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54 **A pressure fluid dispenser and method of making the same.**

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Description

This invention refers to an apparatus for containing and dispensing a pressurized fluid, comprising an expandable bag having a generally cylindrical shaped outer wall, said bag having a closed end and an open end, said outer wall including a plurality of substantially longitudinal pleats which define a plurality of peaks and valleys, valve means coupled with said open end for selectively releasing the contents of the bag, and an expandable sleeve substantially surrounding said bag for maintaining pressure on the bag and its contents.

From US-A-4,423,829 there is known a dispenser of the type set forth, whereby the bag has a plurality of longitudinal creases or pleats so as to divide the wall into sections which can fold in on each other two-by-two as liquid is dispensed. While this arrangement was successful it still shared a basic problem common with all flexible containers, namely that the manner in which the bag is folded or collapsed could not be precisely controlled so that often extraneous creases developed which did not permit all the contents of the bag to be dispensed.

It is the object of the present invention to provide a dispenser of the type set forth which enables collapsing of the expandable bag contained therein in a controlled manner until substantially all the fluid disposed within the bag has been expelled.

According to the invention this object is met by a plurality of expandable longitudinal ribs formed by coating the bag and disposed in the valleys of the pleats and at least partially filling said valleys, said longitudinal ribs controlling refolding of the pleats in the bag as fluid is released from the bag.

Thereby the amount of residual product that remains undispensed in the bag is minimized so that waste of the product is avoided.

Preferably said ribs are formed by dipping said bag in a coating such that the coating forms longitudinal ribs which fill the bottom of each of the pleat valleys.

Brief Description of the Drawings

Figure 1 shows a bag assembly inserted in an enclosure;
 Figure 2 shows the flexible bag produced by molding;
 Figure 3 shows a bottom view of the bag after molding;
 Figure 4 shows the bag of Fig. 3 after it has been pleated;
 Figure 5 shows a bottom view of Fig. 4;
 Figure 6 shows a partial sectional view of the

bag with the coating provided on the bag;
 Figure 7 shows the bag assembly according to this invention;

Figure 8 shows a sectional view taken along line 8-8 of Figure 7 of a bag assembly with a 1.9 g coating after the bag has been refolded;

Figure 9 shows a sectional view taken along line 8-8 of Figure 7 of a bag assembly with a 5g coating; and

Figure 10 shows a sectional view taken along line 8-8 of Figure 7 of a bag assembly without a coating.

Description of the Preferred Embodiments

In the following description any reference to either orientation or direction is intended for the purpose of illustration and is not to be interpreted as a limitation of the invention.

A dispenser with a pressurized or barrier bag comprises a bag assembly 10 (see Figure 1) which is typically inserted in an enclosure 11. The assembly comprises a tubular bag 12 with a closed bottom end 14 and a mouth 16. A metal cap 18 is fitted over the mouth 16. The cap has a central orifice 20 communicating with the interior of the cap. Inside the mouth and concentric therewith is a valve assembly 22 adapted to release pressurized fluid contained within the bag when activated through orifice 20. After the bag assembly is inserted in the enclosure 11 an actuator 23 is mounted on top. The actuator has a hollow stem 25 which extends through 20 and releases the fluid when the activator is pressed downward.

The bag is surrounded by a relatively thin and resilient coating 24 which conforms to the shape of the bag. The coating is described more fully below. The coated bag is disposed within an elastomeric member 26 which is commonly described as an expandable sleeve. The member 26 is essentially coextensive with bag 12.

In order to obtain the necessary shape the bag is first formed into the shape of a bottle as shown in Figure 2. Preferably the bag is made of a flexible but substantially nonresilient material which is relatively inert so that it will not impart any taste or smell to its contents. For example the bag may be made out of a plastic material such as nylon, polypropylene, polyester or SARANEX®. The material may be formed into the shape shown in Figure 2 by blow molding or similar well-known methods in the art.

