y para sacar dicho material de capa de bolsa exterior en alineamiento con dicho por lo menos material de capa de bolsa interior alrededor de dicha abertura,

j. Formar un 2do sello sobre dicha capa de bolsa exterior para formar una capa de bolsa exterior alrededor de dichas capas de bolsa interior con suficiente distancia de dichas por lo menos capas de bolsa interior para permitir que dichas por lo menos capas de bolsa interior se expandan suavemente dentro de dicha capa de bolsa exterior a sus límites flexibles,

k. Mantener dicha 2da superficie rebordeada de dicho accesorio contra dicha superficie exterior de dicha por lo menos capa de bolsa exterior,

l. Insertar aseguradores a través de dichas aberturas en dichas superficies rebordeadas y dichas por lo menos capas de bolsa interior y exterior, y

m. Forzar dicho 1er miembro rebordeado y 2do miembro rebordeado de dicho accesorio contra dichas por lo

menos porciones de capa de bolsa interior y exterior entre dichas 1ra y 2da porciones de reborde al asegurar dichos aseguradores para formar un sello de compresión entre ellos y para evitar el movimiento de arrastre de dichas por lo menos capas de bolsa interior y exterior en dicho accesorio para formar un recipiente multi-capa flexible, para la retención y suministro de materiales fluibles.

24. Un método para formar un recipiente multi-capa para la retención y suministro de material fluible de la Reivindicación 23 que comprende además;

a. Colocar dicha capa de bolsa interior formada en las etapas (a) a (e) en un segundo tubo de un material compresible y elásticamente flexible,
b. Formar un 1er sello en un extremo de dicho segundo tubo de un material compresible y elásticamente flexible,
c. Indizar sobre dicho segundo tubo para la posición de dicho accesorio para alinear la abertura con dicha abertura de dicha por lo menos capa de bolsa interior,
d. Hacer un hueco en dicho segundo tubo en dicha posición indizada suficiente para el orificio de dicho accesorio y para dejar dicho material elásticamente flexible en alineamiento con dicho por lo menos material de capa de bolsa interior alrededor de dicha abertura,

e. Formar un 2do sello sobre el otro extremo de dicho segundo tubo para formar una capa de bolsa intermedia independiente de dicha capa de bolsa interior y a suficiente distancia de ésta para permitir que dicha capa de bolsa interior se expanda suavemente dentro de dicha capa de bolsa intermedia dentro de sus límites elásticos y para hacer que dicha capa de bolsa intermedia se expanda suavemente dentro de sus límites elásticos,

f. Colocar dichas por lo menos capas de bolsa interior e intermedia en un material de capa de bolsa externa que tiene propiedades fuertes y resistentes a la abrasión y un límite flexible y completar las etapas (f) a (m) de la Reivindicación 23.

26. Un método para formar un recipiente multi-capa para la retención y suministro del material fluible de la Reivindicación 25 en donde dicho forzado de dicho 1ro y 2^{dc} miembros de reborde de dicho accesorio contra dichas por lo menos capas de bolsa interior, intermedia, y exterior comprenden además;

a. Asegurar dichos aseguradores con una fuerza de 75 pulgadas/libras a 400 pulgadas/libras para formar un sello de compresión y para evitar el movimiento de arrastre de dichas por lo menos capas de bolsa interior, intermedia, y exterior y halar hacia fuera desde dicho por lo menos un accesorio.

27. Un método para formar un recipiente multi-capa para la retención y suministro del material fluible de la Reivindicación 26 en donde dicho forzado de dicho 1er miembro rebordeado y 2do miembro rebordeados de dicho accesorio contra dichas por lo menos capas de bolsa internas, intermedia, y externas comprenden además;

a. Asegurar dichos aseguradores con una fuerza de 80 pulgadas/libras a 315 pulgadas/libras para formar un sello de compresión y para evitar el movimiento de arrastre de dichas por lo menos capas de bolsa interna, intermedia, y externa y halar hacia fuera desde dicho por lo menos un accesorio.

RECIPIENTE MULTICAPA INDEPENDIENTE FLEXIBLE Y MÉTODO PARA FORMACIÓN

Resumen:

Recipiente multicapa independiente flexible y método para formar el recipiente multicapa independiente flexible para retención y suministro de materiales fluíbles que tienen capas independientes libremente movibles una entre la otra y selladas una de la otra con por lo menos un accesorio formado a su través y sellos de compresión formados entre los bordes del accesorio y el material flexible del recipiente multicapa independiente mediante por lo menos un accesorio formado a su través para sellar el por lo menos un accesorio en el lugar y para formar un sello de compresión entre la multicapa independiente de materiales flexibles y formar un recipiente multicapa flexible.

