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(54) **EASY OPENING, RE-CLOSEABLE BAG**

LEICHT ZU ÖFFNENDER WIEDERVERSCHLIESSBARER BEUTEL

SACHET FACILE A OUVRIR ET REFERMABLE

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**WO-A-93/18988**

**WO-A-96/29256**

**US-A- 4 124 965**

**US-A- 4 290 526**

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**Description****FIELD OF THE INVENTION**

[0001] This invention relates to bags for use in storing products such as but not limited to powdered or granular detergent, pet food, coffee, cereal etc., wherein the bag has a line of weakness, which provides for easy opening of the bag. More particularly the bags further comprise an adjustable means for re-closing.

**BACKGROUND OF THE INVENTION**

[0002] Flexible bags are used today to package a wide variety of consumer products including granular detergents. In order to be useful as a package these bags must be resistant to opening during shipping and handling at the store. Currently marketed detergent bags have several disadvantages. First, current bags are difficult to open without the aid of scissors, a knife or other utensil. Often times the consumer attempts to rip open the bag, with the end result being that the contents are spilled out. Additionally, the bag and any text printed on the bag, can become distorted by the pulling and stretching of the opening action.

[0003] Second, once opened, current detergent bags offer no efficient and effective means of re-closing the bag. The ability to re-close the bag is desired by many consumers. This is especially true for bulk size packages. Until now methods for re-closing such bags have been unsatisfactory. These methods include zippers and adhesive tapes as well as simple folding mechanisms. The main drawback of the aforementioned methods is that contamination of the re-closing means with the contents of the bag prevents the means from forming a reliable, re-usable seal. Additionally, simple folding mechanisms provide no protection from product leakage.

[0004] Third, as the contents of the bag are gradually depleted it is desirable to be able to adjust the closing means such that the bag is more thoroughly sealed. Current flexible detergent bags do not offer means to adjust for a tight reliable closure.

[0005] Accordingly the need remains for a flexible bag for packaging consumer products that is easy to open i.e. without the aid of a knife, scissors or other utensil. There remains an additional need for a mechanism by which the bag can be securely re-closed after opening by the consumer. The re-closing mechanism should be unaffected by any contamination. The need also remains for a re-closing means that is adjustable to provide a secure and reliable seal as the bag becomes less full.

[0006] WO 96/29256 relates to a re-closeable bag package that is provided with elements of the hook and loop coupling type to close it in such a way as to be adapted to the varying quantity of product contained therein.

**SUMMARY OF THE INVENTION**

[0007] The present invention meets the aforementioned needs by providing a bag according to claim 1. Further preferred embodiment are disclosed independent claims 2 to 6.

[0008] All percentages, ratios, and proportions herein are on a weight basis unless otherwise indicated.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0009]

Figure 1 is a horizontal perspective view of a first embodiment of a bag of the present invention.

Figure 2 is a vertical perspective view of a first embodiment of a bag of the present invention.

Figure 3 is a vertical perspective view of a first embodiment of a bag of the present invention.

Figure 4 is a horizontal perspective view of a second embodiment of a bag of the present invention.

Figure 5 is a horizontal perspective view of a second embodiment of a bag of the present invention.

Figure 6 is a horizontal perspective view of a third embodiment of a bag of the present invention.

Figure 7 is a vertical perspective view of a third embodiment of a bag of the present invention in the closed position.

Figure 8 is a representation of a typical graph obtained using ASTM D-882 for measuring tensile strength.

Figure 9 is a representation of a typical graph obtained using ASTM D-5733 for measuring trapezoidal tear strength on a single specimen.

Figure 10 is a vertical perspective view of a fourth embodiment of the present invention.

Figure 11 is a vertical perspective view of a fourth embodiment of the present invention in the closed position.

**DETAILED DESCRIPTION OF THE INVENTION**

[0010] Reference will now be made in detail to the present preferred embodiments of the invention, examples of which are illustrated in the accompanying figures. As will be understood, the terms front and back as used herein to describe panels of the bag are for orientation purposes only and are otherwise interchangeable. As discussed more fully hereafter, the present invention is directed to a flexible bag for containing granular, powdered or other contents, preferably granular detergent, provided with a line of weakness to facilitate opening. A particularly preferred bag 10 made in accordance with the present invention is illustrated in Figure 1. The bag 10 is illustrated having front panel 12, back panel 14, and side panels 16 and 18 with each panel having an upper edge 20 and a lower edge 22. The bag 10 also has a top section 24 and a bottom section 26, which are sealed by

joining front panel 12 to back panel 14 along upper edges 20 and lower edges 22. The bag 10 is provided with a line of weakness 28, wherein at least a portion of at least one of panels 12 or 14 is not weakened by the line 28. In a preferred embodiment the line 28 spans both side panels 16 and 18 and one of either front panel 12 or back panel 14.

**[0011]** Figure 2 illustrates the same bag 10 as Figure 1 wherein the line of weakness 28 has been opened by pulling on either side of the line 28.

**[0012]** Figure 3 represents the same bag 10 as Figure 1 and additionally comprises re-closeable means 30 (not shown in Figure 3) and 32. Re-closeable means 30 and 32 can be any mechanical fastening mechanism and are preferably comprised of a hook and loop fastening system, wherein one of the means 30 or 32 is the hook component and the other is the loop component. It is within the scope of this invention that the two are interchangeable. Figure 4 shows the re-closeable means 30 as a small strip adjacent to upper edge 20 and affixed to front panel 12. It is also within the scope of this invention that the re-closeable means is comprised of a hook and hook system rather than a hook and loop system.