Next the bottle shaped bag is pleated into the shape shown in Figures 4 and 5. In this form the bag has a plurality of longitudinal or axial pleats defined by crests 28 separated by troughs or valleys 30. Since the bag is flexible it may be compressed radially until the inner walls 32 of each

pleat 28 essentially contact or fold over each other. When the bag is compressed or folded in this manner the only empty space left in the bag is a relatively narrow tube 34 defined by troughs 30.

It has been found that the pleated bag can be programmed or constrained to re-fold in a very precise and controlled manner after being filled with a product by enveloping it with a coating applied over the pleats. Preferably a rubber latex coating is applied to the exterior surface of the bag. The latex is chosen so that when it is applied to the bag, it forms a smooth, even, elastic coating on the bag with a bead or rib being generated to fill the bottom of the pleat valleys 30, as shown at 36 on Figure 6. The size of the bead depends on the density and viscosity of the latex.

Several different rubber-like latex material have been tried and it has been found that pre-vulcanized rubber or a synthetic isoprene are most suitable for the coating.

Latex formulations similar to those used for making different rubber products, such as balloons, surgical gloves, etc. are suitable. Some change in solids content and/or viscosity may be required but these techniques are well known to those in this industry.

The latex is a water based emulsion containing the rubber, filler etc. at room temperature. The bag shaped as shown in Figure 4 is dipped into the bath and removed. After the excess latex drains off, the coated bags are dipped into a coagulant, drained, then dipped into water for rinsing and then are heated in an oven, at the maximum temperature which will not affect the container, to drive off the water and to form a solid continuous elastic surface coating on the bag. The coating so formed has sufficient adhesion to the bag to withstand further handling.

The bag is now ready for the final assembly. The valve assembly 22 and cap 20 are fitted over mouth 16 of the bag. The elastomeric sleeve 26 is then expanded and pulled over the bag into the position shown in Figure 1. Preferably the inner diameter of sleeve 26 is smaller than the outer diameter of the coated bag shown in Figure 4 so that the pleats of the bag are forced close together. During this later operation a vacuum may be applied to the bottle to draw in the pleats thereby making the assembly easier.

As previously described, a fluid is fed under pressure into the bag forcing it to expand substantially into the shape of Figure 2. Sleeve 26 also expands. The elastomeric sleeve 26 applies sufficient force in the bag to keep it pressurized after it (the bag) has been disconnected from the pressurized fluid source. Thus the fluid may be dispensed by activating the valve assembly 22. As more and more fluid is withdrawn or ejected from the bag,

the ribs or beads of the coating disposed in the pleat valleys, force the bag to regain its pleated shape in a smooth, orderly fashion so that extraneous creases are not formed, until the bag is reduced to its minimum or collapsed stage at which point essentially all the fluid contained therein has been removed.

The effects of an expansion and contraction cycle are illustrated on three different bags. Figure 8 shows a cross-sectional view of a bag with a 1.9 gram nominal dry weight latex coating taken along lines 8-8 of Figure 7. Figures 9 and 10 show the same view of a bag with a 5 gram nominal dry weight latex coating and no coating respectively. These nominal weights refer to the dry weight of the latex for a nominal 0.2 l (7 fl. oz.) container. Smaller and larger containers would have corresponding different weights.

A comparison of Figures 8 and 10 shows that the bag without a coating was refolded in a haphazard manner so that in its final stage it still contains many voids and the pleats are not discernible. The bag assembly of Figure 8 has been deformed into an ellipse but there are less voids than in Figure 10 and the pleats are readily identifiable. Figure 9 shows that the bag having a 5 g latex reforms into a configuration with the least number of voids and its pleats are folded evenly.

