



## (51) International Patent Classification:

B65D 30/20 (2006.01) B65D 33/18 (2006.01)

B65D 33/02 (2006.01) B31B 70/00 (2017.01)

B65D 33/08 (2006.01)

## (21) International Application Number:

PCT/EP2019/059848

## (22) International Filing Date:

16 April 2019 (16.04.2019)

## (25) Filing Language:

English

## (26) Publication Language:

English

## (30) Priority Data:

18168048.9 18 April 2018 (18.04.2018) EP

## (71) Applicant: BILLERUDKORSNÄS AB [SE/SE]; Box 703, 169 27 Solna (SE).

## (72) Inventors: LEANDERSSON, Carina; Bondestad Björkhaget 1, 665 91 Kil (SE). SÖDERSTRÖM, Daniel; Lingonstigen 157, 973 33 Luleå (SE). ALMKVIST, Jonas; Brännbacksvägen 21, 952 51 Kalix (SE).

## (74) Agent: KRANSELL &amp; WENNBORG KB; P.O. Box 27834, 115 93 STOCKHOLM (SE).

## (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,

CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

## Published:

— with international search report (Art. 21(3))

## (54) Title: BAG, METHOD AND ARRANGEMENT FOR PRODUCING A BAG

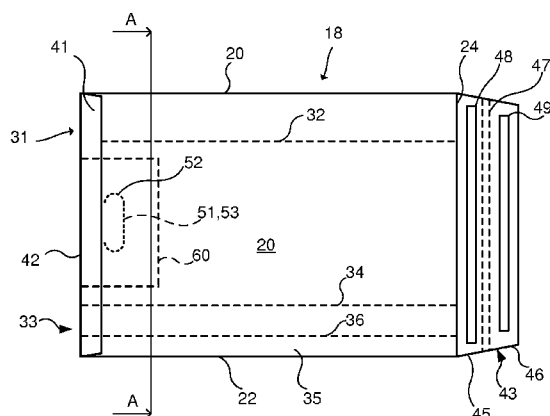


Fig. 2

(57) Abstract: A paper bag (1) for receiving and containing goods. The bag (1) comprises a first wall panel (10) having two longitudinal side edges (11, 12) and a second wall panel (20) having two longitudinal side edges (21, 22). A gusset section (31, 33) connects each longitudinal side edge of the first and second panels. The first (10) and second wall panels (20) exhibit respective, mutually aligned first cuts (51, 52) which are arranged in proximity to a first longitudinal end of the first and second wall panels and configured to form a cut-out handle. At least one reinforcement patch (60) is arranged between the first (10) and second (20) panels, overlapping said first cuts (51, 52) and adhered to the first and second panels. A method and a bag converting arrangement for producing a bag (10) is also provided.



## BAG, METHOD AND ARRANGEMENT FOR PRODUCING A BAG

### Technical Field

The present disclosure generally relates to paper bags. In particular, a paper  
5 bag for receiving and containing goods comprising a reinforced handle and a  
method as well as an a converting arrangement for producing a bag, are  
provided.

### Background

The market for e-commerce packaging is currently dominated by corrugated  
10 boxes and polybags. One example of a shipping polybag comprises a closable  
opening and no handle.

Carrier solutions for the retail segment are dominated by top loadable carrier  
bags. A typical retail carrier bag comprises two face panels, side gussets  
bridging the face panels and a handle on top of each face panel. The face  
15 panels and the side gussets are typically made of paper.

US 896 10 12 B2 discloses a bag having a front panel, a back panel and a gusset  
panel, all formed of multi-ply plastic sheet material. Either or both of the  
front panel and the gusset panel at one side has an extension, and either or  
both of the back panel and the gusset panel at the other side has an extension.  
20 The extensions are welded together at outer margins thereof so that the width  
of the combined extensions is greater than the width of the gusset panel. The  
extensions are formed with carrying apertures.

WO 20 17/ 151756 A1 discloses a bag comprising a body exhibiting a first panel  
and a second panel which panels are connected by means of two side gussets.  
25 The body exhibits a closed stepped end with a cut opening forming a handle.  
The bag may be formed of polymer or paper material.

