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(54) **POUCH COMPRISING A FIBROUS REINFORCEMENT AND USE OF A FIBROUS REINFORCEMENT**

(57) A pouch (10) comprising a first wall (18) and a second wall (19) both made of fibrous material (11) and a second wall (19) made of fibrous material (11), the walls (18, 19) limiting a closed interior (12). The pouch comprises a first seam (21) comprising a first part (18a) of the first wall (18), a first part (19a) of the second wall (19), and fibrous reinforcement (40). The fibrous reinforcement (40), the first part (18a) of the first wall (18) and the first part (19a) of the second wall (19) are joined to each other to form the first seam (21). The pouch (10) comprises a hole (30) penetrating through the first seam (21) such that the hole (30) is arranged between a part of the fibrous reinforcement (40) and the interior (12). Use of a fibrous reinforcement (40) for reinforcing a first seam (21) of the pouch (10).

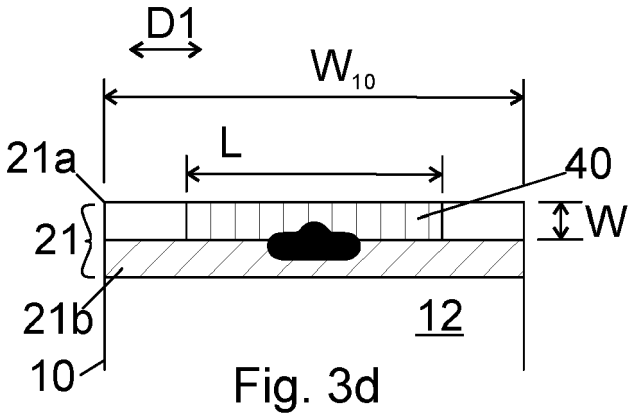

Fig. 3d

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Description

Technical field

[0001] The invention relates to pouches. The invention relates recyclable pouches. The invention relates pouches manufacturable from recyclable material. The invention relates to pouches that can be suspended. The invention relates to reinforced pouches that can be suspended.

Background

[0002] Commercial goods, such as foodstuff, are often sold in pouches. An example of a known pouch is shown in Fig. 8a. Referring to Fig. 8b, such pouches 10 are generally suspended from a hanger 90. Typically, several pouches 10 are suspended from the same hanger 90 in a store. The pouch 10 has a hole 30 for suspending the pouch 10 as shown in Figs. 8a and 8b. When suspended, the hanger 90 penetrates through the hole 30 as shown in Fig. 8b. Such pouches are oftentimes made of plastic material.

[0003] For environmental reasons the plastic material of the pouch 10 should preferably be replaced by a more sustainable material, such as paper. Moreover, the paper material of the pouch should not be too thick, because that would unnecessarily increase material use. When the inventors made paper pouches, they realized that suitably thick paper pouches easily tear near the hole 30. Such tears 92 are shown in Fig. 8c. However, the pouches should withstand normal use without tearing.

[0004] There is therefore a need for a fibre-based pouch that is tear resistant near the suspending hole.

Summary

[0005] The inventors have found that the strength of the pouch can be increased by using a reinforcement strip near the hole. Furthermore, to meet the environmental requirements, also the reinforcement comprises fibrous material, such as paper or cardboard. The invention relates also to a use of a fibrous reinforcement to reinforce a pouch.

[0006] In an embodiment, in order to keep the pouch visually attractive to a customer, the reinforcement is arranged between a first part of a front wall of the pouch and a first part of a rear wall of the pouch. Thus, the reinforcement remains concealed between the walls of the pouch.

[0007] The invention is disclosed in more specific terms in the independent claims. The dependent claims disclose preferable embodiments. The specification and figures disclose these and other embodiments.

Brief description of the drawings

[0008]

Fig. 1a	shows a pouch in a front view,
Fig. 1b	shows the pouch of Fig. 1a in a rear view,
Fig. 1c	shows a cross sectional view Ic-Ic indicated in Fig. 1a of the pouch of Fig. 1a, particularly of a first seam of the pouch, the text IIe/IIf indicating that figures 2e and 2f show examples for a structure of the first seam,
Fig. 1d	shows a cross sectional view Id-Id indicated in Fig. 1a of the pouch of Fig. 1a,
Fig. 1e	shows a cross sectional view Ie-Ie indicated in Fig. 1a of the pouch of Fig. 1a, particularly of a third seam of the pouch,
Fig. 2a	shows a cross section of a non-reinforced seam in more detail,
Figs. 2b-2d	show cross sections of reinforced seams of a pouch of e.g. Figs. 4a and 4b in more detail,
Figs. 2e-2f	show cross sections cross sections of reinforced seams of a pouch of e.g. Figs. 1a and 1b in more detail,
Figs. 3a-3d	show reinforced seams in a front view,
Fig. 4a	shows a pouch in a front view,
Fig. 4b	shows the pouch of Fig. 4a in a rear view,
Fig. 4c	shows a cross sectional view IVc-IVc indicated in Fig. 4a of the pouch of Fig. 4a, particularly of a first seam of the pouch, the text IIb/IIc/IId indicating that figures 2b, 2c, and 2d show examples for a structure of the first seam,
Fig. 5a	shows in a side view unwinding fibrous material from a roll and applying fibrous reinforcement onto the fibrous material,
Fig. 5b	shows in a top view fibrous material to which fibrous reinforcement has been applied as stripes that extend in a cross-direction of the fibrous material, and cutting the fibrous material to form sheets,
Fig. 5c	shows in a top view fibrous material to which fibrous reinforcement has been applied as a stripe that extends in a machine-direction of the fibrous material, and cutting the fibrous material to form sheets,
Fig. 5d	shows in a top view cutting fibrous material to two halves and applying fibrous reinforcement that extends in a cross-direction of the fibrous material, and cutting the halves of the fibrous material to form sheets,
Fig. 5e	shows in a top view cutting fibrous material to two halves and applying fibrous reinforcements that extend in a machine-direction of the fibrous material,
Fig. 5f	shows a pouch having been made such that the fibrous reinforcement extends in a direction that is a cross-direction of the fibrous material of the walls of the pouch,

Fig. 6a shows a first way of folding a sheet to form a pouch,
Fig. 6b shows a primary way of applying heat activatable material onto a sheet before folding the sheet in the first way to form a pouch,
Fig. 6c shows a secondary way of applying heat activatable material onto a sheet before folding the sheet in the first way to form a pouch,
Fig. 6d shows the first way of folding a sheet having two stripes of fibrous reinforcement to form a pouch,
Fig. 7a shows a second way of folding a sheet to form a pouch,
Fig. 7b shows a primary way of applying heat activatable material onto a sheet before folding the sheet in the second way to form a pouch,
Fig. 7c shows a secondary way of applying heat activatable material onto a sheet before folding the sheet in the second way to form a pouch,
Fig. 7d shows the second way of folding a sheet having only a short stripe of fibrous reinforcement to form a pouch,
Fig. 8a shows a pouch that can be suspended,
Fig. 8b shows suspended pouches, and
Fig. 8c shows a broken pouch.

Detailed description

[0009] Figs. 1a to 1e show details of a pouch 10. The pouch comprises a hole 30. As indicated in background, the pouch 10 can be suspended from a hanger 90, whereby the hanger 90 can penetrate through the hole 30. The walls of the pouch 10 are made from fibrous material to improve recyclability.

[0010] The pouch 10 can be made from flexible, sheet-like material by folding and by joining parts of the sheet-like material to form seams (21, 22, 23). Throughout this description, the term "seam" refers to a part of the pouch, wherein two layers of the fibrous material 11 are joined to each other so that at least some adhesive, and optionally other material, such a reinforcement, is arranged in between these two layers of the fibrous material 11. Structural details of different seams will be discussed below.

[0011] At least a first seam 21 of the seams is reinforced, whereby the pouch 10 is not made solely by folding the sheet-like material. If made by folding, a part of the sheet-like material forms a first wall 18 of the pouch 10 and another part of the a part of the sheet-like material forms a second wall 19 of the pouch 10. As an alternative to folding a pouch 10 can be made by joining two separate pieces of sheet-like material, whereby a first piece of the sheet-like material forms the first wall 18 and a second piece of the sheet-like material forms the second wall 19. The first wall 18 and the second wall 19 of the pouch 10 limit an interior 12 of the pouch 10. The interior 12 is closed. In other words, the pouch 10 does not comprise holes or apertures through which solid material can pass from the interior 12 to the exterior of the pouch 10.

[0012] The walls 18, 19 are shown in Figs. 1a, 1b, and 1d; and the walls limiting the interior 12 are shown in Fig. 1d. In use, the interior is at last partly filled with the goods stored in the pouch. Examples of goods include foodstuff (pasta, flour, sugar, granola, oatmeal), candy, and ironware (nails, screws, bolts). Depending on the goods, the properties of the walls 18, 19 may be engineered according to needs. Such properties include reduced or increased gas permeation, improved fat and oil resistance, as wells as improved water tightness. To increase water tightness and/or reduce gas permeation and/or improve fat and oil resistance, various films can by used as known in the art. Such films can be applied on the inner surface of the walls 18, 19. The films, if needed, can be applied e.g. before sheets 80 for forming the pouch have been cut. The films, if needed, can be applied e.g. before applying adhesive, e.g. heat activatable material 43, onto the sheet 80. Further details of manufacturing the pouch 10 will be given below.

[0013] As an alternative to solid films, it is possible to increase water tightness and/or reduce gas permeation and/or improve fat and oil resistance by using a dispersion coating, which, upon drying, forms a barrier of the fibrous material 11. Applying the barrier in the form of a dispersion coating is much easier than using separate solid films. The term "dispersion coating" is used herein even if the material used for the dispersion coating may impregnate into the fibrous material. Most preferably, the dispersion used for applying the barrier is an aqueous dispersion, i.e. a water-based dispersion. The inventors realized that, unlike typical solid films, the dispersion coating does not strengthen the fibrous material, whereby a reinforcement is needed particularly when the barrier is applied in the form of a dispersion. Therefore, when a paper to which the dispersion coating has been applied is used as the fibrous material 11, the reinforcement becomes necessary, and the inventors have found how the fibrous reinforcement 40 can be used for the purpose. This applies also when a paper to which the dispersion coating has been applied and to which a solid film (e.g. polymer film) has not been applied is used as the fibrous material 11. The dispersion coating of the fibrous material 11 in such a case preferably faces the interior 12 of the pouch. In addition, the dispersion coating or another dispersion coating may contain heat activatable material 43 as detailed below.

[0014] The figures 1a to 1e and 4a to 4c show embodiments, wherein the first wall 18 is a front wall and the second wall 19 is a rear wall. Typically, at least a front wall of a pouch does not comprise a seam in the middle of the front wall. This is shown in Figs. 1a and 4a. A rear wall may comprise a seam in the middle of the rear wall as shown in Fig. 1b, but need not comprise a seam in

the middle, as shown in Fig. 4b. The first wall 18 discussed in this description can be considered either as a front wall or a rear wall, and the second wall 19 in this description can be considered, respectively, either as a rear wall or a front wall.

[0015] For environmental reasons, the material of the pouch 10 is selected from sustainable materials. Thus, the sheet-like material, from which the walls 18, 19 of the pouch 10 are made, is fibrous. Preferably the sheet-like material comprises cellulose fibres. An example of such a material is paper.

[0016] In line with this, the pouch 10 comprises a first wall 18 made of fibrous material 11 and a second wall 19 made of fibrous material 11. Preferably, the second wall 19 and the first wall 18 are made of the same fibrous material 11. The first wall 18 and the second wall 19 limit the interior 12 of the pouch 10.

