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(54) METHOD FOR PRODUCTION OF BAGS FOR THE TRANSPORT AND STORAGE OF BULK GOODS OR LIQUIDS, AND BAG OBTAINED ACCORDING TO THE METHOD

(57) The present invention relates to a method for production of bags for the transport and storage of bulk goods or liquids, wherein use is made of tubular fabric cut into several pieces, which are then assembled together, comprising the steps of:
- providing a tubular fabric;
- flattening said tubular fabric to form a first double-thickness fabric having two opposite sides, respectively an internal side (11 a) and an external side (11 b), extending between two flattened edges (12, 14);
- folding-in or pleating at lest one of the flattened edges (12, 14) of said double-thickness fabric (10) to form a gusset (20);
- cutting said tubular fabric into pieces and assembling said pieces to form a bag;
wherein the assembly of two said pieces (10, 10') comprises the steps of:
- connecting together the gussets (20) of two said pieces (10, 10') by means of a stitching or a welding, said stitching or welding extending along a connection line (21);
- assembling the first and second pieces (10, 10') by means of seams (23) formed around or near first to fourth gusset ends (15, 19, 15', 19').

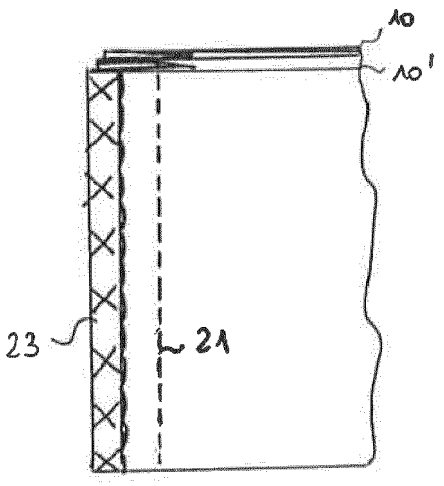

Fig.6

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Description

TECHNICAL FIELD

[0001] The present invention relates to a method for production of bags for the transport and storage of bulk goods or liquids, as well as the bag obtained according to the method.

STATE OF THE ART

[0002] Bags for the transport and storage of bulk goods or liquids, which are also known as "big bags", are in general made of fabrics woven from polypropylene, which fabrics may or may not be laminated. The most common method for production of bags of this type consists of sewing together a plurality of pieces of fabric, so as to form a rectangular parallelepiped.

[0003] For this purpose, it is possible to use tubular fabrics produced by means of circular looms, the pieces which are designed to be sewn together to form the bag being constituted by sections of tubular fabric which are flattened to form lengths of flat double-thickness fabric, the width of which is half the circumference of the tube.

[0004] Since pieces of fabric are to be sewn together to form the bag, use is generally made of sewing machines with one needle or two needles, such those described in the patent applications GB-A-2 301 087, JP-A-2004 033548 or JP-A-2005 118400. In the case of machines with two needles, the needles work in parallel, generally at a distance of approximately 0.5 to 1 cm, in order to produce two parallel seams which increase the strength of the assembly. An example of a machine of this type is represented schematically in figure 3 of US 8,950,346 B2. Such machines are however not adapted for producing bags that are used for the storage and transport of powdery goods, because the powder may escape via the sewing holes. US 8,950,346 B2 relates to a method permitting to sew together pieces of fabric without forming sewing holes. This method uses a sewing machine comprising at least two needles operating in line one behind the other in one and the same direction so as to form a seam along a single line. Thus the perforation produced by the first needle is covered by the stitch of the second needle and the perforation produced by the second needle is made through the thread of the stitch made by the first needle, thus filling said perforation with said thread.

[0005] One disadvantage of these known methods is the relative weakness of the assembly due to the fact that stresses applied by the content of a bag are concentrated on the seam line separating two adjacent lateral walls of said bag. This may become particularly problematic in the specific case of big bags with nominal weights of approximately 250 to 3000 kilos. When these bags are completely filled, the seams are subjected to the full weight of the container's content. Therefore, this is a risk that these seams are torn or break.

DISCLOSURE OF THE INVENTION

[0006] The object of the present invention is to propose a method for production of bags for the transport and storage of bulk goods or liquids, which makes it possible in particular to overcome the above-described disadvantages.