## Summary

One object of the present disclosure is to provide a paper bag that is simple and convenient to handle.

5 A more particular object of the present disclosure is to provide a bag that is simple and convenient to pick up at, carry from and/or return to a retail store and/or a pick up point (for click and collect shopping).

Another object is to provide such a bag which may be loaded with comparatively heavy goods and still easily carried without the risk of breakage of the bag.

10 A more particular object of the present disclosure is to provide a bag that is simple and convenient to handle by a worker in a retail store, pick up point, e-tailer, distribution center and/or warehouse.

A further object of the present disclosure is to provide a bag that can be converted or transformed from a shipping bag to a carrier bag and/or from a  
15 carrier bag to a shipping bag.

A still further object of the present disclosure is to provide a bag that can easily be loaded with goods.

A still further object of the present disclosure is to provide a bag that is strong, durable, tear resistant, puncture resistant and/or wet resistant, for  
20 example that can withstand an intercontinental return journey.

A still further object of the present disclosure is to provide a bag that is environmentally friendly, such as fully recyclable and/or biodegradable.

A still further object of the present disclosure is to provide a bag that is compact to store.

25 A still further object of the present disclosure is to provide a bag that has a large printing area.

A still further object of the present disclosure is to provide a bag that enables a simple, cheap and/or efficient production.

A still further object of the present disclosure is to provide a bag that solves several or all of the foregoing objects.

- 5 A still further object of the present disclosure is to provide a method of producing a bag solving one, several or all of the foregoing objects.

Yet another object is to provide a paper bag converting arrangement for producing such a bag.

- 10 According to one aspect, there is provided a paper bag for receiving and containing goods. The bag comprises a first wall panel having two longitudinal side edges; a second wall panel having two longitudinal side edges; and a gusset section connecting each longitudinal side edge of the first and second panels. The first and second panels exhibit respective, mutually aligned first cuts or lines of weakness which are arranged in proximity to a  
15 first longitudinal end of the first and second wall panels and configured to form a cut-out handle. At least one reinforcement patch is arranged between the first and second panels, overlapping said first cuts and adhered to the first and second wall panels.

- 20 In use, goods may be loaded into the bag through an open second end of the bag which is arranged opposite to the first end. Grace to the gusset sections, the bag adopts an expanded state when an item is contained in the bag. The bag may adopt several expanded states, depending on the volume of the goods received in the bag, i.e. the degree to which the bag is filled.

- 25 The reinforced cut-out handle facilitates carrying of the bag, especially when an end consumer collects the bag from a pick-up store or the like and brings home the bag. The handle and reinforcement patch are arranged in proximity to the first end of the bag such that they do not reduce the available space for loading goods to any significant degree. By arranging the handle in proximity to an edge of the bag also allows for that the handle may be easily and

comfortably gripped by introducing the fingers into the cut-out handle and gripping the paper material arranged between the cut-out handle and the edge of the bag. The reinforcement patch which is adhered to both wall panels of the bag greatly enhances the strength of the bag at the area

5 surrounding the handle. Hereby the weight of the goods loaded into the bag may be increased without compromising the strength or durability of the bag and the handle. Additionally, since the reinforcement patch is adhered to both the first and second panels, it forms a seal around the cut-out handle such that no communication between the inside and outside of the bag is

10 formed at the handle. Hereby, the position of the handle may be chosen freely while still effectively separating the interior of the bag from the surrounding atmosphere.

Either of the gusset sections of the bag may be configured to support the bag on a horizontal surface at least in an expanded state of the bag. The gusset

15 sections of the bag may thus alternatively be referred to as support sections. When the bag is supported by either gusset section on a horizontal surface, the bag may be said to stand or be erected. In this position, the upper, non-supported gusset section may extend horizontally, substantially horizontally, generally horizontally, may be inclined with respect to horizontal or may

20 form, for example, a V-shape. Furthermore, in this position of the bag, the first end and/or the second end of the bag may extend vertically, substantially vertically, generally vertically or may be inclined with respect to vertical. In any case, the first end and/or the second end may be substantially perpendicular to, or perpendicular to either or both gusset sections.