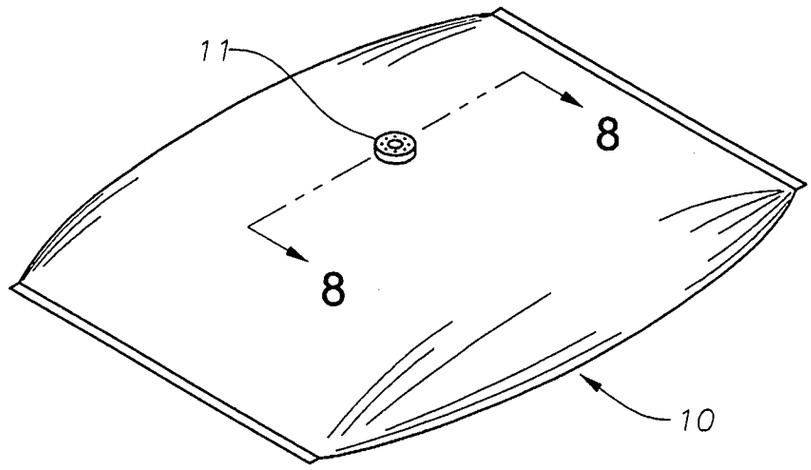


Fig. 1

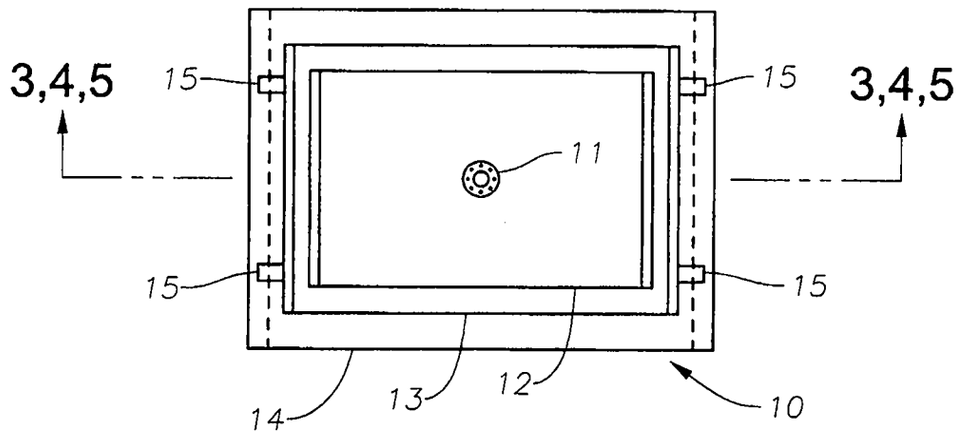


Fig. 2

Fig. 3

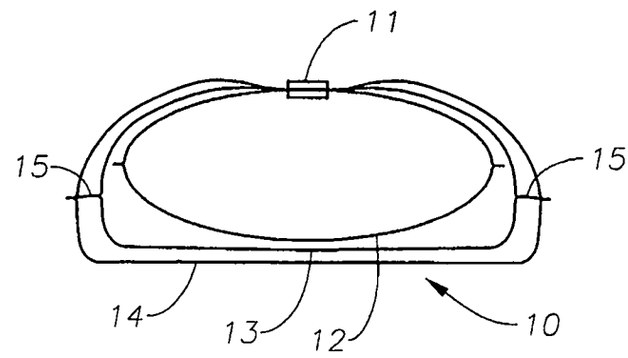


Fig. 4

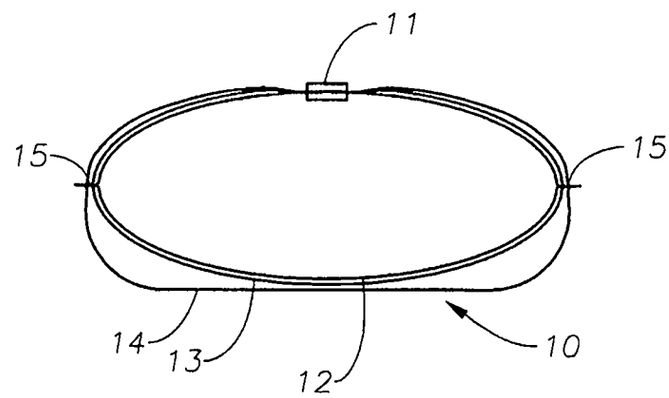
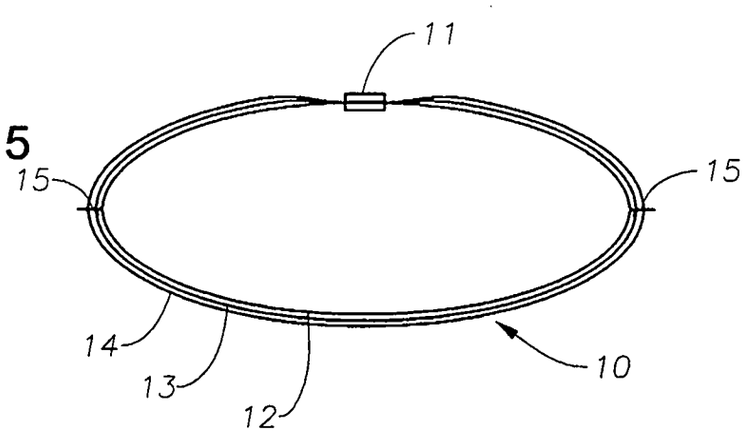


Fig. 5



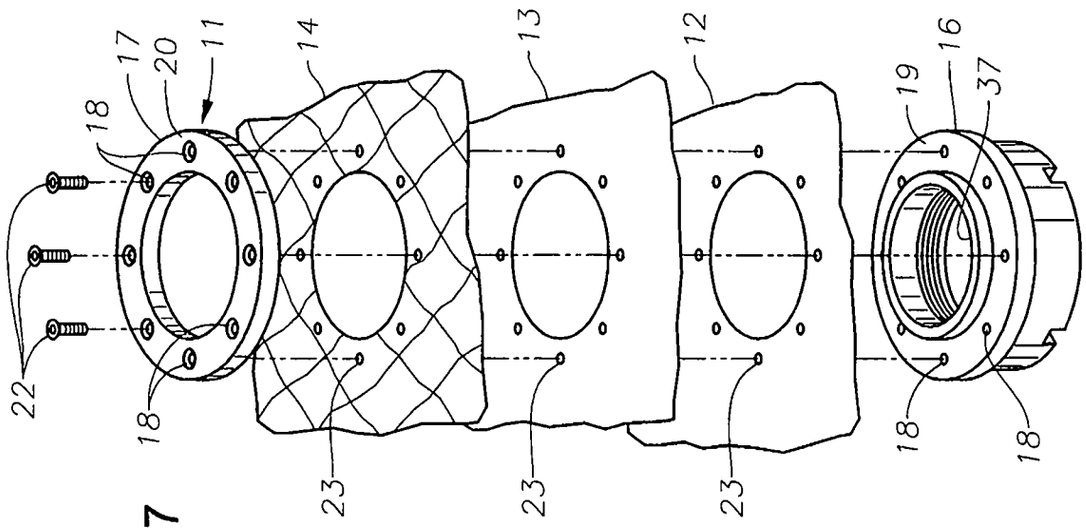

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Fig. 7

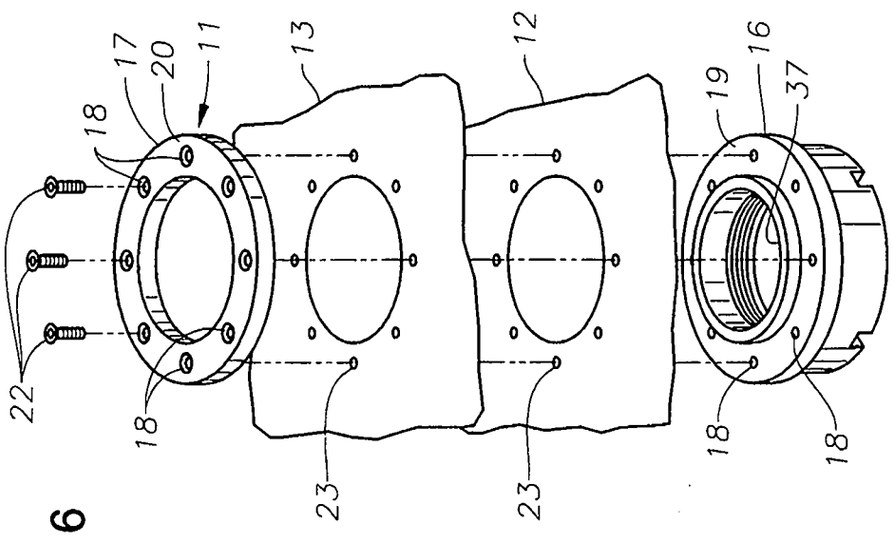
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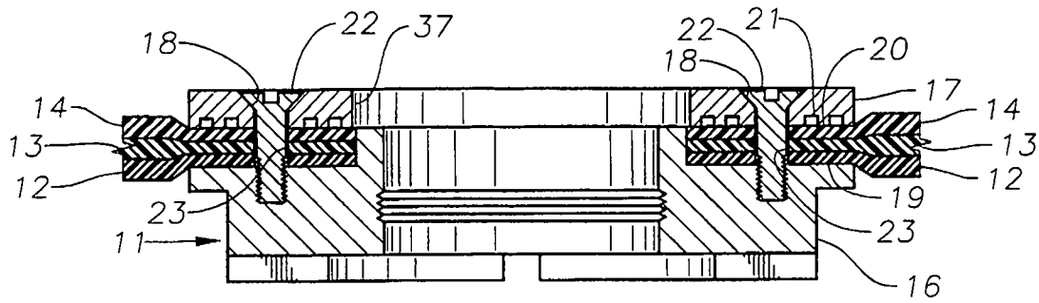
Fig. 6



