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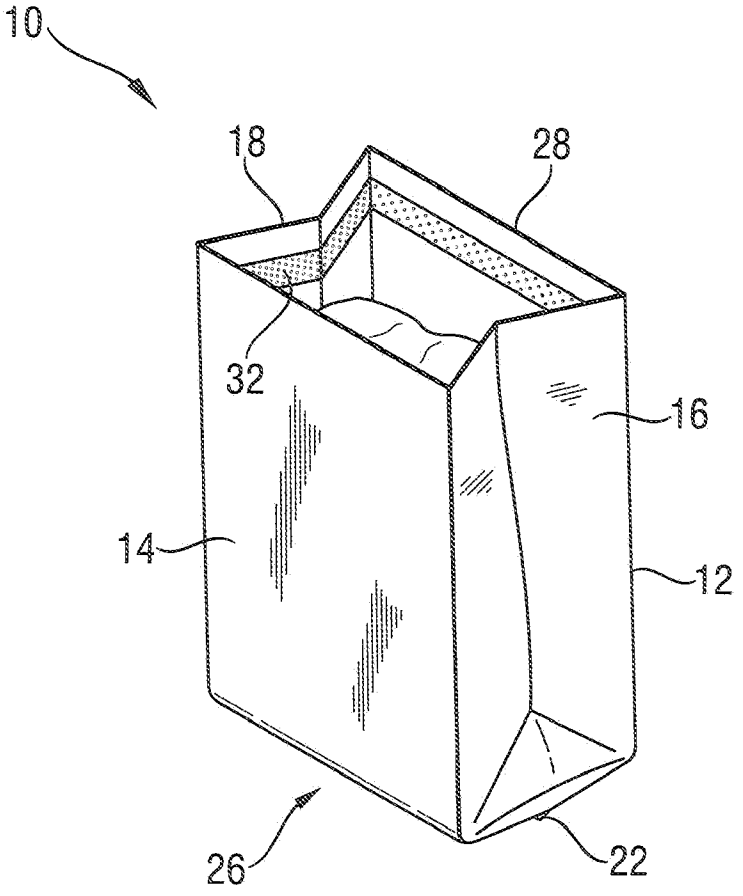
(54) Recloseable Bag

(57) The invention relates to a reclosable packaging comprising:
- a bag (10) comprising a reclosing means (32) and
- a granular product comprising less than 10% by weight of undersized particles having a geometric mean particle diameter of at most 150 micrometers.

Fig. 3



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Description

FIELD OF THE INVENTION

[0001] This invention relates to bags for use in storing powdered or granular products such as but not limited to detergent, pet food, coffee, cereal etc., wherein the bag has a re-closing means and the product comprises particles of a specific size.

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. It is also advantageous if the package can be securely reclosable after opening by the consumer and provide protection from product leakage. The ability to re-close the bag is desired by many consumers. This is especially true for bulk size packages. Recloseable bags are disclosed in EP1409366. However, it has been found that in some instances methods for re-closing such bags have not been completely satisfactory and the reclosing mean can fail. The present inventor has found that this may be due to contamination of the re-closing means with the contents of the bag, preventing the means from forming a reliable, re-usable seal.

SUMMARY OF THE INVENTION

[0003] The present invention meets the aforementioned needs by providing a reclosable packaging comprising:

- a bag comprising a reclosing means and
- a granular product comprising less than 10% by weight of particles having a geometric mean particle diameter of at most 150 micrometers.

[0004] According to an exemplary embodiment of the invention, the product comprises less than 10% by weight of particles having a geometric mean particle diameter of at most 300 micrometers.

[0005] Preferably, the reclosing means comprises a mechanical fastener, the mechanical fastener comprising inter-operating hooks and/or loops. The average density, d, of hooks and/or loops on a surface of mechanical fastener may be of 40-120 hooks and/or loops per square centimeters of mechanical fastener. It may be preferred that the product comprises less than 10% by weight of fines particles having an average diameter of at most of $d^{-1/2}/10$ cm, with d being the average density of hooks and/or loops on a surface of mechanical fastener.