25 However, at loading it may be preferred to keep the bag in a lying position where the first or second wall panel is supported by a supporting surface, e.g. on a table, a desk or the like

The bag according to the present disclosure may thus have "functions" in at least three of four edges of the bag, i.e. the carrying handle or the handle zone

30 for the carrying handle at the first end, the gusset sections for supporting the bag on a horizontal surface at least in an expanded state of the bag, and the

foldable flap for closing the first end of the bag. The second end of the bag, being opposite to said first end, may for example be provided with a second foldable flap or other means for closing the second end. Such a second foldable flap may exhibit first means for original closing, means for opening  
5 and second means for re-closing the second end. By this means, the end consumer may easily open the second end of the bag for accessing the goods transported from an on-line shop or the like. In cases where some of the goods is to be returned to the shop, the end user may re-load it into the bag, re-close the second flap and then use the bag for return shipment to the shop.

10 The bag according to the present disclosure may be loaded with goods or merchandise (e.g. clothes, shoes, foodstuffs) from the open end while the bag is standing or lying down. The bag may thus constitute an end-loadable bag. Loading of the bag while the bag is standing is particularly space saving. However, the bag may also easily be loaded in a lying position.

15 After the bag has been loaded with goods, the bag may be closed to transform into a retail carrier bag or transform into a shipping bag.

The reinforcement patch may be provided with a handle-forming second cut, which is aligned with the first cuts. By this means the formation of the handle is facilitated especially when the reinforcement patch is made of a strong and  
20 tear resistant material.

However, at an alternative embodiment, the reinforcement patch is not provided with any handle forming cut. At such embodiments the handle-forming cuts in the first and second panel defines a tear-line also for the reinforcement patch such that a portion of the reinforcement patch  
25 corresponding to the handle is teared out when pressure is applied to the handle portion from either wall panel. Such an embodiment prevents unintentional formation of the handle, e.g. during transportation and handling of the bag before reaching the end consumer.

The first and/or second cuts may comprise a tearable perforation. In this  
30 case, the area of the perforated handle lines constitutes a handle zone for a

carrying handle. In this manner, the bag may have a smooth exterior profile (e.g. with no protruding parts or through holes) in a first closed state during shipping. This reduces the risk of tearing the bag during outbound shipping.

The handle zone may be elongated and extend in a direction between the  
5 longitudinal side edges and/or in parallel with the edge at the first end of the bag. The handle zone for a carrying handle may be formed by a circumferential weakened line which defines a carrying handle. By this means the portions of first and second panel and the reinforcement patch defined within the circumferential weakened line is removed from the bag when  
10 forming the handle.

Alternatively the weakened line may extend only partially around the handle zone. By this means the cut-out portion of the handle zone remains connected to the bag and may form an additional reinforcing material layer when the handle is used and the remaining portion has been folded about the  
15 non-cut line.

The handle zone may comprise weakened lines other than perforated lines.

When the bag is delivered to a customer (e.g. at a pick up point or retail store), the carrying handle may be opened, e.g. by breaking the one or more perforated handle lines and folding up the handle flap such that the carrying  
20 handle is created from the handle zone. In this manner, the bag is also converted into a retail carrier bag. The bag may comprise one or several carrying handles according to the present disclosure.

The carrying handle may alternatively be constituted by a through hole. Regardless of the type of carrying handle, the carrying handle may be  
25 substantially centered along the first end. Alternatively, or in addition, one or more non-centered carrying handles may be used.

The first and second wall panels may be connected along their first longitudinal ends for closing the corresponding first end of the bag.

The first and second wall panels may be connected by means of a first flap which extends from the first end of the first wall panel and is folded onto and adhered to the second wall panel.

- 5 The first flap may be permanently adhered to the second wall panel. By permanently adhered is meant that the first flap can not be removed from the second wall panel without tearing or damaging the first flap or the second wall panel. By this means a tamper indicating functionality is achieved.

The handle forming cuts may be arranged such that they do not extend into the first foldable flap. Hereby manufacturing of the bag is facilitated.

