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(54) PACKAGING BAG

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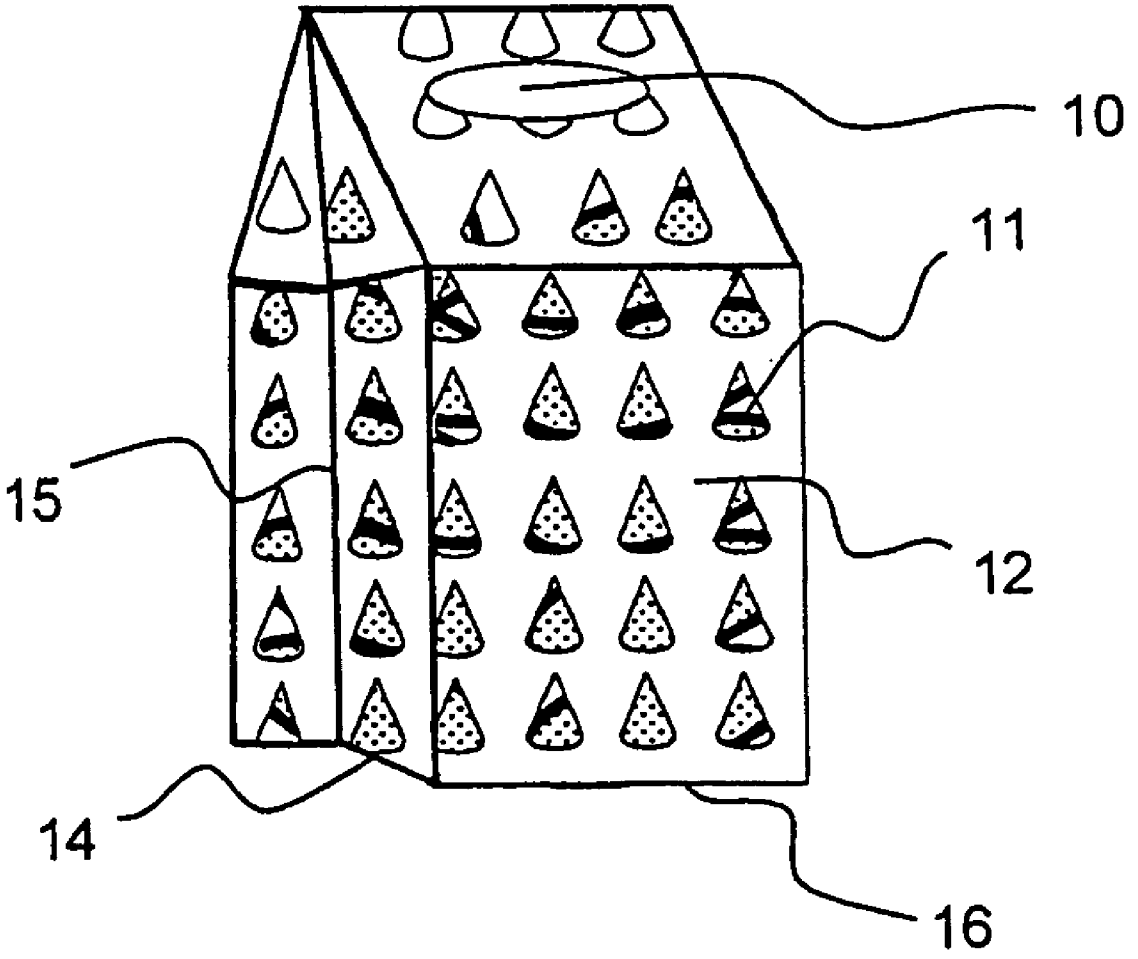
(57) **ABSTRACT**

This invention relates to a packaging bag. The packaging bag is made of an envelope of at least one enclosing element made of polymer material and the envelope includes a plurality of perforation holes at least on a part of the enclosing element. The packaging bag is especially suited for accommodating goods which have damageable surfaces and require air ventilation. Such goods may be agricultural products.