[0006] Preferably, the product is a detergent composition.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007]

Figures 1 and 2 are perspective views of a bag of the present invention.

Figure 3 is a perspective view of a bag of the present invention after the top section has been completely removed.

Figure 4 is a diagrammatic view of a section of web of film illustrating the process embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0008] 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, preferably granular detergent, provided with a reclosing means. A particularly preferred bag 10 made in accordance with the present invention is illustrated in Figures 1 and 2. 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 in each of the front, back and side panels 12, 14, 16, 18. Figure 3 illustrates the bag after the top section 24 has been completely removed, and shows the reclosing means 32.

Bag Materials

[0009] The bags of the present invention are flexible and may be formed from 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. According to a preferred embodiment of the present invention, described in further detail below, a continuous web of material 30 shown in Figure 4 is transported in the machine direction, MD, and is provided with a line of weakness 28 across substantially the whole width of the web 30 substantially in the cross-machine direction,

CMD, and reclosing means 32 are affixed adjacent to the line of weakness 28 substantially in the cross-machine direction, CMD. The reclosing means 32 shown in Figure 4 comprises one strip of loops 34 and two strips of hooks 36.

[0010] According to one embodiment of the present invention, the bag may be provided via a process as disclosed in patent application EP 1409366.

Re-closing means

[0011] The main objective of the reclosing means 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-closing means preferably comprises a mechanical fastener, more 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.

[0012] The means may consist of placing fastening materials on opposite panels of the bag. In a preferred embodiment, the panels are the front and 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-closing means 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-closing means is characterized by the energy required to peel off one component of the fastener from the other component. This energy preferably should not be less than 2.4Kgfmm per each Kg of product contained in the bag.

[0013] At least one piece of the mechanical fastener may be placed on one panel of the bag while a piece of the matching fastener may be placed on an opposite panel of the bag. Preferably one piece of the mechanical fastener is a horizontal strip adhered to the inside of the bag. Most preferably two interacting horizontal strips are adhered to the insides of the bag.

[0014] 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.

[0015] 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 web of film is being prepared or while the web of film is being unwound from a roll at the machine. In an alternative embodiment of the present invention the bags may be preformed, and the mechanical fasteners may be adhered to the bag after it has been so formed.

[0016] However, in a preferred embodiment of the present invention the mechanical fastener comprise hook and loops which are adhered to the flat film. Most preferably one strip of loops and two strips of hooks or one strip of hooks and two strips of loops are applied onto the flat film, in particular, on a part adjacent to the top part of the bag. This allows the reclosing means to be kept out of the bag length seal while positioning the reclosing means substantially completely around the bag opening to allow the consumer to completely close the bag. This provides significant advantage in terms of roll stability prior to converting the film into a bag if the application process of the reclosing means is separate from the bag forming process, and carried out on different machines.

[0017] The hook-like fastening elements may have a height of 1.3 to 3.8 mm. The loop-like fastening elements may have a height of 1.5 to 4 mm and/or may be larger by 0.2 to 2.0 mm than the height of said hook-like fastening elements.

[0018] The hook-like fastening elements and loop-like fastening elements may be provided in a density of 40 to 120 pieces/cm^2, generally of 60 to 90 pieces/cm^2.

[0019] Where a synthetic monofilament is used for preparing hook-like fastening elements, the monofilament generally has a diameter of 0.1 to 0.4 mm, or of 0.14 to 0.25 mm.

[0020] For preparing loop-like fastening elements, generally used are multifilament yarns consisting of single filaments having a diameter of 20 to 100μm, or of 35 to 95μm. Such multifilament yarns combine 2 to 50 single filaments, or of 3 to 30 single filaments.

[0021] The above monofilaments and multifilament yarns used for forming hook-like fastening elements and loop-like fastening elements, respectively, comprise synthetic fibers or metal fibers. In general, fibers of thermoplastic resin such as polyamide, polyester, polypropylene and polyethylene are used. In particular, polyester is preferred since it exhibits high engaging strength and has high dimensional stability. Thermoplastic resins such as polyamide and polypropylene are also used for preparing plastic projections with a swollen head which constitute hook-like fastening elements.