- 10 Preferably the handle forming cuts and the handle zone may be arranged at a distance from the first end of the first and second panels which distance is equal to or somewhat greater than the longitudinal length of the first flap. By this means the handle will be formed just adjacent the first flap. Hereby the first flap and the corresponding and overlapping areas of the first and second  
15 wall panels as well as of the reinforcement patch may easily and comfortably be gripped by inserting ones fingers through the cut-out handle.

- The carrying handle or the handle zone for the carrying handle, as the case may be, may have a geometrical center point 3.0 cm to 8.5 cm, such as approximately 4.5 cm, from a first end of the bag, when the first foldable flap  
20 has been folded over and adhered to the second panel.

The reinforcement patch may be arranged such that it does not extend onto the first foldable flap. By this means manufacturing of the bag is facilitated and the material thickness at the region of the first foldable flap is kept comparatively small.

- 25 The reinforcement patch may extend over between 30 and 90 % of the width of the first and second panel, preferably between 40 and 80 % and more preferably between 55 and 75 %.

The reinforcement patch may extend over between 5 and 35 % of the longitudinal length of the first and second panel, preferably between 10 and 30 % and more preferably between 15 and 25 %.

5 The bag may further comprise a second flap which is foldable and arranged at the second end of the bag. Hereby the bag may be loaded from the second end and easily closed when the bag has been loaded, by folding and adhering the second flap.

The second foldable flap may be arranged as an extension of the first panel.

10 The bag according to the present disclosure may for example be used to ship and carry clothes, shoes, foodstuffs and household goods. Throughout the present disclosure, the first wall panel and the second wall panel may alternatively be referred to as a first main side and a second main side, respectively.

15 The second foldable flap may be re-closable and/or tamper-proof. For example, the second flap may comprise at least one tear strip for tearing the flap and at least one fastening element for fastening the second flap to the first wall panel or to the second wall panel. The tear strip may be arranged distal of one of the at least one fastening element in an open state of the re-closable flap. Throughout the present disclosure, a fastening element may be  
20 constituted by a peel and seal strip. However, alternative types of fastening elements are conceivable. The fastening element may extend over substantially the entire length of an associated flap, e.g. of the re-closable flap.

25 The second foldable flap may thus comprise a first adhesive portion for original closing of the bag, a first tear strip for opening the second foldable flap and a second adhesive portion for reclosing the second foldable flap.

The major parts of the bag of the present disclosure are preferably made of a paper material. As an example, the wall panels, the bottom section and the side sections may be made of a paper material. These parts of the bag are

preferably formed from a single piece of paper material. Further, where applicable, the first and the second flap may comprise the same paper material.

The paper material may for example have a grammage of 50 gsm to 200 gsm, such as 80 gsm to 140 gsm, such as 85 gsm to 120 gsm. "gsm" means g/m<sup>2</sup>. The grammage is measured according to the standard ISO 536:2012.

It has been found that high puncture resistance is particularly advantageous for e-commerce bags. The puncture resistance of a paper material depends i.a. on the stretchability, the tensile strength and the tear strength.

10 The paper material is preferably a kraft paper material. The pulp used for forming the paper material preferably comprises at least 50% softwood pulp, more preferably at least 75% softwood pulp and most preferably at least 90 % softwood pulp.

In one embodiment, the paper material has the following characteristics:

- 15 - a tensile strength in the machine direction (MD) of at least 5.1 kN/m, preferably at least 7.6 kN/m;
- a tensile strength in the cross direction (CD) of at least 3.0 kN/m, preferably at least 4.5 kN/m;
- a stretchability in the MD of at least 1.9 %, preferably at least 2.1 %;
- 20 - a stretchability in the CD of at least 6.5 %, preferably at least 7.0 %;
- a tear strength in the MD of at least 480 mN, preferably at least 850 mN; and
- a tear strength in the CD of at least 510 mN, preferably at least 900 Nm