[0017] The pouch 10 comprises at least a first seam 21, which closes the interior 12. The pouch 10 comprises a hole 30 penetrating through the first seam 21. However, the interior 12 of the pouch 10 is closed. Therefore, the hole 30 does not penetrate to the interior 12 of the pouch 10. Thus, the hole 30 penetrates through only the first seam 21. Therefore, a part of the first seam 21 is arranged between the hole 30 and the interior 12. The first seam 21 comprises a first part 18a of the first wall 18 and a first part 19a of the second wall 19.

[0018] In order to reinforce the first seam 21, through which the hole 30 penetrates, the first seam 21 comprises reinforcement. For environmental reasons, the reinforcement is a fibrous reinforcement 40. For these reasons, the first seam 21 comprises fibrous reinforcement 40. The fibrous reinforcement 40, the first part 18a of the first wall 18 and the first part 19a of the second wall 19 are joined to each other to form the first seam 21. The fibrous reinforcement 40, first part 18a of the first wall 18 and the first part 19a of the second wall 19 are joined to each particularly in a direction of thickness of the first seam 21. They are joined to each other using suitable adhesive or adhesives, including a heat activatable material 43 and a pressure sensitive adhesive 44. Thus, the first seam 21 closes the interior 12.

[0019] To keep the pouch 10 visually attractive even if the fibrous reinforcement 40 is applied, preferably, the fibrous reinforcement 40 is arranged between the walls 18, 19 so that the reinforcement remains concealed between the walls 18, 19. In particular, the fibrous reinforcement 40 is preferably arranged between the first part 18a of the first wall 18 and the first part 19a of the second wall 19. Reference is made to Figs. 1c and 4c. However, the fibrous reinforcement 40 need not be arranged between the walls 18, 19, instead, in the first seam 21, e.g. the first part 18a of the first wall 18 may be arranged between the first part 19a of the second wall 19 and the fibrous reinforcement 40 (not shown).

[0020] For these reasons, in an embodiment, the first seam 21 comprises fibrous reinforcement 40 arranged between the first part 18a of the first wall 18 and the first part 19a of the second wall 19. The fibrous reinforcement 40 is joined to the first part 18a of the first wall 18 and to the first part 19a of the second wall 19. Thus, the first seam 21 closes the interior 12.

[0021] Figs. 1c and 4c shows the fibrous reinforcement 40 of the first seam 21 in more detail. Fig. 1c is a cross-section of the first seam 21, the cross-section being indicated in Fig. 1a. As shown in Fig. 1c, the first part 18a of the first wall 18 is made of the fibrous material 11 and the first part 19a of the second wall 19 is made of the fibrous material 11. Fig. 1c also shows a thickness T of the fibrous reinforcement 40. Fig. 1c also shows a part of a second seam 22, which is better shown in Fig. 1b. The second seam 22 of Figs. 1b to 1e is a result of a particular type of folding a sheet 80 to form the pouch 10. However, as detailed above, a pouch can be made by other means, too. Thus, the pouch need not comprise a second seam 22 in a central part of the rear side (see Figs. 4a to 4c).

[0022] Even if not shown in Fig. 1c or 4c, some adhesive, e.g. heat activated material 42 and/or pressure sensitive adhesive 44, is provided (a) between the first part 18a of the first wall 18 and the fibrous reinforcement 40 and (b) between the first part 19a of the second wall 19 and the fibrous reinforcement 40. Examples of even more detailed structures of the first seam 21 of the pouch 10 of Figs. 1a to 1e are shown in Figs. 2e and 2f is indicated by the text IIe/IIf in Fig. 1c. Examples of even more detailed structures of the first seam 21 of the pouch 10 of Figs. 4a to 4c are shown in Figs. 2b, 2c, and 2d is indicated by the text IIb/IIc//IId in Fig. 4c. This applies, when the fibrous reinforcement 40 is arranged between the walls 18, 19.

[0023] When the fibrous reinforcement 40 is not arranged between the walls 18, 19, some adhesive, e.g. heat activated material 42, is arranged between the first part 18a of the first wall 18 and the first part 19a of the second wall 19 to join these parts 18a, 19a directly to each other (not shown). Moreover, some adhesive, e.g. heat activated material 42 and/or pressure sensitive adhesive 44, is provided so that the fibrous reinforcement 40 is directly joined to only one of the first part 18a of the first wall 18 and the first part 19a of the second wall 19; i.e. the fibrous reinforcement 40 remains as an outermost layer of the first seam 21. Thus, in an embodiment, the fibrous reinforcement 40 is joined to at least one of the first part 18a of the first wall 18 and the first part 19a of the second wall 19. At least one of a heat activated material 42 and a pressure sensitive adhesive 44 as a glue also in this case.

[0024] In the pouch 10 the hole 30 is arranged between a part of the fibrous reinforcement 40 and the interior 12. More specifically, the hole 30 is arranged between the part of the fibrous reinforcement 40 and the interior 12 of the pouch 10 in a second direction D2 of the pouch 10, the second direction being directed from a bottom edge E2 of the pouch 10 to a top edge E1 of the pouch 10. Alternative definitions for the second direction D2 will

follow. In particular, the whole hole 30 is arranged between a part of the fibrous reinforcement 40 and the interior 12 in this direction. When the hole 30 is such arranged, the part of the fibrous reinforcement 40 is arranged between the hole 30 and a top edge E1 of the pouch. Thus, the fibrous reinforcement 40 reinforces particularly the part of the pouch 10 that remains between the hole 10 and the a top edge E1. Thus, the fibrous reinforcement 40 level out stress concentration that otherwise could be imposed at sides of the hole 30. The sides of the hole 30 refers to the sides which, without the reinforcement 40, tend to break, as indicated by the tears 92 in Fig. 8c. In this way, the fibrous reinforcement 40 strengthens the pouch 10 particularly near the hole 30 and against tearing; the tearing being indicated in Fig. 8c.

[0025] Figures 3a to 3d show four examples how the 10 the hole 30 can be arranged between a part of the fibrous reinforcement 40 and the interior 12. In Fig. 3a, the first seam 21 is equally wide and equally long as the fibrous reinforcement 40. A width of the fibrous reinforcement 40 is shown by the symbol W. Thus, the whole first seam 21 has the general structure indicated in Fig. 1c. Further details of such a structure have been shown in Figs. 2b to 2f and will be discussed in more detail below. As shown in Fig. 3a, in an embodiment a part of the fibrous reinforcement 40 is arranged between the hole 30 and the interior 12. However, this does not apply in the embodiment of Fig. 3b.

[0026] In Fig. 3b, only an upper part 21a of the first seam 21 is provided with the fibrous reinforcement 40. Accordingly, a lower part 21b of the first seam 21 is not provided with the fibrous reinforcement 40. Thus, in the lower part 21b, the walls 18, 19 of the pouch 10 are joined to each other without there being fibrous reinforcement 40 in between. Thus, in Fig. 3b, a width W of the fibrous reinforcement 40 is less than a width of the first seam 21 (the widths defined in the second direction D2). However, in Fig. 3b, the first seam 21 is equally long as the fibrous reinforcement 40 (the lengths defined in the first direction D1).

[0027] In line with this, the upper part 21a of the first seam has the general structure indicated in Fig. 1c. Details of such a structure have been shown in Figs. 2b to 2f. However, the lower part 21b of the first seam 21 has the general structure indicated in Fig. 2a. In Figs. 2a to 2f, the reference numeral 42 indicates a first type of adhesive, e.g. heat activated material. In Figs. 2b to 2f, the reference numeral 44 indicates a second type of adhesive, e.g. pressure sensitive adhesive.

[0028] In Figs. 3a and 3b a length L of the fibrous reinforcement 40 equals a width W_{10} of the pouch 10 (both defined in the first direction D1). Moreover, because the interior 12 is closed, the width W_{10} of the pouch 10 equals the length of the first seam 21. However, the whole hole 30 can arranged between a part of the fibrous reinforcement 40 and the interior 12 even if the fibrous reinforcement 40 is somewhat shorter. Such embodiments are shown in Figs. 3c and 3d.

[0029] In Fig. 3c, the first seam 21 is equally wide as the fibrous reinforcement 40. However, the length L of the fibrous reinforcement 40 is less than the width W_{10} of the pouch 10.

[0030] In Fig. 3d, the first seam 21 is wider than the fibrous reinforcement 40. Moreover, the length L of the fibrous reinforcement 40 is less than the width W_{10} of the pouch 10. In Fig. 3d, only an upper part 21a of the first seam 21 is provided with the fibrous reinforcement 40. Accordingly, a lower part 21b of the first seam 21 is not provided with the fibrous reinforcement 40

[0031] Preferably, the fibrous reinforcement 40 comprises cellulose fibres and the fibrous material 11 comprises cellulose fibres. More preferably, the fibrous reinforcement 40 comprises paper comprising cellulose or cardboard comprising cellulose. Preferably, the first wall 18 and the second wall 19 comprise the same fibrous material 11. Preferably, the fibrous material 11 comprises cellulose fibres. Preferably, the fibrous material 11 comprises paper comprising cellulose.

[0032] A purpose of the fibrous reinforcement 40 is to reinforce the first seam 21. Therefore, in a preferable embodiment, an area density of the fibrous reinforcement 40 is not less than a grammage of the fibrous material 11. More preferably, the area density of the fibrous reinforcement 40 is more than a grammage of the fibrous material 11.

[0033] In this description, the term grammage of the fibrous material 11 refers to the surface-specific density of the fibrous material 11 (i.e. the material of the walls of the pouch 10), given in units of mass per area, most typically in units of grams per square metre (g/m^2). The fibrous material 11 is, in general, sheet-like and has a substantially even thickness, whereby the definition is sensible for this material. Moreover, the term grammage is commonly used in the field of paper industry. During manufacturing process, the fibrous material 11 may be covered e.g. with heat activatable material 43, and the heat activatable material may be transformed to a heat activated material 42. The term grammage refers to the surface-specific density before the application of further material, such as the heat activatable material 43.

[0034] In this description, the term area density of the fibrous reinforcement 40 refers to the total surface-specific density of the material of the fibrous reinforcement 40 arranged in the first seam 21. Preferably the fibrous reinforcement 40 is arranged between the first part 18a of the first wall 18 and the first part 19a of the second wall 19, whereby the term area density of the fibrous reinforcement 40 refers to the total surface-specific density of the material of the fibrous reinforcement 40 arranged between the first part 18a of the first wall 18 and the first part 19a of the second wall 19. The area relative to which the surface-specific density is calculated refers to an area of a cross section of the first seam 21 on a plane defined by the first and the second directions D1, D2 (such a cross section shown e.g. in Figs. 3a to 3d) and only to such parts of the cross-section that comprise the material

of the fibrous reinforcement 40.

[0035] Referring to Figs. 2b to 2d, the fibrous reinforcement 40 may be provided as only one layer of material. In such a case, the area density of the fibrous reinforcement 40 refers to the surface-specific density of the sole layer of the material of the fibrous reinforcement 40. Such a first seam 21 is obtainable e.g. by folding a sheet 80 as depicted in Figs. 6a to 6c or 7d. However, referring to Figs. 2e and 2f, the fibrous reinforcement 40 may be provided as two layers of material. In such a case, the area density of the fibrous reinforcement 40 refers to the total surface-specific density of the two layers of material of the fibrous reinforcement 40. Such a first seam 21 is obtainable e.g. by folding a sheet 80 as depicted in Figs. 7a to 7c or 6d.