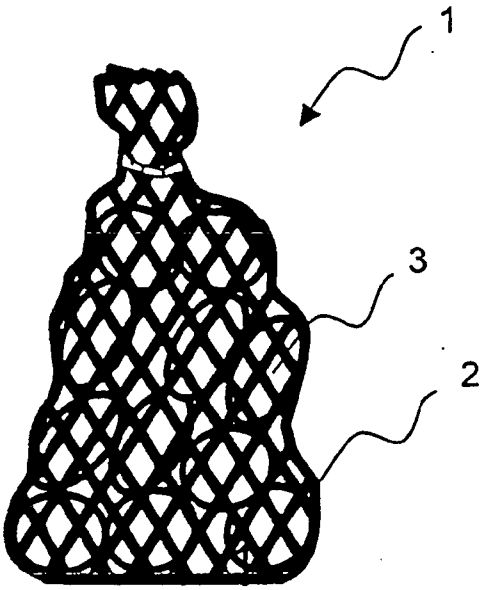


Fig. 1a

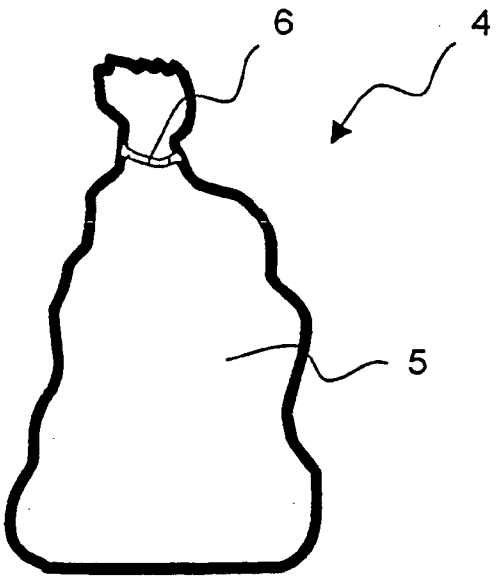


Fig. 1b

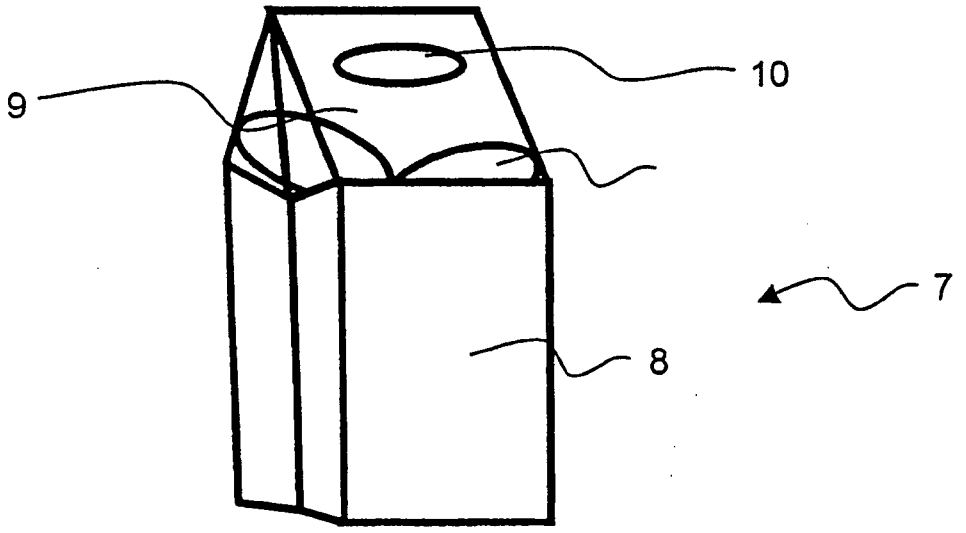


Fig. 1c

Prior Art

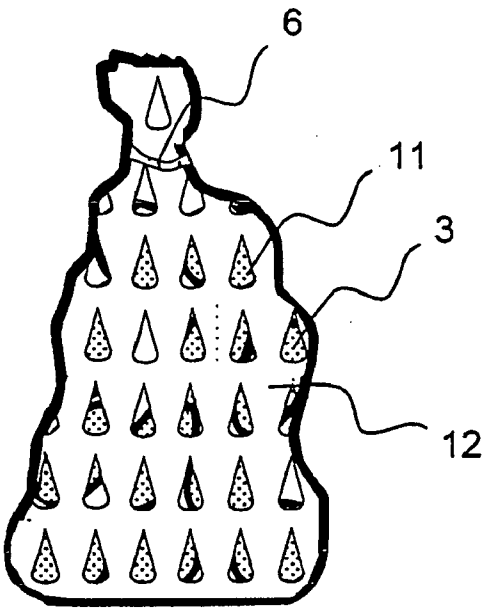


Fig. 2a

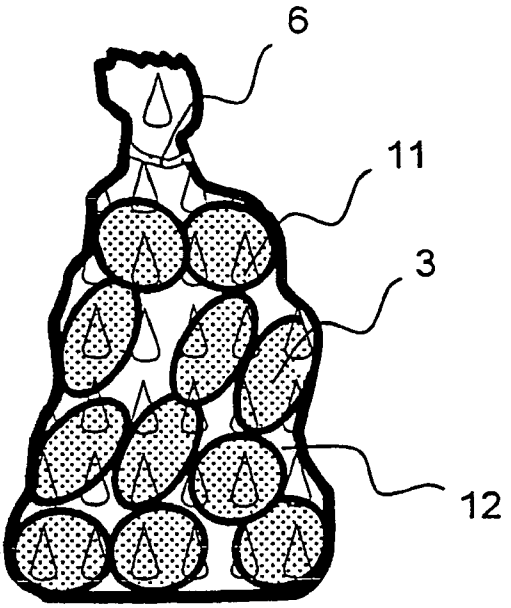


Fig. 2b

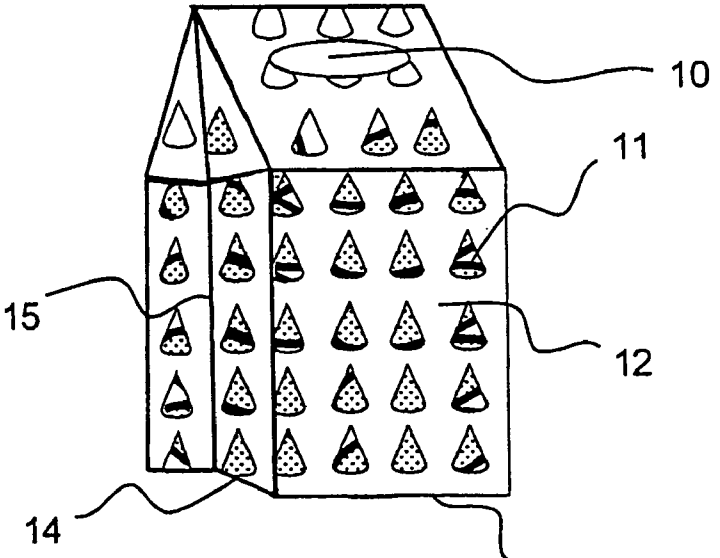


Fig. 3

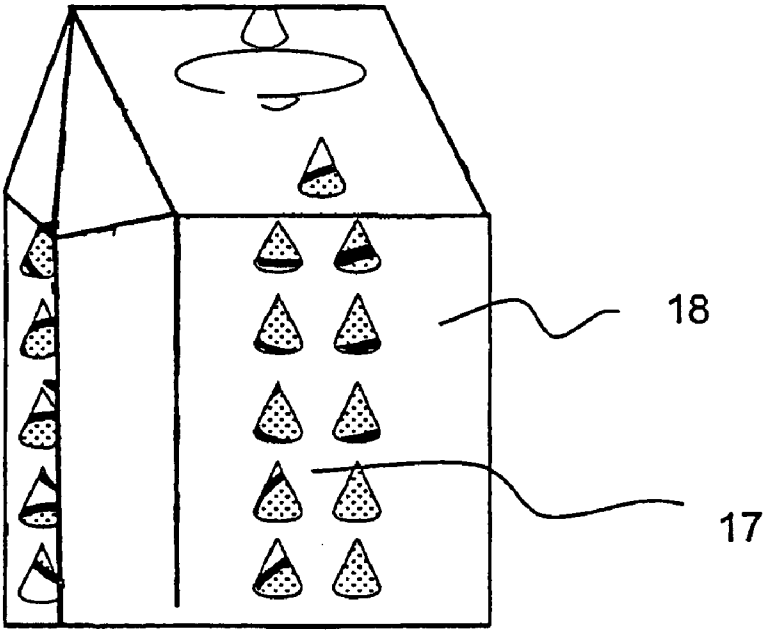


Fig. 4a

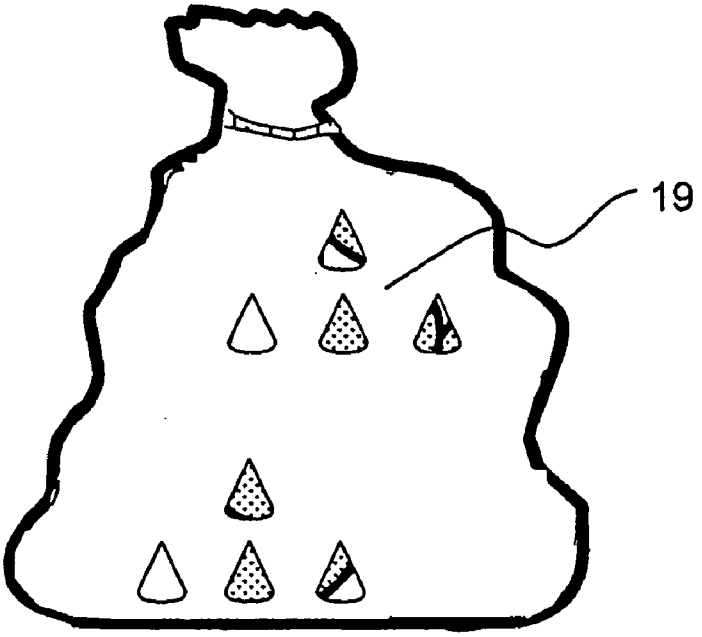


Fig. 4b

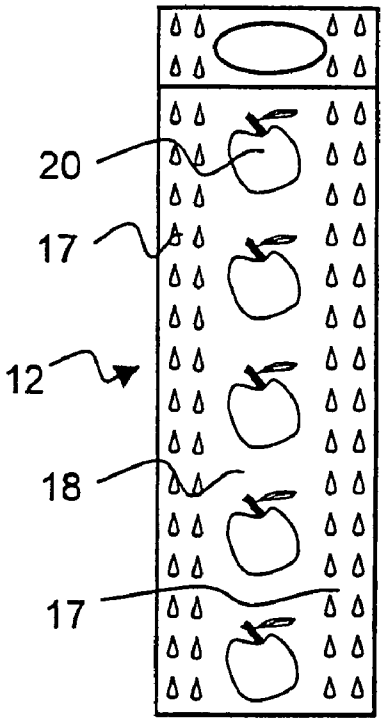


Fig. 5a

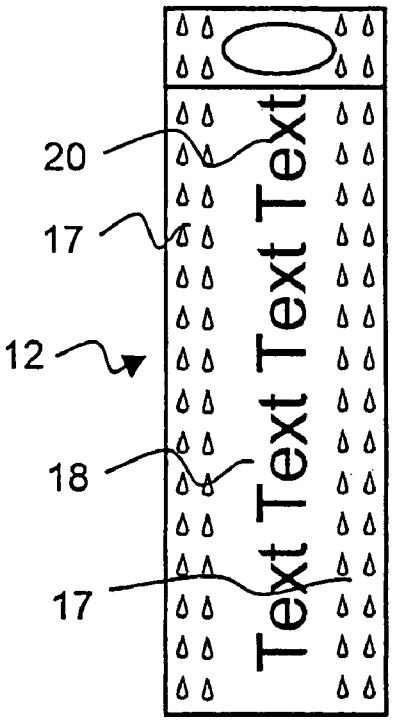


Fig. 5b

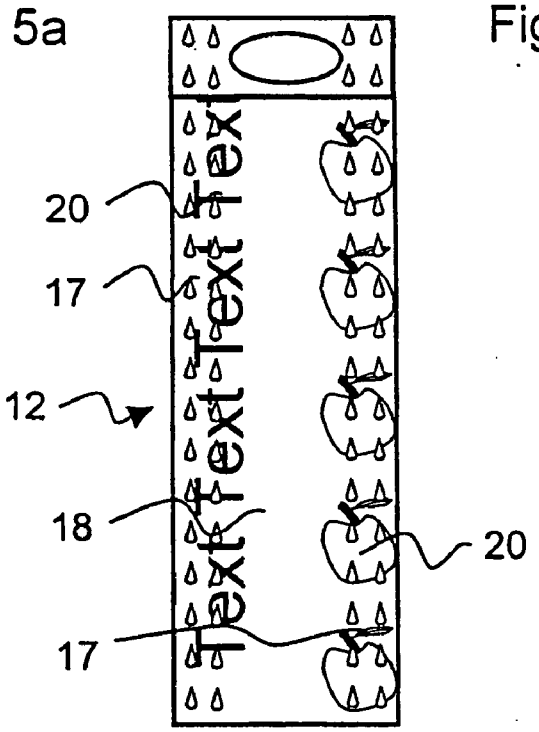


Fig. 5c

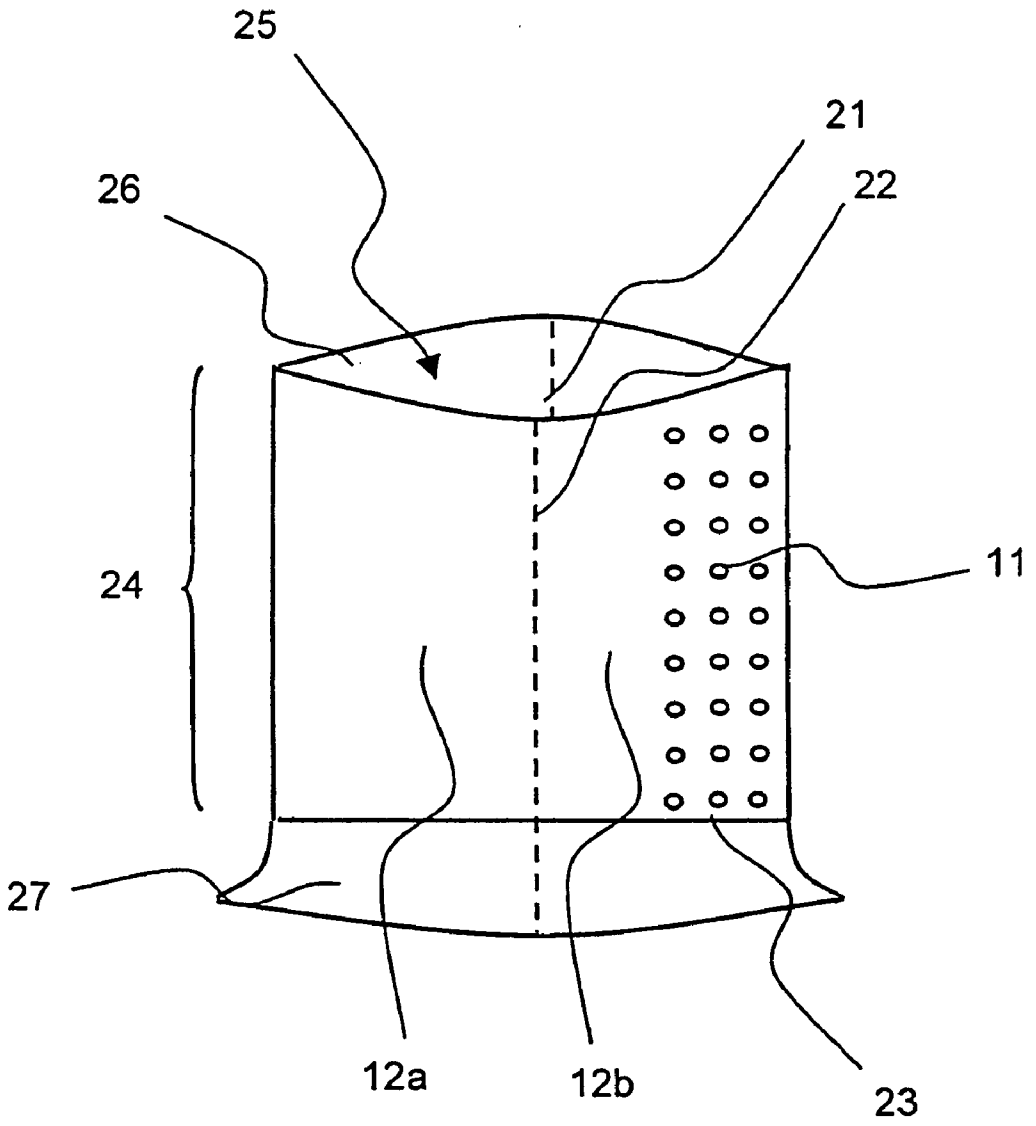


Fig. 6

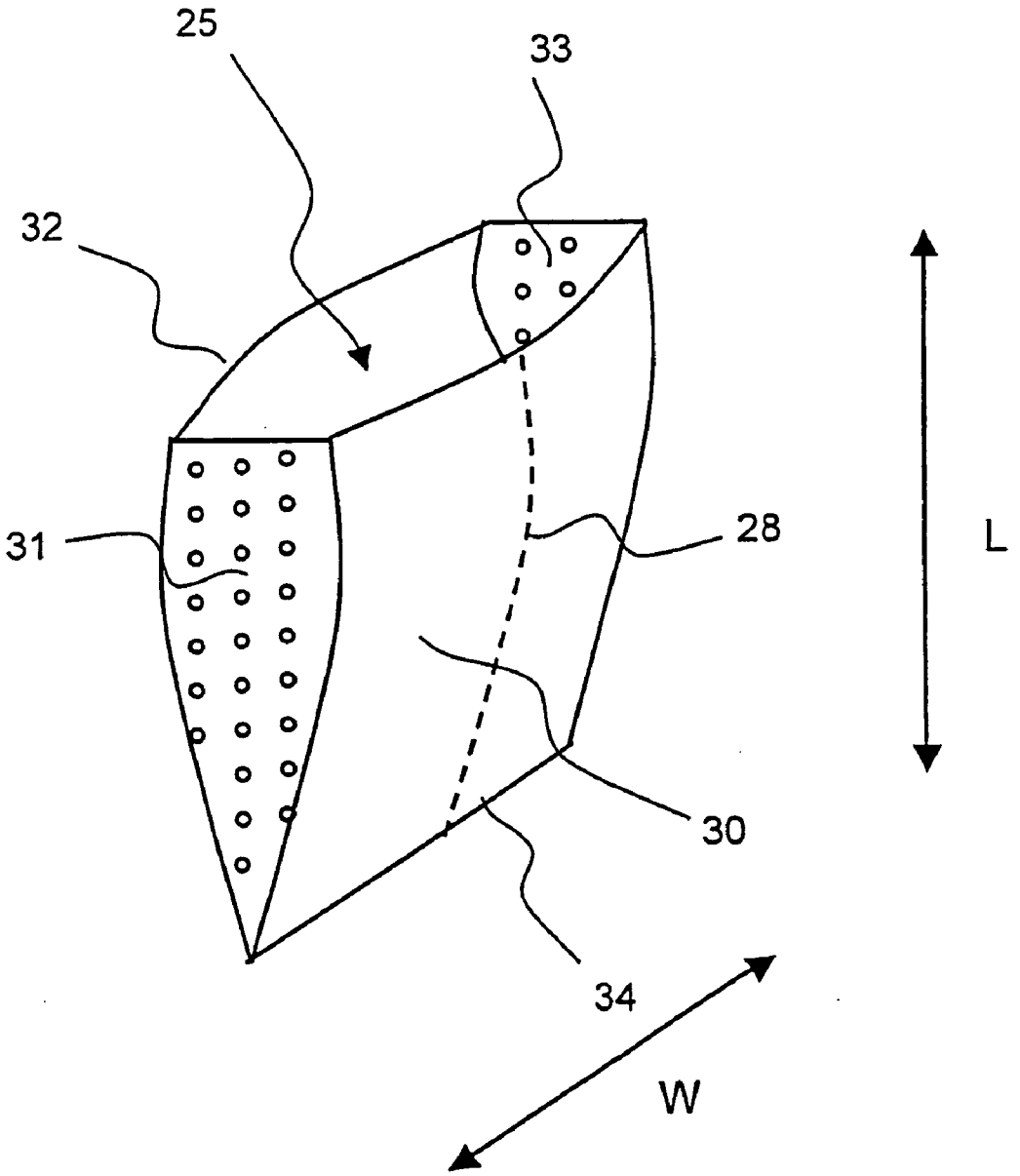


Fig. 7

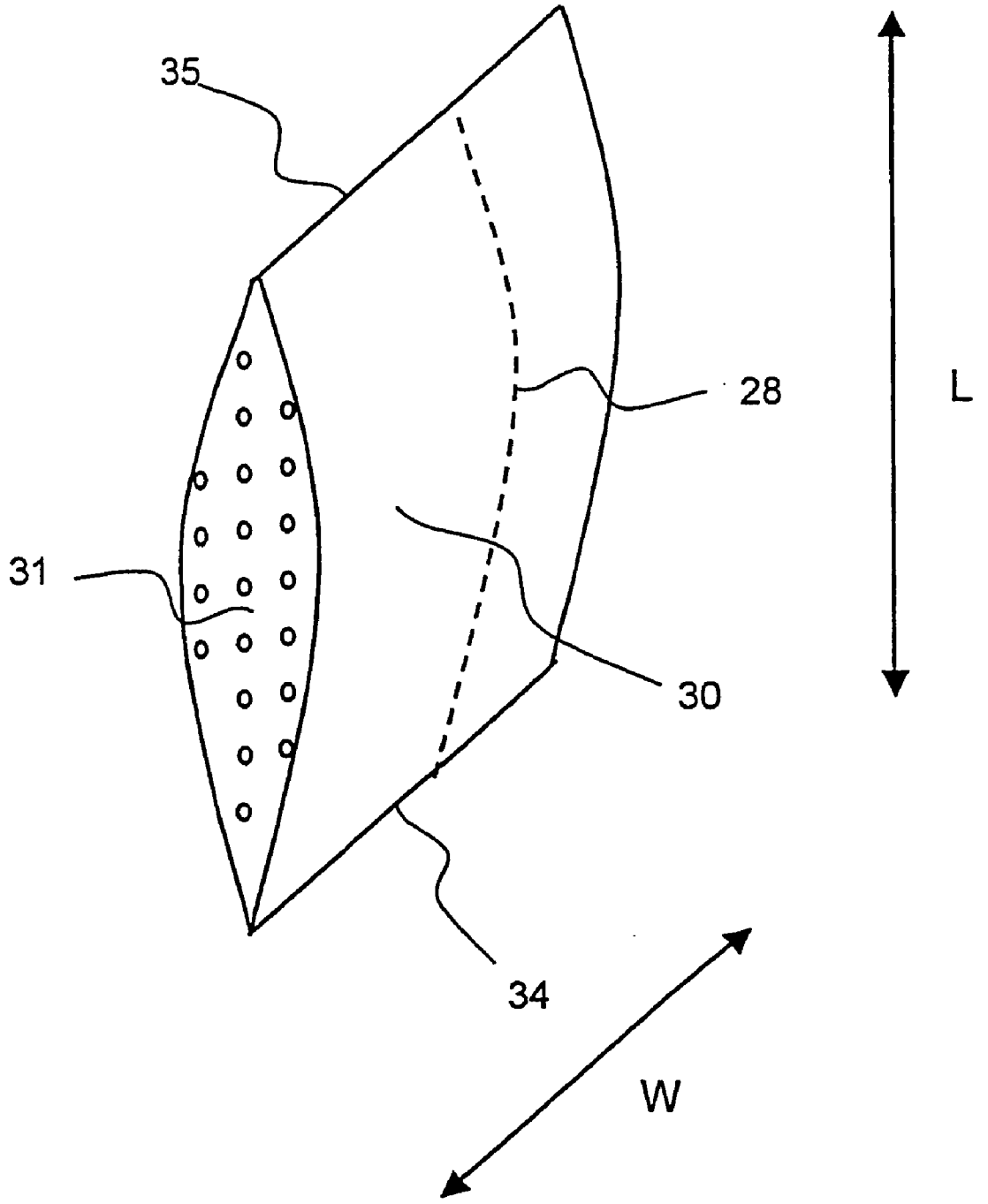


Fig. 8

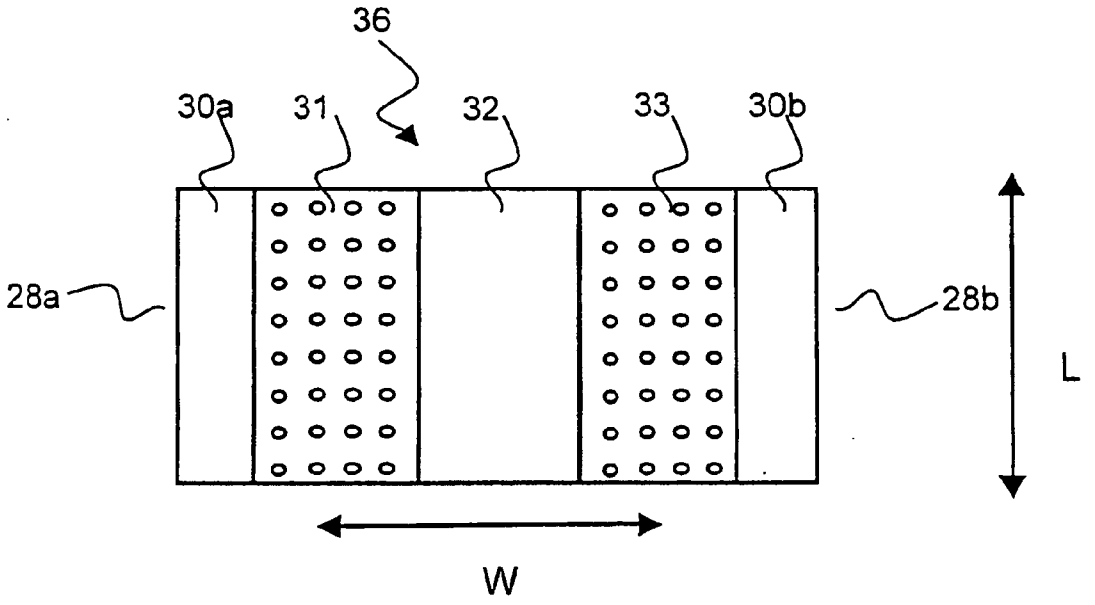


Fig. 9a

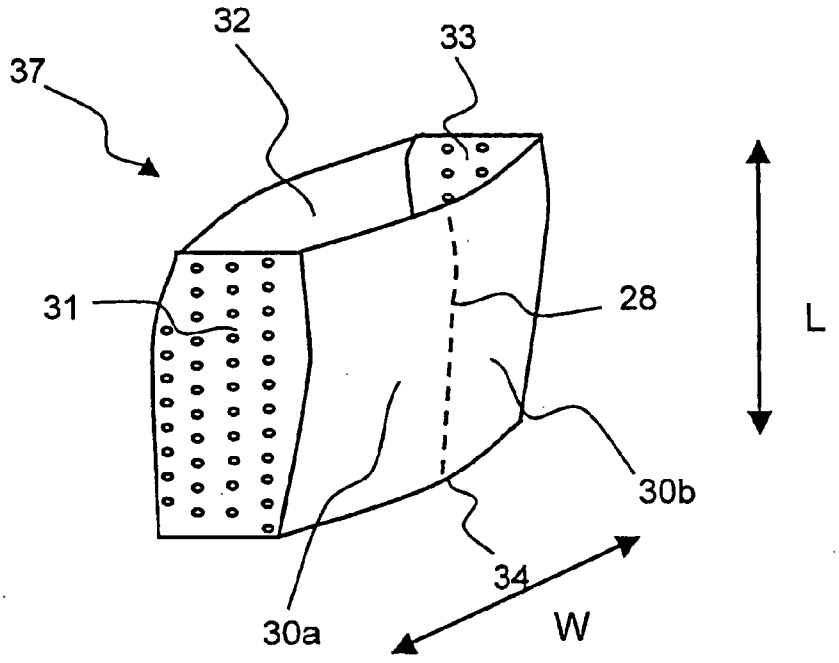


Fig. 9b

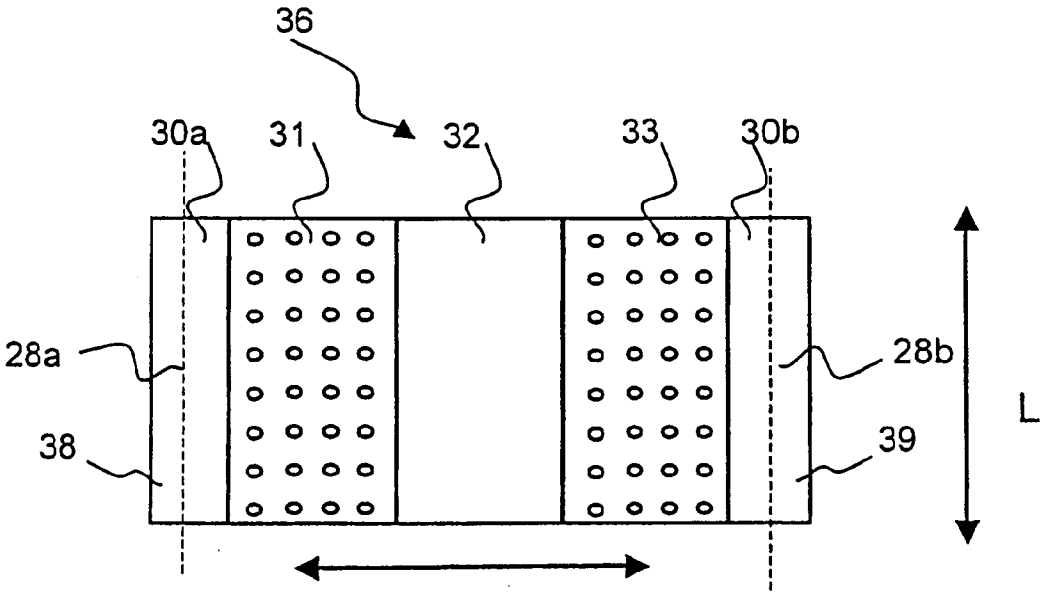


Fig. 10a

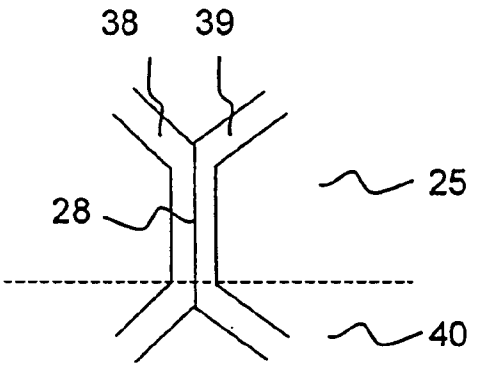


Fig. 10b

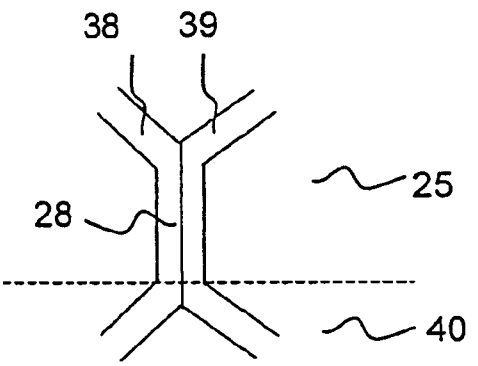


Fig. 10c

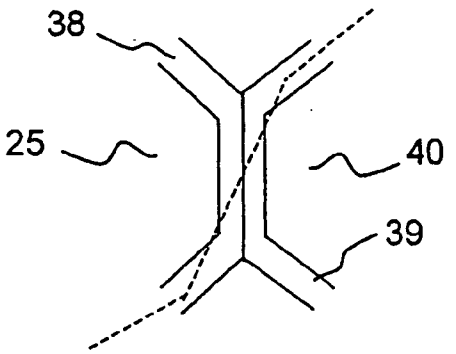


Fig. 10d

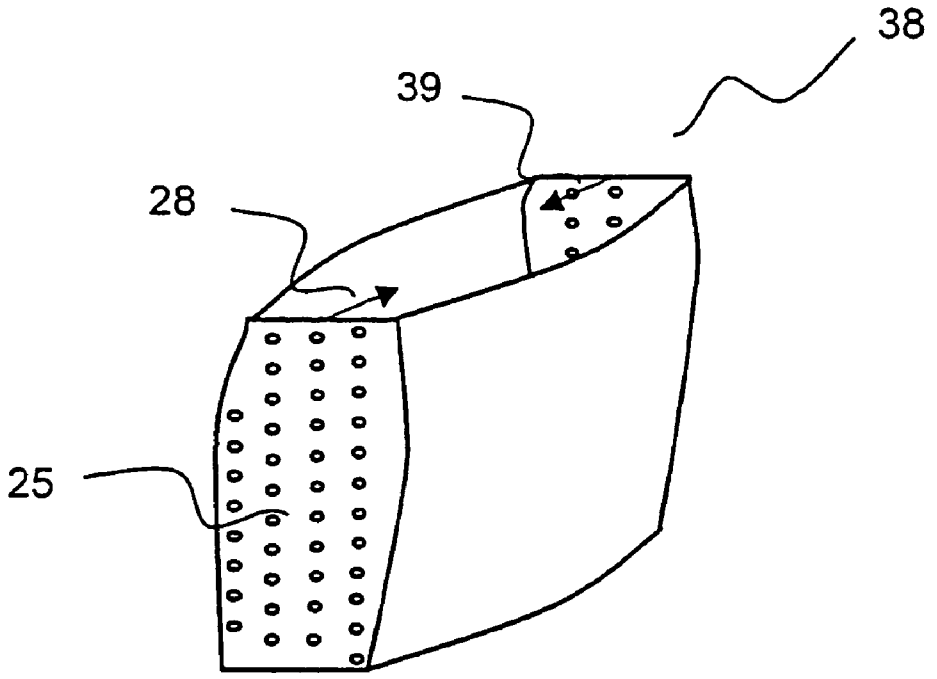


Fig. 11a

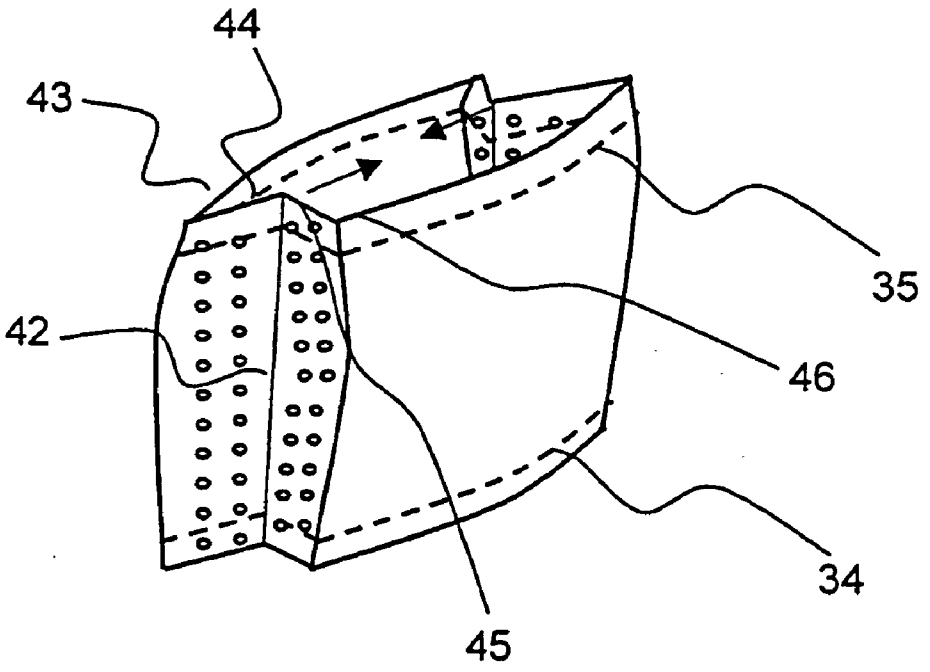


Fig. 11b

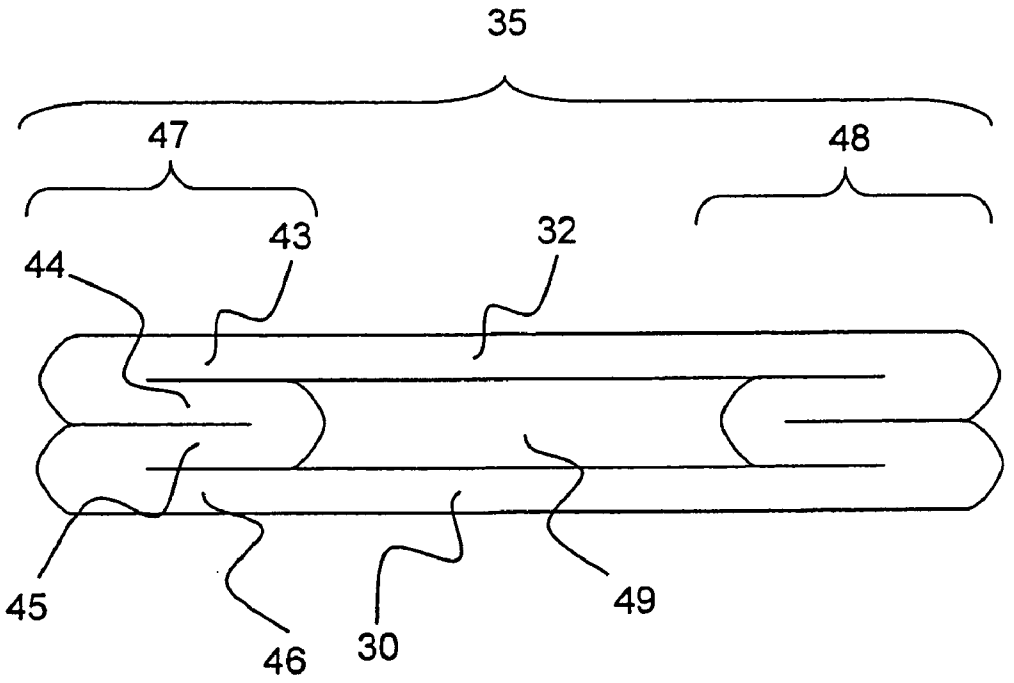


Fig. 12a

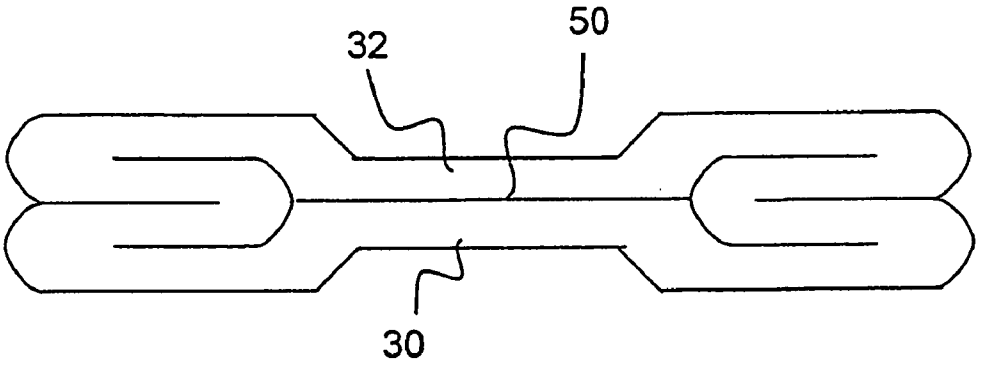


Fig. 12b

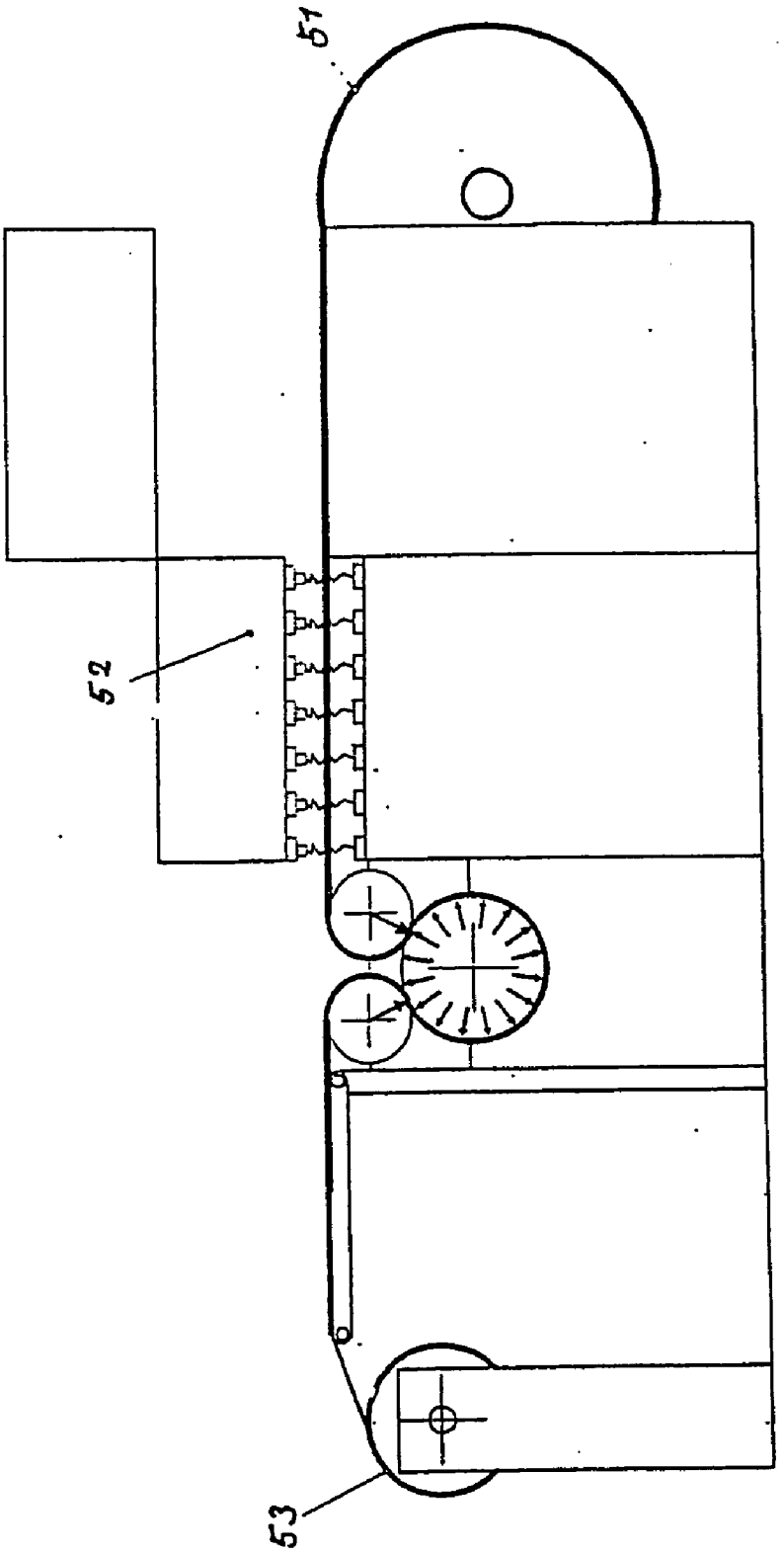


Fig. 13

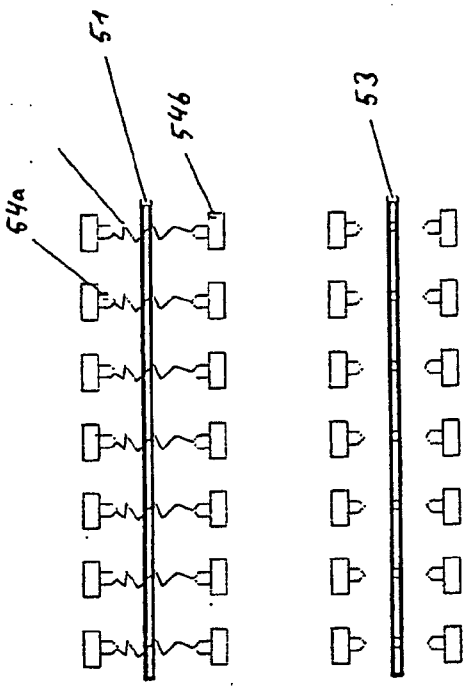


Fig. 14b

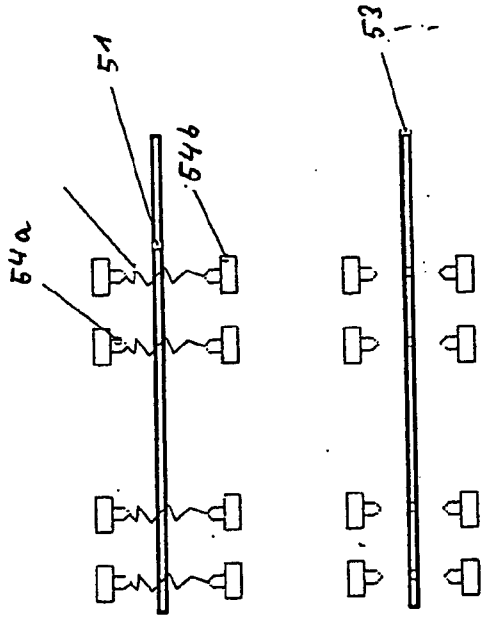


Fig. 14a

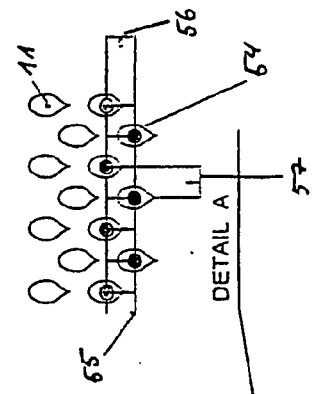


Fig. 15c

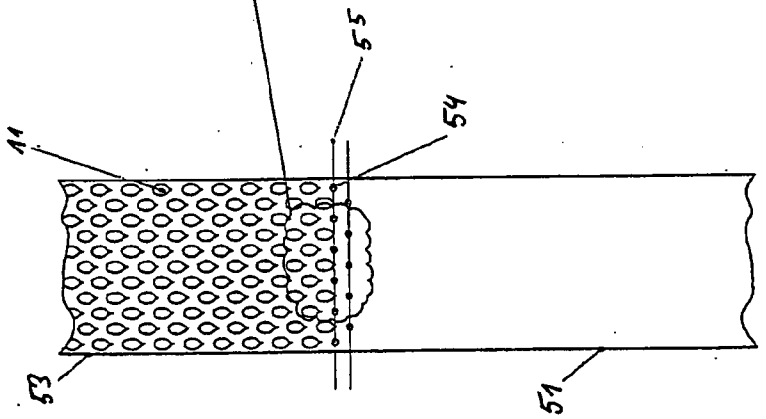


Fig. 15b

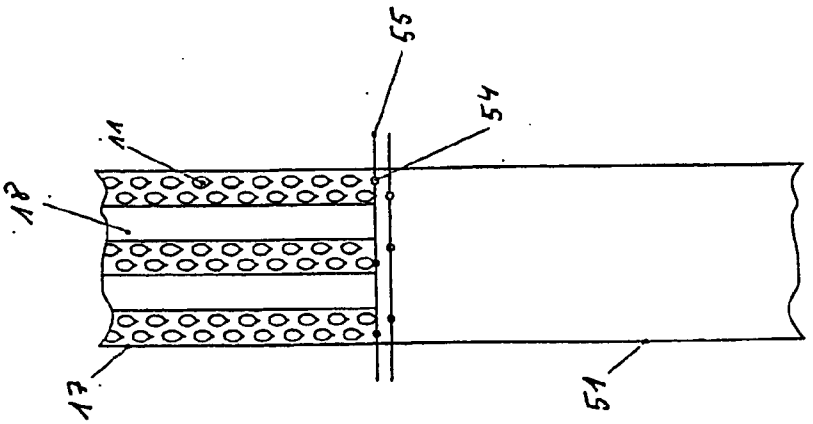


Fig. 15a

PACKAGING BAG

[0001] This application is a National Stage application of International Application No. PCT/EP2008/010043 filed on Nov. 26, 2008.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] This invention relates to a packaging bag. The packaging bag is made of an envelope of at least one enclosing element made of polymer material and the envelope includes a plurality of perforation holes. The packaging bag is especially suited for accommodating goods which have damageable surfaces and require air ventilation. Such goods may be agricultural products.

[0004] 2. Description of the Prior Art

[0005] Packaging is a crucial element in almost all industries where goods have to be transported, stored or presented. One of the most commonly used forms of packaging is the bag. Therefore there exist a vast number of types of packaging products in form of bags, optimized for the various applications.