[0007] For this purpose, the present invention relates to a method for production of bags for the transport and storage of bulk goods or liquids, wherein use is made of tubular fabric cut into several pieces, which are then assembled together, comprising the steps of:

- providing a tubular fabric;
- flattening said tubular fabric to form a first double-thickness fabric having two opposite sides, respectively an internal side (11a) and an external side (11 b), extending between two flattened edges (12, 14);
- folding-in or pleating a first (12) of the flattened edges (12, 14) of said double-thickness fabric (10) to form a first gusset (20), said first gusset (20) being defined by a first oblique section (13) extending between said folded-in flattened edge (12) and a first gusset end (15) positioned on the external side (11b) of the first double-thickness fabric (10) and by a second oblique section (17) extending between said folded-in flattened edge (12) and a second gusset end (19) positioned on the internal side (11 a) of the first double-thickness fabric (10);
- folding-in or pleating the second (14) of the flattened edges (12, 14) in a manner symmetric to said first edge (12),
- cutting said tubular fabric into pieces and assembling said pieces to form a bag,

wherein the assembly of two said pieces (10, 10') comprises the steps of:

- disposing the first and the second pieces (10, 10') such that the external side (11b') of the second piece (10') is in contact with or close to the internal side (11 a) of the first piece (10) and such that the first, second, third and fourth gusset ends (15, 19, 15', 19') of said pieces are substantially aligned;
- connecting together the second and third oblique sections (17, 13') by means of a stitching or a welding, without connecting together the first and fourth oblique sections (13, 17'), said stitching or welding extending along a connection line (21);

assembling the first and second pieces (10, 10') by means of seams (23) formed around or near the first to fourth gusset ends (15, 19, 15', 19')

[0008] The present invention also relates to a bag for the transport and storage of bulk goods or liquids according to claim 8.

[0009] Other important characteristics of the invention form the basis of the dependent claims, and are dis-

cussed hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The following description is provided by way of non-limiting example. It relates to the drawing, in which:

- figures 1 and 1 a are respectively perspective and top schematic views of a tubular fabric used for making a bag in accordance with the invention;
- figures 2 and 2a are similar views to figures 1 and 1a, but illustrating the tubular fabric having been flattened to form a double-thickness fabric;
- figures 3 and 3a are similar views to figures 2 and 2a, but illustrating the double-thickness fabric after the formation of a gusset at its flattened ends;
- figures 4 and 4a are similar views to figures 3 and 3a, but illustrating a pair of double-thickness pieces of fabric having been disposed for their assembling;
- figures 5, 5a and 5b are similar views to figures 4 and 4a, but illustrating partially the pair of double-thickness pieces of fabric after the connection of the second and third oblique sections by stitching and, optionally, by welding for figure 5b;
- figures 6 and 6a are similar views to figures 5 and 5a, but illustrating partially the pair of double-thickness pieces of fabric after their assembling by means of seams;
- figure 7 is a perspective view of a schematic bag according to the present invention;
- figure 8 is a cross-sectional top view of the bag shown in figure 7.

DETAILED DESCRIPTION OF THE EMBODIMENTS OF THE INVENTION

[0011] The bags according to the invention are made of pieces constituted by sections of tubular fabric flattened so as to form lengths of flat double-thickness fabric, the width of which is half the circumference of the tube. Pieces of fabric of this type can be square or rectangular and form either the bottom or one of the lateral walls of the bag. It is also possible that one piece of fabric is designed to constitute both the bottom of the bag and two opposite lateral walls, two complementary pieces being designed to constitute the two other lateral walls of the bag. In the conventional bag, the assembly of two adjacent pieces of fabric of the bag are carried out by sewing along a single line, which is parallel to the sides of the pieces. Such a configuration is for example illustrated in figures 1 and 2 of US 8,950,346 B2. In this configuration, stresses applied on the bag by its content are transmitted directly to the single line. A deterioration of the seam may thus occur in use, which leads to an imperfect sealing against the powders, and, therefore, to a possible loss of content if the bag contains powders or other similar products.

[0012] To avoid this problem, the essential concept of the production method according to the invention consists to form a gusset at one end of the pieces of fabric and to provide this gusseted end with several connecting lines or areas, said connecting lines or areas being positioned so as to distribute stresses on several portions of the pieces of fabric when they are assembled together.

[0013] The production and assembly of two adjacent pieces of fabric for the formation of a bag according to the invention will be better understood by reference to figures 1 to 6 and 1a to 6a.

[0014] Referring firstly to figures 1 and 1a, one starts with a tubular fabric 10 weighing preferably 75 to 125 grams per square meter. The tubular fabric 10 has an appropriate diameter and length which is determined by the desired dimensions of the finished bag.

[0015] Referring to figures 2 and 2a, this tubular fabric 10 is then flattened so as to form a double-thickness fabric having two opposite sides, respectively an internal side 11 a and an external side 11 b, extending between two flattened edges, respectively a left edge 12 and a right edge 14, and two open or cut edges 16, 18.

