A flexible sealed bag containing a plurality of at least partially water soluble unit dose articles comprises a front panel, a back panel and a bottom panel. The front panel and the back panel may be marginally joined together along at least two opposed edges to be in a confronting relationship to form the closed bag. The front and back panels are joined at the top of the bag by a frangible seal. The bottom panel is intermediate to the front panel and back panel, and is joined to each of them.
Fig. 2
FLEXIBLE BAG CONTAINING UNIT DOSE ARTICLES

FIELD OF THE INVENTION

[0001] The field of the present invention is packaging for unit dose articles, particularly unit dose articles comprising laundry compositions. The laundry compositions may include, but are not limited to, additives for use in wash and/or rinse cycles, detergents, fabric softeners, and perfumes among others. These unit dose articles may comprise compositions that are in any suitable form including, but not limited to, solids, pastes, gels, liquids and combinations thereof. Non-solid laundry compositions will most commonly be encapsulated in film material that is at least partially soluble in water.

BACKGROUND OF THE INVENTION

[0002] Life is becoming more hectic than ever. We now access global information at the touch of a button, keep our mobile phones handy for any eventuality, and as consumers, we have become accustomed to the get-it-now style. Household compositions like detergents have been impacted by this trend. For example, over the last decade and a half manufacturers have moved from the traditional big-box laundry and auto dish detergents, to compacted detergents, and more recently, to unit dose detergents. The unit dose is typically a tablet or a water soluble pouch that can be directly added into a washing machine, without the bother or mess of measuring. The unit dose is designed to dissolve in the water during the wash cycle.

[0003] Water-soluble unit dose articles are susceptible to incidental or unintentional contact with moisture. Consequently, it is important to protect the article from moisture during the various stages of its life cycle, including during transport and storage. Packaging is a way of providing such protection. Packaging also forms an integral part of a product and may be a consumer's first point of contact with a brand. Thus apart from protecting the unit dose article from damage, the package must be aesthetically pleasing and provide space for branding and usage information to the consumer. In sum, the ideal package is functional, informative and attractive.

[0004] One attempt to meet these needs has been to package unit dose articles in flexible bags. To prevent waste and to provide a full looking bag, the bags are typically sized according to the volume of unit dose articles contained therein. The height of the bag is often manipulated to provide for a good shelf presence. The width of the bag is often manipulated to minimize the bag footprint on the shelf. Oftentimes, these considerations lead to a tall bag having a small footprint and consequently a high center of gravity. These bags may tend to tip over on the store shelf.

[0005] Some bags have a window through which the consumer may see the product prior to purchase. The size and placement of the window is such that the bag appears to be full of product. A full looking bag has been viewed as a critical element for conveying to consumers that they are getting their money's worth.

[0006] Given these considerations, as well as that unit dose articles are sold in a variety of counts, the manufacturer may be required to make a whole series of bags for a single final product. This can be disadvantageous since it adds to manufacturing costs.

[0007] Thus there remains a need for an attractive bag that protects unit dose articles from moisture, provides the consumer with brand and usage information, and that can be utilized to package a variety of article counts, while still signaling to the consumer that they are getting value for their money. Such a bag must also comprise a combination of bag dimensions that collectively meet these needs while providing for good process reliability.

SUMMARY OF THE INVENTION

[0008] The present invention is directed to a flexible sealed bag containing a plurality of unit dose articles. The flexible sealed bag contains at least one at least partially water soluble unit dose article having a major dimension. The flexible bag comprises a front panel and a back panel marginally joined thereto along at least two opposed edges to be in a confronting relationship to form a closed bag. The front panel and the back panel are joined at the top by a frangible seal. A bottom panel is intermediate to the front panel and the back panel, and joined to each of them. The bag has a depth that is at least about two times that of the major dimension of the at least one unit dose article.