Thus figures 8-10 show the effectiveness of the invention to control the refolding of the bag. In addition the coating has a relatively non-slip surface so that when the coated bag is disposed within the expandable sleeve sufficient frictional forces develop between the bag and the sleeve to prevent the sleeve from slipping axially during its expansion and contraction. In previous configurations such slipping was found to be undesirable because if the sleeve slips axially some portions of it become more expanded than other portions and therefore during contractions the bags were subjected to uneven pressure. Although slippage could also be prevented by roughing the outer surface of the bag, it has been found that such an operation also introduces undue stress in the structure of the bag thereby weakening it.

Tests have shown that a dispenser built in accordance with this invention functioned properly after being stored on a shelf for a year with a pressurized fluid. Bags constructed in accordance with this invention also functioned properly after being subjected to a temperature of 49°C for 90 days. These tests conform to the standards accepted by the industry.

Claims

1. An apparatus for containing and dispensing a pressurized fluid, comprising an expandable

bag (10) having a generally cylindrical shaped outer wall (12) and a closed end (14) and an open end (16), said outer wall including a plurality of substantially longitudinal pleats which define a plurality of peaks (28) and valleys (30), valve means (22) coupled with said open end (16) for selectively releasing the contents of the bag, and an expandable sleeve (26) substantially surrounding said bag for maintaining pressure on the bag and its contents, characterized by a plurality of expandable longitudinal ribs (36) formed by coating said bag (10) and disposed in said valleys (30) of said pleats and at least partially filling said valleys, said longitudinal ribs (36) controlling refolding of the pleats in the bag as fluid is released from the bag.

2. An apparatus in accordance with claim 1 wherein said longitudinal pleats extend from adjacent said open end (16) to adjacent said closed end (14).
3. An apparatus in accordance with claim 1 and additionally including an enclosure (11) into which said bag is inserted.
4. An apparatus in accordance with claims 1 wherein said plurality of longitudinal ribs (36) comprise latex, prevulcanized natural rubber, or synthetic isoprene.
5. An apparatus in accordance with claim 1 wherein an inner diameter of said expandable sleeve (26) is smaller than an outer diameter defined by pleat crests (28) in said bag.
6. An apparatus in accordance with Claim 1 wherein said plurality of longitudinal ribs (36) are formed by dipping said bag in a coating (24) such that said coating forms longitudinal ribs (36) which fill the bottom of each of said pleat valleys (30).
7. An apparatus in accordance with claim 6 wherein said coating (24) is a latex material.
8. An apparatus in accordance with claim 7 wherein said latex material comprises 5 gram dry weight latex.

Revendications

1. Récipient pour l'absorption et la distribution de fluides par pression, comprenant un sac extensible (10) avec une paroi extérieure (12) de forme généralement cylindrique et un bout fermé (14) et un bout ouvert (16), cette paroi