[0016] Referring to figures 3 and 3a, a gusset 20 is now formed by folded in or pleating the double-thickness fabric 10 at the portion adjacent the left edge 12, said left edge 12 projecting inwards in the fabric 10 to an extent of several cm for example. Gusseting to achieve the gusset 20 may be effected as the tubular fabric 10 is flattened, and may be effected by appropriate shaping tools (not shown) past which the tubular fabric progresses, simultaneously with a gusset 24 at the right edge 14. The gusset 20 is thus defined by a first oblique section 13 extending between the folded-in left edge 12 and a first gusset end 15 positioned on the external side 11 b of the fabric 10 and by a second oblique section 17 extending between said folded-in left edge 12 and a second gusset end 19 positioned on the internal side 11 a of the fabric 10.

[0017] So prepared, the tubular fabric is cut into pieces to be assembled to form a bag.

[0018] Referring to figures 4 and 4a, the piece of fabric 10 of figures 3 and 3a is disposed adjacent to a similar piece of fabric 10'. Said piece of fabric 10' is in particular defined by an internal side 11 a', an external side 11 b', a left edge 12' projecting inwards and a gusset 20' defined by a third oblique section 13' extending between the left edge 12' and a third gusset end 15' positioned on the external side 11b' and by a fourth oblique section 17' extending between said left edge 12' and a fourth gusset end 19' positioned on the internal side 11 a'. The pieces of fabric 10 and 10' may advantageously be disposed such that the external side 11 b' of the piece of fabric 10' is in contact with or close to the internal side 11 a of the piece of fabric 10 and such that the first, second, third and fourth gusset ends 15, 19, 15', 19' are substantially aligned.

[0019] Referring to figures 5 and 5a, the pieces of fabric 10 and 10' are then connected together by means of a stitching or a welding extending between the second and third oblique sections 17 and 13'. Therefore, this stitching

or welding does not connect together the first and fourth oblique sections 13 and 17'. As illustrated in figures 5 and 5a, the stitching or welding extends along a single connection line 21. To prevent any loss of content through the perforation made by the needles during the stitching operation, a sewing machine according to figure 4 of US 8,950,346 B2 may advantageously be used and the steps defined in claims 1 to 8 of US 8,950,346 B2 may be carried out to form the connection line 21. Accordingly, the method of the present invention may advantageously comprise the step of providing a sewing machine equipped with at least two needles, feeding each needle with a thread and operating said needles in-line one behind the other in one and the same direction so as to produce a seam along the connection line 21 with a stitch formed by the second needle being made on the thread of a stitch formed by the first needle, the stitch formed by the second needle covering a perforation produced by the first needle, and a perforation produced by the second needle being thus made through the thread, thereby filling the perforation with the thread. Furthermore, the method of the present invention may further comprise the step of controlling the needles such that the needles work alternately, and at equivalent stitch distances, and/or such that the second needle perforates the fabric in the middle of the stitch of the first needle. Finally, the threads fed into the needles of the sewing machine may advantageously comprise multi-filament threads with a textured structure. In the conventional bags, these multi-filaments threads are positioned on the external sides thereof, thus leading to a deconstruction of the threads by contact with an adjacent bag. On the contrary, in the bag of the present invention, the connection line 21 is advantageously positioned so as to be protected by the first and fourth oblique sections 13 and 17', thus preventing a contact with another bag.

[0020] Figure 5b illustrates an optional step consisting to connect together the second and third oblique sections 13 and 17' by means of a welding, said welding extending along a line 22 extending between the connection line 21 and the virtual plane defined by the first to fourth gusset ends 15, 19, 15', 19'. This welding permits to increase the level of sealing of the bag. Indeed, if any loss of content occurs through the connection line 21, this content is prevented to escape from the bag by means of said welding.

[0021] Referring to figures 6 and 6a, the pieces of fabric 10 and 10' are finally assembled together by means of seams 23 formed around or near the first to fourth gusset ends 15, 19, 15', 19'. These seams 23 are properly positioned to connect together the first to fourth oblique sections 13, 17, 13', 17', but being sufficiently distant from the connection line 21 to leave a non-sewn area encompassing this connection line 21 and the left edges 12, 12' of the fabrics 10, 10'. Thus configured, the seams 23 permit that stresses applied to the pieces of fabric 10, 10' are distributed on the first to fourth oblique sections 13, 17, 13', 17' and not concentrated only on the connection line 21. Furthermore, the seams 23 define a sewn area that completely encapsulates the connection line 21, thus avoiding contact between the connection line and a connection line of another bag. This configuration also increases the leakproof properties of the bag. Thus, a bag formed by a combination of several pieces of fabric assembled in accordance with the method illustrated in figures 1 to 6, respectively 1 a to 6a, may have a greater level of sealing than the conventional bags, as well as a better resistance to stress. In particular, several tests have shown that the bags according to the invention are substantially stronger than the bags produced by a method according to US 8,950,346 B2. Some tests have shown 1.5 time improvements in the resistance at break.