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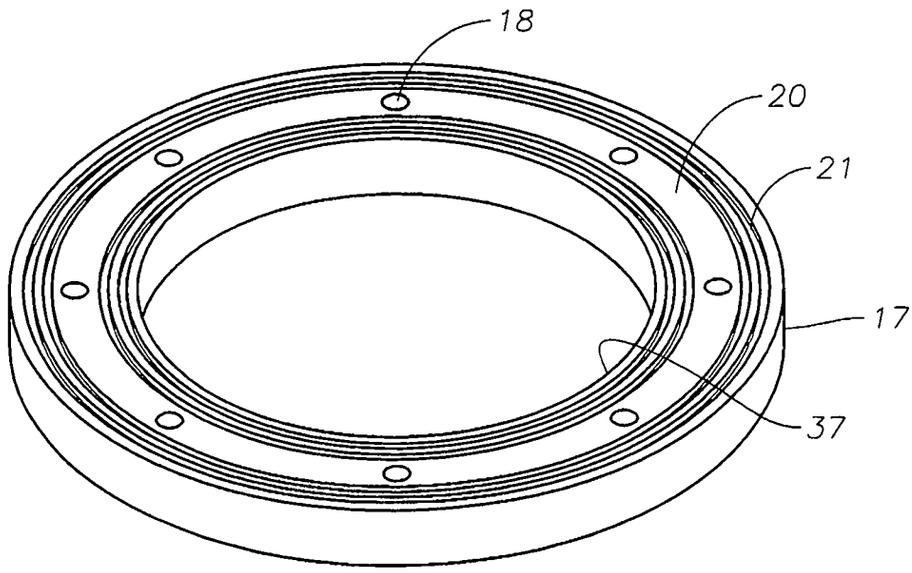


Fig. 9

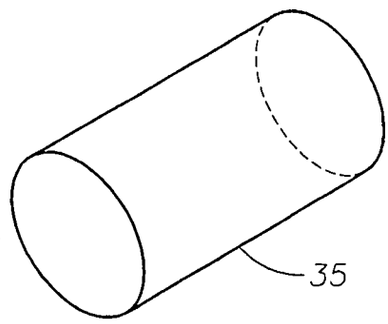


Fig. 10

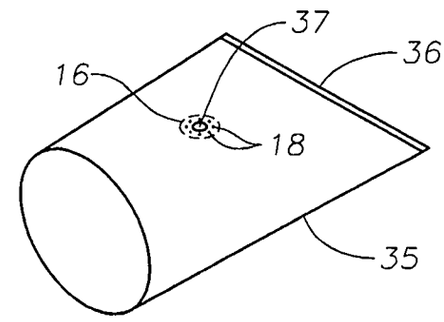


Fig. 11

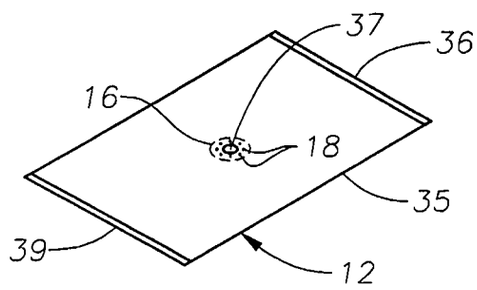


Fig. 12

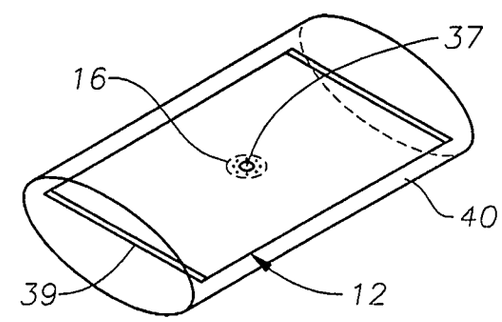


Fig. 13

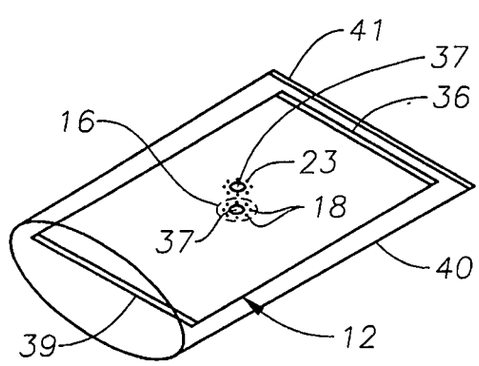


Fig. 14

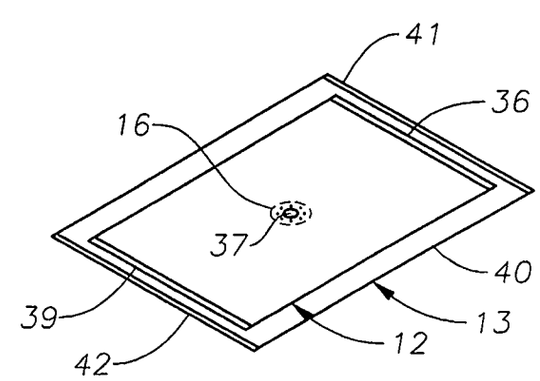
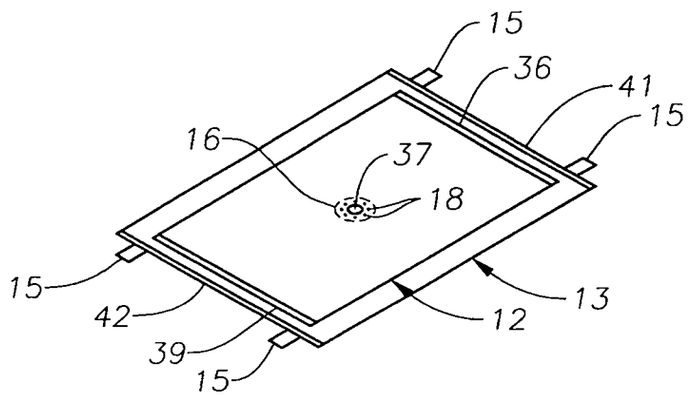