**[0013]** Figure 5 shows re-closeable means 32 as a vertical strip affixed to back panel 14. Figure 6 illustrates another representation of re-closeable means 30. Figure 7 is a representation of the bag in the closed position.

**[0014]** Another preferred embodiment of the re-closeable system is illustrated in Figures 10 and 11. One component 30 of the re-closeable system is attached with the hook or loop portion facing the panel that is attached to, either front panel 12 or back panel 14. A portion of component 30 is left unattached. Closing of the bag occurs by two consecutive folds of the top section 2 of the bag 10. The first fold leaves the unattached part of the re-closeable system sticking out and enables it to match to the second component of the system. The second fold actually matches the mechanical fasteners together. Figure 11 represents this alternative embodiment in the closed position.

#### Bag Materials

**[0015]** The bags of the present invention are formed from elastic materials including but not limited to polymeric film, woven materials, non-woven materials, preferably polyethylene film, more preferably monolayers, coextrusions, two-layer laminations, three-layer laminations and metalized laminations, all materials with or without lacquer coatings. Bags according to the present invention can be formed by any method known in the art. One method for forming flexible bags from a continuous web of material is well known in the art and described in U.S. Pat. No. 5,054,619, issued to Muckenfuhs.

#### Line of Weakness

**[0016]** The easy opening feature of bags according to

the present invention results from the weakening of the film material in the desired trajectory of bag rupture or separation.

**[0017]** The line of weakness is such that at least a portion of one panel of the bag remains un-weakened by the line. This prevents the entire top of the bag from being separated upon opening. After opening, the flap that results from the line of weakness being broken provides the bag with a handle or grasp area for the consumer to hold onto while dosing the product. This feature provides better maneuverability of the bag and allows easier dosing.

**[0018]** The line of weakness will deteriorate the strength of the film in such a way that it can withstand normal filling, packing and handling operation and yet be easily opened by the consumer. This behavior is achieved by reducing the trapezoidal tear strength of the original film. Reduction of the trapezoidal tear strength is also most likely accompanied by loss of tensile strength.

**[0019]** The line of weakness is characterized by the following test methods: a) ASTM D-882 Standard Test Method for Tensile Properties on Thin Plastic Sheet and b) ASTM D-5733 Standard Test Method for Tearing Strength of Nonwoven Fabrics by the Trapezoidal Procedure. The resultant graphs of these test methods are exemplified in Figures 8 and 9. The samples used to generate Figures 8 and 9 are taken from the line of weakness 28 as shown in Figure 1. In accordance with ASTM D-882 and ASTM D-5733, the line of weakness 28 must be parallel to the shortest side of the sample (i.e.; width). The line of weakness 28 must cover the entire width of the sample and must be centered with respect to the sample length. The slot for initiating the cut of the trapezoidal tear sample must be on top of the line of weakness 28.

**[0020]** The line of weakness is characterized by three parameters obtained from the above-mentioned standard tests. The first parameter is yield stress value. Referring to Figure 8, this graph is illustrative of the approximate yield stress value of a weakened film (shown in Figure 8 as  $Y_2$ ) versus the approximate yield stress value of an unweakened film (shown in Figure 8 as  $Y_1$ ). The yield stress value of the weakened film in the ASTM D-882 tensile test should be no less than 90% of the yield stress value of the un-weakened film. Second, the final or rupture stress value of the weakened film (shown as  $R_2$  in Figure 8) should be no lower than 90% of the yield stress value of the unweakened film  $Y_1$ .

**[0021]** Third, the average trapezoidal tearing force according to ASTM D-5733, of the weakened film should be less than 4Kgf. Figure 9 is illustrative of a typical graph obtained using ASTM D-5733 for measuring trapezoidal tear strength on the weakened film of a single specimen. With regard to both Figures 8 and 9, the values indicated therein for force, elongation (Figure 8), and extension (Figure 9), should be considered as merely exemplary and in no way limiting to the present invention.

**[0022]** Additionally, the line of weakness may possess a pattern. Those patterns may take the form of a continuous line, a dashed line, or a combination thereof. However the most preferred pattern is the dashed line, wherein the dashed line is comprised of a plurality of scored segments. The length of each scored segment varies from about 0.12 mm to 4.4 mm, preferably varies from about 0.3 mm to 2 mm, and most preferably varies from about 0.6 mm to 1 mm. The distance between adjacent scored segments varies from about 0.4 mm to 4 mm, preferably varies from about 1 mm to 3 mm, and most preferably varies from about 1.5 mm to 2 mm. The score depth will vary depending upon the thickness of the film.

**[0023]** A starting notch may be provided at some point along the line of weakness. The starting notch provides an area, which is easier to tear because the scoring is deeper. If the line of weakness spans the back panel wherein there is also a vertical seal, the starting notch provides easy tearing through the multiple plies of the vertical seal to the line of weakness.

#### Method of Producing the Line of Weakness

**[0024]** The line of weakness can be produced using methods including but not limited to scoring, perforating, chemical treatment, preferably laser scoring, laser perforation, mechanical scoring, mechanical perforation, embossing methods, or combinations of these methods. The line of weakness is preferably made in the film before it is formed into a bag.

**[0025]** One method of making a line of weakness in a flexible film uses at least one laser. First a laser beam with sufficient wattage to evaporate a portion of the film material is focused onto the film. The use of laser technology allows for very accurate control of the depth or penetration from very slight scoring to complete perforation of the film. A laser using any form of electromagnetic radiation can be used. Suitable lasers for use in the present invention include those based on CO<sub>2</sub> gas.