[0022] Figures 7 and 8 illustrate a bag 100 according to a preferred embodiment of the present invention. This bag 100 has a parallelepiped shape and is constituted by four double-thickness pieces of fabric 101 to 104 forming the lateral sides of the bag and one piece of fabric 105 forming the bottom side of the bag. The bag 100 is advantageously equipped with four lifting straps 106 positioned at the four upper corners of the bag, whereto forks of forklifts can fit or penetrate. Each double-thickness piece of fabric 101 to 104 comprises a gusset 20, 20' formed at both of its ends, each gusset being connected to a gusset of an adjacent piece of fabric by respectively a stitching or welding 21 and seams 23. Thus assembled, the double-thickness fabrics 101 to 104 have the same structure as the fabrics 10, 10' illustrated in figures 6 and 6a.

Claims

1. Method for production of bags for the transport and storage of bulk goods or liquids, wherein use is made of tubular fabric cut into several pieces, which are then assembled together, comprising the steps of:

    - providing a tubular fabric;
    - flattening said tubular fabric to form a first double-thickness fabric having two opposite sides, respectively an internal side (11a) and an external side (11b), extending between two flattened edges (12, 14);
    - folding-in or pleating a first (12) of the flattened edges (12, 14) of said double-thickness fabric (10) to form a first gusset (20), said first gusset (20) being defined by a first oblique section (13) extending between said folded-in flattened edge (12) and a first gusset end (15) positioned on the external side (11b) of the first double-thickness fabric (10) and by a second oblique section (17) extending between said folded-in flattened edge (12) and a second gusset end (19) positioned on the internal side (11 a) of the first double-thickness fabric (10);
    - folding-in or pleating the second (14) of the

flattened edges (12, 14) in a manner symmetric to said first edge (12),
- cutting said tubular fabric into pieces and assembling said pieces to form a bag,

wherein the assembly of two said pieces (10, 10') comprises the steps of:

- disposing the first and the second pieces (10, 10') such that the external side (11 b') of the second piece (10') is in contact with or close to the internal side (11 a) of the first piece (10) and such that the first, second, third and fourth gusset ends (15, 19, 15', 19') of said pieces are substantially aligned;
- connecting together the second and third oblique sections (17, 13') by means of a stitching or a welding, without connecting together the first and fourth oblique sections (13, 17'), said stitching or welding extending along a connection line (21);
- assembling the first and second pieces (10, 10') by means of seams (23) formed around or near the first to fourth gusset ends (15, 19, 15', 19').

2. Method according to claim 1, further comprising, before making the seams (23), the additional step of connecting together the second and third oblique sections (17, 13') by means of a welding, said welding extending along a line (22) extending between the connection line (21) and the first to fourth gusset ends (15, 19, 15', 19').

3. Method according to one of the preceding claims, wherein the step of connecting together the second and third oblique sections (17, 13') by means of a stitching comprises the steps of providing a sewing machine equipped with at least two needles, feeding each needle with a thread and operating said needles in-line one behind the other in one and the same direction so as to produce a seam along the connection line (21) with a stitch formed by the second needle being made on the thread of a stitch formed by the first needle, the stitch formed by the second needle covering a perforation produced by the first needle, and a perforation produced by the second needle being thus made through the thread, thereby filling the perforation with the thread.

4. Method according to claim 3, further comprising the step of controlling the needles such that the needles work alternately, and at equivalent stitch distances.

5. Method according to claim 3 or 4, further comprising the step of controlling the needles such that the second needle perforates the fabric in the middle of the stitch of the first needle.

6. Method according to any one of claims 3 to 5, wherein the threads fed into the needles of the sewing machine comprise multi-filament threads with a textured structure.

7. Method according to one of the preceding claims, wherein the seams (23) are configured to leave a non-sewn area encompassing the connection line (21) and the folded-in flattened edges (12, 12') of said first and second double thickness fabrics (10, 10').