[0036] Preferably, the fibrous reinforcement 40 is arranged as only one layer of material. This reduces the need for using adhesive to attach the layers together. Examples of ways of forming a first seam 21 having the fibrous reinforcement 40 arranged as one layer only include those shown in Figs. 6a and 7d.

[0037] As for the area density of fibrous reinforcement 40 and its relation to a grammage of the paper-like or cardboard-like material used as the fibrous reinforcement 40, in the embodiments of Figs. 2b to 2d, the area density of the fibrous reinforcement 40 equals a grammage of the material of the sole fibrous reinforcement layer. However, in the embodiments of Figs. 2e and 2f, the area density of the fibrous reinforcement 40 is the sum of the grammages of the materials of both the layers of the fibrous reinforcement 40.

[0038] In order to have sufficient reinforcing properties, preferably, an area density of the fibrous reinforcement 40 is at least 80 g/m^2, more preferably at least 90 g/m^2. Herein the area density refers to the fibrous reinforcement 40 as such. In practice, the fibrous reinforcement 40 may be applied in the form of an adhesive tape, which further comprises adhesive. Naturally, the adhesive increases the mass. The aforementioned area density refers to the area density of the fibrous reinforcement 40 without the adhesive used for adhering the fibrous reinforcement 40.

[0039] To save material, the area density should not be too excessive. Thus, preferably, an area density of the fibrous reinforcement 40 is at most 350 g/m^2, more preferably at most 200 g/m^2 and most preferably at most 150 g/m^2. As above, area density refers to the area density of the fibrous reinforcement 40 without the adhesive used for adhering the fibrous reinforcement 40. Suitable ranges for the area density of the fibrous reinforcement 40 therefore include the ranges 80 g/m^2- 350 g/m^2 and 90 g/m^2- 200 g/m^2. Most preferably, an area density of the fibrous reinforcement 40 is 90 g/m^2 - 150 g/m^2.

[0040] In addition to the area density, a width W of the fibrous reinforcement 40 affects the degree of strengthening. The width W of the fibrous reinforcement 40 is depicted in Figs. 3a to 3d. Preferably, the width W of the fibrous reinforcement 40 is 2 mm to 10 mm. The width W is measured in the second direction D2 defined elsewhere in this specification. The width W is thus measured in a direction that is perpendicular to the first direction D1 shown in Figs. 3a to 3d and perpendicular to a direction of the thickness T of the fibrous reinforcement 40. Also the first direction D1 is defined elsewhere in this specification.

[0041] Furthermore, a length L of the fibrous reinforcement 40 affects the degree of strengthening. The length L of the fibrous reinforcement 40 is depicted in Figs. 3a to 3d. As shown therein, the length L of the fibrous reinforcement 40 is directed in the same direction as a width W_{10} of the pouch 10. As shown in Figs. 3a to 3d, preferably a length L of the fibrous reinforcement 40 is greater than a length of the hole 30, wherein the length of the hole is measured in the same direction as the length L of the fibrous reinforcement 40. Thus, the length of the hole remains between the sides S1, S2 of the hole. Moreover, preferably, the fibrous reinforcement 40 extends in the same direction as a width W_{10} of the pouch 10 beyond both sides S1, S2 of the hole 30, as shown in Figs. 3c and 3d as well as in Figs. 3a and 3b. The sides S1, S2 of the hole are shown in Figs. 8c and 3a only even if the pouch 10 of other figures has the hole and the sides thereof.

[0042] However, for manufacturing reasons, preferably, the length L of the fibrous reinforcement 40 equals the width W_{10} of the pouch 10, wherein the width W_{10} of the pouch 10 is measured in the same direction as the length L of the fibrous reinforcement 40.

[0043] Therefore, in an embodiment, the first seam 21 extends in a first direction D1 throughout a whole width W_{10} of the pouch 10 and the fibrous reinforcement 40 extends in the first direction D1 beyond both sides of the hole 30, as shown in Figs. 3a to 3d. Moreover, the fibrous reinforcement 40 extends between the first part 18a of the first wall 18 and the first part 19a of the second wall 19 as shown in Figs. 1c and 4c. Preferably, the first seam 21 extends in a first direction D1 throughout a whole width W_{10} of the pouch 10 and the fibrous reinforcement 40 extends in the first direction D1 throughout the whole width W_{10} of the pouch 10, as shown in Figs. 3a and 3b.

[0044] As for the fibrous material 11 of the walls 18, 19 of the pouch 10, in an embodiment a grammage of the fibrous material 11 is at least 40 g/m^2, preferably at least 70 g/m^2. It has been found that such a grammage provides sufficient strength for the pouch 10 as such. Moreover, preferably, a grammage of the fibrous material 11 is at most 160 g/m^2, more preferably at most 90 g/m^2. Such grammage ensures only minor use of raw materials, yet provides for sufficient strength. Suitable ranges for the grammage of the fibrous material 11 therefore include the ranges 40 g/m^2- 160 g/m^2 and 70 g/m^2- 90 g/m^2.

[0045] As for manufacturing the pouch 10, the pouch 10 is preferably manufactured from a sheet 80 by folding. After folding, parts of the walls 18, 19, which themselves are formed by parts of the sheet 80, are joined to each

other to form the seams 21, 22, 23 and to close the pouch 10 to form the closed interior. Naturally, the goods to be stored in the interior 12 are supplied to the interior 12 before closing all the seams 21, 22, 23.

[0046] Figure 6a shows one way of folding the sheet 80 to form the pouch 10. As depicted in Fig. 6a, a strip of fibrous reinforcement 40 has been applied onto one side of the sheet 80. Fig. 6a also shows the first part 18a of the first wall 18 and the first part 19a of the second wall 19 before folding the sheet 80 to form the pouch 10 having the walls 18, 19. The sheet 80 is folded about the line L shown by a dot-line. As a result, a pouch shown in Figs. 4a and 4b is obtained. Naturally, the further seams 22, 23 of Figs. 4a and 4b should also be made, and can be made e.g. by gluing, such as hot-pressing. As shown in Fig. 6a and discussed above, after folding the sheet 80, the strip of fibrous reinforcement 40 becomes arranged between the first part 18a of the first wall 18 and the first part 19a of the second wall 19. In Fig. 6a, the fibrous reinforcement 40 is provided only on the first part 18a of the first wall 18. Correspondingly, no reinforcement is provided on the first part 19a of the second wall 19. Thus, after folding, only one layer of fibrous reinforcement 40 is arranged between the first part 18a of the first wall 18 and the first part 19a of the second wall 19. This results in a first seam 21 have e.g. a structure indicated in one of the Figs. 2b to 2d. When only one of the walls is provided with the fibrous reinforcement 40, the walls 18,19 can be named so that the fibrous reinforcement 40 is provided only on the first part 18a of the first wall 18

[0047] As shown in Fig. 6d, another fibrous reinforcement 40 could be provided on the first part 19a of the second wall 19. In such a case, after folding, two layers of fibrous reinforcement 40 would arranged between the first part 18a of the first wall 18 and the first part 19a of the second wall 19. This would result e.g. in the structure shown in Fig. 2e or 2f.

[0048] Figure 7a shows another way of folding the sheet 80 to form the pouch 10. As depicted in Fig. 7a, a strip of fibrous reinforcement 40, 40a, 40b has been applied onto one side of the sheet 80. Fig. 7a also shows the first part 18a of the first wall 18 and the first part 19a of the second wall 19. As shown in Fig. 7a, the first part 19a of the second wall 19 comprises two separate regions. The sheet 80 is folded about the lines L shown by a dot-lines. As a result, a pouch shown in Figs. 1a to 1e could be obtained. Naturally, the further seams 22, 23 of Figs. 1a to 1e should also be made e.g. by gluing. As shown in Fig. 7a and discussed above, after folding the sheet 80, the strip of fibrous reinforcement 40 is arrange between the first part 18a of the first wall 18 and the first part 19a of the second wall 19. However, as readable from Fig. 7a, the strip of fibrous reinforcement 40 would be folded onto itself, whereby, after folding, two layers of fibrous reinforcement 40 is arranged between the first part 18a of the first wall 18 and the first part 19a of the second wall 19. This results e.g. in the structure shown in Fig. 2e or 2f. In particular, a first region of a first part 40a of the fibrous reinforcement 40 would be folded on a part of a second part 40b of the fibrous reinforcement 40. Moreover, a second region of a first part 40a of the fibrous reinforcement 40 would be folded on a part of a second part 40b of the fibrous reinforcement 40.

[0049] As shown in Fig. 7d, it is possible to use a shorter stripe of fibrous reinforcement 40 when folding the sheet 80 in this way. For example, as shown in Fig. 7d, neither one of the regions of the first part 19a of the second wall 19 need not be provided with the fibrous reinforcement 40, if the fibrous reinforcement 40 would be provided on the first part 18a of the first wall 18. Then, after folding, the first seam 21 would have the general structure shown in Figs. 2b to 2d.

[0050] There are multiple ways of joining the different material layers to each other. Preferably, the fibrous reinforcement 40 is attached to fibrous material 11 with at least pressure sensitive adhesive 44. As an example, the fibrous material 11 may be provided in the form of a roll 70 (see Fig. 5a). Then, after unwinding the fibrous material 11 from the roll 70, a stripe or stripes of fibrous reinforcement 40 can be attached to the fibrous material 11 with pressure sensitive adhesive 44, as shown in Fig. 5a. In Figs. 5a to 5d, the one-headed arrow(s) indicate a direction of propagation of the fibrous material 11 in a production line. Fig. 5a shows the application of the fibrous reinforcement 40 to the fibrous material 11 from above, so that the fibrous reinforcement 40 remains above the fibrous material 11. However, in an embodiment (not shown), the fibrous reinforcement 40 is attached to the fibrous material 11 from below, so that the fibrous reinforcement 40 remains below the fibrous material 11. Also in such case, pressure sensitive adhesive may be used to attach the fibrous reinforcement 40 to fibrous material 11 or the heat activatable material 43 covering the downward-facing side of the fibrous material 11.

[0051] A stripe of fibrous reinforcement 40 may be applied in the machine-direction MD of the fibrous material 11, as shown in Fig. 5c. However, preferably, stripes of fibrous reinforcement 40 are be applied in the cross-direction CD of the fibrous material 11, as shown in Fig. 5b. Thereafter, sheets 80 can be formed by cutting the fibrous material along cut lines C shown in Figs. 5b to 5e. Thus, preferably, the fibrous reinforcement 40 is attached to fibrous material 11 with at least pressure sensitive adhesive 44. Such structures of a seam are shown in Figs. 2c to 2f.

[0052] Oftentimes a width of the roll 70 is so large that the width of the roll 70 corresponds to a suitable width of more than one sheets 80 for making a pouch 10. For example, the width of the roll 70 may correspond a width of two sheets 80 for making a pouch 10. This is illustrated in Fig. 5d and 5e. Both figures 5d and 5e show a knife 72 that is used to cut the fibrous material 11 received from the roll 70 to two halves. Each of the halves can then be cut along the cut lines C to form the sheets 80 as depicted in Figs. 5d and 5e.

[0053] In this case, to simplify the manufacturing tools, preferably the fibrous reinforcement 40 is applied in the cross-direction CD and before cutting fibrous material 11 received from the roll 70 to two halves by the knife 72, as shown in Fig. 5d. This has the benefit that only one applicator is needed for applying the fibrous reinforcement 40 onto the fibrous material 11 (which may be covered with heat activatable material 43 at the time of applying the fibrous reinforcement 40 as detailed below). In contrast, if the fibrous reinforcement 40 would be applied in the machine-direction MD, as in Fig. 5e, two applicators would be needed, each one applying one stripe of the fibrous reinforcement 40.