[0022] Where a synthetic monofilament is used for hook-like fastening elements, the synthetic resin constituting it may generally constitute also a multifilament yarn used for preparing loop-like fastening elements. Synthetic fibers comprising different resins may however be used separately for hook-like fastening elements and loop-like fastening elements. In this case, the resin used for hook-like fastening elements preferably has a higher Young's modulus than that used for loop-like fastening elements. For example, synthetic fiber comprising polyester can be used for hook-like fastening elements when synthetic fiber comprising polyamide is used for loop-like fastening elements.

[0023] In an exemplary embodiment the loop materials have a basis weight of less than 40 grams per square metre or even less than 30 gsm. For example the basis weight of the hook material is less than 200 gsm. In particular loop materials such N29 supplied by Aplix, France have been found to be particularly effective. For the hooks, low basis weight extruded polypropylene hooks such Aplix 963 supplied by Aplix, France are preferred.

Granular Product

[0024] The granular product of the invention comprises particles, less than 10% by weight of particles having a geometric mean particle diameter of not greater than 150 micrometers.

[0025] As used herein, the word "particles" means the entire size range of the product or the entire size range of discrete particles, agglomerates, or granules in the product. It specifically does not refer to a size fraction (i.e., representing less than 100% of the entire size range) of any of these types of particles unless the size fraction represents 100% of a discrete particle in an admixture of particles. For each type of particle component in an admixture, the entire size range of discrete particles of that type have the same or substantially similar composition regardless of whether the particles are in contact with other particles. For agglomerated components, the agglomerates themselves are considered as discrete particles and each discrete particle may be comprised of a composite of smaller primary particles and binder compositions.

[0026] As used herein, the phrase "geometric mean particle diameter" means the geometric mass median diameter of a set of discrete particles as measured by any standard mass-based particle size measurement technique, preferably by dry sieving.

[0027] The granular product may comprise from 0 to 5%, in particular from 0.1 to 3%, for example from 0.2 to 2% or even at from 1% by weight of undersized particles.

[0028] Undersized particles are particles having a geometric mean particle diameter of from 0 to 150 micrometers, in particular from 0 to 300 micrometers, for example from 0 to 500 micrometers.

[0029] When the reclosing means comprises a mechanical fastener comprising a hook and loop fastener, the granular product may comprise less than 10%, for example from 0 to 5%, in particular from 0.1 to 3%, for example from 0.2 to 2% or even at from 1% by weight of particles having a geometric mean particle diameter of at most $d^{-1/2}/10$ cm, in particular of at most $d^{-1/2}/5$ cm, or even of at most $d^{-1/2}/3$ cm, for example of at most $d^{-1/2}$cm, with d being the average density of hooks and/or loops on a surface of mechanical fastener.

[0030] When the reclosing means comprises a mechanical fastener comprising a hook and loop fastener, the granular product may comprise less than 10%, for example from 0 to 5%, in particular from 0.1 to 3%, for example from 0.2 to 2%, or even at most 1%, by weight of particles having a geometric mean particle diameter of at most $Q^{1/2}/5$ cm, in particular of from 0 to $Q^{1/2}/2$ cm, or even of at most $Q^{1/2}$ cm, with Q being the average surface area defined by the inside of the loop.

[0031] Preferably, the geometric mean particle diameter of the particles is from 500 microns to 1500 microns, in particular from 600 microns to 1200 microns, and for example from 600 microns to 1000 microns. At least 50%, in particular at least 75%, or even at least 90%, and in particular at least 95%, by weight of the total particles in the product, have the selected mean particle size diameter. In this way, a substantial portion of the granular detergent product will have the uniform size so as to provide an aesthetic appearance desired by consumers.

[0032] The particle size distribution is defined by a relatively tight geometric standard deviation or "span" so as not to have too many particles outside of the target size. Accordingly, the geometric standard deviation is for example from 1 to 2, or from 1.0 to 1.7, or even from 1.0 to 1.4, and in particular from 1.0 to 1.2. As used herein, the phrase "geometric standard deviation" or "span" of a particle size distribution means the geometric breadth of the best-fitted log-normal function to the above-mentioned particle size data which can be accomplished by the ratio of the diameter of the 84.13 percentile divided by the diameter of the 50^{th} percentile of the cumulative distribution ($D_{84.13}/D_{50}$); See Gotoh et al, Powder Technology Handbook, pp. 6-11, Marcel Dekker 1997.