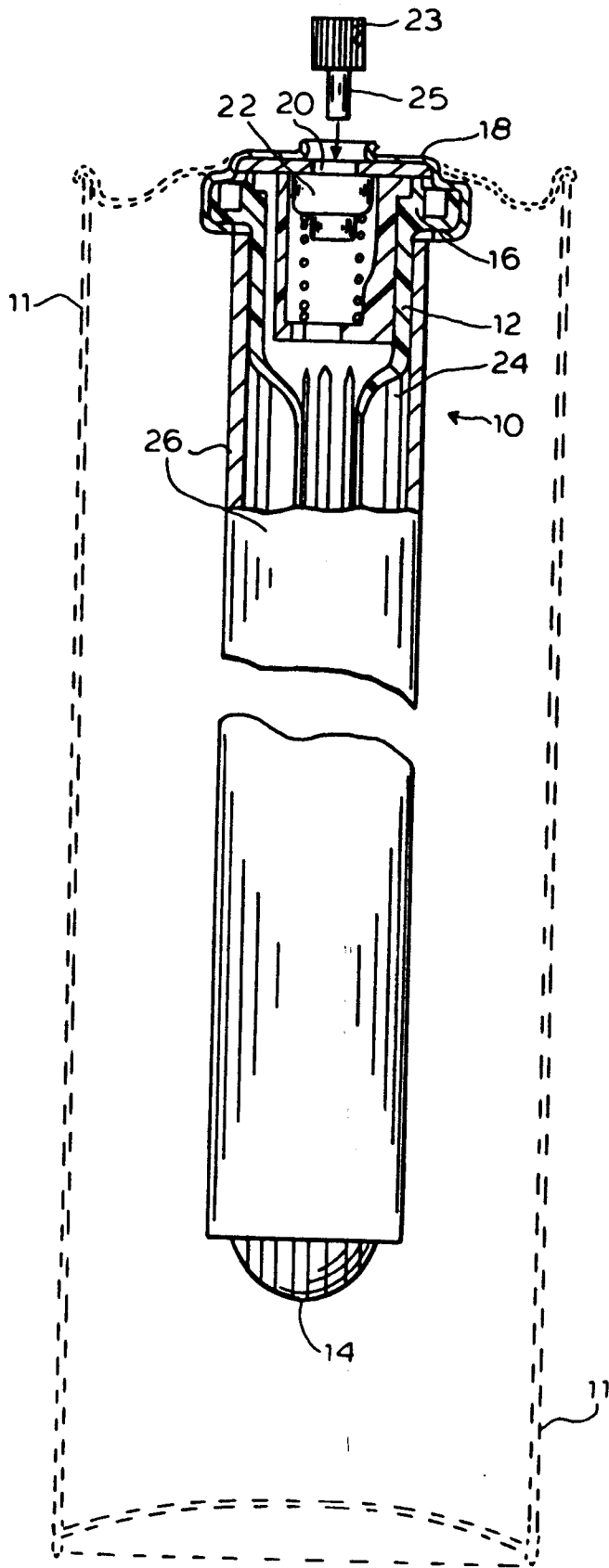
extérieure comportant une pluralité de plis substantiellement longitudinaux, qui définissent une quantité de collines (28) et de vallées (30) et le bout ouvert (16) étant raccordé à une valve (22) pour la distribution du contenu du sac, un manchon extensible (26) entourant substantiellement ledit sac, étant prévu pour maintenir le sac et son contenu sous pression, caractérisé par une pluralité de nervures longitudinales extensibles (36) formées en appliquant une couche sur ledit sac (10) et placées dans lesdites vallées (30) des plis en remplissant au moins partiellement ces vallées, ces nervures longitudinales (36) contrôlant la façon comme les plis se replient dans le sac, quand du fluid est distribué du sac.