8. Bag for the transport and storage of bulk goods or liquids formed by the assembly of several double-thickness pieces of fabric, each piece of fabric (10) having two opposite sides, respectively an internal side (11a) and an external side (11b), extending between two edges (12, 14);
wherein each piece of fabric (10) comprises at least one gusset (20), said gusset (20) being defined by a first oblique section (13) extending between one of said flattened edges (12) and a first gusset end (15) positioned on the external side (11 b) of the piece of fabric (10) and a second gusset end (19) positioned on the internal side (11 a) of the piece of fabric (10);.
wherein two adjacent pieces of fabric, respectively a first and a second pieces (10, 10'), are assembled such that the external side (11 b') of the second piece (10') is in contact with or close to the internal side (11 a) of the first piece (10) and such that the first, second, third and fourth gusset ends (15, 19, 15', 19') of said pieces are substantially aligned;
wherein the second and third oblique sections (17, 13') of said first and second pieces (10, 10') are connected together by means of a stitching or a welding, said stitching or welding extending along a connection line (21); and
wherein the first and second pieces (10, 10') are assembled by means of seams (23) formed around or near the first to fourth gusset ends (15, 19, 15', 19').

9. Bag according to claim 8, wherein the second and third oblique sections (17, 13') of the first and second pieces (10, 10') are connected together by means of a welding, said welding extending along a line (22) extending between the connection line (21) and the first to fourth gusset ends (15, 19, 15', 19').

10. Bag according to claim 8 or 9, wherein the seam formed along the connection line (21) comprises at least two superimposed threads, one thread perforating the other and vice versa.

11. Bag according to claim 10, wherein the superimposed threads are multi-filament threads with a textured structure.

12. Bag according to any one of claims 8 to 11, wherein the seams (23) are configured to leave a non-sewn area encompassing the connection line (21) and the flattened edges (12, 12') of the first and second pieces (10, 10').