[0054] When the fibrous reinforcement 40 is applied in the cross-direction CD of the fibrous material 11 as an adhesive tape comprising the fibrous reinforcement 40, eye marks may be printed onto the fibrous material 11 to determine the location where, in the machine-direction, the tape should be added.

[0055] It has surprisingly been found that when the fibrous reinforcement 40 is applied in the cross-direction CD, the tendency of the pouch 10 tearing near the hole 30 is reduced. This seems to be related to the anisotropic strength properties of the fibrous material 11 as detailed below. Reasons will follow.

[0056] Concerning manufacturing, preferably, a tape comprising the fibrous reinforcement 40 and the pressure sensitive adhesive 44 is used to form the fibrous reinforcement 40 on the fibrous material 11. Thus, such a tape is attached to the fibrous material 11 as depicted in Fig. 5a to provide the fibrous material 11 with the fibrous reinforcement 40. The tape may comprise e.g. 80 g/m^2- 350 g/m^2, preferably 90 g/m^2- 200 g/m^2, and most preferably 90 g/m^2 - 150 g/m^2 of the fibrous reinforcement 40 and on a first side of the fibrous reinforcement 40 pressure sensitive adhesive 44. These values apply at least when the pouch is made by folding the sheet 80 such that the first seam 21 comprises only one layer of the fibrous reinforcement 40. In case the pouch 10 is made such that the first seam 21 comprises two layers of fibrous reinforcement 40, then the tape may comprise half of these values of the fibrous reinforcement 40. Preferably the tape comprises 15 g/m^2 to 50 g/m^2 pressure sensitive adhesive 44 on the first side of the fibrous reinforcement 40. A thin silicone release layer (not shown) may be provided on a second, opposite, side of the fibrous reinforcement 40. If used, such a silicone release layer could be provided on top of the fibrous reinforcement 40 e.g. in the embodiment of Fig. 5a, wherein the pressure sensitive adhesive 44 is arranged underneath the fibrous reinforcement 40. The silicone release layer may help handling of the tape. An area density of the silicone release layer may be e.g. in the range 0.1 g/m^2 to 0.5 g/m^2.

[0057] Figure 6a shows a first way of folding the sheet 80 to form a pouch. However, a pouch 10 has also other seams than the first seam 21 to close the interior 12. Figures 4a and 4b show a second seam 22 and a third seam 23 that are provided at the sides of the pouch 10 after folding the sheet as indicated in Fig. 6a. As indicated in Fig. 6a, the second seam 22 is formed by attaching a second part 22a of the first wall 18 to a second part 22b of the second wall 19. Moreover, as indicated in Fig. 6a, the third seam 23 is formed by attaching a third part 23a of the first wall 18 to a third part 23b of the second wall 19.

[0058] Figure 7a shows a second way of folding the sheet 80 to form a pouch. However, a pouch 10 has also other seams than the first seam 21 to close the interior 12. Figures 1a and 1b show a second seam 22 provided on a rear side of the pouch 10 and a third seam 23 provided at a bottom of the pouch 10. As indicated in Fig. 7a, the third seam 23 is formed by attaching two third parts 23b of the second wall 19 to a third part 23a of the first wall 18. Moreover, as indicated in Fig. 7a, the second seam 22 is formed by attaching a fourth part 24b of the second wall 19 to a fifth part 25b of the second wall 19.

[0059] A structure of the third seam 23 of Fig. 1b is shown in Fig. 1e. However, Fig. 1e does not show the adhesive layer in between the walls 18, 19. A structure showing the adhesive is depicted in Fig. 2a. A structure of the second seam 22 or third seam 23 of Fig. 4a is schematically shown in Fig. 2a. The walls 18, 19 comprising the fibrous material 11 are joined to each other using suitable adhesive; e.g. a heat activated material 42.

[0060] As for the method of joining materials together, particularly joining (i) another side of the fibrous reinforcement 40 to the fibrous material 11 (see Figs. 2b to 2f) or (ii) two walls 18, 19 of fibrous material 11 together (see Fig. 2a), preferably a heat activatable material 43 is used. However, as detailed above, preferably the pressure sensitive adhesive 44 is used to attach one side of the fibrous reinforcement 40 (see Figs. 2c to 2f) to the fibrous material 11 or to a heat activatable material 43 covering the fibrous material 11.

[0061] A heat activatable material 43 is such a material that, by application of heat, becomes activated to form a joint. In this description the reference numeral 43 stands for heat activatable material (before activation) and the reference numeral 42 stands for heat activated material (after activation and formation of the joint). Thus, the heat activatable material 43 transforms to heat activated material 42 by activation, optionally after a certain period of time.

[0062] Heat activatable materials 43 include materials that melt upon heating and solidify upon cooling so that an adhesive joint is made. After solidifying the material has been activated by heat and is, therefore a heat activated material 42. These materials include hot melt adhesives. Such materials are commonly re-activatable by the application of heat. Heat activatable materials 43 further include resin-based materials that harden upon heating. After hardening, the material is a heat activated material 42 and forms a joint. However, after hardening, these types of heat activated materials are typically not re-activatable by heat.

[0063] In order to form the second seam 22 and the

third seam 23, in an embodiment, at least such parts of the sheet 80 that are used to form the seam 22, 23 are covered by heat activatable material 43, as shown in Figs. 6b, 6c, 7b, and 7c.

[0064] Referring first to Figs. 6c and 7c, in an embodiment, the whole sheet 80 is covered by the heat activatable material 43. It is possible to cover all the fibrous material 11 by heat activatable material 43 before applying the fibrous reinforcement 40 onto the sheet 80 (or more precisely onto the heat activatable material 43 that is covering the sheet). The fibrous reinforcement 40 may then be attached to the heat activatable material 43 covering the sheet 80 by the pressure sensitive adhesive 44. The heat activatable material 43 may be applied e.g. even before cutting a wide roll of paper to two halves (see Figs. 5d and 5e). The sheet-like material on the roll 70 may have a heat-activatable coating. Alternatively, it is possible to cover all the fibrous material 11 (and the fibrous reinforcement 80) by heat activatable material 43 after applying the fibrous reinforcement 40 onto the fibrous material 11. The fibrous reinforcement 40 may be attached by the pressure sensitive adhesive 44.

[0065] When the whole sheet 80 is covered by the heat activatable material 43, the heat activatable material 43 (or, if activated, heat activated material 42) may have also the same function as the barrier of the fibrous material 11 discussed above. Thus, from the point of view of reducing or increasing gas permeation, improving fat and oil resistance, and/or improving water tightness of the fibrous material 11, it may be beneficial that the whole sheet 80 is covered by the heat activatable material 43. To clarify, one dispersion coating may serve as both the barrier and the heat activatable material. Or, a first dispersion coating may serve as the barrier of the fibrous material 11 and a second dispersion coating may contain the heat activatable material.

[0066] In the former case (i.e. when the fibrous material 11 is covered by the heat activatable material 43 before the application of the reinforcement 40), and in the embodiment of Fig. 6c, the structure of the resulting first seam 21 would correspond to that of Fig. 2d. Therein the pressure sensitive adhesive 44 connects the fibrous reinforcement 40 to a heat activated material 42 on the first wall 18. Moreover, the heat activated material 42 on the second wall 19 joins the second wall 19 to the fibrous reinforcement 40.

[0067] In the latter case (i.e. when the fibrous material 11 and the fibrous reinforcement joined thereto are covered by the heat activatable material 43), and in the embodiment of Fig. 6c, the structure of the resulting first seam 21 would correspond to that of Fig. 2c. Therein the pressure sensitive adhesive 44 connects the fibrous reinforcement 40 directly to the first wall 18 and a heat activated material 42 on the second wall 19 (and on the fibrous reinforcement 40 itself) joins the second wall 19 to the fibrous reinforcement 40.

[0068] In the former case (i.e. when the fibrous material 11 is covered by the heat activatable material 43 before the application of the reinforcement 40), and in the embodiment of Fig. 7c, the structure of the resulting first seam 21 would correspond to that of Fig. 2f. Therein the pressure sensitive adhesive 44 connects the fibrous reinforcement 40 to a heat activated material 42 on both the first wall 18 and the second wall 19. However, some further adhesive 46 may be needed to attach a first part 40a of the fibrous reinforcement onto a second part 40b of the fibrous reinforcement 40. The first part 40a and the second part(s) 40b of the fibrous reinforcement 40 are shown in Figs. 7a to 7c. For example, a tape having pressure sensitive adhesive on both sides of the fibrous reinforcement 40 could be used, whereby the pressure sensitive adhesive on the other side of the tape would serve for the purposes of the further adhesive 46.

[0069] In the latter case (i.e. when the fibrous material 11 and the fibrous reinforcement joined thereto are covered by the heat activatable material 43), and in the embodiment of Fig. 7c, the structure of the resulting first seam 21 would correspond to that of Fig. 2e. Therein the pressure sensitive adhesive 44 connects the fibrous reinforcement 40 directly to the fibrous material 11 of the first wall 18 and the second wall 19. Moreover, the heat activatable material that has been applied onto a first part 40a of the fibrous reinforcement and onto a second part 40b of the fibrous reinforcement 40, after having been activated to form the heat activated material 42 joins the parts 40a, 40b of the fibrous reinforcement 40 shown as layers in Fig. 2e.

[0070] It is also possible to use heat activatable material 43 as the sole adhesive for joining the fibrous reinforcement 40 to the fibrous material 11. For example, a sheet 80 may be covered (at least on the locations to which the fibrous reinforcement 40 is attached) by heat activatable material 43, and the fibrous reinforcement 40 may be hot-pressed to the heat activatable material 43 to activate the heat activatable material and press and join the materials together. Then the first seam 21 can be completed by hot pressing the other wall, suitably covered with heat activatable material 43, to the fibrous reinforcement 40. A first seam 21 shown in Fig. 2b would be obtained.

[0071] In line with what has been said above, in an embodiment, the fibrous reinforcement 40 is joined (i.e. it has been joined) to the first part 18a of the first wall 18 by at least one of a heat activated material 42 and a pressure sensitive adhesive 44. Moreover, for the same reasons, in that embodiment, the fibrous reinforcement 40 is joined (i.e. it has been joined) to the first part 19a of the second wall 19 by at least one of a heat activated material 42 and a pressure sensitive adhesive 44.

[0072] Even more preferably, the fibrous reinforcement 40 is joined to the first part 18a of the first wall 18 by at least a pressure sensitive adhesive 44; and the fibrous reinforcement 40 is joined to the first part 19a of the second wall 19 by at least a heat activated material 42.

[0073] Moreover, in an embodiment, particularly, when the sheet-like fibrous material 11 is coated with the heat

activatable material 43 before application of the fibrous reinforcement 40, and the fibrous reinforcement 40 is attached thereto in the form of a tape comprising pressure sensitive adhesive 44, and the heat activatable material 43 is transformed to heat activated material 42 by heat activation, the fibrous reinforcement 40 is joined (i.e. it has been joined) to the first part 18a of the first wall 18 by a heat activated material 42 and a pressure sensitive adhesive 44. Moreover, for the same reasons, in that embodiment, the fibrous reinforcement 40 is joined (i.e. it has been joined) to the first part 19a of the second wall 19 by at least a heat activated material 42.