[0033] The bulk density of the particles is for example in the range of from 400 g/l to 850g/l, or from 550 g/l to 800 g/l or even from 600 g/l to 750 g/l. As can be recognized by one of ordinary skill in the art, the control of improperly sized particles via the present invention contributes to the tight span of the composition produced by the present invention. As used herein, the term "bulk density" refers to the uncompressed, untapped powder bulk density, as measured by pouring an excess of powder sample through a funnel into a smooth metal vessel (e.g., a 500 ml volume cylinder), scraping off the excess from the heap above the rim of the vessel, measuring the remaining mass of powder and dividing the mass by the volume of the vessel.

[0034] Shape of the individual particles can be measured in a number of different ways known to those of ordinary skill in the art. One such method is using optical microscopy with Optimus (V5.0) image analysis software. "Circularity" is defined as (measured perimeter length of the particle image)^2/(measured area of the particle image). The circularity of a perfectly smooth sphere (minimum circularity) is 12.57; and "Aspect Ratio" which is defined as the length/width of the particle image.

[0035] Each of these attributes can be averaged over the bulk granular composition. The granular compositions of the invention may have an average circularities of at most 50, in particular from 12.57 to 30, for example at most 23, or even at most 18. Also possible are granular compositions with particles with an average aspect ratios of at most 2, in particular at most 1.5, or at most 1.3, or

from 0.2 to 1.2.

[0036] The granular product may be a detergent composition and may comprise surfactant(s). The product may further comprise builders, bleaches, bleach activators, suds boosters or suds suppressors, antitamish and anticorrosion agents, soil suspending agents, soil release agents, germicides, pH adjusting agents, non-builder alkalinity sources, chelating agents, smectite clays, enzymes, enzyme-stabilizing agents and perfumes. Suitable detergent composition are exemplified in EP 1776442 which is incorporated by reference.

Granulation Process

[0037] The granular product of this invention can be made by any particulation or granulation process. An example of such a process is spray drying (in a co-current or counter current spray drying tower) which typically gives low bulk densities of 600g/l or lower. Particulate materials of higher bulk density can be prepared by a continuous granulation and densification process (e.g. using LodigeÂ® CB and/or LodigeÂ® KM mixers). Other suitable processes include fluid bed processes, compaction processes (e.g. roll compaction), extrusion and spheronization, as well as any particulate material made by any chemical process like flocculation, crystallisation sentering. The granular product may be composed by from 20 to 100% for example from 50 to 90 %, or from 60 to 80% of spray dryed powder and from 0 to 80%, for example fron 10 to 50% or even from 20 to 40% of added powder.

[0038] Granulation processes are well known in the detergent art. Some non-limiting examples include the process as described in U.S Patent Nos. 5,489,392. 5,516,448 to Capeci et al.

[0039] The product of the invention may be processed in a fluidized bed granulator with selected recycle of the improperly sized particles. In particular, the present invention meets the aforementioned needs by controlling the size of the particles within the process to a greater extent than current detergent manufacturing processes. Via the present invention the amount of undersized particles or fines present in a detergent composition may be reduced via the use of fluidized bed granulation.

[0040] The process may comprise various alternative scenarios such as re-introduction to any combination of the fluid bed or when present, to a premixer or finishing step. Undersized particles may be removed from the fluidized bed and re-introduced to the process such as to the premixer or fluidized bed or may be re-circulated within the fluid bed via the use of an internally recycling fluidized bed.

[0041] Alternatively, undersized particles are controlled via the use of an internally recirculating fluidized bed wherein undersized particles are captured before exiting the fluidized bed and remain within the bed until agglomerated to acceptable sizes.