[0006] The variety is stretching over all characteristics of the bags like the materials e.g. natural or synthetic materials, types e.g. meshes or closed surfaces, forms, stability, sizes, colors or additional features like various types of handles, carrying straps or stabilizing features. Three examples for the state of the art are schematically shown in FIG. **1***a* to FIG. **1***c*.

[0007] FIG. **1***a* shows a mesh packaging bag **1** made of a mesh **2**. It is apparent that the product **3** is visible from the outside. FIG. **1***b* shows a plastic packaging bag **4** of the same type, wherein this bag **4** is made of a material with a closed and opaque surface **5** and therefore the goods inside the bag are not visible. The bags **1**, **4** in FIG. **1***a* and FIG. **1***b* are closed with a single clip **6**. FIG. **1***c* shows a bag **7** wherein the form of the bag **7** in the filled situation is not defined by the goods **2** inside the bag, but by structures provided to the bag **7**. Additionally the bag **7** comprises two areas; i.e. a lower area **8**, where the enclosing material is opaque, and a second area **9** wherein the enclosing material is transparent. Additionally this bag **7** comprises a handle **10** in form of an opening in the enclosing material.

[0008] The packaging products in the form of bags **1**, **4**, and **7** in FIG. **1***a* to **1***c* are most commonly made of synthetic materials mainly for cost and weight reasons by using a closed film of the material and then forming the bag. Such bags do not allow adequate air or cooling circulation in their interior, resulting in the poor preservation of the packed foods. The same situation occurs in case of increased heat that may be trapped inside the bag and spoil perishable agricultural products.

[0009] The packaging products available in the form of mesh overcome these ventilation problems since they have an air circulation enabling surface and allow good air ventilation for example for food. However, meshes present significant disadvantages, since the mesh is in contact with the packed good. When the mesh is produced, it undergoes yarn hardening in order to obtain higher tensile strength. Goods that are in direct contact with the mesh rub against the hard yarn and their outer surface is often destroyed. In many cases, rubbing also causes an aesthetic and cleanliness problem, as in the case of onions packed in mesh bags. The mesh destroys the skin of onions that falls off and litters during transport or storage of the mesh bag. This problem is not limited to food, but applies to every good having surfaces that can be scratched are damaged by the mesh material.