[0074] As detailed above and in Figures 1a, 1b, 4a, and 4b, in an embodiment, the pouch 10 comprises a second seam 22. Herein the second seam 22 refers to a seam that is transverse to the first seam 21. Thus, the first seam 21 extends in the first direction D1 throughout a whole width W_{10} of the pouch 10 and the second seam 22 extends in a second direction D2 throughout a whole height H_{10} of the pouch 10. Notable, the fibrous reinforcement 40 need not extend throughout a whole width W_{10} of the pouch 10 even if part of the first seam 21. These directions D1, D2 and measures W_{10}, H_{10} are shown in Fig. 1b.

[0075] As detailed above and in Figures 1a, 1b, 4a, and 4b, in an embodiment, the pouch comprises a third seam 23. The third seam 23 may be parallel to the first seam 21 or transverse to the first seam 21 depending on the way the pouch 10 has been manufactured.

[0076] Referring to Figs. 6b and 7b it is also possible to reduce the use of the heat activatable material 43 by using heat activatable material 43 only on the locations of the seams 21, 22, 23. Thus, in an embodiment of the pouch 10, at least a part of the fibrous material 11 limiting of the interior 12 of the pouch 10 is not covered, on the inside of the pouch 10, either by heat activated material 42 or by heat activatable material 43. As detailed above, the heat activatable material 43 may have similar properties as a material for the barrier of the fibrous material 11 Thus, by using heat activatable material 43 only on the locations of the seams 21, 22, 23 it is possibly to keep the gas permeability of the walls 18, 19 of the pouch 10 high. This is benefiacial for applications where high gas permeability is desired.

[0077] Naturally, it is also possible to apply a first dispersion coating onto the whole sheet 80 to form the barrier of the firbous material 11, and apply a second dispersion comprising heat activatable material 43 only on the locations of the seams 21, 22, 23.

[0078] However, from the point of view of manufacturability, it may be beneficial to cover the whole web of the fibrous material 11 with the heat activatable material 43 as in Figs. 6c and 7c. Thus, there is no need for equipment for targeting and applying the heat activatable material 43 to only certain locations of the sheets 80. Instead, the heat activatable material 43 may be, e.g., sprayed onto the hole web of the fibrous material 11. The heat activatable material 43 may be provided in the form of a dispersion, e.g. aquesous dispersion. Moreover, this may be done at the time of manufacturing the fibrous material 11 and by the manufacturer of the fibrous material 11. Therefore, in an embodiment of the pouch 10, all parts of the fibrous material 11 limiting the interior 12 of the pouch 10 is covered, on the inside of the pouch 10, either by heat activated material 42 or by heat activatable material 43.

[0079] As mentioned above, it has surprisingly been found that when the fibrous reinforcement 40 is applied in the cross-direction CD, the tendency of the pouch 10 tearing at the sides S1, S2 of the hole 30 is reduced. Application of the fibrous reinforcement 40 in the cross-direction CD is shown in Figs. 5b and 5d.

[0080] In general, the machine-direction MD of the fibrous material 11 is the direction that is parallel to the direction of the movement of the forming wire on a machine making the fibrous material 11, e.g. the direction of the movement of the forming wire on a paper machine making the paper used as the fibrous material 11. The machine direction is also the direction of movement of material web, when unwinding the fibrous material 11 from the roll 70. The cross-direction CD is transverse to the machine-direction MD and transverse to a direction of a thickness of the fibrous material, as shown in Figs. 5a to 5e. The direction of movement of the material is shown by one-headed arrow in Figs. 5a to 5e. In paper, the machine-direction is also the direction to which the grains of the paper are formed. Thus, the fibres of paper are mainly oriented in the machine direction MD. This makes paper an anisotropic material. For this reason, the strength and stiffness of individual fibres of paper is affected by grain direction, meaning that the tensile (breaking) strength and stiffness are higher in the grain direction. Therefore, the strength and stiffness of paper is, in general, higher in the machine-direction MD than in the cross-direction CD.

[0081] When the fibrous reinforcement 40 is applied in the cross-direction CD and used in the first seam 21 as detailed above, the machine-direction MD of the fibrous material 11 becomes oriented from a bottom edge E2 of the pouch to the top edge E1 of the pouch, as shown in Fig. 5f. This direction is referred to as the second direction D2 in this description. When the pouch 10 is suspended from a hanger so that the hanger penetrates the hole 30, the gravitational forces of the pouch are also directed in the second direction D2. As discussed, in this embodiment, the second direction D2 is parallel to the machine-direction of the fibrous material 11. Since the fibrous material 11, e.g. paper, has naturally higher strength in the machine-direction MD than in the cross-direction CD, this orientation decreases the tendency of the pouch tearing near the sides S1, S2 of the hole. Therefore, by applying the fibrous reinforcement 40 in the cross-direction CD of the fibrous material 11 of the first wall 18 or the second wall 19 of the pouch 10, the tearing resistance of the pouch 10 improves.

[0082] It is also noted that when the pouch 10 is made

by folding a sheet 80, typically the machine-direction of the fibrous material 11 of the first wall 18 is parallel to the machine-direction of the fibrous material 11 of the second wall 19. If a pouch 10 is made from two separate sheets by attaching them together at the seams (21, 22, 23) it would be possible that the machine-directions of the walls 18, 19 of the pouch 10 are not be parallel.

[0083] As detailed above, the first seam 21 extends in the first direction D1, which has been defined above. To clarify, a top edge E1 of the pouch 10 is arranged to a second direction D2 from the hole 30, the second direction D2 being perpendicular to the first direction D1. In addition, the hole 30 is arranged to the second direction D2 from the interior 12 of the pouch 10. Thus, the top edge E1 of the pouch 10 is arranged a height H_{10} of the pouch apart from a bottom edge E2 of the pouch, the height H_{10} being defined in the second direction D2.

[0084] In order the strengthen the pouch 10 near the hole 30, in a preferred embodiment, a machine-direction MD of the first wall 18 is parallel to the second direction D2, and a machine-direction MD of the second wall 19 is parallel to the second direction D2. This applies in particular when the first wall 18 and the second wall 19 of the pouch 10 comprise paper, in particular paper that comprises cellulose fibres. In terms of the cross-direction CD, it is noted that the first seam 21 extends in the first direction D1 throughout a whole width W_{10} of the pouch 10. Thus, in this embodiment, the cross-direction CD of the first wall 18 is parallel to the first direction D1, and the cross-direction CD of the second wall 19 is parallel to the first direction D1. Reference is made to Fig. 5f.

[0085] As detailed above, this selection of directions also has benefits in the case the pouch 10 is manufactured from a sheet 80 of the fibrous material and the sheet 80 has been manufactured from such a web of the fibrous material 11 that a width of the web is greater than a width of the sheet 80. Reference is made to Fig. 5d.

[0086] As detailed above, the fibrous reinforcement 40 in the pouch 10 is for reinforcing the pouch 10, in particular for reinforcing the pouch against tearing at the sides S1, S2 of the hole 30 of the pouch 10. Thus, an aspect of the embodiments is the use of the fibrous reinforcement 40. In the use, the fibrous reinforcement 40 is used for reinforcing the first seam 21 of the pouch 10. As discussed, in the use the pouch comprises a first wall 18 made of the fibrous material 11 and a second wall 19 made of the fibrous material 11. Moreover, the first seam 21 is provided with the hole 30.

[0087] The use comprises arranging the fibrous reinforcement 40 between the first part 18a of the first wall 18 and the first part 19a of the second wall 19; and arranging a hole 30 between a part of the fibrous reinforcement 40 and an interior 12 of the pouch 10. Thus, the hole 30 is arranged between the part of the fibrous reinforcement 40 and the interior 12 of the pouch 10 in the second direction D2. The use further comprises joining the first part 18a of the first wall 18 to the fibrous reinforcement 40 and joining the first part 19a of the second wall 19 to the fibrous reinforcement 40 to form the first seam 21 and to close the interior 12.

[0088] What has been said about the materials for joining the materials applies for the use. In particular, in an embodiment, at least one of a heat activatable material 43 and a pressure sensitive adhesive 44 is used for joining the fibrous reinforcement 40 to the first part 18a of the first wall 18; and at least one of a heat activatable material 43 and a pressure sensitive adhesive 44 is used for joining the fibrous reinforcement 40 to the first part 19a of the second wall 19. More preferably, in an embodiment, at least a pressure sensitive adhesive is used for joining the fibrous reinforcement 40 to the first part 18a of the first wall 18; and at least a heat activatable material 43 is used for joining the fibrous reinforcement 40 to the first part 19a of the second wall 19.

[0089] As discussed in the context of the pouch 10, in an embodiment of the use, the fibrous reinforcement 40 is provided in the form of only one layer of a fibrous reinforcement band, e.g. a tape comprising the fibrous reinforcement 40 and pressure sensitive adhesive 44. Reference is made to Figs. 2b to 2d. However, in an embodiment of the use, the fibrous reinforcement 40 is provided in the form of two layers of a fibrous reinforcement band. Reference is made to Figs. 2e and 2f. Moreover, in an embodiment of the use (not shown), the fibrous reinforcement 40 is provided in the form of more than two layers of a fibrous reinforcement band.

[0090] What has been said about the area density of the fibrous reinforcement 40 in the context of the pouch 10 applies for the use. However, as detailed above, the use may comprise use of one, two, or more than two layers of a fibrous reinforcement band. In general, such a band comprises a fibrous base, and may comprise further layers. When the fibrous reinforcement 40 is provided in the form of an adhesive tape, the adhesive tape forms the reinforcement band and in that embodiment, the reinforcement band comprises the fibrous base and adhesive, such as pressure sensitive adhesive, as detailed above. The fibrous base material is the fibrous sheet-like material (e.g. paper or cardboard) of the tape, onto which other layers of the tape have been applied.

[0091] In an embodiment of the use the fibrous reinforcement 40 is provided in the form of only one fibrous reinforcement band and a grammage of the fibrous base of the fibrous reinforcement band is 80 g/m^2 to 350 g/m^2, preferably 90 g/m^2 - 200 g/m^2, and most preferably 90 g/m^2 - 150 g/m^2. Herein the term grammage of the fibrous base the fibrous reinforcement band refers to the surface-specific density of the fibrous base (e.g. paper or cardboard) of the fibrous reinforcement band.

[0092] In an embodiment of the use the fibrous reinforcement 40 is provided in the form of two fibrous reinforcement bands and a grammage of a fibrous base of each one of the fibrous reinforcement bands is 40 g/m^2 to 175 g/m^2, preferably 45 g/m^2- 100 g/m^2, and most preferably 45 g/m^2 - 75 g/m^2.

[0093] In an embodiment of the use the fibrous rein-

forcement 40 is provided in the form of more than two fibrous reinforcement bands and a an area density of a combination of fibrous bases of the fibrous reinforcement bands is 80 g/m^2 to 350 g/m^2, preferably 90 g/m^2- 200 g/m^2, and most preferably 90 g/m^2 - 150 g/m^2.

Claims

1. A pouch (10) comprising

- a first wall (18) made of fibrous material (11) and a second wall (19) made of fibrous material (11), the first wall (18) and the second wall (19) limiting an interior (12) of the pouch (10),
- at least a first seam (21) closing the interior (12), the first seam (21) comprising
- a first part (18a) of the first wall (18),
- a first part (19a) of the second wall (19), and
- fibrous reinforcement (40) such that the fibrous reinforcement (40), the first part (18a) of the first wall (18) and the first part (19a) of the second wall (19) are joined to each other to form the first seam (21), the pouch (10) comprising
- a hole (30) penetrating through the first seam (21), wherein
- the hole (30) is arranged between a part of the fibrous reinforcement (40) and the interior (12).