25 In another embodiment, the paper material has the following characteristics

- a tensile strength in the machine direction (MD) of at least 9.6 kN/m, preferably at least 12.0 kN/m;
- a tensile strength in the cross direction (CD) of at least 5.3 kN/m, preferably at least 7.2 kN/m;

- a stretchability in the MD of at least 2.3 %, preferably at least 2.6 %;
- a stretchability in the CD of at least 6.0 %, preferably at least 6.5%;
- a tear strength in the MD of at least 950 mN, preferably at least 1380 mN; and
- 5     - a tear strength in the CD of at least 1000 mN, preferably at least 1600 Nm

In yet another embodiment, the paper material has the following characteristics:

- a tensile strength in the machine direction (MD) of at least 10.0 kN/m, preferably at least 10.8 kN/m;
- 10     - a tensile strength in the cross direction (CD) of at least 5.5 kN/m, preferably at least 5.9 kN/m;
- a stretchability in the MD of at least 2.0 %, preferably at least 2.3 %;
- a stretchability in the CD of at least 5.5 %, preferably at least 6.0 %;
- 15     - a tear strength in the MD of at least 1000 mN, preferably at least 1085 mN; and
- a tear strength in the CD of at least 1050 mN, preferably at least 1150 mN.

In another embodiment, the paper material has the following characteristics:

- 20     - a tensile strength in the MD of at least 6.5 kN/m, preferably at least 7.3 kN/m;
- a tensile strength in the CD of at least 4.6 kN/m, preferably at least 5.2 kN/m;
- a stretchability in the MD of at least 4.8 %, preferably at least 5.8 %;
- 25     - a stretchability in the CD of at least 7.0 %, preferably at least 8.0 %;
- a tear strength in the MD of at least 1000 mN, preferably at least 1100 mN, more preferably at least 1200 mN; and
- a tear strength in the CD of at least 1050 mN, preferably at least 1120 mN, more preferably at least 1280 mN.

- 30     In yet another embodiment, the paper material has the following characteristics:

- a tensile strength in the MD of at least 7.0 kN/m, preferably at least 8.0 kN/m;
- a tensile strength in the CD of at least 4.2 kN/m, preferably at least 4.5 kN/m;
- 5     - a stretchability in the MD of at least 9.0 %, preferably at least 10.0 %;
- a stretchability in the CD of at least 7.0 %, preferably at least 8.5 %;
- a tear strength in the MD of at least 1300 mN, preferably at least 1400 mN; and
- a tear strength in the CD of at least 1500 mN, preferably at least 1700
- 10     mN.

Examples of paper materials suitable for the bag according to the present disclosure include Performance White SE WS-R (a white sack paper), Axello Kraft (White MF kraft paper), Xpression Fine (White MF kraft paper), Expression Tough 90 gsm, Xpression Tough 100 gsm and FibreForm® (all

15     marketed by BillerudKorsnäs AB (Sweden)).

The paper material of the present disclosure may be coated, e.g. with a pigment coating.

Each gusset section may for example comprise a pair of subpanels folded along a gusset fold line. The two subpanels of the gusset may have a generally

20     flattened "V" shape when the bag is in a collapsed state. Thus, in the collapsed state of the bag, the gusset fold line may have an acute angle. In one expanded state of the bag, the gusset fold line may have an obtuse angle such that the gusset section is concave. In a further expanded state of the bag, the gusset fold line may have a more obtuse angle. Alternatively, at least one

25     gusset section of the bag may be flat or substantially flat when the bag adopts one or more expanded states.

Since the bag may be substantially flat in a collapsed state, several empty bags may be stored and/or transported in a stack which is space saving. In the collapsed state of the bag, the thickness of the bag may substantially

correspond to the sum of the thicknesses of the first wall panel and the second wall panel.

According to one example, a user (e.g. a worker at a retail store, e-tailer, distribution center and/or warehouse ) may pick up a bag according to the present disclosure in a collapsed state, insert his/her hand into the bag through the second end opening and spread his/her fingers within the bag to separate the first wall panel and the second wall panel such that the bag adopts a slightly expanded state. In this expanded state, the bag may be laid down or put standing on a horizontal surface, such as a desk, and the bag can be loaded with goods. This loading procedure is comfortable. In the first closed state, i.e. when the second re-closable flap closes the second end opening a first time, the bag may be shipped or may be handed over to a customer. In case the bag is handed over to a customer, the customer can carry the bag by means of the carrying handle. The bag in the collapsed state may thus be transformed either into a shipping bag or into a retail carrier bag.