Fig. 15



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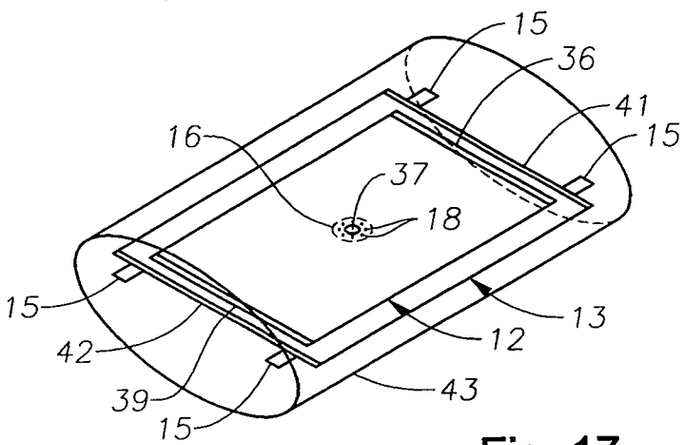
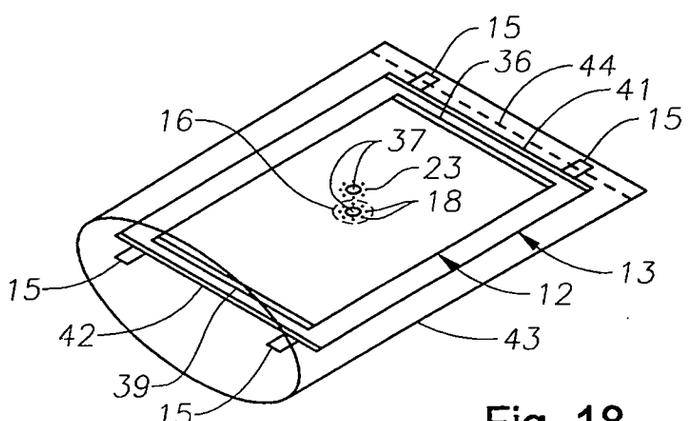


Fig. 17



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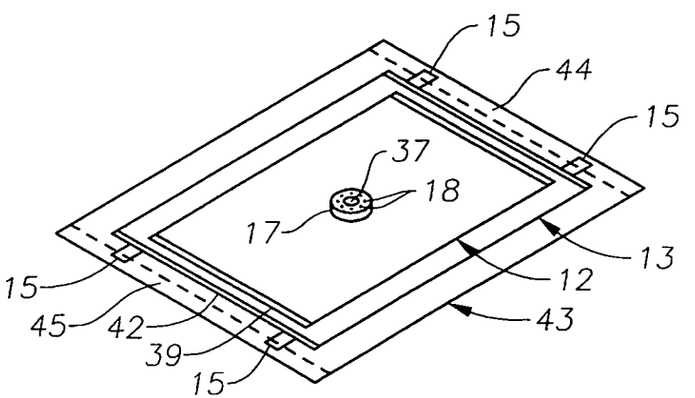

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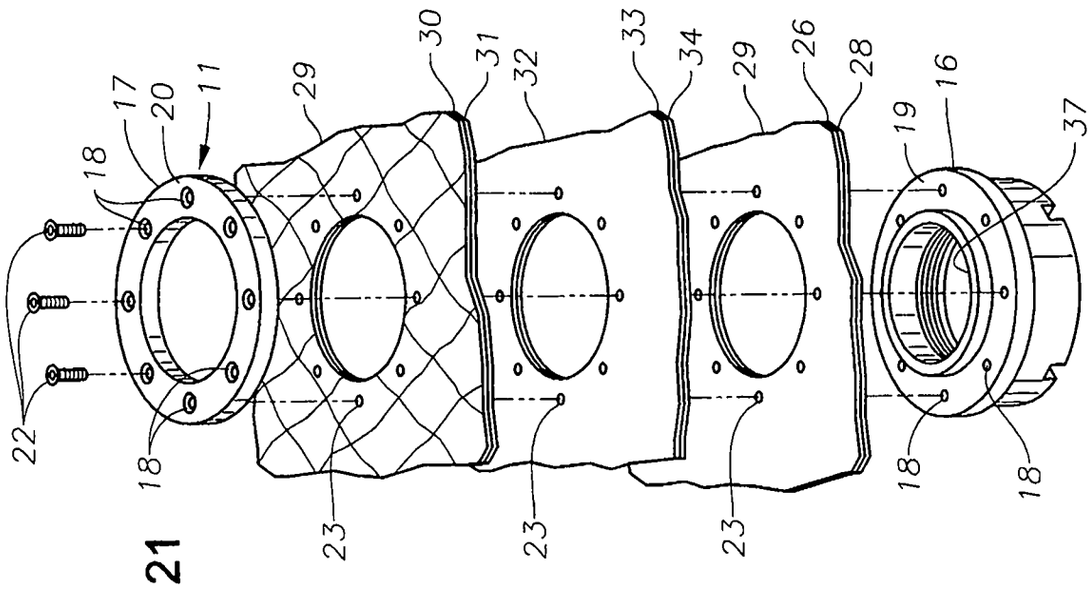
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Fig. 21

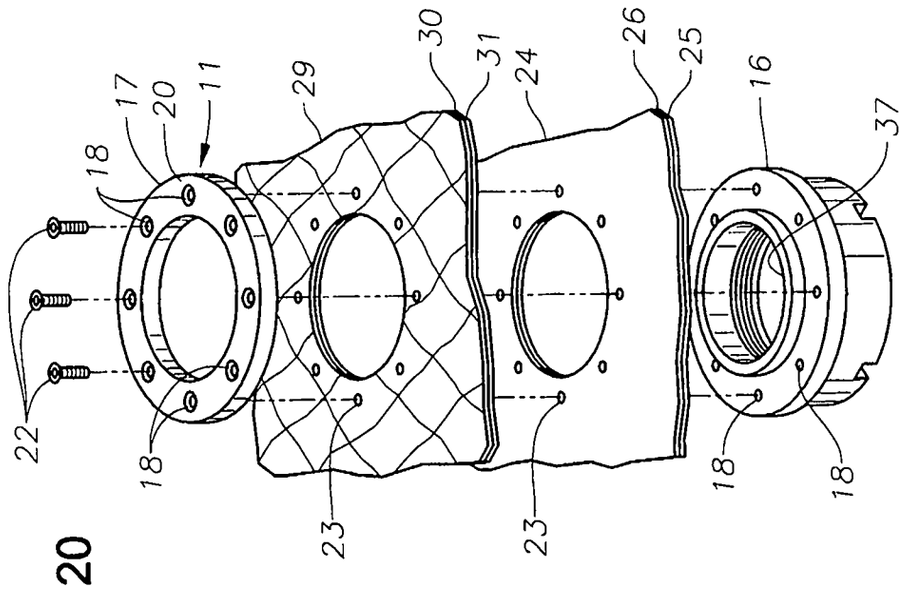
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Fig. 20

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92*bis*.1 and Administrative Instructions, Section 422)

To:

ELLIOTT, Douglas, H.
Patterson & Sheridan, LLP
3040 Post Oak Blvd.
suite 1500
Houston, TX 77056
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)*
08 November 2007 (08.11.2007)

Applicant's or agent's file reference
7046.03 PCT

IMPORTANT NOTIFICATION

International application No.
PCT/US2005/043694

International filing date *(day/month/year)*
05 December 2005 (05.12.2005)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address
TRUE, Charles, W.

State of Nationality:
State of Residence:
Telephone No.:
Facsimile No.:
Teleprinter No.:

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person ☐ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address
ENVIRONMENTAL PACKAGING TECHNOLOGIES, LTD
2200 Post Oak Blvd.
Suite 325
Houston, TX 77056
United States of America

State of Nationality: US
State of Residence: US
Telephone No.:
Facsimile No.:
Teleprinter No.:

3. Further observations, if necessary:
The person identified in Box 2 has been added to the record as applicant for all designated States except the United States of America. The status of the person in Box 1 has changed to Applicant for the US only.