2. The pouch (10) of claim 1, wherein

- the fibrous reinforcement (40) is arranged between the first part (18a) of the first wall (18) and the first part (19a) of the second wall (19) and joined to the first part (18a) of the first wall (18) and the first part (19a) of the second wall (19).

3. The pouch (10) of claim 1 or 2, wherein

- the fibrous reinforcement (40) comprises cellulose fibres and
- the fibrous material (11) comprises cellulose fibres;

preferably,

- the fibrous reinforcement (40) comprises paper or cardboard and
- the fibrous material (11) comprises paper.

4. The pouch (10) of any of the claims 1 to 3, wherein

- an area density of the fibrous reinforcement (40) is not less than a grammage of the fibrous material (11).

5. The pouch (10) of any of the claims 1 to 4, wherein

- an area density of the fibrous reinforcement (40) is at least 80 g/m^2, preferably at least 100 g/m^2;

more preferably,

- the area density of the fibrous reinforcement (40) is 80 g/m^2 to 350 g/m^2, such as 100 g/m^2 to 200 g/m^2.

6. The pouch (10) of any of the claims 1 to 5, wherein

- a grammage of the fibrous material (11) is at least 40 g/m^2, preferably at least 70 g/m^2;

more preferably,

- the grammage of the fibrous material (11) is 40 g/m^2 to 160 g/m^2, such as 70 g/m^2 to 90 g/m^2.

7. The pouch (10) of any of the claims 1 to 6, wherein

- the first seam (21) extends in a first direction (D1) throughout a whole width (W_{10}) of the pouch (10) and
- a width (W) of the fibrous reinforcement (40) is 2 mm to 10 mm, wherein
- the width (W) of the fibrous reinforcement (40) is measured in a second direction (D2), which is perpendicular to the first direction (D1).

8. The pouch (10) of any of the claims 1 to 7, wherein

- the first seam (21) extends in a first direction (D1) throughout a whole width (W_{10}) of the pouch (10) and
- the fibrous reinforcement (40) extends in the first direction (D1) beyond both sides (S1, S2) of the hole (30);

preferably,

- the fibrous reinforcement (40) extends in the first direction (D1) throughout the whole width (W_{10}) of the pouch (10).

9. The pouch (10) of any of the claims 1 to 8, wherein

- the fibrous reinforcement (40) is joined to at least one of the first part (18a) of the first wall (18) and the first part (19a) of the second wall (19) by at least one of
  - a heat activated material (42) and
  - a pressure sensitive adhesive (44);

preferably,

- the fibrous reinforcement (40) is arranged between the first part (18a) of the first wall (18) and the first part (19a) of the second wall (19) and joined to the first part (18a) of the first wall (18) and the first part (19a) of the second wall (19) and
- the fibrous reinforcement (40) is joined to the first part (18a) of the first wall (18) by at least one of

  • a heat activated material (42) and
  • a pressure sensitive adhesive (44); and

- the fibrous reinforcement (40) is joined to the first part (19a) of the second wall (19) by at least one of

  • a heat activated material (42) and
  • a pressure sensitive adhesive (44).

10. The pouch (10) of any of the claims 2 to 9, wherein

- the fibrous reinforcement (40) is joined to the first part (18a) of the first wall (18) by at least a pressure sensitive adhesive (44) and
- the fibrous reinforcement (40) is joined to the first part (19a) of the second wall (19) by at least a heat activated material (42).

11. The pouch (10) of any of the claims 1 to 12, wherein

- the first seam (21) extends in a first direction (D1) throughout a whole width (W_{10}) of the pouch (10),
- a cross-direction (CD) of the fibrous material (11) of the first wall (18) is parallel to the first direction (D1), and
- a cross-direction (CD) of the fibrous material (11) of the second wall (19) is parallel to the first direction (D1).

12. Use of a fibrous reinforcement (40) for reinforcing a first seam (21) of a pouch (10), the pouch (10) comprising a first wall (18) made of fibrous material (11) and a second wall (19) made of fibrous material (11), the first seam (21) being provided with a hole (30), the use comprising

- arranging the hole (30) between a part of the fibrous reinforcement (40) and an interior (12) of the pouch (10), and
- joining the fibrous reinforcement (40), the first part (18a) of the first wall (18) and the first part (19a) of the second wall (19) together to form the first seam (21) and to close the interior (12).

13. The use of claim 12, comprising

- arranging the fibrous reinforcement (40) between the first part (18a) of the first wall (18) and the first part (19a) of the second wall (19) and
- joining the first part (18a) of the first wall (18) to the fibrous reinforcement (40) and joining the first part (19a) of the second wall (19) to the fibrous reinforcement (40) to form the first seam (21).

14. The use of claim 12 or 13, wherein

- the fibrous reinforcement (40) is provided in the form of one, two, or more than two layers of a fibrous reinforcement band.

15. The use of claim 14, wherein

[A]

- the fibrous reinforcement (40) is provided in the form of only one layer of a fibrous reinforcement band and
- a grammage of a fibrous base of the fibrous reinforcement band is 80 g/m^2 to 350 g/m^2, or

[B]

- the fibrous reinforcement (40) is provided in the form of two layers of fibrous reinforcement bands and
- a grammage of a fibrous base of each one of the fibrous reinforcement bands is 40 g/m^2 to 175 g/m^2, or

[C]

- the a fibrous reinforcement (40) is provided in the form of more than two layers of fibrous reinforcement bands and
- a an area density of a combination of fibrous bases of the fibrous reinforcement bands is 80 g/m^2 to 350 g/m^2.