[0042] Oversized or large particles may also exist wherein "large particles" are defined as particles that have a geometric mean particle diameter that is greater than 1.65 standard deviations above the chosen geometric mean particle diameter of the granular detergent composition at a given span or geometric standard deviation

[0043] Upon exiting from the fluid bed granulator (or any suitable stage therein), the detergent agglomerates may be sized to separate oversized particles from detergent agglomerates in the desired range. The oversized particles may be sized according to conventionally known technology such as via screening. The oversized particles are then re-introduced into the process at appropriate locations in order to achieve the more uniform detergent composition as disclosed herein. The control of these oversized particles leads to better overall properties of the composition such as particle density and span as described herein which contribute to the overall superiority of the detergent composition.

[0044] Preferably, but by no means required, the oversized particles may be optionally milled or ground before re-introduction to the process. The milling or grinding may be preformed in conventional grinding equipment as is well known in the art of detergent processing. The oversized particles may be re-introduced to the process to any desired stage suitable for control of the process such as the fluid bed, the pre-mixer or series of pre-mixers or the finishing step, when present.

[0045] Processes to select the size of the particles are well known by the skilled person and may in particular be found in patent application EP 01187901.

[0046] The processes of this invention may comprise the step of spraying an additional binder material as hereinbefore described in the pre-mixer or series of pre-mixers in order to enhance granulation of the various materials in the feed stream. The liquid binder material may be added for purposes of enhancing granulation by providing a "binding" or "sticking" agent for the components such as undersized particles. The binder is preferably selected from the group consisting of water, anionic surfactants and their precursors, nonionic surfactants, polyethylene glycol, polyvinyl pyrrolidone, polyacrylates, citric acid and mixtures thereof. Other suitable binder materials including those listed herein are described in Beerse et al, U.S. Patent No. 5,108.646 (Procter & Gamble Co.).

[0047] In an optional embodiment of the present invention, the process may additionally include a finishing step including but not limited to, admix and/or spray-on of additional ingredients such as enzymes, bleach perfumes, etc or a packaging step.

[0048] The particles of this invention may be further processed in an optional step by adding a coating agent to improve the particle color, increase the particle "whiteness", or improve the particle flowability after the particles exit the mixer or the dryer to obtain the granular detergent composition produced by the present invention. Coating agents herein may include dry inorganic materials such as zeolites, carbonates, sulfates etc. Alternatively, the

coating process may include the spray of a liquid coating agents such as anionic surfactant, slurries or solutions of inorganic or organic salts, and various other materials. Those skilled in the art will appreciate that a wide variety of methods may be used to dry as well as cool the exiting detergent particles without departing from the scope of the invention. Since the mixer can be operated at relatively low temperatures, the need for cooling apparatus is not required by the present process, which thereby further reduces manufacturing costs of the final product.

[0049] Another optional processing step includes continuously adding a coating agent such as zeolites and fumed silica to the mixer to facilitate free flowability of the resulting detergent particles and to prevent over granulation.

Claims

1. Reclosable packaging comprising:

- a bag comprising a reclosing means and
- a granular product comprising less than 10% by weight of particles having a geometric mean particle diameter of at most 150 micrometers.

2. A packaging according claim 1, wherein the product comprises less than 10% by weight of particles having a geometric mean particle diameter of at most 300 micrometers.

3. A packaging according to any one of the preceding claims, wherein the reclosing means comprises a mechanical fastener, the mechanical fastener comprising interoperating hooks and/or loops.

4. A packaging according to claim 3, wherein the average density d of hooks and/or loops on a surface of mechanical fastener is of 40-120 hooks and/or loops per square centimeters of mechanical fasteners.

5. A packaging according to claim 3 or 4, wherein the product comprises less than 10% by weight of particles having an average diameter of at most of $d^{-1/2}/10$.

6. A packaging according to any one of the preceding claims, wherein the particles have an average circularity of at most 50.

7. A packaging according to any one of the preceding claims, wherein the particles have an average aspect ratio of at most 50.

8. A packaging according to any one of the preceding claims, wherein the particles have a geometric standard deviation of from 1 to 2.

9. A packaging according to any one of the preceding claims, wherein the geometric mean particle diameter of the particles is from 500 microns to 1500 microns.