[0009] The invention is also directed to a series of these bags, which each have a height less than about 300 mm and each differ in height by about 20 to about 30 mm.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] While the specification concludes with claims particularly pointing out and distinctly claiming the invention, it is believed that the present invention will be better understood from the following description of preferred embodiments taken in conjunction with the accompanying drawings in which:

[0011] FIG. 1 is a perspective view of a bag containing articles according to the present invention.

[0012] FIG. 2 is a front view of an empty bag according to the present invention.

[0013] FIG. 3 is a perspective view of a unit dose article according to the present invention.

[0014] FIG. 4 is a cross-sectional view of a chute through which unit dose articles of the present invention may fall.

[0015] FIG. 5 is a perspective view of a bag according to the present invention under a chute.

[0016] FIGS. 6a, 6b, and 6c are front views of bottom seals according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0017] One embodiment of a flexible bag 10 according to the present invention is as illustrated in FIG. 1. The flexible bag 10 comprises a front panel 30, a back panel 50 and a bottom panel (not shown). The front panel 30 in this embodiment is rectangularly shaped and comprises spaced apart side edges 35a, 35b. The front panel is marginally joined to the back panel 50 along at least two opposed edges to be in confronting relationship. FIG. 1 shows the two opposed edges marginally joined together, those opposed edges of the front panel and back panel, respectively 35a, 55a. The bottom panel (not shown) is intermediate to the front panel 30 and back panel 50, and joined to each. The front panel 30 and the back panel 50 are joined at the top by a frangible seal 20 after the bag is filled with unit dose articles.

[0018] A variety of materials can be used to form the panels of the bag, the seal(s) and other elements of the present
invention. Technical requirements such as moisture protection and compatibility with product as well as costs and ease of manufacture are the primary factors when selecting these materials.

One or more materials may be used to form the one or more panels 30, 50 of the bag 10. In some embodiments, one or more panels 30, 50 comprise layers of material. In some embodiments, the layers are laminated together. Materials of use include, but are not limited to film forming plastics. Film forming plastics may be selected from the group of polyethylene terephthalate, polyethylene, Nylon™, Barex™, Evoh™ and combinations thereof. In some embodiments, the panels 30, 50 may comprise layers laminated together.

The panels 30, 50 of the bag 10 may be joined along the edges 35a, 35b using any suitable method that will provide a seal that serves as a moisture barrier. Non-limiting examples include heat sealing, ultrasonic welding, autogeneous bonding, pressure sealing, adhesive sealing, and combinations thereof.

Any suitable means of creating a frangible seal joining the front and back panels together is of use. Non-limiting examples include perforating, applying a line of weakness, peelable seal, resealable closures and combinations thereof.

As shown in FIG. 1, the front panel 30 may comprise at least one opaque portion 31 and at least one transparent window 32. The unit dose articles 100 are distributed from the bottom of the bag 10 to a height 110 therein, providing an empty space 33 above the height 110 of the unit dose articles 100 such that the transparent window 32 intercepts the articles 100 and the empty space 33. The flexible bag 10 shown in FIG. 1 comprises an optional, additional closure 25 for securing the bag 10 in a closed condition after the frangible seal 20 is broken.

Referring to FIG. 2, the flexible bag 10 may be defined by its height 11 and width 12 when the bag 10 is unfilled and placed on a flat surface with the front panel up. The height 11 and width 12 of the bag 10 are measured at their maximum value.

FIG. 3 shows an exemplary unit dose article 100 of the present invention. The unit dose article 100 is preferably a unitized dose of a household care composition including, but not limited to laundry, dish or hard surface cleaning compositions. While such articles 100 can have a variety of four’s, shapes and compositions, a common feature of such compositions is their susceptibility to being degraded, deactivated, rendered unstable or dissolved when exposed to prolonged and/or high levels of moisture. By way of example, laundry additives encapsulated in polymer films that are designed to be fast dissolving under both hot and cold water conditions, may become tacky, unstable and even prematurely dissolved if not protected from prolonged exposure to atmospheric moisture. Such articles are described in U.S. Patent Publication No. 2010/0192986A1 and U.S. Pat. No. 6,995,126, which are incorporated herein by reference.