The first end may be substantially flat in an expanded state of the bag.

The bag may be formed from a single piece of material. For example, at least the first wall panel and the second wall panel may be formed from a single piece of material. An optional first and second flap for closing a second side opening at the second end may also be formed from the same piece of material. A reinforcing patch according to the present disclosure may be formed from a different piece of the same material or of a different material.

A bag according to the present disclosure may have a longitudinal length, in a direction between the first and second end, and a width (e.g. in a collapsed state of the bag), in a direction between the longitudinal side edges, and wherein the length of the bag is greater than the width of the bag. Thus, the first and second end may constitute short sides of the bag and the side edges may constitute long sides of the bag. In this case, the bag may have an appearance similar to a handbag. This type of bag may be used for shipping

small garments, like underwear. Moreover, this type of narrow bag also helps centering of the mass in the bag.

Alternatively, the bag may have a length, in a longitudinal direction between the first end and the second end, and a width (e.g. in a collapsed state of the bag), in a direction between the longitudinal side edges, and wherein the length of the bag is smaller than the width of the bag. Thus, the side edges may then constitute short sides of the bag and the first and second ends may constitute long sides of the bag. In this case, when carrying the bag by means of the carrying handle, the bag is oriented horizontally, i.e. the bag has a vertical extension that is smaller than the horizontal extension. .

The bag may comprise several reinforcing patches. In case of a plurality of reinforcing patches, the reinforcing patches may be stacked. The outmost reinforcement patches of such a stack may be adhered to the inside of the first and second wall panels respectively and the intermediate patches may be adhered mutually and to the outmost patches. Such a plurality of stacked reinforcing patches increases the stiffness of the carrying handle. The reinforcing patches may be adhered to the insides of the first wall panel and the second wall panel, e.g. by gluing.

The reinforcing patch may be substantially centered, or centered, over a center of gravity of the bag in an unloaded state. The reinforcing patch may be substantially centered, or centered, between the first side section and the second side section.

The second foldable flap may comprise two fastening elements and one tear strip arranged between the two fastening elements. In this case, first end may be permanently closed. The closing of the first end may in this case be carried out during manufacture of the bag. The closing of the second side section may for example be implemented by means of the first flap which is folded onto and adhered to the second wall panel by means of gluing.

A first fastening element (e.g. the most distal fastening element on the second flap when the flap is open) may be used to close the bag a first time, e.g. prior

to shipping the bag or prior to handing over the bag to a customer at a retail store. The customer may then open the bag by tearing the tear strip such that the second flap is divided into a first flap section and a second flap section. In this case, the first flap section remains on first wall panel or the second wall  
5 panel by means of the first fastening element. However, the bag can be opened by opening the second flap section. Should the customer want to close the bag again, e.g. for returning merchandise, the second flap section may be connected to the first wall panel or the second wall panel by means of a second fastening element (e.g. the most proximal fastening element on the  
10 second flap when the second flap is open) such that the bag is closed by means of the second flap.

The tear strip may for example be constituted by two parallel rows of perforations on the second flap between the two fastening elements. The perforations may for example be produced by means of die cutting or  
15 perforating. The tear strip may extend parallel with the second end of the bag.

Each of the two fastening element may be constituted by a peel and seal strip. In this case, the peel and seal strips and the tear strip may be manufactured by providing two glue lines (e.g. of pressure sensitive glue) on the re-closable  
20 second flap, covering the glue lines with a release liner and perforating the release liner and the re-closable flap. Thus, in order to close the re-closable flap a first time, the most distal part of the release liner (most distal when the re-closable flap is open) may be peeled off and the re-closable flap may be closed by pressing the most distal glue line onto the first wall panel or the  
25 second wall panel. In order to open the bag, the tear strip of the re-closable flap formed by the two perforation lines may be torn off such that a first flap section of the re-closable flap stays glued on the bag and a second flap section of the re-closable flap is opened. In order to close the re-closable flap a second time, the most proximal part of the release liner (most proximal when  
30 the re-closable flap is open) may be peeled off and the re-closable flap may be closed by pressing the most proximal glue line of the second flap section onto the first wall panel or the second wall panel.