[0010] Apart from the food air circulation problem, bags with closed surfaces possess the advantage that information can be printed on them, which can be very well seen and depicts a benefit regarding information provision, product recognition or advertisements. However closed surface bags have the disadvantages, such as the non-visible good condition. On the shelves of the stores, the buyers might prefer to see the good stored in the bag in its actual condition before purchasing it. In most cases, the abovementioned bags are not transparent and therefore the good cannot be seen.

[0011] Again, the mesh bags can overcome this disadvantage of non-visible good condition, but only at the costs of a bad readability of information on the mesh. Therefore often information containing media are attached to the meshes. Additionally mesh bags cannot be used for small goods, which would fall through the mesh.

[0012] WO 2007/026183 describes a packaging means for providing a fresh grocery good that is placed in the packaging means. In one embodiment it is realized as a bag furnished with a moisture absorbent insert and sealed air-tightly under vacuum, wherein the packaging means includes a vacuum foil clinging to the good, and a fenestrated moisture impermeable layer, e.g. a perforated foil separating the good and the moisture absorbent insert from one another.

[0013] U.S. Pat. No. 5,171,593 discloses a ventilated package film with a band of micro-perforations to envelope goods like blueberries or raspberries, which are placed in containers. The film is used to envelop the whole container.

[0014] The problem to be solved with the invention is it to overcome the above mentioned disadvantages of bags corresponding to the prior art.

SUMMARY OF THE INVENTION

[0015] The object of the present invention is solved by a bag as described herein and as defined in the appended claims.

[0016] The present invention is directed to provide an optimized packaging bag wherein the above mentioned advantages of the meshes and the above mentioned advantages of bags with closed surfaces are combined in one product. Such a bag allows adequate preservation, transport and storage of packed goods while offering an aesthetic and functional product. The bag may be realized as a low cost product with a very broad application range through its flexibility to be adapted to the application.

[0017] The bag corresponding to this invention offers a superior combination of beneficial characteristics to the state of the art bags. It provides great elasticity and resistance to rupture and wear and has an aesthetic appearance, since the perforated shell, of which the bag is made of, maintains substantially its shape and initial form without tear when force applied by the good it contains. It further allows air circulation in its interior retaining the good's humidity, liberating the heat trapped in the bag to the environment and allowing the appropriate cooling of the good.