**[0026]** The speed of the film and the movement of the laser beam are dependent upon the pattern and depth of score desired as well as the type of film used. Suitable methods for laser scoring films are disclosed in US Patent Nos. 3,626,143, 3,790,744, 3,909,582 all to American Can Company and US Patent Nos. 5,158,499 and 5,229,180 to American National Can Company, US Patent No. 5,001,325 to LPF Verpakkingen B.V., US Patent No. 4,743,123 to Wavin B. V., Japanese Patents 09133018, 07008283 and 06103200 all to Dainippon Printing Company.

**[0027]** Another suitable method for producing the line of weakness is the use of blades. The blades are installed on an engraving cylinder, which is mounted directly on the film processing machinery so that the cuts are made prior to formation of the bag. Different blade patterns can be used to get different patterns in the line of weakness. The pressure applied to the blades is also varied during the process to control the dimensions and depth of the

cuts to ensure the bag opens easily.

**[0028]** Embossing is another alternative method for production of the line of weakness. The embossing technology weakens the film in specific areas by means of pressure, temperature, time and a deforming profile. The desired results are achieved by changing the caliper and/or material structure at the embossed trajectory. The basic equipment used for embossing consists of a sealing jaw capable of pressing against a back plate. A deforming profile or pattern is fixed to the jaw and heated. The film is pressed between the deforming profile and the back plate. The main variables known to affect this process are: heating temperature, cooling temperature, pressure, heating time, cooling time, film tension while embossing, film tension after embossing, back plate material, back plate thickness, back plate temperature, jaw pattern and jaw thickness. The embossing unit would be installed after an unwinding station of film, preferably incorporated into the packaging equipment line. Suitable examples of embossing are described in US Patent No. 5,878,549 to American National Can Company.

#### Re-closeable System

**[0029]** The re-closeable system is resistant to contamination by the contents of the bag. Its main objective is to protect granule products contained in bags from spillage, humidity, and other external factors that might affect the integrity of the product. This re-closeable system comprises a mechanical fastener, preferably hook and loop or hook and hook type, attached to a flexible bag that allows consumers to open and securely close the bags as many times as product uses in the bag.

**[0030]** The system consists of placing fastening materials on opposite panels of the bag. In a preferred embodiment, the panels are the front and the back panel although other configurations are contemplated. The fasteners can be either disposable or industrial materials. It is desired to use disposable materials to optimize costs.

The mechanical fasteners can be of any shape and size, and in any disposition. The particular configuration of the re-closeable system components should be such that the bag can be sealed throughout the entire use of the product contained therein. By sealed is meant that no product spills out when the bag is tipped on its side. Specifically, the re-closeable system is characterized by the energy required to peel off one component of the fastener from the other component. This energy must not be less than 2.4Kgfmm per each Kg of product contained in the bag.

**[0031]** The re-closeable system is intended to work with the easy opening feature described above which facilitates the opening of the bag. At least one (1) piece of the mechanical fastener is placed on one panel of the bag while a piece of the matching fastener is placed on the opposite panel of the bag. Preferably one piece of the mechanical fastener is a vertical strip. The top of the bag (with the small piece of fastener) is rolled over for the two fasteners to match and tightly close the bag as

the product is being consumed. As more product is consumed, the fasteners close farther down vertically to allow the tight seal. A variation of this design is also a button-to-button closure. This means that the mechanical fasteners can also consist of two individual buttons that perform the seal. In this case, the seal is a stationary one, instead of an adjustable one.

**[0032]** These mechanical fasteners can be adhered to the bag by the means of adhesives. The adhesive can be either a hot melt or pressure sensitive adhesive. A hot melt adhesive is applied to the mechanical fastener right before the piece is to be applied to the bag. The pressure sensitive adhesive is adhered to the fastener as one piece.

**[0033]** The application of these mechanical fasteners to the bag can be accomplished in different ways. One way is to adhere these fasteners to the film before the bag is produced. In this case, the pieces of mechanical fasteners are attached to the film either while the roll of film is being prepared or while the roll of film is being unwound at the machine. The mechanical fasteners may also be adhered to the bag after it has been formed.

## Claims

1. A bag (10) comprising a front (12) and back (14) panel and two inwardly folded side panels (16 and 18), each panel having an upper (20) and lower (22) edge, a top (24) and a bottom (26) formed from the joining of the front and back panels, and wherein the bag (10) comprises a means to re-close the bag (10) after opening (30 and 32), and wherein the re-closing means (30 and 32) is adjustable, **characterised in that** the top being further defined by a line of weakness (28), said line of weakness (28) spanning one of the front (12) and back (14) panels and both side panels (16 and 18).
2. A bag (10) according to Claim 1 wherein the yield stress value of the bag (10) with the line of weakness (28) as measured according to ASTM method number D-882 is at least 90% of the yield stress value of the bag (10) before the line of weakness (28) is added.
3. A bag (10) according to any of the preceding Claims wherein the final or rupture stress value of the bag (10) as measured according to ASTM method number D-882 is at least 90% of the yield stress value of the bag (10) before the line of weakness (28) is added.
4. A bag (10) according to any of the preceding Claims wherein the average trapezoidal tearing strength of the bag (10) as measured according to ASTM method number D-5733 is less than 4 kg.