4. A copy of this notification has been sent to:

☒ the receiving Office
☐ the International Searching Authority
☒ the International Preliminary Examining Authority
☐ the designated Offices concerned
☒ the elected Offices concerned
☐ other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 70 90

Authorized officer
Appave Jose
e-mail pt12.pct@wipo.int
Telephone No. +41 22 338 74 12

Box No. VIII (iv) DECLARATION: INVENTORSHIP (only for the purposes of the designation of the United States of America)

The declaration must conform to the following standardized wording provided for in Section 214; see Notes to Boxes Nos. VIII, VIII (i) to (v) (in general) and the specific Notes to Box No. VIII (iv). If this Box is not used, this sheet should not be included in the request.

Declaration of inventorship (Rules 4.17(iv) and 51*bis*.1(a)(iv))
for the purposes of the designation of the United States of America:

I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/ US05/43694 (if furnishing declaration pursuant to Rule 26*ter*).

I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.

I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications," by application number, country or Member of the World Trade Organization, day, month and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed.

Prior Applications: US 11/124,982

I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application.

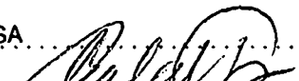
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name: Charles True

Residence: Houston, Texas, USA
(city and either US state, if applicable, or country)

Mailing Address: 5747 Larkin Street
Houston, Texas 77007

Citizenship: USA

Inventor's Signature:  Date: 24 April 2006
(The signature must be that of the inventor, not that of the agent)

Name:

Residence:
(city and either US state, if applicable, or country)

Mailing Address:

Citizenship:

Inventor's Signature: Date:
(The signature must be that of the inventor, not that of the agent)

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (iv)".

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

PARKS, Michael, L.
Parks & Associates P.C.
3131 West Alabama, Suite 101
Houston, TX 77098
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 03 April 2006 (03.04.2006)	
Applicant's or agent's file reference 7046.03 PCT	IMPORTANT NOTIFICATION
International application No. PCT/US2005/043694	International filing date *(day/month/year)* 05 December 2005 (05.12.2005)
International publication date *(day/month/year)* **Not yet published**	Priority date *(day/month/year)* 09 May 2005 (09.05.2005)
Applicant TRUE, Charles, W.	

1. By means of this Form, which replaces any previously issued notification concerning submission or transmittal of priority documents, the applicant is hereby notified of the date of receipt by the International Bureau of the priority document(s) relating to all earlier application(s) whose priority is claimed. Unless otherwise indicated by the letters "NR", in the right-hand column or by an asterisk appearing next to a date of receipt, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).

2. *(If applicable)* The **letters "NR"** appearing in the right-hand column denote **a priority document which, on the date of mailing of this Form, had not yet been received by the International Bureau** under Rule 17.1(a) or (b). Where, under Rule 17.1(a), the priority document must be submitted by the applicant to the receiving Office or the International Bureau, but the applicant fails to submit the priority document within the applicable time limit under that Rule, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

3. *(If applicable)***An asterisk (*)** appearing next to a date of receipt, in the right-hand column, denotes **a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b)** (the priority document was received after the time limit prescribed in Rule 17.1(a) or the request to prepare and transmit the priority document was submitted to the receiving Office after the applicable time limit under Rule 17.1(b)). Even though the priority document was not furnished in compliance with Rule 17.1(a) or (b), the International Bureau will nevertheless transmit a copy of the document to the designated Offices, for their consideration. In case such a copy is not accepted by the designated Office as the priority document, Rule 17.1(c) provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

Priority date	Priority application No.	Country or regional Office or PCT receiving Office	Date of receipt of priority document
09 May 2005 (09.05.2005)	11/124,982	US	07 March 2006 (07.03.2006)

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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: Michael L. Parks
Parks & Associates P.C.
3131 West Alabama, Suite 101
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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	26 SEP 2007

Applicant's or agent's file reference	FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date *(day·month·year)*	Priority date *(day·month·year)*
PCT/US05-43694	05 December 2005	09 May 2005

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - B65D 30/08 (2007.01)
USPC - 383/112

Applicant Charles W. True

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [X] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	08 August 2007	Blaine Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (April 2007)

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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing

      ☐ contained in the international application as filed

      ☐ filed together with the international application in electronic form

      ☐ furnished subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-24, 26, 27	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-24, 26, 27	NO
Industrial applicability (IA)	Claims	1-24, 26, 27	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-4, 16-18, 23 and 24 lack an inventive step under PCT Article 33(3) as being obvious over Dorsch in view of Maturana. Dorsch shows for claim 1, a flexible multi-layer container (10) for retention and delivery of flowable materials having independent layers (11) sealed off from each other with at least one fitting (figure 3) formed there through and compression seals formed with the at least one fitting formed there through comprising at least a 1st bag layer (11) formed from a compressible and elastically flexible material (column 3, lines 58-59) having the ability to expand within the elastic limits of said flexible material upon receiving flowable materials, at least a 2nd bag layer (11) formed from a compressible and elastically flexible material (column 3 lines 58-59) sized relative to said at least 1st bag layer for allowing said at least 1st bag layer formed from an elastically flexible material to smoothly expand within the elastic limits of said flexible material upon receiving flowable materials and for causing said at least 2nd bag layer (11) to be smoothly expanded within its elastic limits, and at least one fitting means (figure 3) formed through said at least 1st and 2nd bag layers (11) formed having a flange member (20) internal of said at least 1st bag layer (11) formed and a flange (22) external of said at least 2nd bag layer (11) formed for forming a compression seal between said flanges and said compressible and elastically flexible material (11) by compressing the compressible and elastically flexible material of said at least 1st and 2nd bag layer materials sufficiently for forming a compression seal there between and for sealing said at least one fitting means in place and for forming a flexible multilayer container, for claim 2, at least a 3rd bag layer (11) formed from a flexible material having strength and abrasion resistant properties sized relative to said at least 1st and 2nd bag layers (11) for allowing said at least 1st and 2nd bag layers formed from flexible materials to smoothly expand within their elastic limits and for causing said 3rd bag layer (11) to expand within its flexible limits, for claim 3, a 1st flanged member (20) internal of said at least 1st bag layer (11) having sufficient flange surface for engaging said at least 1st bag layer (11) formed from the inside surface of said at least 1st bag layer (11), a 2nd flanged member (22) external of said at least 3rd bag layer (11) having sufficient flange surface for engaging said at least 3rd bag layer (11) formed from the external surface of said at least 3rd bag layer (11) and for functional engagement with said 1st flanged portion means (20), and means for driving (23, 24) said 1st and 2nd flanged members (20, 22) toward each other and said at least 1st, 2nd and 3rd bag layers (11) for forming a compression seal there-between and sealing said at least one fitting means in place and for forming a flexible multi-layer container, for claim 4, a sufficient surface on said 1st flanged member (20) portioned on said inside surface of said at least 1st bag layer (11) for providing a seating surface against said inside surface of said at least 1st bag layer (11) and a sufficient surface on said 2nd flanged member (22) having a gripping surface positioned on said outside surface of said at least 3rd bag layer (11) for holding said bag layers surface against movement and for engaging said flanged surfaces toward each other and against said at least 1st, 2nd and 3rd bag layer (11) surfaces for forming a compression seal and holding said at least 1st, 2nd, and 3rd bag layer (11) materials against movement creep, for claim 16 a flexible multi-layer container (10) for retention and delivery of flowable materials having independent layers (11) sealed off from each other with at least one fitting (figure 3) formed there through and compression seals formed at the at least one fitting formed there through comprising at least an interior bag layer (11) formed from a compressible and elastically flexible material (column 3 lines 58-59) having the ability to expand within the elastic limits of said flexible material upon receiving flowable materials, at least an exterior bag layer (11) formed from a flexible material having strength and abrasion resistant properties sized relative to said at least interior bag layers (11) for allowing said at least interior bag layers (11) formed from flexible materials to smoothly expand within its elastic limits and for causing said exterior bag layer (11) to expand within its flexible limits, and at least one fitting means (figure 3) formed through said at least interior and exterior bag layers (11) formed having a flange member (20) internal of said at least interior bag layer (11) formed and a flange (22) external of said at least exterior bag layer (11) formed for forming a compression seal between said flanges and said compressible and elastically flexible material by compressing the compressible and elastically flexible material of said at least interior and exterior bag layer materials sufficiently for sealing said at least one fitting means in place and for forming a flexible multi-layer container, for claim 17, a 1st flanged member (20) internal of said at least interior bag layer (11) having sufficient flange surface for engaging said at least interior bag layer (11) formed from the inside surface of said at least interior bag layer (11), a 2nd flanged member (22) external of said at least exterior bag layer (11) having sufficient flange surface for engaging said at least exterior bag layer (11) formed from the external surface of said at least exterior bag layer (11) and for engaging with said 1st flanged portion means (20), and means for driving (23, 24) said 1st and 2nd flanged members (20, 22) toward each other and said at least interior and exterior bag layers (11) for forming a compression seal there between and sealing said at least one fitting means in place and for forming a flexible multi-layer container, and for claim 18, a sufficient surface on said 1st flanged member (20) portioned on said inside surface of said at least interior bag layer (11) for providing a seating surface against said inside surface of said at least interior bag layer (11), and a sufficient surface on said 2nd flanged member (22) having gripping surface positioned on said outside surface of said at least exterior bag layer (11) for holding said bag layers surface against movement and for engaging said flange surfaces (20, 22) toward each other and against said at least interior and exterior bag layer (11) surfaces for forming a compression seal and holding said at least interior and exterior bag layer (11) materials against movement creep. Dorsch does not show a multi-layer container having independent layers freely movable between each other. Maturana shows for claim 1 a flexible multi-layer container (10) for retention and delivery of flowable materials having independent layers (20, 24, 26) freely movable between each other (column 1 line 66 to column 2 line 1) and sealed off from each other -