[0018] The packaging bag comprises an envelope with a plurality of perforation holes, wherein said envelope comprises at least one enclosing element made of a polymer film of at least one layer, wherein said perforation holes are distributed on at least a part of said enclosing element, wherein the enclosing element has at least one joint and wherein at

least parts of the surfaces of said enclosing element and said joint defines an inner chamber of said bag.

[0019] The envelope may comprise more than one enclosing element which are joined to each other together defining the inner chamber of the bag. Such a solution with more than one element may be especially suited for bags with more complex forms or where enclosing elements made of different materials are used. This allows an adaptation of the appearance of the packaging bag to the application.

[0020] The envelope may comprise one enclosing element. In this embodiment the enclosing element is joined with itself forming the envelope defining an inner chamber of the bag.

[0021] The enclosing element may be a substantially rectangular film as base element. A bag comprising a substantially rectangular film as base element has the advantage that the base element may be easily manufactured with standard tooling as a part of a larger substantially rectangular film and then the base elements for different bags may be cut out off the larger substantially rectangular film without material loss. The substantially rectangular enclosing elements joint together forming the envelope have together preferably a width between 0.2 m to 1.2 m.

[0022] The packaging bag comprises a perforated envelope which is made of a polymer film material which is soft and does not damage the packed goods by destroying or damaging the skin of the goods or peeling off the good's skin and therefore not littering the storage area.

[0023] This innovation significantly improves especially the agricultural products packaging problem with respect to friction, appearance and preservation of packed goods. The main intention is the packaging for agricultural goods, but the application of the invention is not restricted to such goods.

[0024] The openings of the perforation holes may have circular, oval, substantially rectangular or drop-shaped form. The rectangular openings may have rounded corners.