5. A bag (10) according to any of the preceding Claims further comprising laundry detergent.
6. A bag (10) according to any of the preceding Claims wherein the line of weakness (28) is formed using a method selected from the group consisting of chemical treatment, laser scoring, laser perforation, mechanical scoring, mechanical perforation, embossing methods or combinations thereof.

## Patentansprüche

1. Beutel (10), der ein vorderes Feld (12) und ein hinteres Feld (14) und zwei einwärts gefaltete Seitenfelder (16 und 18) umfasst, wobei jedes Feld einen oberen Rand (20) und einen unteren Rand (22), ein oberes Ende (24) und ein unteres Ende (26), die durch die Aneinanderfügung der vorderen und hinteren Felder gebildet werden, aufweist, und wobei der Beutel (10) ein Mittel zum Wiederverschließen des Beutels (10) nach dem Öffnen (30 und 32) umfasst, und wobei das Wiederverschließungsmittel (30 und 32) angepasst werden kann, **dadurch gekennzeichnet, dass** das obere Ende ferner durch eine Schwächungslinie (28) gekennzeichnet ist, wobei die Schwächungslinie (28) über eines der vorderen (12) und hinteren (14) Felder und beide Seitenfelder (16 und 18) hinweg verläuft.
2. Beutel (10) nach Anspruch 1, wobei der Fließspannungswert des Beutels (10) mit der Schwächungslinie (28), gemessen gemäß dem ASTM-Verfahren Nummer D-882, mindestens 90 % des Fließspannungswerts des Beutels (10) vor Hinzufügung der Schwächungslinie (28) beträgt.
3. Beutel (10) nach einem der vorhergehenden Ansprüche, wobei der finale Spannungswert oder Bruchspannungswert des Beutels (10), gemessen gemäß dem ASTM-Verfahren Nummer D-882, mindestens 90 % des Fließspannungswerts des Beutels (10) vor Hinzufügung der Schwächungslinie (28) beträgt.
4. Beutel (10) nach einem der vorhergehenden Ansprüche, wobei die durchschnittliche trapezoidale Reißfestigkeit des Beutels (10), gemessen gemäß dem ASTM-Verfahren Nummer D-5733, unter 4 kg liegt.
5. Beutel (10) nach einem der vorhergehenden Ansprüche, welcher ferner ein Wäschewaschmittel enthält.
6. Beutel (10) nach einem der vorhergehenden Ansprüche, wobei die Schwächungslinie (28) unter Anwendung eines Verfahrens ausgebildet wird, das

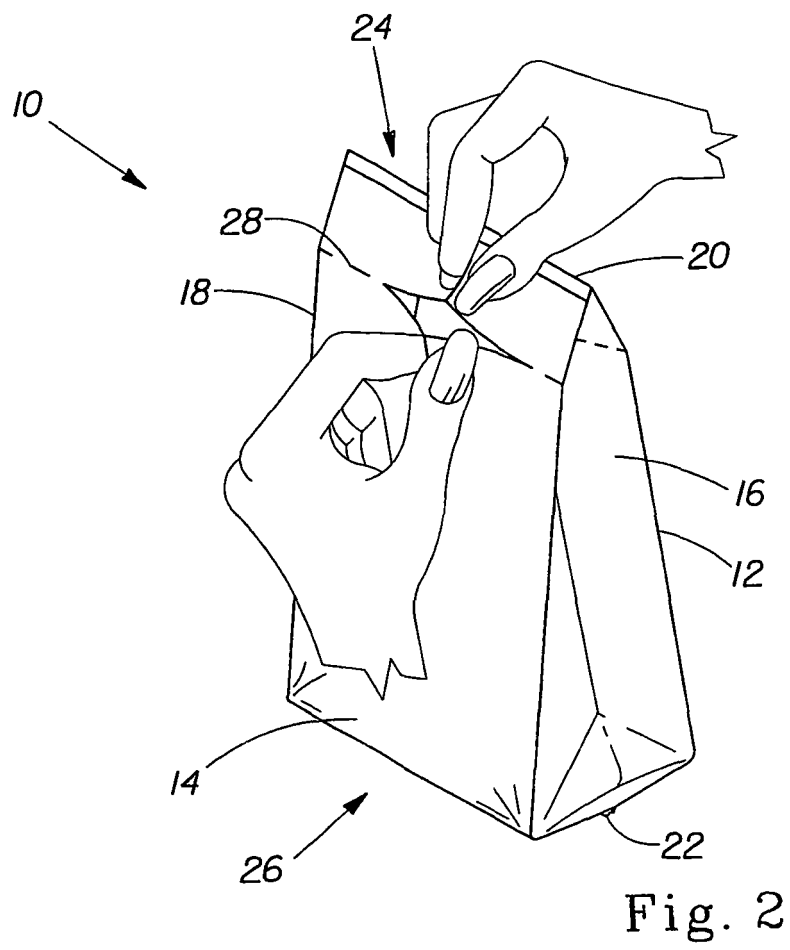
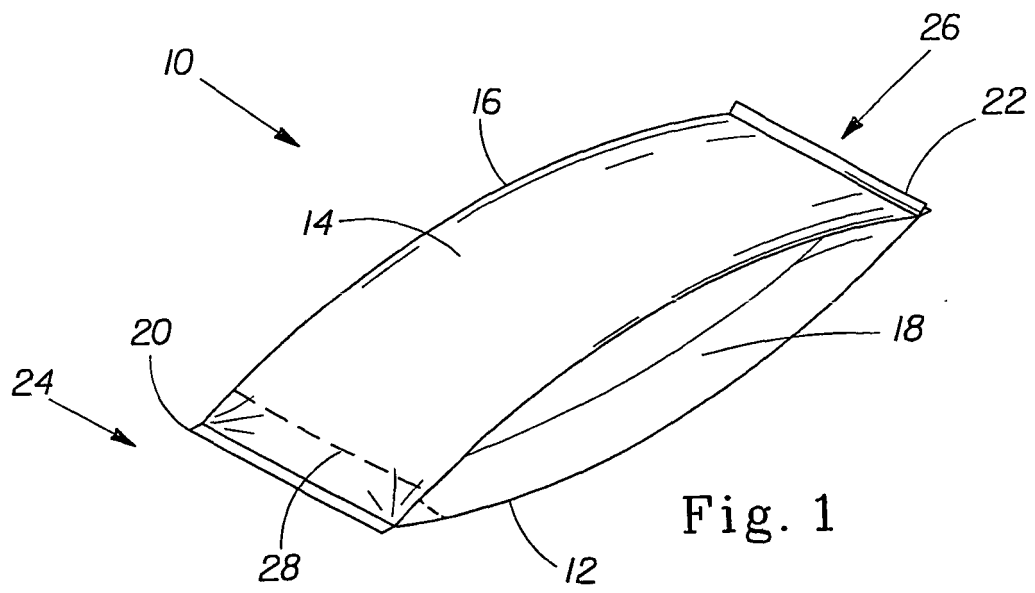
ausgewählt ist aus der Gruppe, bestehend aus chemischer Behandlung, Laserritzung, Laserperforierung, mechanischer Ritzung, mechanischer Perforierung, Prägeverfahren oder Kombinationen davon.