As shown in FIG. 3, the unit dose article 100 may have a pincushion shape with a major dimension 101. As used herein, “major dimension” defines the largest linear dimension of the largest unit dose article 100 in the bag. If the unit dose article 100 is substantially circular, the “major dimension” defines the diameter thereof. In embodiments in which the bag 10 contains a plurality of unit dose articles 100 having different shapes and sizes, the major dimension 101 corresponds to the major dimension of the largest of the unit dose article 100.

In preferred embodiments, the unit dose article has a pincushion shape with a major dimension of no greater than about 50 mm.

The bags of the present invention are filled with a predetermined quantity of unit dose articles along a high speed line using any suitable method in the art. Non-limiting methods include Vertical Form Fill Sealing, Horizontal Form Fill Sealing and Horizontal Fill Sealing. In any one or more of these processes, unit dose articles may be dispensed through a chute that directs the unit dose through an opening in the bag. In some embodiments, the opening is at the top of the bag, in other embodiments, the opening is at the side of the bag. Once the bag is filled, the opening may be sealed. The filling and sealing processes typically occur at line speeds as high as 60 bags per minute. Consequently, process reliability is one key to reducing down time on the line. Process reliability may be impacted by several factors such as the chute geometry and bag geometry. One factor to consider is that as unit dose articles are dispensed from a chute into a bag, they tend to form a mound inside of the bag. If the height of the mound is too great, it can interfere with the subsequent sealing of the bag, which can in turn lead to breakage of the article and contamination of the line.

Another factor to consider is that as the unit dose articles fall through the chute, they can bunch up or “bridge” such that they clog the chute and impede further unit dose articles from being dispensed into the bag. Oftentimes, this problem leads to inconsistencies in the quantity of unit dose articles contained within the bags when they are sealed.

For these and other reasons, the dimensions of the chute are chosen to minimize bridging. The minor dimension of the chute is chosen to be at least about two times that of the major dimension of the largest unit dose article to be packaged in the bag. FIG. 4 shows the cross-section of an exemplary chute 700. The minor dimension 710 of the chute is the diameter of a theoretical circle 711 inscribed within a cross-section of the chute at the narrowest point along the chute’s height. In some embodiments, the cross-section of the chute, particularly at its opening, may be congruent with the cross-section of the fill side of the bag. In other embodiments, the chute opening may be smaller than the cross-section of the fill side of the bag.

The dimensions of the bag may impact process reliability as well as shelf presence. Consequently, a combination of bag dimensions is chosen to maximize shelf presence, whilst minimizing interruptions in the production line. These dimensions are discussed in further detail below.

Bag Depth:

As unit dose articles fall from the chute into the bag, bridging can occur at the opening of the bag. Consequently, the front panel to back panel dimension or “depth” of the bag at its opening during filling is chosen to minimize bridging. Referring to FIG. 5, the depth 13 of the bag 10 at its opening 15 is defined as the maximum distance between the front panel 30 and the back panel 50 when the bag is set to be filled with unit dose articles from a chute 800.

It has been found that bags having a bag opening depth that is at least two times the major dimension of the largest unit dose article provide for good process reliability. As discussed above, preferred unit dose articles according to the present invention may have a major dimension that is no
Bag Height

[0033] Bag height is typically chosen to provide for good presence on a store shelf. It has been found that bag height may allow ready differentiation by the consumer between bags containing different quantities of unit dose articles. Maximum bag height is often a function of store shelf height. Shelf height (i.e., the vertical distance between the top of a shelf and the bottom of the shelf directly above it) is often about 300 mm. Thus if different quantities of a unit dose article are to be sold, a series of bags having different heights, each less than 300 mm are utilized.