[0025] The oval or rectangular openings have preferably a minor axis length between 0.2 mm and 4 mm and major axis length between 2 mm and 8 mm. The drop-shaped openings preferably have comparable opening areas to the above given numbers for the oval openings. Preferably the individual openings should have uniform opening areas.

[0026] The number of perforation holes may vary due to the polymer film material property, the density of the perforation holes, the application purpose, the weight of the goods, the ventilation need or the requested appearance.

[0027] The perforation holes may be located only on parts of the enclosing element or in case that more than one enclosing element is used, some of the enclosing elements may be perforated and others may not be perforated.

[0028] The envelope of the bag may offer visibility to its interior, since the polymer film may be semitransparent or transparent. Even if the enclosing element according to this invention is opaque or colored or printed the envelope of the bag may offer visibility to its interior due to the perforation holes. Furthermore the polymer film material of the enclosing element may be selected to be recyclable and environment-friendly. The bag may be provided without a handle or with a handle. The handle may be part of the polymer film forming the enclosing element made and the bag therefore can then be easily carried and stored.

[0029] The polymer film comprises at least one polymer layer, but may comprise as well of more than one polymer layer flatly connected to each other forming a multilayer polymer system. The fixation of the different layers to each other may achieved by welding, thermal binding, gluing, laminating or any other fixation method and the fixation may be over the full area of the layers or in some areas of the layers.

[0030] The polymer film may have areas with different numbers of layers and the thickness of the polymer film varies preferably from 30 μm to 120 μm.

[0031] The properties of the enclosing element, such as polymer material, additives to the polymer, number of layers, thickness of layers, perforation hole distribution, size of perforation holes, density of holes, color of layers, and other relevant properties may be freely chosen to address the needs of the specific application. Requirement of the application, which can be addressed with such a property selection, may be the level of required air circulation, the required water vapor permeability, the required stability of the film, the size of the good, abrasion properties of the good, the design of the package, expected transparency of the film or expected printability of information on the bag.