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## Revendications

1. Sac (10) comprenant un pan avant (12) et arrière (14) et deux pans latéraux pliés à l'intérieur (16 et 18), chaque pan ayant un bord supérieur (20) et inférieur (22), un dessus (24) et un dessous (26) formés depuis la jonction des pans avant et arrière, et où le sac (10) comprend un moyen de refermer le sac (10) après l'ouverture (30 et 32) et où le moyen de fermeture (30 et 32) est ajustable, **caractérisé en ce que** le dessus étant davantage défini par une ligne de points faibles (28), dite ligne de points faibles (28) traversant un des pans avant (12) et arrière (14) et les deux pans latéraux (16 et 18). 10  
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2. Sac (10) selon la revendication 1, où la valeur de contrainte de résistance du sac (10) avec la ligne de points faibles (28), comme mesurée selon le procédé ASTM numéro D-882, est au moins 90 % de la valeur de contrainte de résistance du sac (10) avant que la ligne de points faibles (28) soit ajoutée. 25
3. Sac (10) selon l'une quelconque des revendications précédentes, où la valeur de contrainte finale ou de rupture du sac (10), comme mesurée selon le procédé ASTM numéro D-882, est au moins 90 % de la valeur de contrainte de résistance du sac (10) avant que la ligne de points faibles (28) soit ajoutée. 30  
35
4. Sac (10) selon l'une quelconque des revendications précédentes, où la solidité à la déchirure trapézoïdale moyenne du sac (10), comme mesurée selon le procédé ASTM numéro D-5733, est inférieure à 4 kg. 40
5. Sac selon l'une quelconque des revendications précédentes, comprenant, en outre, un détergent pour le lavage du linge. 45
6. Sac (10) selon l'une quelconque des revendications précédentes, où la ligne de points faibles (28) est formée en utilisant un procédé choisi parmi le groupe constitué de traitement chimique, marquage au laser, perforation au laser, marquage mécanique, perforation mécanique, procédés de gaufrage ou leurs combinaisons. 50