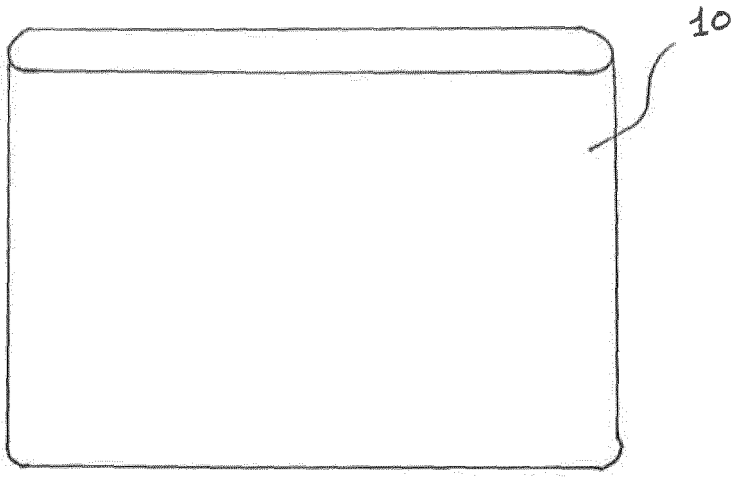

Fig. 1

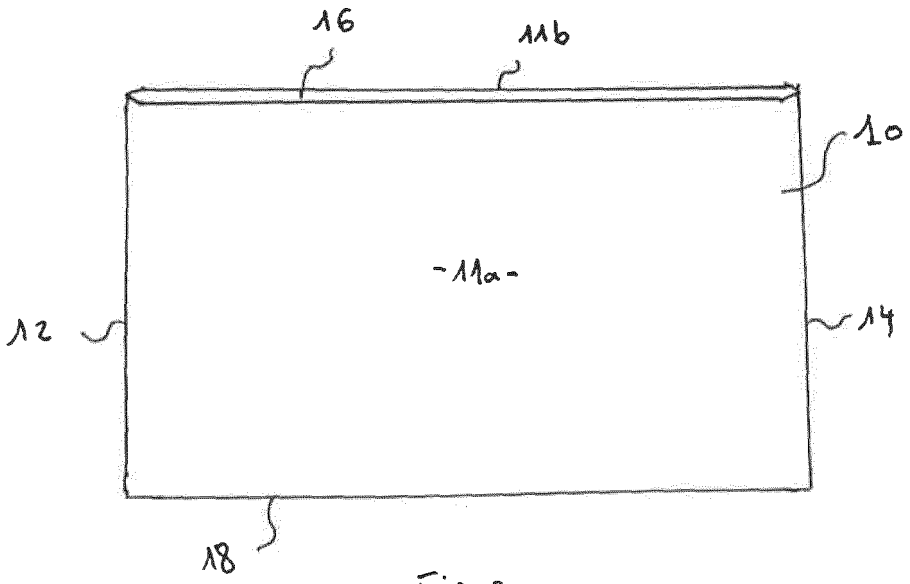

Fig. 2

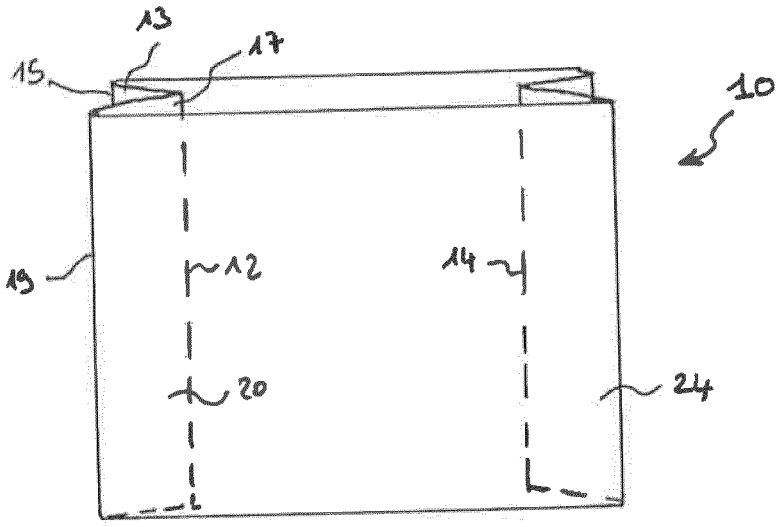

FIG.3

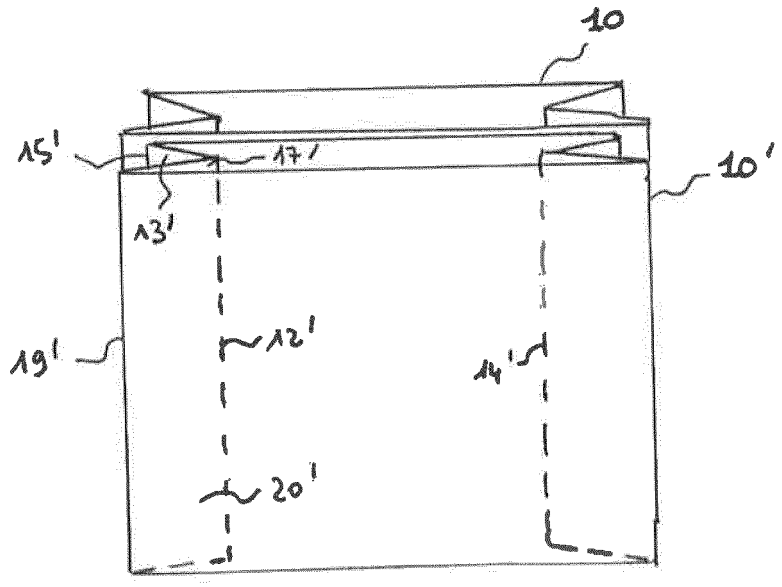

FIG.4

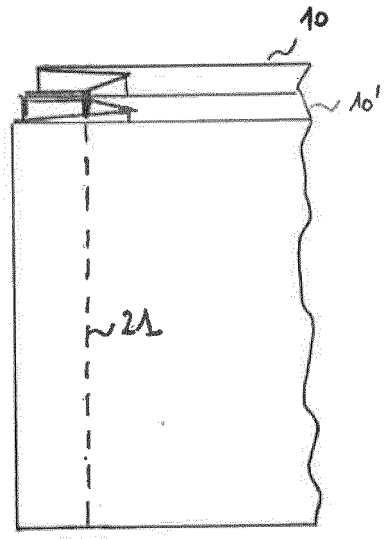

Fig.5

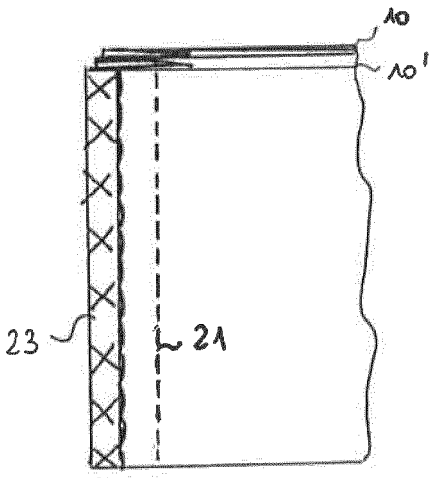

Fig.6

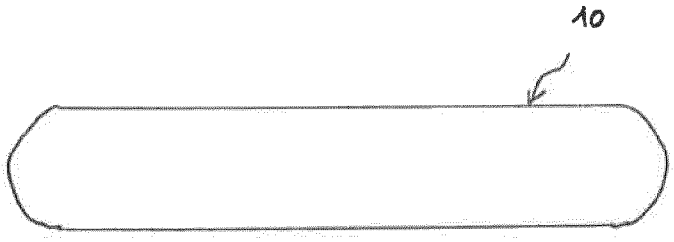

Fig. 1a

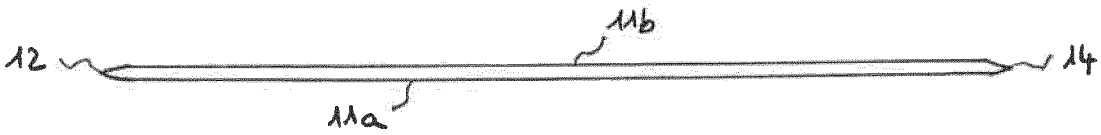

Fig. 2a