[0034] It has been found that for the differences in height to be readily apparent to the consumer, the minimum height step between the bags is at least about 20 mm. Thus bags according to the present invention may be chosen from a “menu” of bags starting at 200 mm and progressing upward to 300 mm in steps of 20 mm.

Aspect Ratio

[0035] The “aspect ratio” of a flexible bag is defined as the ratio between the bag height and width. A bag’s aspect ratio may impact the bag’s shelf presence and stability on the shelf. Shelf stability is quantified by a bag’s tip angle. “Tip angle” is defined herein as the maximum angle that the vertical axis of the package can make with an imaginary vertical line before the bag falls over. The angle is measured by progressively tilting the package until it falls over. The package can be tilted sideways, front to back or in any other direction of interest. In this application we measure the tilt angle front to back as this represents the least stable direction of the bags.

[0036] For a given depth, a bag having a high aspect ratio will have a high center of gravity. A high center of gravity may in turn result in a reduced tip angle. A bag having the same depth, but a lower aspect ratio will have a lower center of gravity and increased the tip angle. Thus the bag having the lower aspect ratio is more stable on the shelf.

[0037] However, the shelf stability of the flexible bag is desirably balanced with a good shelf presence. In the laundry and auto dish product categories, the flexible bags are typically tall and narrow. Thus a short and wide bag would likely not fit with this aesthetic.

[0038] Balancing these considerations, it has been found that the optimal aspect ratio of a flexible bag is from about 1:1 to about 1:3.1, the later aspect ratio being most preferred.

Bag Width

[0039] For a given height and depth there is a minimum bag width that ensures that the internal volume is sufficient to fit the contents in a reliable manufacturing operation. In other words, there is a minimum bag width that ensures that no unit doses will be crushed by the bag sealing operation causing contamination and line stoppage. The minimum width may be determined using a testing fixture in the lab that mimics the filling equipment on the high speed line.

[0040] Once the height and aspect ratio of the flexible bag are chosen, the width of the bag may be calculated as follows:

\[
\text{Bag width} = \text{Bag height} \times \text{Aspect Ratio}
\]

Bag Head Space/Fill Levels

[0041] The fill level percentage and the headspace percentage of a flexible bag are calculated as fill height/bag height and headspace height/bag height, wherein

\[
\text{Fill height+Headspace height} = \text{Bag height}
\]

[0042] The headspace required depends on a variety of factors including, but not limited to, the bag dimensions, unit dose dimensions, coefficient of friction, puffiness and filling equipment design. The flexible bag according to the present invention is designed to minimize the headspace that is needed for process reliability.

[0043] Fill levels of the flexible package according to the present invention are within a range of from about 28 to about 45% percent of the bag height, or within a range of from about 32 to 45% of the bag height. Most commonly, the fill level is about 35% of the bag height.

Bottom Seals

[0044] Referring to FIG. 6a, b and c, there are three common types of bag 10 bottom seals 900: the parabolic seal (FIG. 6a), the delta seal (FIG. 6b) and the square seal (FIG. 6c). As noted above, the shelf stability of the flexible bag may be quantified by its tip angle. Thus one skilled in the art could choose a bottom seal that provides for the highest tip angle and consequently the best shelf stability.

[0045] Within the category unit dose laundry and dish products, it has been found that commercially available bottles and bags have a tip angle between about 20° and 30° degrees. Thus the bags according to the present invention desirably have a tip angle of at least about 20°. The square seal in combination with a depth of at least about 100 mm provides the flexible packages according to the present invention with this desirable tip angle.

[0046] The flexible bags according to the present invention may further comprise optional components including, but not limited to, windows, resealable closures and perfume.

[0047] Referring back to FIG. 1, in some embodiments, the flexible bag 10 may further comprise one or more transparent or translucent windows 32 through which the consumer can see the fill line of the unit dose articles 100 when the bag 10 is displayed to the consumer for purchase at the point of purchase. Useful window configurations are disclosed in the co-pending US Patent Application having Attorney Docket Number 11880 and filed on Sep. 20, 2010.