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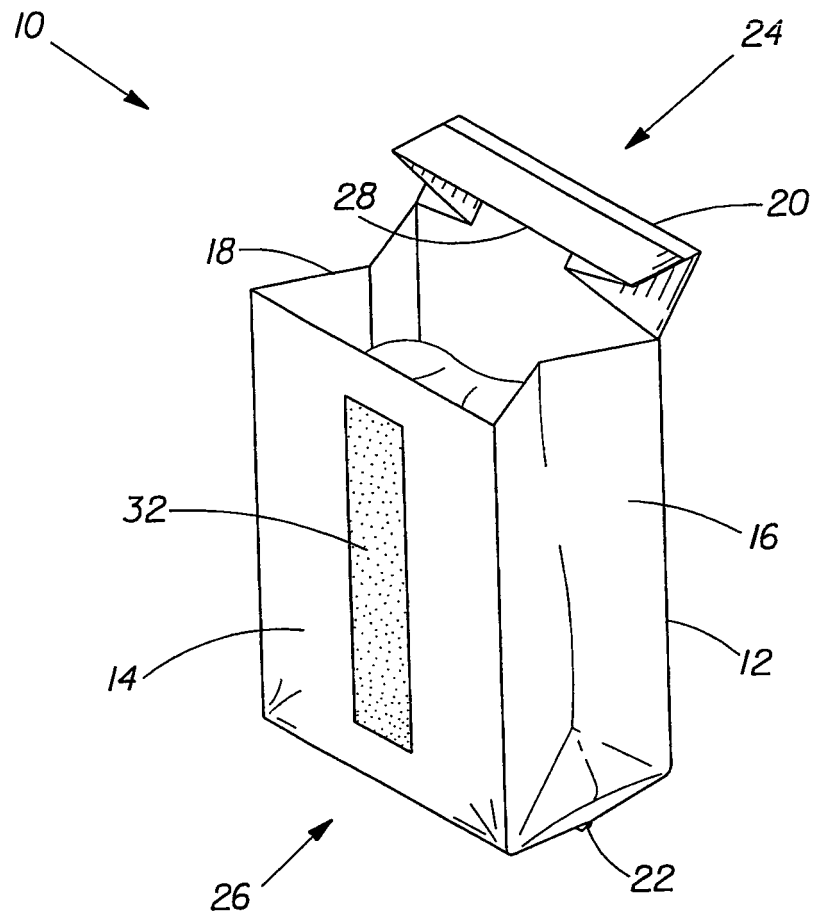
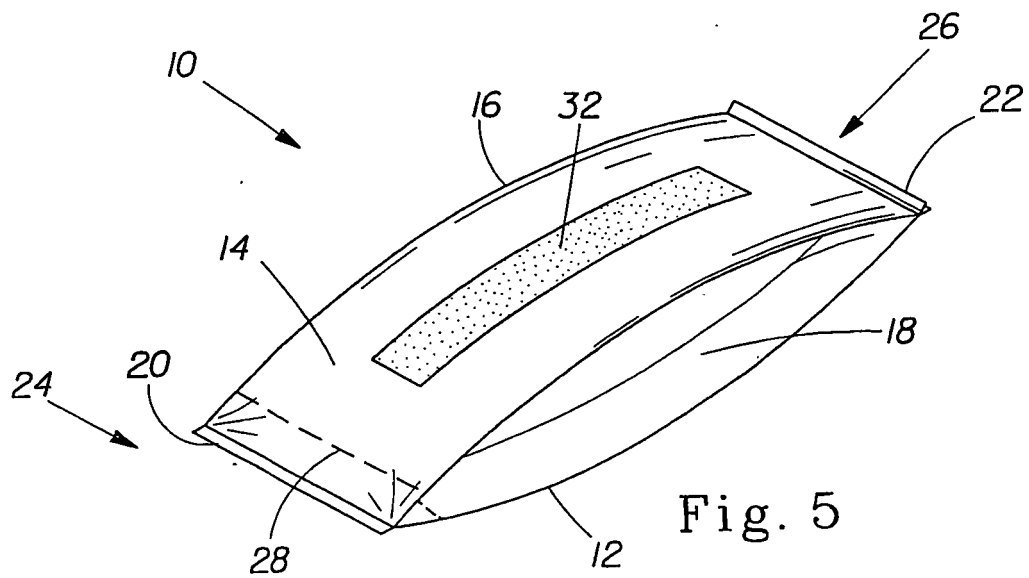