[0032] Processes such as electrical discharge perforation, laser perforation, stamping perforation, hot stamping perforation or hot needle perforation may create the perforation holes. The form of the openings may change after the perforation process due to any further process manufacturing steps or due to usage of the packaging bags such as heavy goods filled in the bag creating stress within the enclosing element.

[0033] The perforation process is preferably applied on the polymer film or on subassemblies of the polymer film having more than one layer or to the individual layers positioned one above the other in a way that the perforation holes of one layer is above the perforation holes of the layer below for a majority of perforation holes. It is as well possible that some layers might not be perforated if their constitution allow for a required permeability and visibility.

[0034] The enclosing element may be opaque, partially transparent or transparent. Partially transparent is defined as meaning that only part of visible light is transmitted through the film. The transparency may be defined by the layer of the polymer film or other transparency impacting materials contained in at least one of the layers or on the surface one or more layers. Such materials may be colors or printing chemicals for example ink or ground coat. The transparency of the enclosing element may differ in different areas of the enclosing element.

[0035] The material of the layer of the polymer film preferably is Polyethylene, High Density Polyethylene or Linear Low Density Polyethylene. One layer of the polymer film may as well be made of other synthetic materials such as Low Density Polyethylene, Ethylene Vinyl Acetate, Polyvinylchloride, Polyamide or copolymers of said polymers or combinations of said polymers or copolymers.

[0036] For polymer films comprising more than one layer the material of the individual layers may differ. Preferably the layer forming the insight of the bag may comprise Linear Low Density Polyethylene.

[0037] For bags comprising more than one enclosing element the material of the individual enclosing elements may differ.

[0038] Additives such as plasticizer, polycarbonate, iridic or colors may be incorporated into at least one layer of the polymer film.

[0039] The plurality of perforation holes in the envelope may be distributed on part or over the entire area of the enclosing element. Preferably the perforation openings on the enclosing element form a stripe or stripes of perforation

holes. The individual openings within those stripes are preferably equidistant and preferably the stripes are formed of lines of perforation holes.

[0040] The perforation openings on the enclosing element may be positioned forming patterns. These patterns may be logos, images, words or letters. Further the same pattern may be repeated on one enclosing element or different patterns may exist on one enclosing element.

[0041] At least one layer of the polymer film of the enclosing element may be printable or inscribable on at least one surface. Preferably this surface is a surface of the enclosing element. The surface may be directed away from the inner chamber of the bag. This allows for providing any type of printed or handwritten information on at least one surface of at least one layer. Therefore the material defining the information may be incorporated insight the polymer film and therefore this information is protected from external influences like rubbing or chemicals. The printable and inscribable area may only be a part of the enclosing element. The information may for example display company logos, product information, and advertisement.

[0042] At least an area of the enclosing element of the bag may show a printing. This printing may display logos, images, drawings, letters or words.

[0043] The printing may be applied prior to or after the application of the perforation process and it may be applied to the polymer film prior to forming the envelope or to the enclosing element after forming the envelope.

[0044] The packaging bag in a preferred embodiment comprises an envelope with a plurality of perforation holes, wherein said envelope comprises at least one enclosing element made of a polymer film of at least one layer, wherein said perforation holes are distributed on at least a part of said enclosing element, wherein said enclosing element has at least one joint, and wherein at least parts of the surfaces of said enclosing element and said joint define an inner chamber of said bag. The enclosing element comprises at least two perforation-areas with the plurality of perforation holes, each of the perforation-areas forming a straight band and reaching over the entire length of the envelope. The enclosing element further comprises at least two non-perforation-areas without perforation holes and each of the non-perforation-areas forming a straight band and reaching over the entire length of the envelope, and the perforation- and the non-perforation-areas forming together said inner chamber of the bag, wherein said perforation-areas and said non-perforation-areas are forming a hose base element by a further joint reaching over at least a part of length of the envelope, and wherein each perforation-area is adjacent to two non-perforation-areas and each non-perforation-area is adjacent to two perforation-areas and wherein one opening of said hose base element is closed by said joint.

[0045] A polymer film forming the enclosing element preferably has in this embodiment a substantially rectangular form as base element.

[0046] The further joint preferably reaches over the entire length of the envelope.

[0047] The further joint may be completely positioned in one of the non-perforated or perforated areas. Preferably it is positioned in one of the non-perforated areas.

[0048] The joint for closing one opening of the hose and defining together with at least parts of the surfaces of the enclosing element an inner chamber may be realize with various configurations how areas of the enclosing element are positioned and joined with each other.

[0049] In one embodiment the joint has a specific configuration in which the enclosing element is joined with itself at an intersection or joint. In this specific joint configuration the joint comprises a first and a second section of the joint each with at least four layers of said enclosing element wherein in at least a subsection of said first section the two inner layers of the joint are of material of a first perforation-area and wherein in at least a subsection of said second section the two inner layers of the joint are of material of a second perforation-area.

[0050] The joint may completely or partially close the opening.

[0051] The bag may be completely closed by a joint.

[0052] All joints forming the envelope of the bag may be generated by welding, thermal binding, gluing, laminating or with joining elements such as staplers are sewing yarn.

[0053] The goods may be positioned inside the bag during the manufacturing process of the envelope. This may be realized by wrapping the enclosing element around the goods and adding the joints. Alternatively the envelope is formed first, the goods are placed inside the envelope and then the bag is closed on the open side of the envelope.

[0054] The packaging bag according to this invention may be provided with a handle or a hanger for hanging the bag to a holding means such as a hook.

[0055] Therefore the packaging bag may comprise at least one handle or at least one hanger, wherein said handle or said hanger is an opening in the polymer film.

BRIEF DESCRIPTION OF THE DRAWINGS

[0056] Hereinafter, the invention is described in more detail by means of the drawings wherein:

[0057] FIGS. **1***a*, **1***b* and **1***c* show schematic drawings for three state of the art bags for goods packaging;

[0058] FIGS. **2***a* and **2***b* are schematic drawings of representative forms of the packaging bag corresponding to the invention;

[0059] FIG. **3** is a schematic drawing of a more complex packaging bag corresponding to the invention;

[0060] FIGS. **4***a* and **4***b* are schematic drawings of packaging bags corresponding to the invention with perforation holes only a part of the enclosing element;

[0061] FIGS. **5***a*, **5***b*, and **5***c* are schematic drawings of packaging bags corresponding to the invention with examples of information provided on the packaging bags;

[0062] FIG. **6** is a schematic drawing of the packaging bag corresponding to the invention;

[0063] FIG. **7** is a schematic perspective drawing of the packaging bag corresponding to the invention open on one side of the envelope;

[0064] FIG. **8** is a schematic perspective drawing of the packaging bag corresponding to the invention completely closed;

[0065] FIGS. **9***a* and **9***b* are schematic drawings of an embodiment of the invention with a rectangular base element and the corresponding hose;

[0066] FIGS. **10***a* to **10***d* are schematic drawings of configurations of the joint for forming the hose corresponding to embodiments of the invention;

[0067] FIGS. **11***a* and **11***b* are perspective schematic drawings describing the formation of the joint for closing the opening of the hose corresponding to embodiments of the invention;

[0068] FIGS. **12***a* and **12***b* are top-down views of configurations for closing the opening of the hose corresponding to embodiments of the invention;

[0069] FIG. **13** shows a perforation machine;

[0070] FIG. **14** shows the discharge process for perforating; and

[0071] FIG. **15** shows the perforation process.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0072] FIGS. **2***a* and **2***b* depict two embodiments of the packaging bags corresponding to the invention. The bags comprise a perforated polymer film with a plurality of perforation holes **11** over the entire surface of the bag. The enclosing element **12** in FIG. **2***a* is opaque, thus, the goods **3** inside the bag are only visible through the perforation holes **11**. In the embodiment shown in FIG. **2***b* the enclosing element **12** is fully transparent and therefore the goods **3** are visible through both the polymer film of the enclosing element **12** and the perforation holes **11**. In this embodiment the main function of the holes **11** is allowing the air circulation and thermal ventilation. These bags have one opening that is closed with a clip **6**.

[0073] The form of the bag may as well be more complex as shown in FIG. **3** and may have structure **14**, **15**, **16** contributing to the form of the bag as well in the filled state. These means may be stiffener elements, folds, reinforcing elements. The bag may keep its shape even under external forces. The form stability may be as well achieved by using materials and stabilizing elements being elastic such that the bag returns back in the original form, after external forces like carrying or piling are removed. In the embodiment shown in FIG. **3** the bag has perforation holes **11**, an opaque enclosing element **12** and a handle **10** in form of an opening in the enclosing element. This handle may have any form. One example would be at least one hole with the function of a hanger to hang the bag to a hook. Embodiment in FIG. **3** has a cubic base form, however embodiment in FIG. **3** may be folded along the fold **15** and therefore may be flat in the folded state.

[0074] Additionally the perforation holes **11** may cover only parts of the bag. The form of the perforated areas can be freely selected such as forming company or product logos. In the same manner the non-perforated areas may have specific forms to represent for example company or product logos. As well the non-perforated areas are positively impacting the stability of the bags and thus offer another parameter to provide an optimized bag. In a preferred embodiment shown in FIG. **4***a* the partially perforated film area **17** and the non-perforated area **18** form stripes. The pattern of the holes on the film may be regular or the holes may be randomly distributed. In a preferred embodiment the perforation holes are forming lines of holes along the long axis and rows along the short axis of the film, but in each consecutive row the holes are displaced along the short axis by half a period. In FIG. **4***c* the base pattern of the perforated areas are triangles **19**.

[0075] The bags have preferably drop-shaped openings of the perforation holes **11** as schematically shown in FIG. **2** to FIG. **4** of a size for which the round portion of the drop has a diameter of approximately 0.3 mm to 7 mm. The size and the density of the openings are freely selectable dependent on the packaged good requirements. In cases where only the ventilation is a relevant feature of the bag, smaller holes might be used, but in case that it is of major importance that the goods can be seen inside the package larger holes or a high density of holes may be more appropriate.

[0076] FIG. **5***a* to FIG. **5***c* show embodiments of the bag corresponding to the invention with information provided on the bag. The perspective shown is a frontal view on a bag, comprising an enclosing element **12**, two areas with perforation holes in from of a stripe **17** and one area without perforation holes in from of a stripe **18**, wherein an information **20** is positioned on the non-perforated area **18**. In FIG. **5***a* this information **20** is an image, in FIG. **5***b* it is a text, and in FIG. **5***c* the information **20** is image and text and in this embodiment the information is displayed on the perforated areas **17**. Every combination is possible for the positioning of the information **20** and it may as well reach over different type of areas.