10. A packaging according to any one of the preceding claims, wherein the product is a detergent composition.

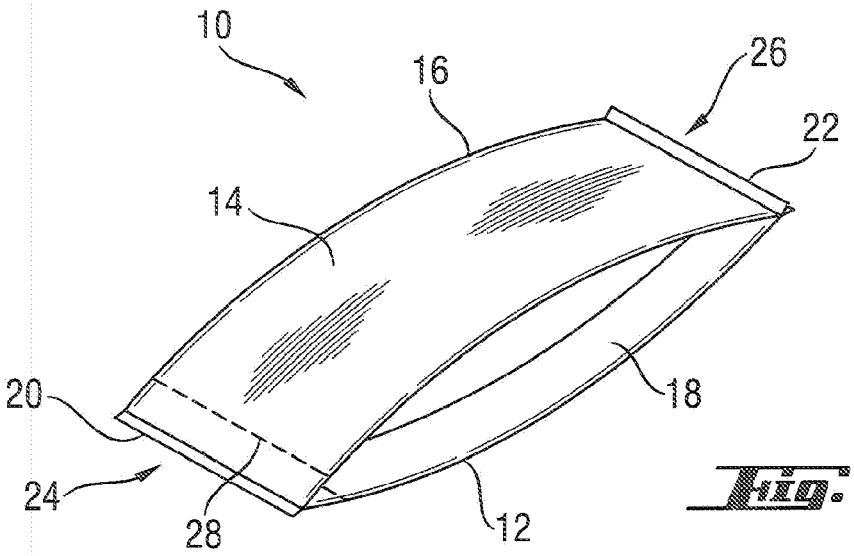


Fig. 1

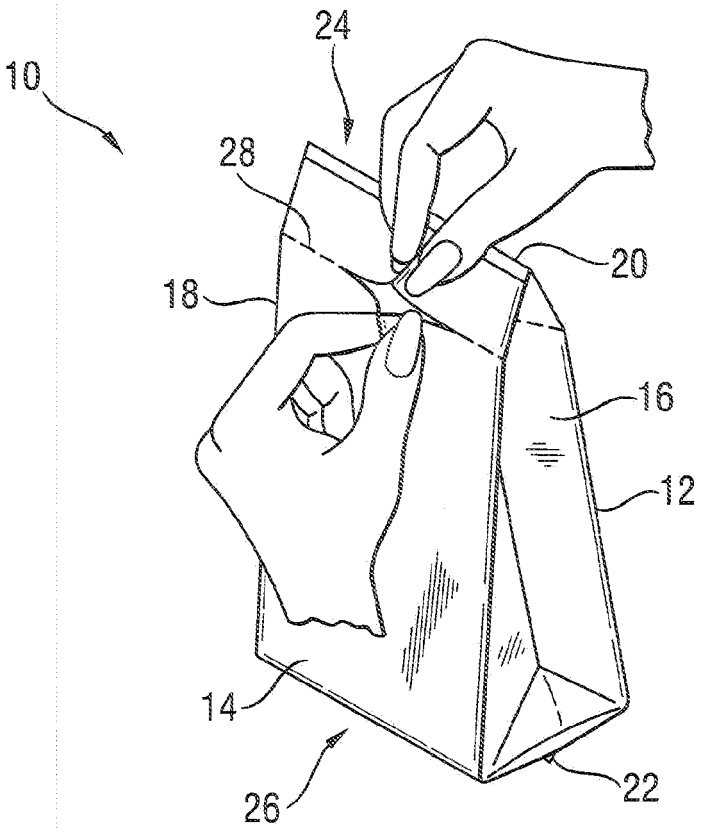


Fig. 2

Fig. 3

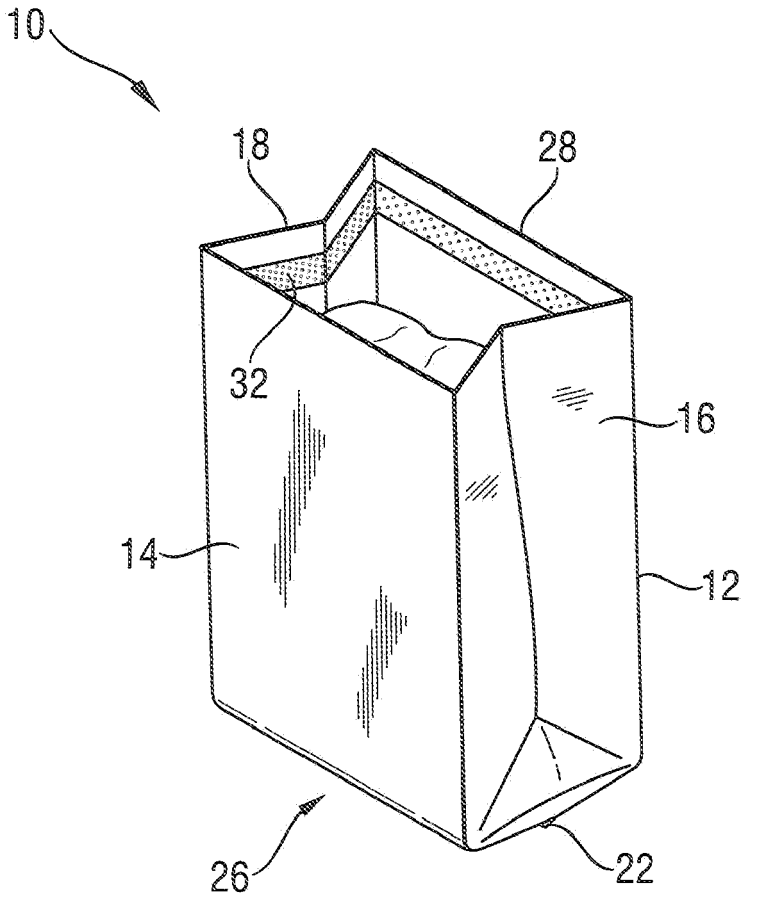
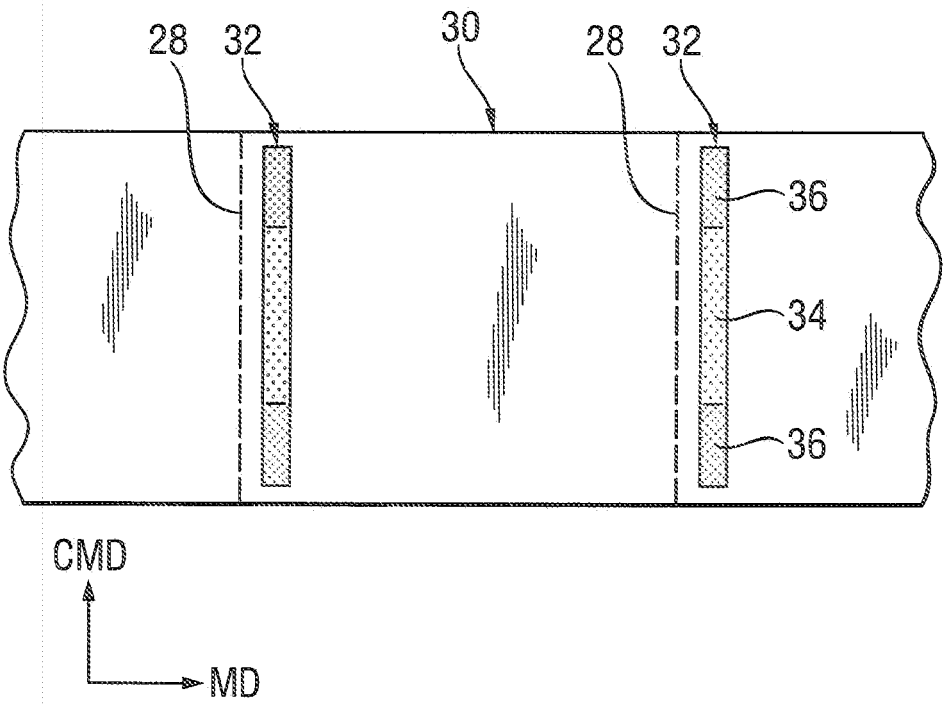


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 07 12 2433

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 May 2008	Sundell, Olli

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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22-05-2008

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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- EP 1776442 A **[0036]**
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