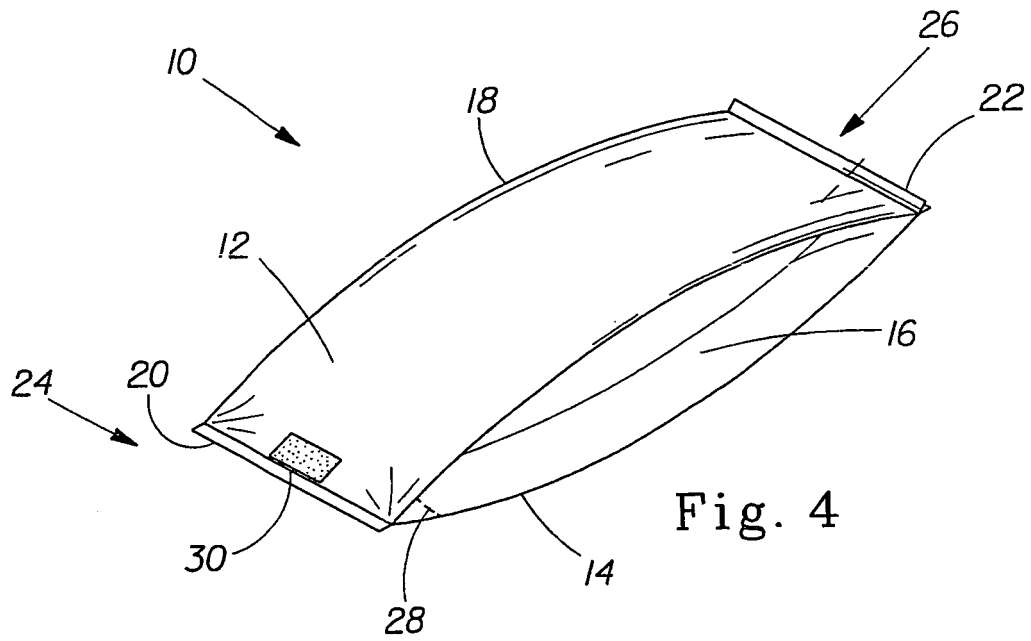
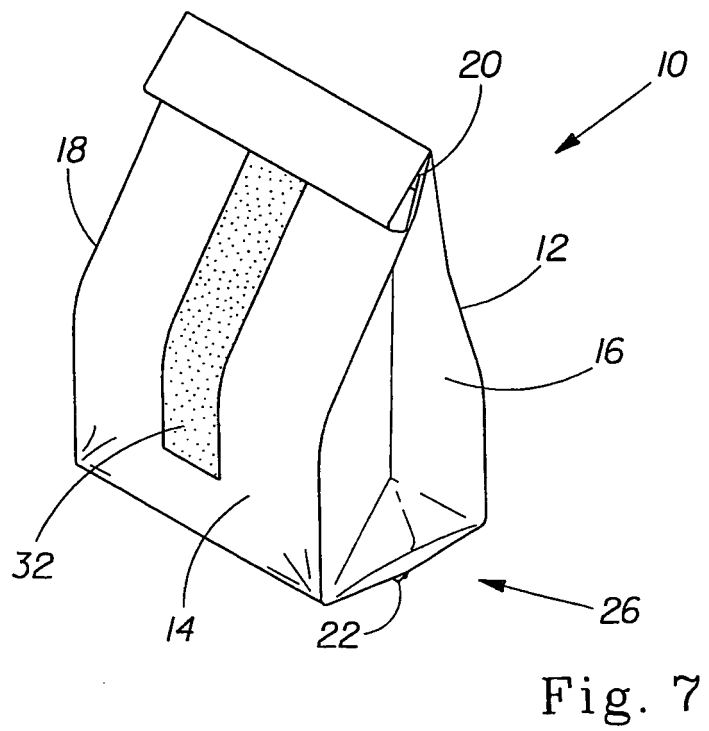
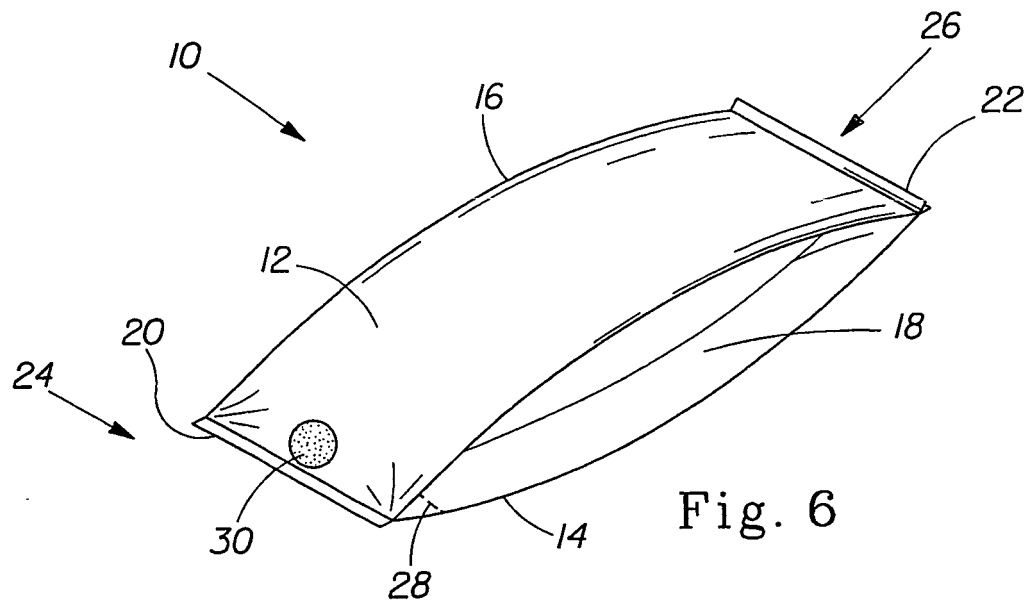