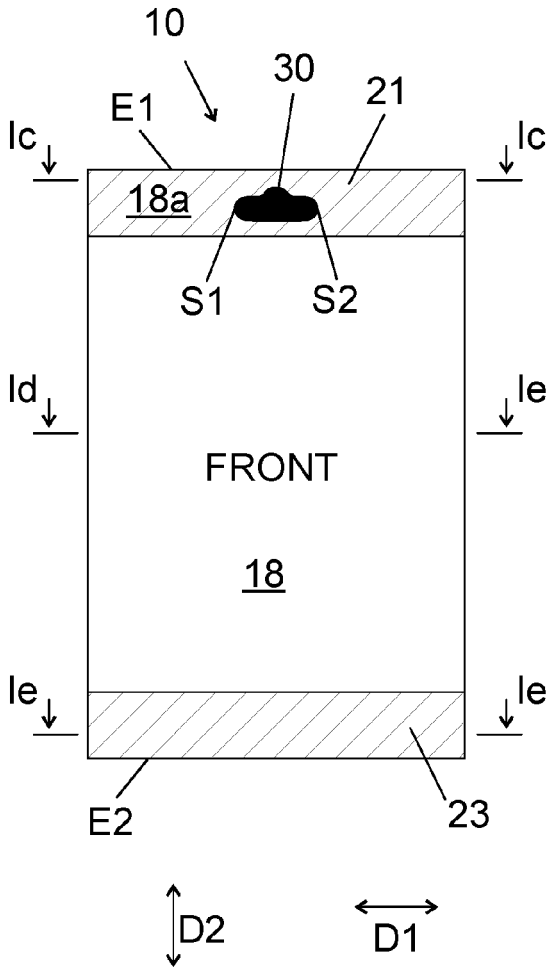


Fig. 1a

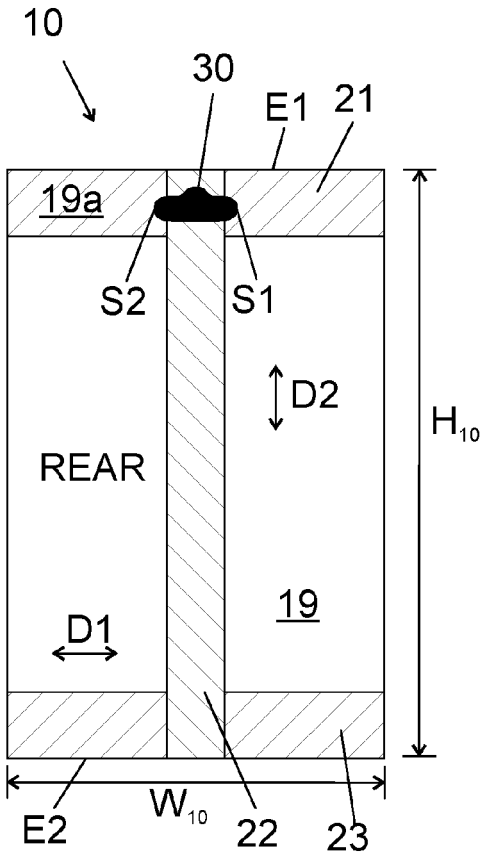


Fig. 1b

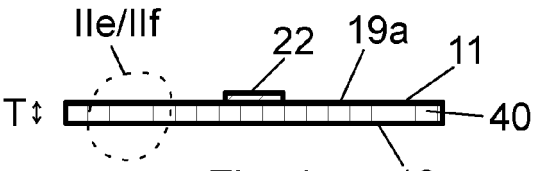


Fig. 1c

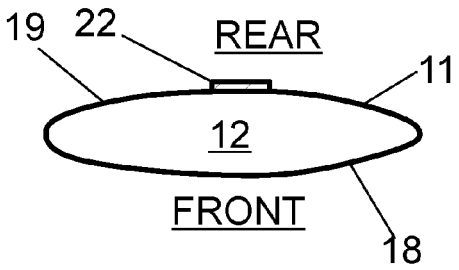


Fig. 1d

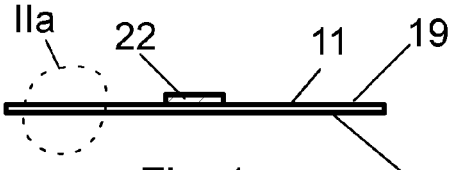


Fig. 1e

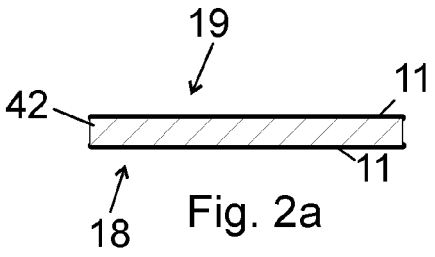


Fig. 2a

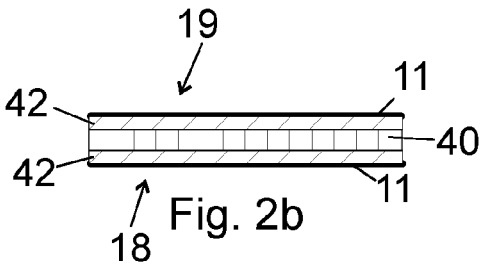


Fig. 2b

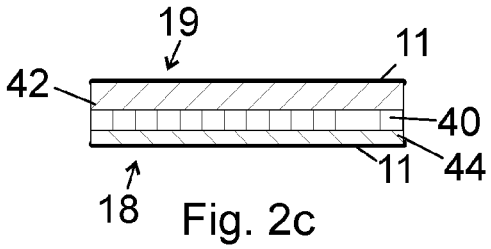


Fig. 2c

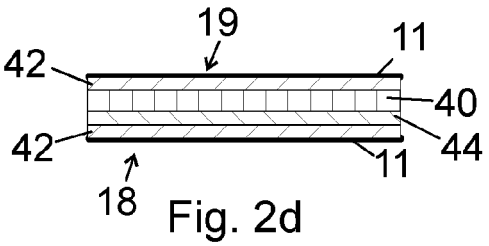


Fig. 2d

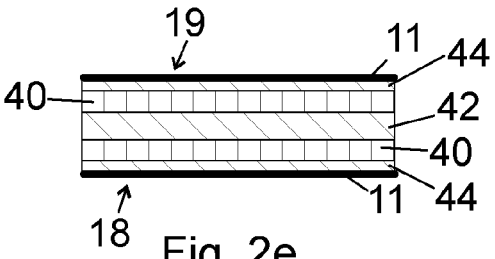


Fig. 2e

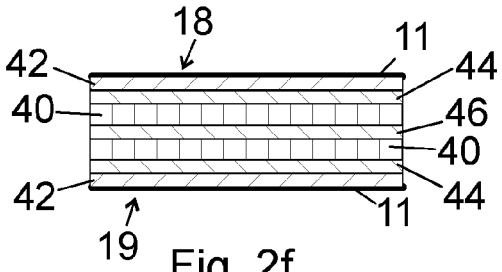


Fig. 2f

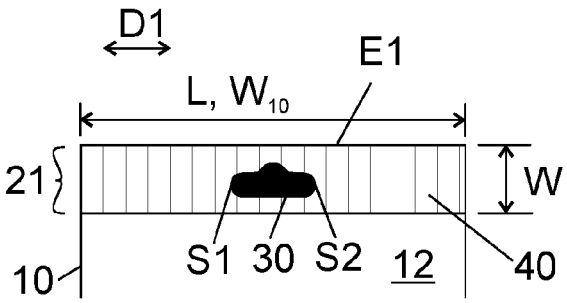


Fig. 3a

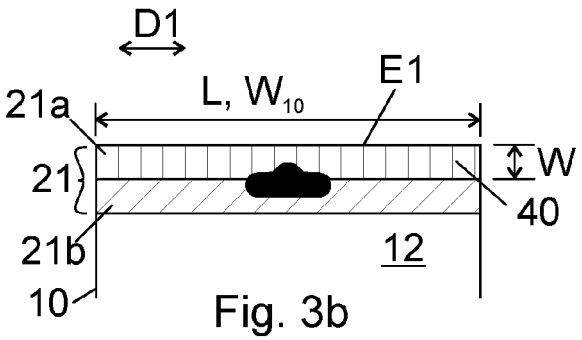


Fig. 3b

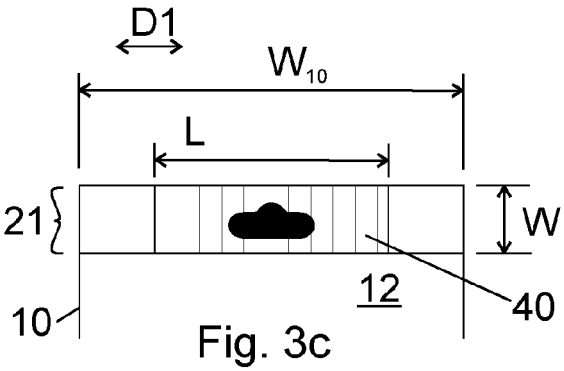


Fig. 3c

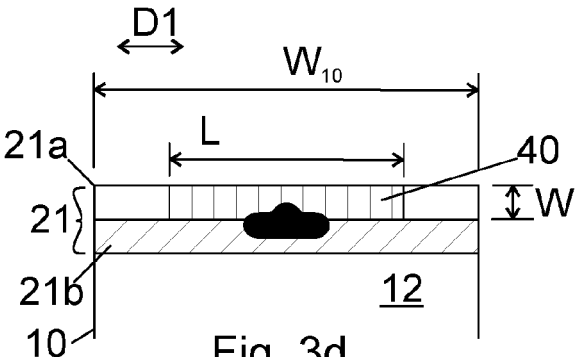


Fig. 3d

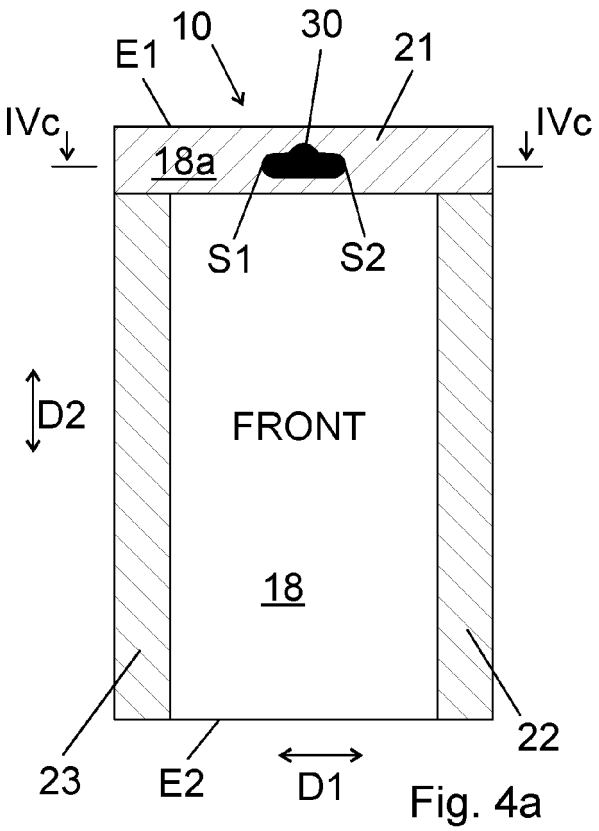


Fig. 4a

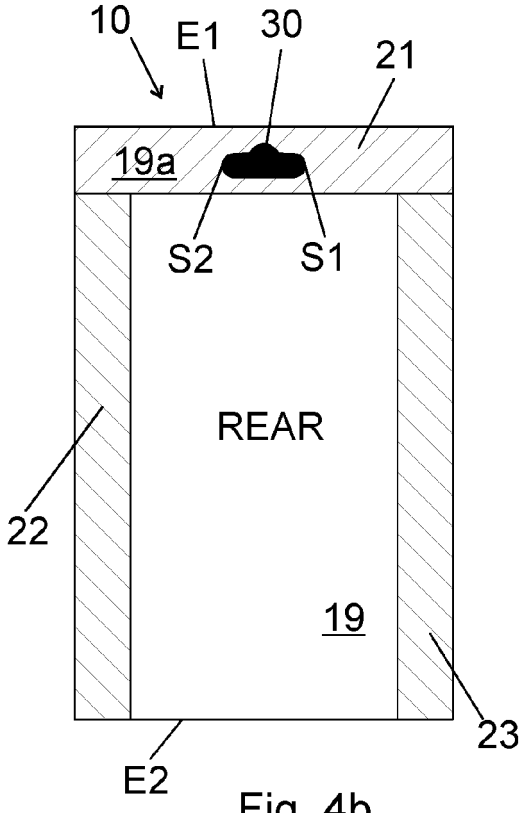


Fig. 4b

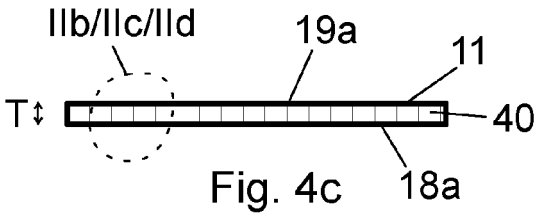


Fig. 4c

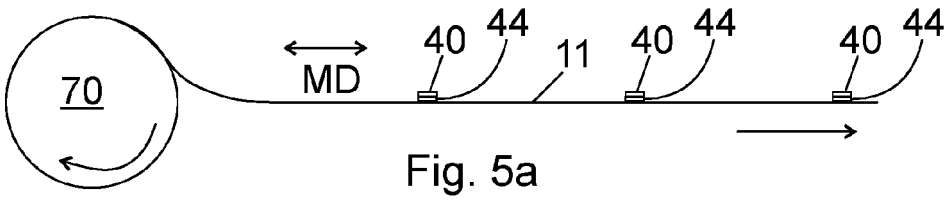


Fig. 5a

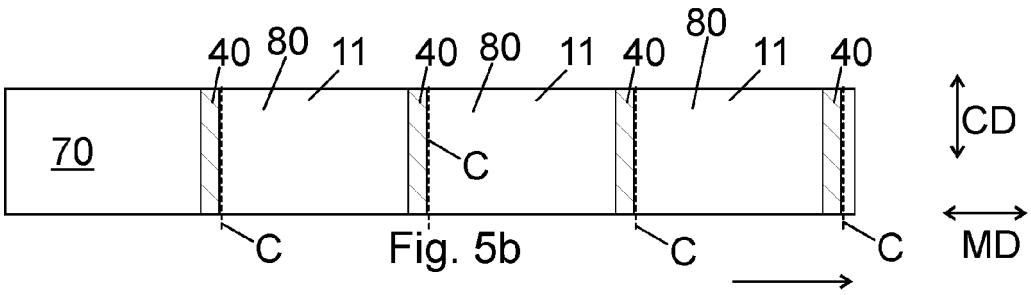


Fig. 5b

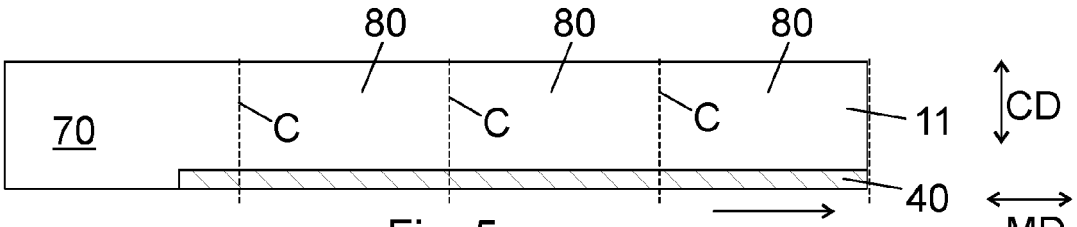


Fig. 5c

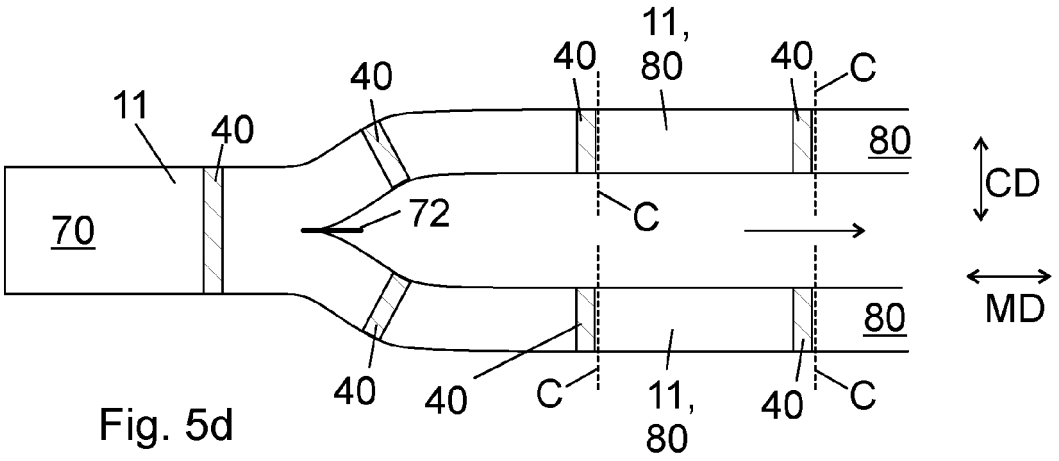


Fig. 5d

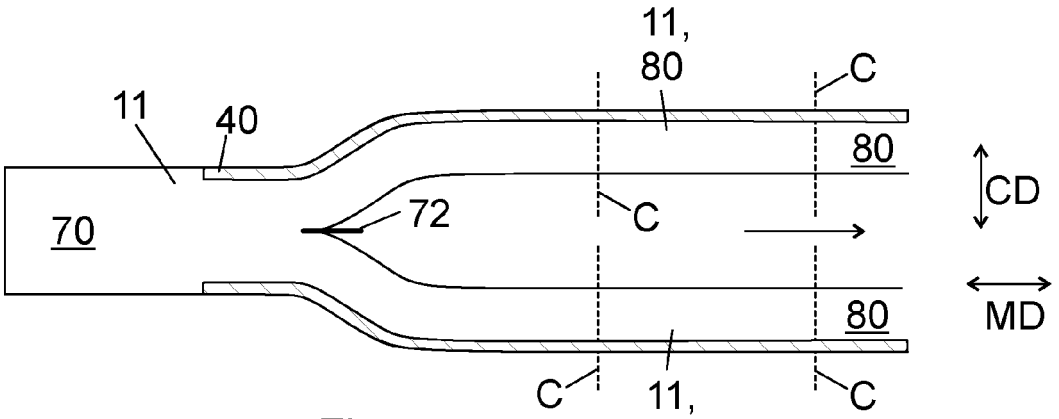


Fig. 5e

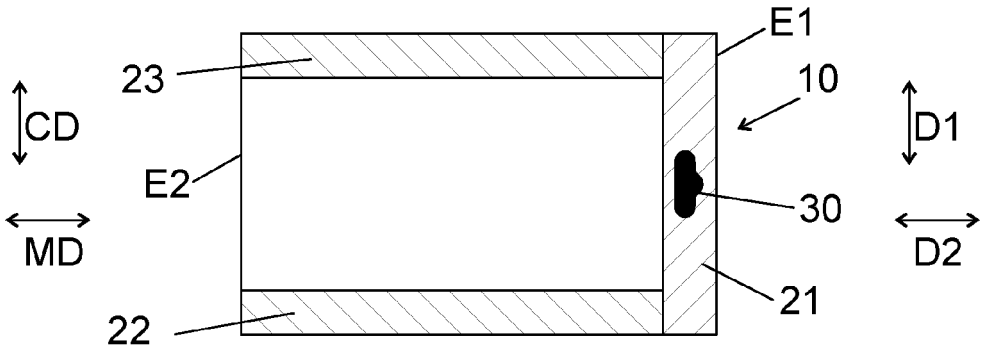


Fig. 5f

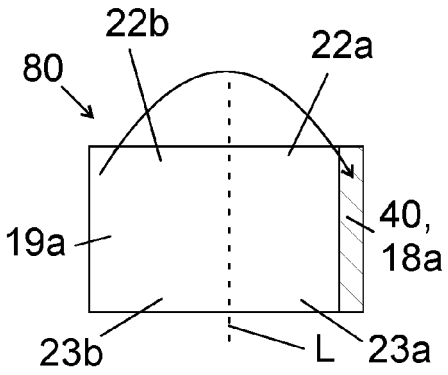


Fig. 6a

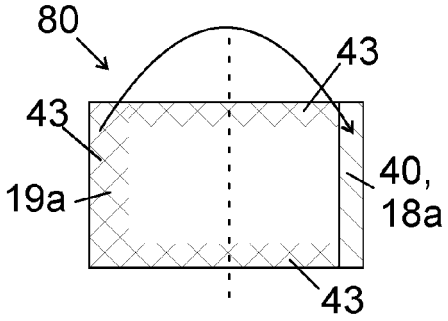


Fig. 6b

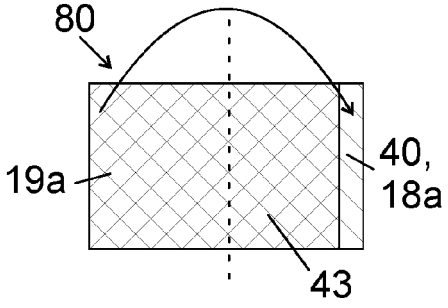


Fig. 6c

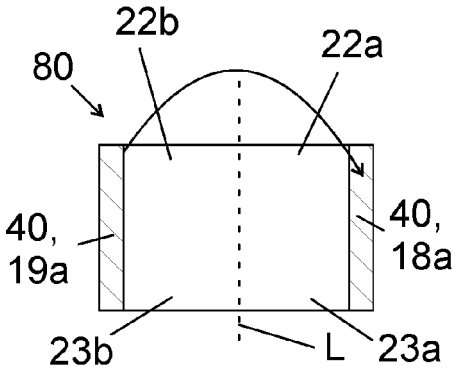


Fig. 6d

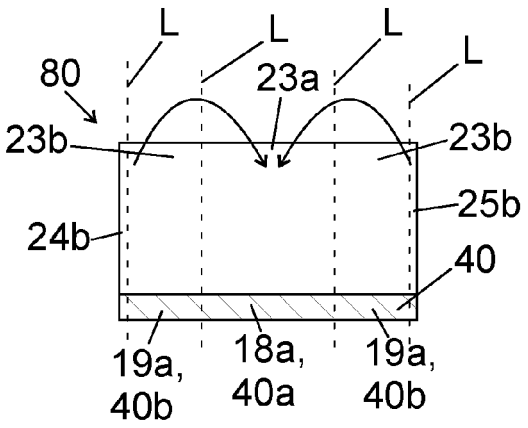


Fig. 7a

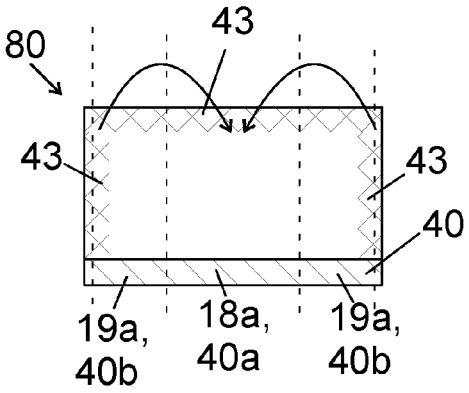


Fig. 7b

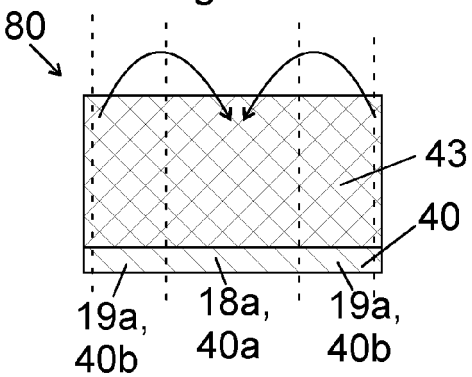


Fig. 7c

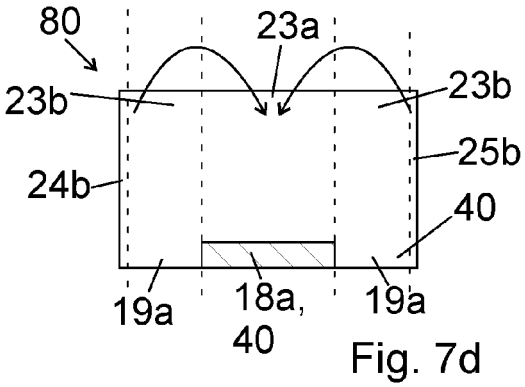