(Continued in Supplemental Box)

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Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

There is no claim 25 present in the application.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
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Box V

with at least one fitting formed there through and compression seals formed with the at least one fitting formed there through, and for claim 16, a flexible multi-layer container (10) for retention and delivery of flowable materials having independent layers (20, 24, 26) freely movable between each other (column 1 line 66 to column 2 line 1) and sealed off from each other with at least one fitting formed there through and compression seals formed at the at least one fitting formed there through. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use independent layers such as those of Maturana with the flanged fitting of Dorsch in order to provide protection to the container layers and contents.

Claims 5 and 19 lack an inventive step under PCT Article 33(3) as being obvious over Dorsch in view of Maturana and further in view of Weikert. Dorsch and Maturana do not show grooved surfaces on the flanges. Weikert shows for claim 5, concentric grooved surfaces (figure 4) on said flanged portion (20) against said outside surface of said 3rd bag layer for holding said bag layers surfaces against movement creep and for being driven toward said 1st flange member (34) and against said at least 1st, 2nd and 3rd bag layer surfaces for forming a compression seal and holding said at least 1st, 2nd, and 3rd bag layer materials against movement creep, and for claim 19, concentric grooved surfaces (figure 4) on said flanged portion (20) against said outside surface of said exterior bag layer for holding said bag layers surfaces against movement creep and for being driven toward said 1st flange member (34) and against said at least interior and exterior bag layer surfaces for forming a compression seal. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a grooved flange such as that of Weikert in the flanged fitting of Dorsch and Maturana in order to provide a better lock against material creep.

Claims 6-8, 13 and 20-24 lack an inventive step under PCT Article 33(3) as being obvious over Dorsch in view of Maturana and further in view of Hodosh et al. Dorsch shows for claim 13, a method of forming a multi-layer container for retention and delivery of flowable material comprising indexing on said tube (11) for the position of a fitting (figure 3) having an orifice (covered by 23) and a flange surface (20) for aligning an aperture to be made at said orifice, making at least one hole (at 16) in said tube at said indexed position sufficient for the orifice of the fitting and for leaving said elastically flexible material in contact with said flange of said fitting, holding said flanged surface (20) of said fitting against said inside surface of said tube (11) about said hole made at said indexed position, indexing on said second tube (11) for the position of said fitting (figure 3) for aligning an aperture to be made there through with said at least 1st bag layer aperture, making at least one hole (at 16) in said second tube at said indexed position sufficient for the orifice of said fitting (figure 3) and for leaving said elastically flexible material in alignment with said at least 1st bag layer (110 material about said aperture, indexing on said 3rd bag layer (11) material for the position of said fitting (figure 3) for aligning aperture with said aperture of said at least 1st and 2nd bag layers (110, making a hole (at 16) in said 3rd bag layer (11) material at said indexed position for the orifice of said fitting (figure 3) and for leaving said 3rd bag layer (11) material in alignment with said at least 1st and 2nd bag layer (11) material about said apertures, holding said 2nd flanged surface (22) of said fitting against said outside surface of said at least 3rd bag layer (11), for claim 23, a method of forming a multi-layer container for retention and delivery of flowable material comprising indexing on said tube (11) for the position of a fitting (figure 3) having an orifice (covered by 23) and a flange surface (20) for aligning an aperture to be made at said orifice, making at least one hole (at 16) in said tube at said indexed position sufficient for the orifice of the fitting (figure 3) and for leaving said elastically flexible material (11) in contact with said flange (20) of said fitting, holding said flanged surface (20) of said fitting against said inside surface of said tube about said hole (at 16) made at said indexed position, indexing on said exterior bag layer (11) material for the position of said fitting (figure 3) for aligning an aperture (at 16) to be made with said aperture of said at least interior bag (11) layers, making at least one hole (at 16) in said exterior bag layer (11) material at said indexed position for the orifice of said fitting (figure 3) and for leaving said exterior bag layer (11) material in alignment with said at least interior bag layer material about said aperture, holding said 2nd flanged surface (22) of said fitting against said outside surface of said at least exterior bag layer (11), and for claim 24, indexing on said second tube (11) for the position of said fitting (figure 30 for aligning aperture (at 16) with said aperture of said at least interior bag layer, making a hole (at 16) in said second tube (11) at said indexed position sufficient for the orifice of said fitting (figure 3) and for leaving said elastically flexible material (11) in alignment with said at least interior bag layer material about said aperture, holding said 2nd flanged surface (22) of said fitting against said outside surface of said at least exterior bag layer (11). Dorsch does not show sealing the ends of the tubes or the flange fasteners. Maturana shows for claim 13, a method of forming a multi-layer container for retention and delivery of flowable material comprising forming at least a 1st seal on one end of a tube of a compressible and elastically flexible material, indexing on said tube for the position of a fitting having an orifice and a flange surface for aligning an aperture to be made at said orifice, making at least one hole in said tube at said indexed position sufficient for the orifice of the fitting and for leaving said elastically flexible material in contact with said flange of said fitting, holding said flanged surface of said fitting against said inside surface of said tube about said hole made at said indexed position, forming a 2nd seal on the other end of said tube of said compressible and elastically flexible material for forming at least a 1st bag layer (making of the first bag is described at column 5 lines 52-67), positioning said 1st bag layer into a second tube of a compressible and elastically flexible material, forming a 1st seal on one end of said second tube of a compressible and elastically flexible material, indexing on said second tube for the position of said, fitting for aligning an aperture to be made there through with said at least 1st bag layer aperture, making at least one hole in said second tube at said indexed position sufficient for the orifice of said fitting and for leaving said elastically flexible material in alignment with said at least 1st bag layer material about said aperture, forming a 2nd seal on the other end of said second tube to form a 2nd bag layer independent of said 1st bag layer and sufficiently distant therefrom to allow said 1st bag layer to smoothly expand within said 2nd bag layer within its elastic limits and for causing said 2nd bag layer to smoothly expand within its elastic limits (making of the second bag is described at column 6 line 55 to column 7 line 22), positioning said at least 1st and 2nd bag layers into a 3rd bag layer material having strength and abrasion resistant properties and a flexible limit, indexing on said 3rd bag layer material for -