[0048] The flexible bags according to the present invention may comprise more than one seal. For example, if the bag is sealed with a frangible seal, it may further comprise a resealable seal so that the consumer may sealably close the bag after use.

[0049] The flexible bags may further comprise perfume. The perfume may be applied to the interior of the bag using any suitable means. A non-limiting example is the application of an adhesive strip comprising perfume to the interior of the bag. Useful adhesive perfume strips are found in U.S. Pat. No. 7,304,025 and US Publication Number 2008/0081774A1.

[0050] The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each
such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as “40 mm” is intended to mean “about 40 mm.”

[0051] Every document cited herein, including any cross referenced or related patent or application, is hereby incorporated herein by reference in its entirety unless expressly excluded or otherwise limited. The citation of any document is not an admission that it is prior art with respect to any invention disclosed or claimed herein or that it alone, or in any combination with any other reference or references, teaches, suggests or discloses any such invention. Further, to the extent that any meaning or definition of a term in this document conflicts with any meaning or definition of the same term in a document incorporated by reference, the meaning or definition assigned to that term in this document shall govern.

[0052] While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

What is claimed is:

1. A flexible sealed bag containing at least one at least partially watersoluble unit dose article having a major dimension, said bag comprising:
a front panel and a back panel marginally joined thereto along at least two opposed edges to be in a confronting relationship to form a closed bag, said front panel and said back panel being joined at the top by a frangible seal;
a bottom panel intermediate to said front panel and said back panel, and joined to each of said front panel and back panel;
wherein said bag has a depth that is at least about two times that of the major dimension of said at least one unit dose article.

2. The flexible sealed bag according to claim 1, wherein
said bag has a height of at least about 100 mm.

3. The flexible sealed bag according to claim 1, wherein
said at least one unit dose article has a major dimension of no greater than about 50 mm.

4. The flexible sealed bag according to claimed 3, wherein
said unit dose article has a pin cushion shape.

5. The flexible sealed bag according to claim 1, wherein
said bag has a height of less than about 300 mm.

6. The flexible sealed bag according to claim 1, wherein
said bag has an aspect ratio of from about 1:1 to about 1.3:1.

7. The flexible sealed bag according to claim 6, wherein
said bag has a tip angle of at least about 20°.

8. The flexible sealed bag according to claim 1, wherein
said articles comprise unit doses of a liquid laundry composition.

9. The flexible sealed bag according to claim 1, wherein
said bag comprises a polymeric film throughout, and said front panel of said bag is generally rectangularly shaped and comprises spaced apart side edges defining a width there between, said side edges of said front panel being heat sealed to corresponding side edges of said back panel.

10. The flexible sealed bag according to claim 1, further
comprising at least one window.

11. The flexible sealed bag according to claim 1, comprising
a bottom seal selected from the group of: parabolic seal, delta seal or square seal.

12. The flexible sealed bag according to claim 11, comprising
a square seal.

13. The flexible sealed bag according to claim 12, said bag
having a depth of about 100 mm.

14. A series of flexible sealed bags according to claim 1,
wherein each of said bags has a height less than about 300 mm and each of said bags differs in height by about 20 to about 50 mm.

15. The series of flexible sealed bags according to claim 13,
wherein each of said bags contains a different quantity of unit dose articles.

16. A flexible sealed bag containing a plurality of at least a partially watersoluble unit dose articles containing liquid laundry composition and having the same major dimension, said bag comprising:
a front panel and a back panel marginally joined thereto along at least two opposed edges to be in a confronting relationship to form a closed bag, said front panel and said back panel being joined at the top by a frangible seal;
a bottom panel intermediate to said front panel and said back panel, and joined to each of said front panel and back panel;
wherein:
said bag has a depth of about 100 mm;
said major dimension is about 50 mm; and
said bag has an aspect ratio of about 1:1.3.

* * * * *