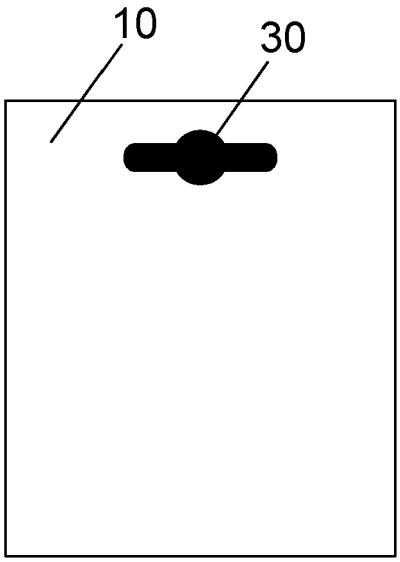
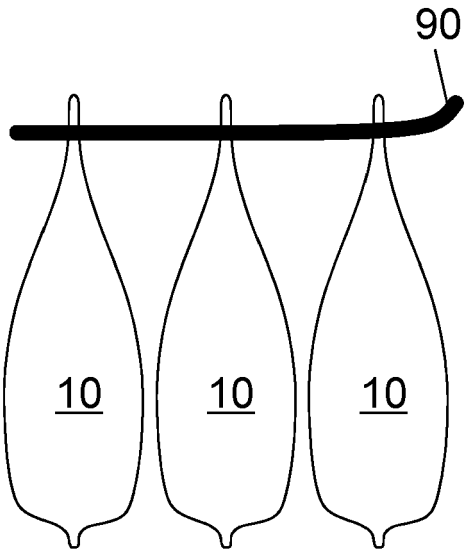


Fig. 7d



PRIOR ART

Fig. 8a



PRIOR ART

Fig. 8b

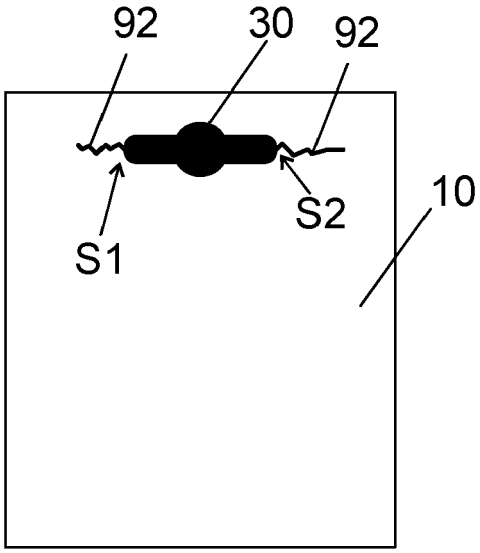


Fig. 8c

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EUROPEAN SEARCH REPORT

Application Number
EP 23 16 9644

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 4 105 138 A1 (DAINIPPON PRINTING CO LTD [JP]) 21 December 2022 (2022-12-21) * column 8, paragraph 47 - column 10, paragraph 56 * * column 11, paragraph 59-60 * * column 15, paragraph 85 - column 17, paragraph 92 * * column 19, paragraph 105 - column 20, paragraph 114 * * column 21, paragraph 125 * * column 22, paragraph 130 - column 23, paragraph 132 * * column 30, paragraph 167 - column 31, paragraph 173 * * figures 1A, 1B, 3, 6, 8. 9A, 30-32 *	1-15	INV. B65D75/56
X	CN 1 480 379 A (TIAN RUIQING [CN]) 10 March 2004 (2004-03-10) * the whole document *	1-15	
X	DE 42 25 998 A1 (MILDENBERGER & WILLING VERPACK [DE]) 10 February 1994 (1994-02-10) * column 2, lines 9-18 * * column 3, line 54 - column 4, line 38 * * figures 6-9 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) B65D
A	EP 3 556 679 A1 (BILLERUDKORSNAES AB [SE]) 23 October 2019 (2019-10-23) * column 2, paragraph 22 - column 3, paragraph 22 * * column 6, paragraph 50-54 * * figures 1, 2, 5 *	1,11,12	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	4 October 2023	Piolat, Olivier

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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04-10-2023

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		WO 2019201954 A1	24-10-2019

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