Fig. 3





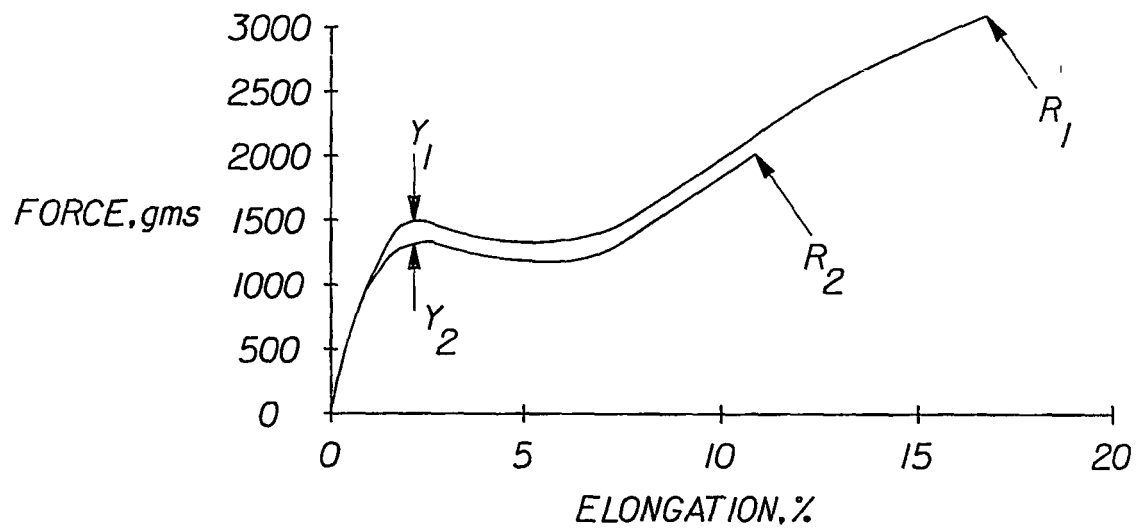


Fig. 8

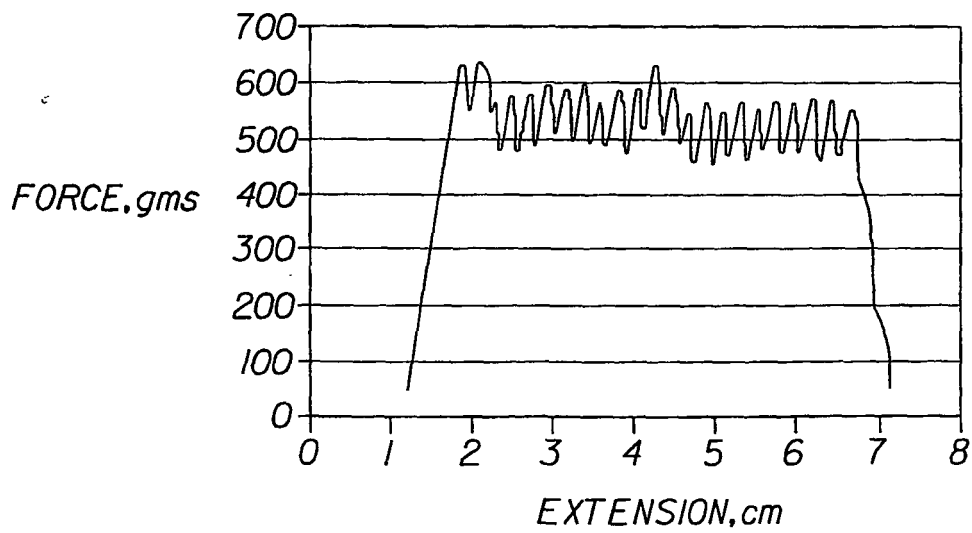


Fig. 9

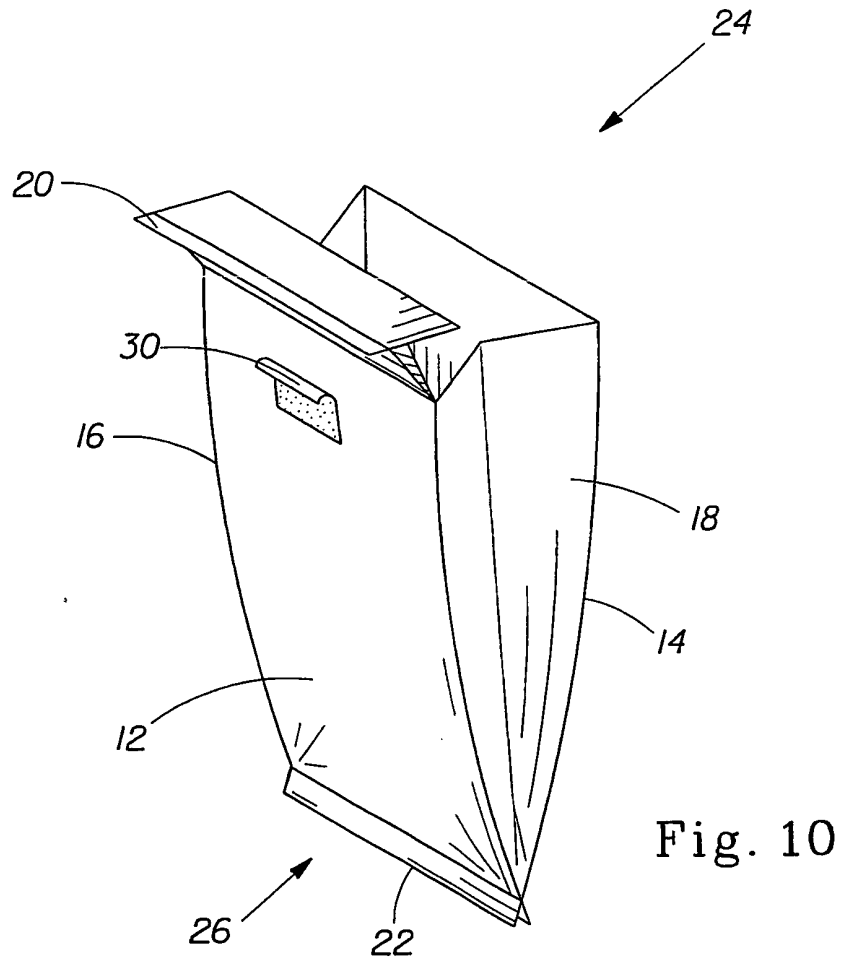


Fig. 10

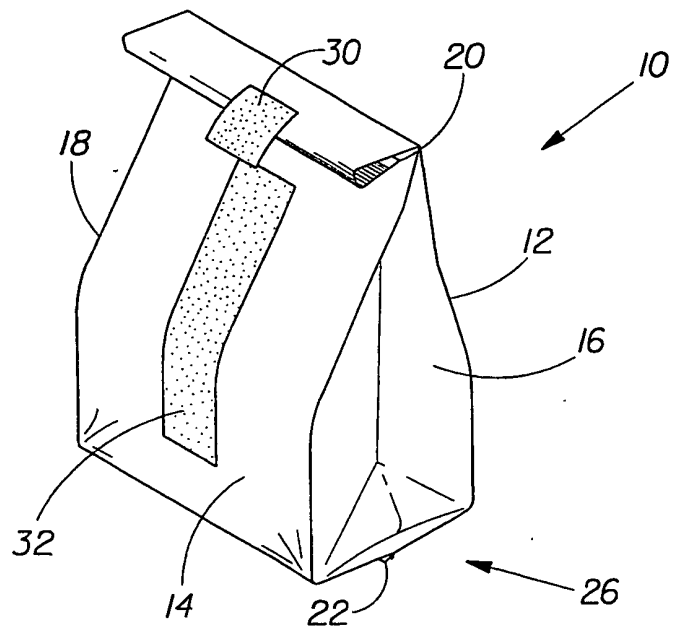


Fig. 11