[0077] In another embodiment the bag comprises two sides and one side is perforated and the second side non-perforated with our without printing. This has he advantage that in case such a product is lying in a shop, the customer may see all the information on the front side, while the ventilation is ensured through the perforation holes on the backside.

[0078] FIG. **6** shows another schematic drawing of a bag corresponding to the invention. The bag is provided with at least one enclosing element **12** in this case with two enclosing elements **12***a* and **12***b*. The two enclosing elements are joined with intersections or two joints **21** and **22** along the length of the bag and closed on the lower end with another intersection or joint **23**. With this joint **23** and the enclosing elements **12***a* and **12***b* an envelope **24** is formed defining an inner chamber **25** and having an opening **26** on the top of the envelope. At least a part of an enclosing element **12***b* is perforated with a plurality of perforation holes **11**. The perforation holes may be on the front-side and/or on the back-side of the bag. It notes that the joint **23** does not necessarily be on the edges of the enclosing elements and therefore some of the polymer film may be external material **27** of the enclosing elements. Depending on the formation of the joint **23** this material **27** may be located insight the inner chamber **25**.

[0079] FIG. **7** shows another embodiment of the packaging bag. This bag comprises one enclosing element **12** with a substantially rectangular film as base element **36** as it is shown in FIG. **9***a*. This rectangular film is closed with an intersection or joint **28** along the length L of the envelope by joining the edges of the film **28***a* and **28***b* as well shown in FIG. **9***a*. With this joint **28** a tubular construction or hose **37** is formed as shown in FIG. **9***b* with four areas **30**, **31**, **32**, and **33** of the enclosing element. In a specific embodiment there are two perforation-areas **31**, **33** with perforation holes **11** and two non-perforation-areas **30**, **32** without perforation holes that are positioned opposite to each other by separating the perforated areas by non-perforated areas. Thus, perforation-areas **31**, **33** are adjacent to two non-perforation areas **30**, **32** and vise versa. In this specific embodiment the two areas **30***a* and **30***b* in FIG. **9***a* are joint to become the area **30**. By closing the hose **37** along the width W of the envelope on the edge **34** with an intersection or joint **34**, an inner chamber **25** is defined. In this embodiment the bag has one filling opening **25** on top of the envelope.

[0080] Since FIG. **7** shows only one embodiment of the invention, the perforation holes may as well be positioned on the front-side area **30** and/or the back-side area **32**. Any combination of perforation holes on the four areas **30**, **31**, **32**, **33** are further embodiments of the invention.

[0081] In another embodiment this opening on top of the envelop is closed with another intersection or joint **35** as shown in FIG. **8**.

[0082] In an embodiment of a bag with one opening **25** goods may be entered, but it is as well possible to directly form the bag around the goods during the packaging of the goods. It may be as well beneficial to sell the bags in a completely closed state and then open it before usage.

[0083] As shown in FIG. **10***a* the joint **28** may be inside the areas **30***a* and **30***b*, then the joint may have different configurations. Three embodiments are shown in FIG. **10***b* to FIG. **10***c*. The two areas **38** and **39** not being part of the envelope may be located inside the inner chamber **25** as depicted in FIG. **10***b*, in the external periphery **40** as it defined by being outside the inner chamber **25** as depicted in FIG. **10***c*. It is as well possible that one area **38** is inside the inner chamber **25** and the second area **39** being in the external periphery **40** as shown in FIG. **10***d*.

[0084] A preferred configuration for closing the openings in the hose **37** along the joint **34** is shown in FIG. **11***a* and **11***b*. In this embodiment formation of the joint may be explained by moving a central part **41** of the two perforated areas **31**,**33** of the hose **37** in the direction to each other. Then a fold **42** is formed. With this fold the rims **43**, **44**, **45**, and **46** are laying one besides the other the two rims **44** and **45** of the perforation-areas being the two inner layers. Joining these layers for example with welding or thermal binding leads to the joint **34** and **35**.

[0085] Such an embodiment may have the advantage that the perforation-areas are not exposed to the periphery, when the bag is folded and therefore the interior of the bag is better protected against dirt from outside as long as the bag is stored in the folded status.

[0086] The resulting top-down view on this fold for the joint **35** is shown in FIGS. **12***a* and **12***b* for two different embodiments. The joint **34** may be formed in the same way. The joint **35** may be separated in different subsections **47**, **48**. In at least two of the subsections **47**, **48** the layers **43**, **44**, **45** and **46** are arranged as described above. In these sub sections **47**, **48** the layers are preferably fixed to each other forming the joint **35**. Between the two sections **47** and **48**, the areas **30** and **32** may be not fixed to the other layer forming an opening **49** from the inner chamber **25** to the external periphery **40**. This is shown in FIG. **12***a*. In another embodiment the areas **30** and **32** are partially fixed to each other. Therefore the width of opening may differ. The opening may have advantages that during the folding process air may exit through this opening or it may be even used as opening for pulling the layers **30** and **32** apart. FIG. **12***b* shows an embodiment where the two layers **32** and **30** are completely closed through an intersection or joint **50** being part of the joint **35**.

[0087] The rectangular base elements is preferably cut out off of rolls of an extended length and a width between 0.2 m and 1.2 m.

[0088] In a preferred embodiment the perforation process is applied to the polymer film as shown in FIG. **13**. A non-perforated film **51** forming a roll is passed with the use of an axial system through a perforation machine **52**. In this specific case an electrical discharge perforation machine is shown, but as well other methods like laser perforation, stamping perforation or hot needle/nail perforation could be conducted. After the perforation the perforated film **53** can again be provided in form of a roll. However it would be possible to have the bag forming or even the packaging machine directly attached to the perforation machine. In a packaging machine a preprinted and ready to use polymer film could be used.

[0089] The discharge perforation process is depicted in FIG. **14***a* and FIG. **14***b*. By applying a high voltage between sharp nails of a transmitter **54***a* and the nails of a receptor **54***b* a voltaic arc is generated. Is a polymer film **51** located between the transmitter and receiver nails, a hole is formed in the polymer film between the opponent nails. The perforation may be conducted by creation of multiple simultaneous electrical discharges. The size of the holes depends upon the applied voltage. By variation of the number of nails and their distribution over the width of the film, the local density of the holes and their total number can be determined. In FIG. **14***b* the nails **54** are equally distributed while in FIG. **14** *a* only some areas of the film become perforated.

[0090] Not only one row of nails **54** can be used in such a perforation machine **52**, but as well several rows. This is shown in FIGS. **15***a* and **15***b*. The nails **54** are located on rods **55**. The number of rods **55** may be freely chosen. The rods are located above and below the path for the polymer film **51**—only one side is shown in FIGS. **15***a* and **15***b* the film. The rods may be positioned vertically to the long axis of the polymer film **4**. The number of nails **54** and their distribution is not fixed, therefore as shown in FIG. **15***a* partially perforated stripes **17** and non-perforated stripes **18** or as shown in FIG. **15***b* fully perforated films **53** may be obtained. FIG. **15***c* as a Detail A of FIG. **15***b* shows that the location of the nails **54** on one rod relative to the location on the second rod determines the final pattern for example by the distance **55** of the rods and the horizontal distance **56** of the nails.

[0091] In another embodiment the numbers of nails per rod are the same, but by individually addressing the nails the positioning of the holes can be controlled. The drop-shape of the holes is a result of the movement of the polymer film during the perforation process. In cases where the film transport is stopped during perforation, the holes become symmetric to have a circular, oval or more rectangular shape.

1-13. (canceled)

14. A packaging bag comprising an envelope having a length, width and a plurality of perforation holes, said envelope comprising:

at least one enclosing element made of a polymer film having at least one layer, said at least one enclosing element comprising:

at least one width joint;

at least two perforation-areas having said plurality of perforation holes, each of the perforation-areas forming a first straight band; and

at least two non-perforation-areas without perforation holes, each of the non-perforation-areas forming a second straight band;

at least one length joint located on one of said at least one non-perforation-areas;

said at least two perforation-areas and said at least two non-perforation-areas being joined at said at least one length joint to form a hose base element, said hose base element having at least one opening and an inner chamber;

wherein each perforation-area is adjacent to two non-perforation-areas and each non-perforation-area is adjacent to two perforation-areas;

said envelope having a closed position wherein one of said at least one opening of said hose base element is closed

by said at least one width joint forming at least four layers at a first and second section of said at least one enclosing element, said four layers comprising two inner layers and two outer layers; and

wherein said two inner layers of said at least one width joint comprise at least a portion of a first perforation-area of said first section and at least a portion of a second perforation-area of said second section.

15. The packaging bag according to claim **14** wherein said at least one enclosing element is one enclosing element.

16. The packaging bag according to claim **14** wherein said at least one enclosing element comprises a substantially rectangular film as said hose base element.

17. The packaging bag according to claim **14** wherein each of said plurality of perforation holes have a circular, oval, rectangular with rounded corners or drop-shaped form.

18. The packaging bag according to claim **14** wherein said at least one enclosing element is opaque, partially transparent or transparent.

19. The packaging bag according to claim **14** wherein said at least one enclosing element of said polymer film is selected from the group consisting of at least one layer of polyethylene, low density polyethylene, high density polyethylene, linear low density polyethylene, ethylene vinyl acetate, polyvinylchloride, polyamide or co-polymers of said polymers and combinations of said polymers or co-polymers.

20. The packaging bag according to claim **14** wherein said at least one layer of polymer film comprises polymer film materials selected from the group consisting of plasticizer, polycarbonate, iridic and colors.

21. The packaging bag according to claim **14** wherein said plurality of perforations holes form stripes in said polymer film.

22. The packaging bag according to claim **14** wherein said plurality of perforation holes form a geometrical pattern, logos, images, letters or words on said at least one enclosing element.

23. The packaging bag according to claim **14** wherein said layer of said polymer film is printable or inscribable.

24. The packaging bag according to claim **14** wherein an area of said at least one enclosing element comprises a printing.

25. The packaging bag according to claim **14** wherein said at least two perforation-areas reach over the entire length of the envelope and said at least two non-perforation-areas reach over the entire length of the envelope.

26. The packaging bag according to claim **14** further comprising at least one handle or at least one hanger, wherein said at least one handle or said at least one hanger comprises an opening in said at least one enclosing element.

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