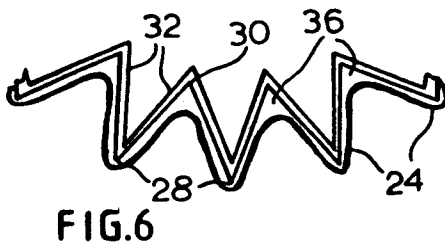
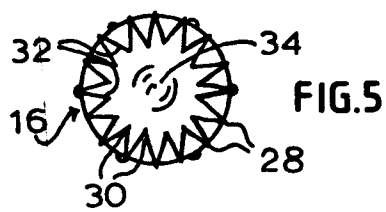
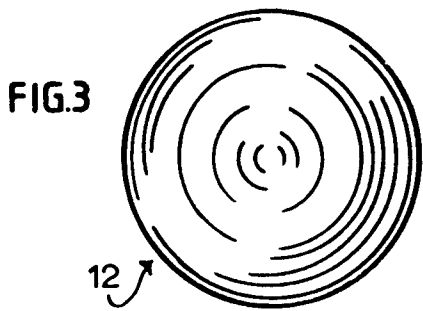
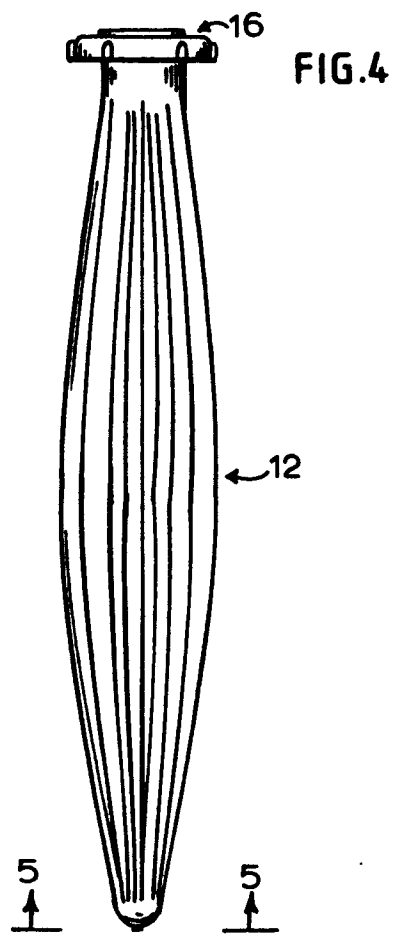
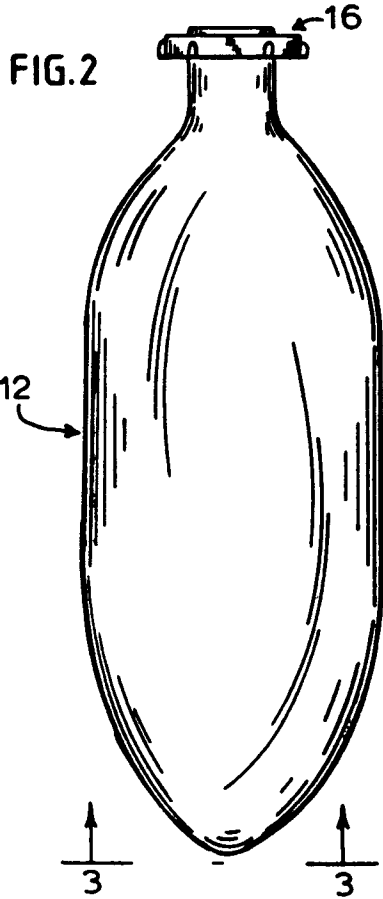
2. Récipient selon revendication 1, caractérisé en ce que les nervures longitudinales s'étendent à partir d'un endroit près du bout ouvert (16) jusqu'à un endroit près du bout fermé (14).
3. Récipient selon revendication 1, caractérisé en ce qu'il comporte une enveloppe additionnelle (11).
4. Récipient selon revendication 1, caractérisé en ce que la pluralité des nervures longitudinales (36) consiste en latex, en caoutchouc pré-vulcanisé ou en isoprène synthétique.
5. Récipient selon revendication 1, caractérisé en ce qu'un diamètre intérieur d'un manchon extensible (26) est plus réduit qu'un diamètre défini par des collines (28) dans le sac.
6. Récipient selon revendication 1, caractérisé en ce que la pluralité des nervures longitudinales (36) se produit par l'immersion du sac dans un matériel de couche (24) de sorte que la couche forme des nervures longitudinales (36) qui remplissent le fond de chaque vallée (30).
7. Récipient selon revendication 1, caractérisé en ce que le matériel de couche (24) est en matériel latex.
8. Récipient selon revendication 1, caractérisé en ce que le matériel latex consiste en latex d'un poids à l'état sec de 5 grammes.