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the position of said fitting for aligning aperture with said aperture of said at least 1st and 2nd bag layers, making a hole in said 3rd bag layer material at said indexed position for the orifice of said fitting and for leaving said 3rd bag layer material in alignment with said at least 1st and 2nd bag layer material about said apertures, forming a 3rd bag layer about said at least 1st and 2nd bag layers with sufficient distance from said at least 1st and 2nd bag layers to allow said at least 1st and 2nd bag layers to smoothly expand within each other and to smoothly expand within said at least 3rd bag layer to its flexible limits (making of the third bag is described at column 7 line 29 to column 8 line 8), for claim 22, at least an intermediate bag layer (24) formed from a compressible and elastically flexible material sized relative to said at least interior bag layer for allowing said at least interior flexible bag layer formed from an elastically flexible material to smoothly expand within the elastic limits of said flexible material upon receiving flowable materials and for causing said at least intermediate bag layer to be smoothly expanded within its elastic limits (column 1 line 66 to column 2 line 1), for claim 23, a method of forming a multi-layer container for retention and delivery of flowable material comprising forming at least a 1st seal on one end of a tube of a compressible and elastically flexible material, indexing on said tube for the position of a fitting having an orifice and a flange surface for aligning an aperture to be made at said orifice, making at least one hole in said tube at said indexed position sufficient for the orifice of the fitting and for leaving said elastically flexible material in contact with said flange of said fitting, holding said flanged surface of said fitting against said inside surface of said tube about said hole made at said indexed position, forming a 2nd seal on the other end of said tube of said compressible and elastically flexible material for forming at least an interior bag layer (making of the interior bag is described at column 5 lines 52-67),. positioning said at least interior bag layers into a exterior bag layer material having strength and abrasion resistant properties and a flexible limit, forming a 1st seal on one end of said exterior bag layer material, indexing on said exterior bag layer material for the position of said fitting for aligning an aperture to be made with said aperture of said at least interior bag layers, making at least one hole in said exterior bag layer material at said indexed position for the orifice of said fitting and for leaving said exterior bag layer material in alignment with said at least interior bag layer material about said aperture, forming a 2nd seal on said exterior bag layer for forming an exterior bag layer about said interior bag layers with sufficient distance from said at least interior bag layers to allow said at least interior bag layers to smoothly expand within said exterior bag layer to its flexible limits (making of the exterior bag is described at column 7 line 29 to column 8 line 8), and for claim 24, positioning said interior bag layer formed in steps (a) thru (e) into a second tube of a compressible and elastically flexible material, forming a 1st seal on one end of said second tube of a compressible and elastically flexible material, indexing on said second tube for the position of said fitting for aligning aperture with said aperture of said at least interior bag layer, making a hole in said second tube at said indexed position sufficient for the orifice of said fitting and for leaving said elastically flexible material in alignment with said at least interior bag layer material about said aperture, forming a 2nd seal on the other end of said second tube for forming an intermediate bag layer independent of said interior bag layer and sufficiently distant therefrom to allow said interior bag layer to smoothly expand within said intermediate bag layer within its elastic limits and for causing said intermediate bag layer to smoothly expand within its elastic limits, positioning said at least interior and intermediate bag layers into an external bag layer material having strength and abrasion resistant properties and a flexible limit and completing steps (f) thru (m) of Claim 23, (making of the intermediate bag is described at column 6 line 55 to column 7 line 22) Maturana does not show the flange fasteners.

Hodosh et al. shows for claim 6, at least two apertures (for fastener 374) through said at least 1st, 2nd, and 3rd bag layers (362) and said 2nd flanged (373) member, at least two fastener receiving means within said 1st flanged member (372), and at least two fastener means (374) through said at least two apertures in said 2nd flanged member (373), said at least 1st, 2nd, and 3rd bag layers (362) and into said at least two fastener receiving means within said 1st flanged member (373) for compressing said 1st and 2nd flanged members toward each other and against said at least 1st, 2nd, and 3rd bag layer materials (362) there between as said fasteners (374) are tightened for forming a compression seal at said at least 1st, 2nd, and 3rd bag layer materials (362) and for preventing movement creep of said at least 1st, 2nd, and 3rd bag layers (362) at said formed compression seal (figure 11b), for claim 7 at least two apertures (for fastener 374) through said at least 1st, 2nd, and 3rd bag layers (362) and said 1st and 2nd flanged member (372, 373), and at least two fastener means (374) through said at least two apertures for compressing the 1st and 2nd flanged members (372, 373) toward each other and against said at least 1st, 2nd, and 3rd bag layer materials (362) there between as said fasteners (364) are tightened for forming a compression seals at said 1st, 2nd, and 3rd bag layer materials (362) and for preventing movement creep at said at least 1st, 2nd, and 3rd bag layer materials (363) from pulling out of said sealing engagement and for forming a compression seals at said 1st, 2nd, and 3rd bag layer materials (figure 11b), for claim 8 aligning means (374) on said at least 2nd bag layer connected to said at least 3rd bag layer for holding said at least 1st and 2nd bag layers in alignment with said at least 3rd bag layer as said at least 1st and 2nd bag layers are allowed to smoothly expand within their elastic limits within said at least 3rd bag layer and cause said at least 3rd bag layer to expand within its flexible limits, for claim 13 inserting fasteners (374) through said apertures in said flanged surfaces (372, 373) and said at least 1st, 2nd, and 3rd bag layers (362) and forcing said 1st flanged (373) and 2nd flanged (372) members of said fitting against said at least 1st, 2nd, and 3rd bag layer (362) portions between said 1st and 2nd flanged portions by fastening said fasteners (374) for forming a compression seal there between and for preventing movement creep of said at least 1st, 2nd, and 3rd bag layers at said fitting for forming a flexible multi-layer container for retention and delivery of flowable materials (figure 11b), for claim 20 at least two apertures (for fasteners 374) through said at least interior and exterior bag layers (362) and said 2nd flanged member (372), at least two fastener (374) receiving means within said 1st flanged member (373) and, at least two fastener means (374) through said at least two apertures in said 2nd flanged member (372), said at least interior and exterior bag layers (362), and into said at least two fastener (374) receiving means within said 1st flanged member (372) for compressing the 1st and 2nd flanged members against each other and said at least interior and exterior bag layer materials there between