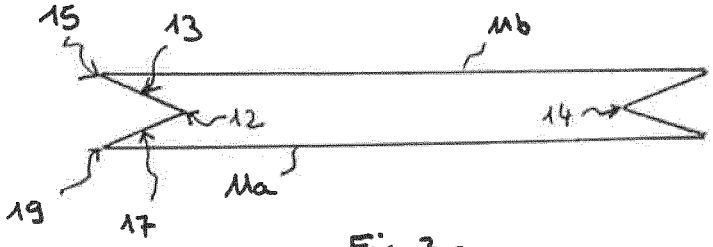

Fig. 3a

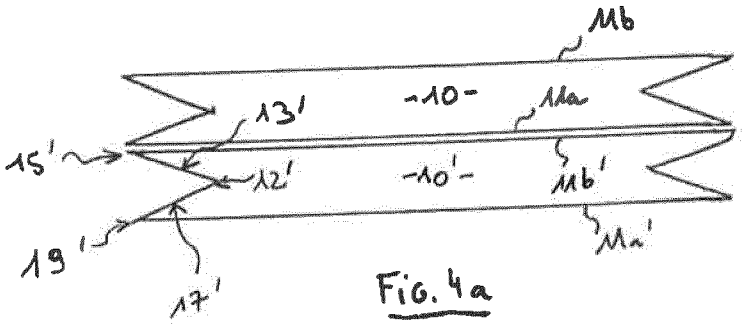

Fig. 4a

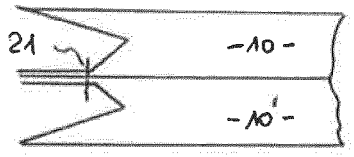

Fig. 5a

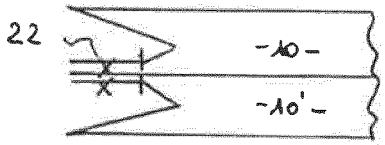

Fig. 5b

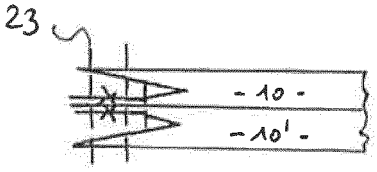

Fig. 6a

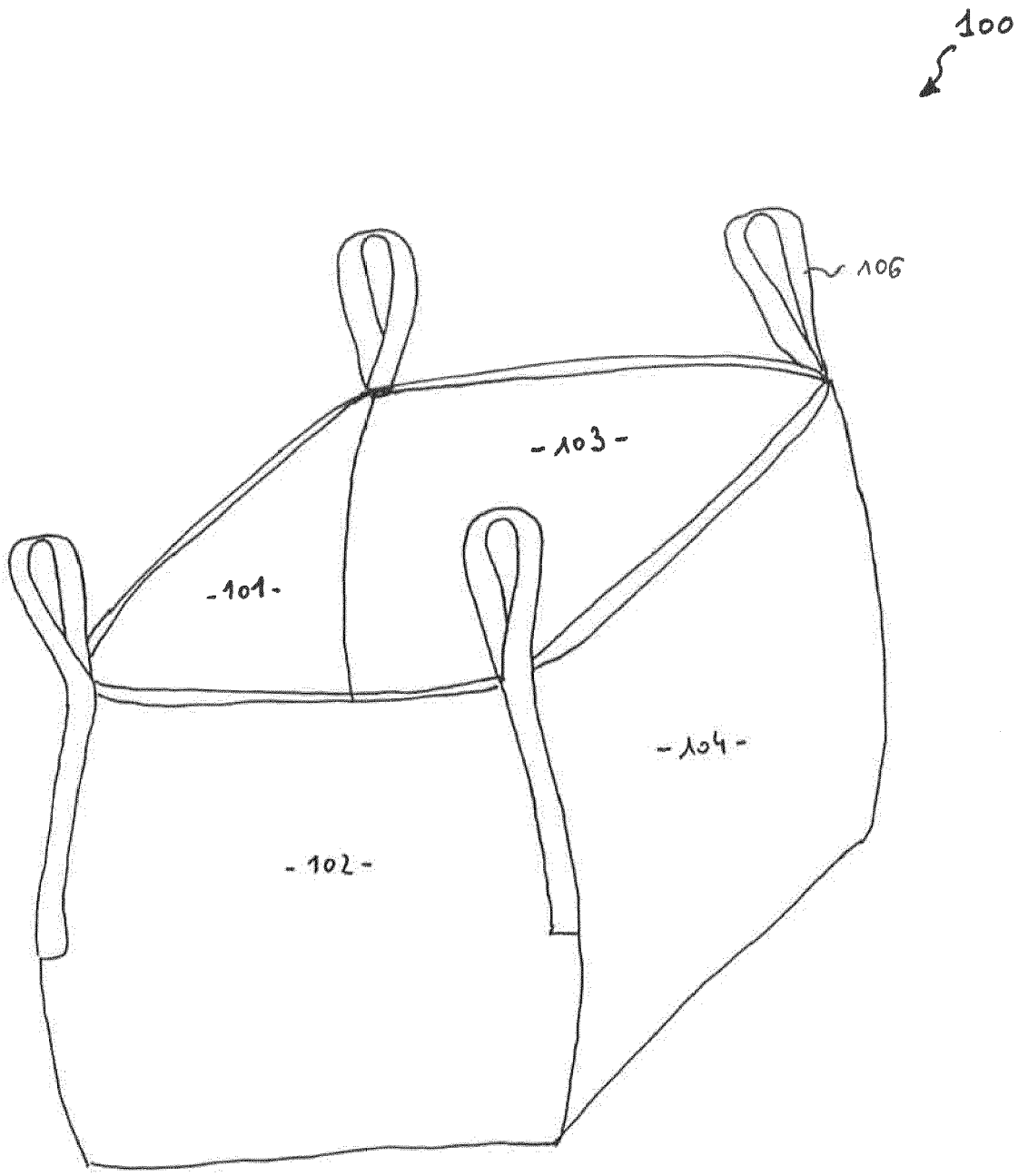

Fig. 7

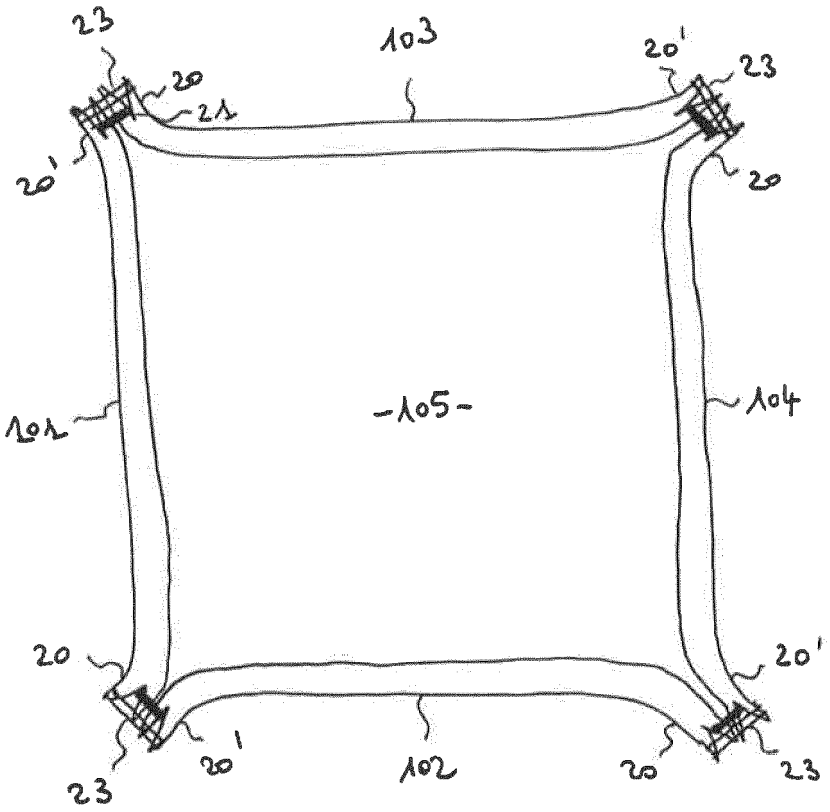

FIG. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 16 17 4965

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y A	US 2014/363106 A1 (SCHNAARS SR DANIEL R [US] ET AL) 11 December 2014 (2014-12-11) * paragraph [0139] - paragraph [0223]; figures 1-19 *	1 2-12	INV. D05B13/00 B65D88/16 D05B93/00
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Place of search	Date of completion of the search	Examiner
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