Patentansprüche

1. Behälter zur Aufnahme und Abgabe eines Druckfluids, mit einem dehnbaren Beutel (10) mit einer im wesentlichen zylindrischen Außenwand (12) und einem geschlossenen Ende (14)

- und einem offenen Ende (16), wobei die Außenwand eine Mehrzahl von im wesentlichen längsgerichteten Falten aufweist, die eine Mehrzahl von Hügeln (28) und Tälern (30) bilden, und das offene Ende (16) mit einem Ventil (22) zur Ausgeben des Inhaltes des Beutels versehen ist, und wobei eine den Beutel im wesentlichen umgebende, dehnbare Hülse (26) vorgesehen ist, um den Beutel und dessen Inhalt unter Druck zu halten, gekennzeichnet durch eine Mehrzahl von dehnbaren Längsrippen (36), die durch Beschichtung des Beutels (10) gebildet und in den Tälern (30) der Falten angeordnet sind und diese Täler zumindest teilweise ausfüllen, wobei diese Längsrippen (36) ein Zurückfallen der Falten in dem Beutel steuern, wenn Fluid aus dem Beutel abgegeben wird. 5
10
15
2. Behälter nach Anspruch 1, dadurch gekennzeichnet, daß die Längsfalten sich von einer Stelle nahe des offenen Endes (16) bis zu einer Stelle nahe des geschlossenen Endes (14) erstrecken. 20
25
3. Behälter nach Anspruch 1, dadurch gekennzeichnet, daß er zusätzlich eine Hülle (11) aufweist, in welche der Beutel eingesetzt ist.
4. Behälter nach Anspruch 1, dadurch gekennzeichnet, daß die mehreren Längsrippen (36) aus Latex, vorvulkanisiertem natürlichem Gummi oder synthetischem Isopren bestehen. 30
5. Behälter nach Anspruch 1, dadurch gekennzeichnet, daß ein Innendurchmesser der dehnbaren Hülse (26) kleiner ist als ein Außendurchmesser, der von Faltenhügeln (28) in dem Beutel bestimmt ist. 35
40
6. Behälter nach Anspruch 1, dadurch gekennzeichnet, daß die mehreren Längsrippen (36) dadurch erzeugt werden, daß der Beutel in ein Beschichtungsmaterial (24) eingetaucht wird, derart, daß die Beschichtung Längsrippen (36) bildet, die den Boden jedes Faltentales (30) füllen. 45
7. Behälter nach Anspruch 6, dadurch gekennzeichnet, daß das Beschichtungsmaterial (24) ein Latexmaterial ist. 50
8. Behälter nach Anspruch 7, dadurch gekennzeichnet, daß das Latexmaterial aus Latex mit 5 Gramm Trockengewicht besteht. 55





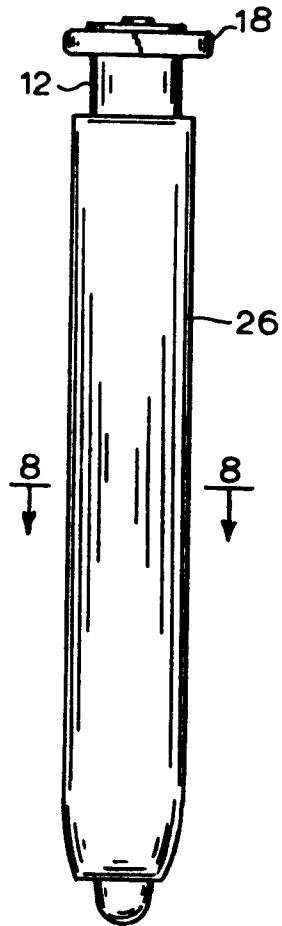


FIG. 7

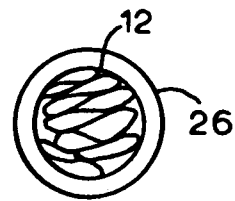


FIG. 10

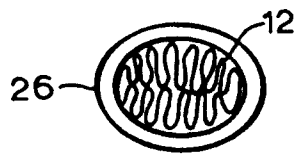


FIG. 8

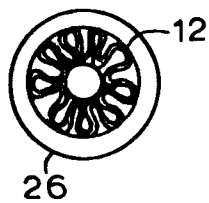


FIG. 9