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as said fasteners are tightened for forming a compression seal at said at least interior and exterior bag layer materials and for preventing movement creep at said formed compression seal (figure 11b), for claim 21 at least two apertures (for fasteners 374) through said at least interior and exterior bag layers (362) and said 1st and 2nd flanged member (373, 372) and, at least two fastener means (374) through said at least two apertures for compressing the 1st and 2nd flanged members (373, 372) against each other and said at least interior and exterior bag layer materials (362) there between and for preventing movement creep resistance against said at least interior and exterior bag layer materials from pulling out of said sealing engagement and for forming compression seals at said interior and exterior bag layer materials (figure 11b), and for claim 23 inserting fasteners (374) through said apertures in said flanged surfaces (372, 373) and said at least interior and exterior bag layers (362), and forcing said 1st flanged (373) and 2nd flanged (372) members of said fitting against said at least interior and exterior bag layer (362) portions between said 1st and 2nd flanged portions (373, 372) by fastening said fasteners (374) for forming a compression seal there between and for preventing movement creep of said at least interior, and exterior bag layers at said fitting for forming a flexible multilayer container for retention and delivery of flowable materials (figure 11b). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use independent layers such as those of Maturana and fasteners such as those of Hodosh et al. with the flanged fitting of Dorsch in order to provide protection to the container layers and contents, to provide a more secure mounting for the flange to prevent material creep.

Claims 9 and 10 lack an inventive step under PCT Article 33(3) as being obvious over Dorsch in view of Maturana and Hodosh et al. and further in view of McGehee. Dorsch shows for claim 10, a material (11) of a thickness at its thinnest sufficient for allowing compression into a compression seal, and a material (11) of a thickness at its thickest sufficient for allowing compression into a compression seal and for preventing creep of said material at the point of compression into a seal about said at least one fitting means (figure 3). Dorsch, Maturana and Hodosh et al. do not show alignment tabs. McGehee shows for claim 9, tab members (13a, 27) connected to said at least 2nd bag layer (13) and projecting therefrom and connected to said 3rd bag layer (12) for causing said at least 1st and 2nd bag layers to align with said at least 3rd bag layer as said 1st and 2nd bag layers smoothly expand within their elastic limits and cause said at least 3rd bag layer to expand within its flexible limits. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use tab members such as those of McGehee in the container of Dorsch, Maturana and Hodosh et al. in order to align the bags.

Claims 11 and 12 lack an inventive step under PCT Article 33(3) as being obvious over Dorsch in view of Maturana, Hodosh et al. and McGehee and further in view of Walters. Dorsch, Maturana, Hodosh et al. and McGehee do not show the specific material thickness. Walters shows for claim 11, a thinness of no less than 04 mils, and a thickness of no more than 80 mils (10 mils at column lines 63-64), and for claim 12, a thinness of no less than 06 mils, and a thickness of no more than 70 mils (10 mils at column lines 63-64).
It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a material of 10 mils as taught by Walters in the container of Dorsch, Maturana, Hodosh et al. and McGehee in order to provide sufficient strength to the container walls.

Claims 14, 15, 26 and 27 lack(s) an inventive step under PCT Article 33(3) as being obvious over Dorsch in view of Maturana and Hodosh et al. and further in view of Coss et al. The term "inch/lbs" is not a recognizable unit of force. It is assumed the unit is referring to torque and is being interpreted as "inch-lbs." Dorsch and Maturana do not show the specific force levels. Coss et al. shows for claim 14, fastening said fasteners with a force of 75 inch/lbs to 400 inch/lbs (column 1 lines 40-42 describe a torque wrench with a range of 5 to 100 foot-pounds, which converts to 60-600 inch-lbs, which is capable of fastening fasteners with the specified force) for forming a compression seal and for preventing movement creep of said at least 1st, 2nd, and 3rd bag layers and pulling away from said at least one fitting, for claim 15, fastening said fasteners with a force of 80 inch/lbs to 305 inch/lbs (column 1 lines 40-42 describe a torque wrench with a range of 5 to 100 foot-pounds, which converts to 60-600 inch-lbs, which is capable of fastening fasteners with the specified force) for forming a compression seal and for preventing movement creep of said at least 1st, 2nd, and 3rd bag layers and pulling way from said at least one fitting, for claim 26 fastening said fasteners with a force of 75 inch/lbs to 400 inch/lbs (column 1 lines 40-42 describe a torque wrench with a range of 5 to 100 foot-pounds, which converts to 60-600 inch-lbs, which is capable of fastening fasteners with the specified force) for forming a compression seal and for preventing movement creep of said at least interior, intermediate, and external bag layers and pulling away from said at least one fitting, and for claim 27 fastening said fasteners with a force of 80 inch/lbs to 315 inch/lbs (column 1, lines 40-42 describe a torque wrench with a range of 5 to 100 foot-pounds, which converts to 60-600 inch-lbs, which is capable of fastening fasteners with the specified force) for forming a compression seal and for preventing movement creep of said at least internal, intermediate, and external bag layers and pulling away from said fitting.
It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a torque wrench such as that of Coss et al. to fasten the fasteners of Dorsch, Maturana and Hodosh et al. with the specified force in order to prevent the fasteners from becoming loose.

Claims 1-24, 26 and 27 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry. There is no claim 25.

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

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Industria y Comercio
SUPERINTENDENCIA

REQUISITOS MINIMOS PARA ADMISION A TRAMITE
PCT

PATENTE DE INVENCION [✓] MODELO DE UTILIDAD [ ]

- Indicación de que se solicita la concesión de una patente [✓]
- Datos de identificación del solicitante o de la persona que presenta la solicitud [✓]
- Descripción de la invención [✓]
- Dibujos de ser estos pertinentes [✓]
- Comprobante de pago de las tasas establecidas [✓]

COMPLETA [ ] INCOMPLETA [ ]

DISEÑO INDUSTRIAL [ ]

- Indicación de que se solicita el registro de Diseño Industrial [ ]
- Datos de identificación del solicitante o de la persona que presenta la solicitud [ ]
- Representación gráfica y fotográfica del Diseño Industrial o muestra del material que incorpora el diseño [ ]
- Comprobante de pago de las tasas establecidas [ ]

COMPLETA [ ] INCOMPLETA [ ]

ESQUEMA DE TRAZADO [ ]

- Indicación de que se solicita el registro de un Esquema de Trazado [ ]
- Datos de identificación del solicitante o de la persona que presenta la solicitud [ ]
- Representación gráfica del esquema trazado [ ]
- Comprobante de pago de las tasas establecidas [ ]

COMPLETA [ ] INCOMPLETA [ ]

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Firma Responsable

Fecha_____

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