Each of the first flap and the second re-closable flap may be connected to either the first wall panel or the second wall panel. Thus, if the first flap and the second flap are connected to the second wall panel in their closed states, the first wall panel provides a large surface for printing. The printing area  
5 may be rectangular and may or may not include the area of the carrying handle (or the handle zone for the carrying handle).

The bag according to the present disclosure may constitute both a shipping bag and a retail carrier bag. The bag may be converted or transformed from a shipping bag to a retail carrier bag and from a retail carrier bag to a shipping  
10 bag.

According to a further aspect, there is provided a method of producing a paper bag. The method comprises the steps of:

- providing a web of paper material;
- feeding the web from an upstream end to a downstream end of a paper bag  
15 converting machine
- converting the web into a tube exhibiting a first panel section and a second panel section;
- folding the web around edges of a first and a second gusset plate for forming gusset sections connecting each longitudinal side edge of the first and second  
20 panel sections;
- attaching a reinforcement patch to the first panel section and the second panel section, wherein
- attaching the reinforcement patch to the first and second panel sections comprises the step of applying an adhesive to at least one of the panel  
25 sections and/or to at least one side of the reinforcement patch by means of an adhesive applicator which is arranged at the first and/or the second gusset plate.

Attaching the reinforcement patch by means of an adhesive applicator which is arranged at the first and/or second gusset plate results in that the adhesive  
30 for attaching the reinforcement patch to the inside of the first or second panel sections is applied in proximity to and shortly upstream of the position where

the so applied adhesive is to make contact with the first or second panel section or with the reinforcement patch. By this means it is prevented that the applied and exposed adhesive makes contact with other parts of the converting machine or the web. Such unintentional contact of the adhesive with the machine or the web causes smearing of the adhesive which may cause jamming and other failures of the converting process and which requires frequent maintenance operations for removing the smeared adhesive.

The step of applying an adhesive to at least one of the panel sections and/or to at least one side of the reinforcement patch may comprise applying the adhesive by means of an adhesive applicator which is arranged at or in proximity to the downstream end of said first and/or second gusset plate.

Alternatively or in combination, the step of applying an adhesive to at least one of the panel sections and/or to at least one side of the reinforcement patch may comprise applying the adhesive by means of an adhesive applicator which is arranged at a recess which is arranged in at least one of the gusset plates and which extends through said at least one gusset plate centrally and in the upstream direction from an downstream end of said at least one gusset plate.

The invention also relates to a paper bag converting arrangement for forming a paper bag from a web of paper material. The arrangement comprises means for feeding a web of paper material in a downstream feed direction and means for adhering a reinforcement patch at different positions along the web. A fold guide is arranged to convert the web into a tube exhibiting a first panel section and a second panel section. A first gusset plate and a second gusset plate are arranged one over the other for forming at least one gusset section connecting the first and second wall panel. A glue applicator is arranged to apply a glue filed to each reinforcement patch or to respective portions of the web, which portions make contact with a respective reinforcement patch after forming the tube. The glue applicator is arranged a

at a recess formed in one of said first and second gusset plates; and said recess extends upstream from a downstream edge of said gusset plate.

The bag according to the present disclosure may be produced in the web feeding direction of the converting machine. That is, the side edges of the bag  
5 may be parallel with the feed direction. In this case, the fold line of the first foldable flap may be substantially perpendicular to the feed direction, i.e. substantially parallel with the cross direction. The bag according to the present disclosure may be produced at high machine speeds.

### **Brief Description of the Drawings**

10 Further details, advantages and aspects of the present disclosure will become apparent from the following embodiments taken in conjunction with the drawings, wherein:

Fig. 3 is a schematic plan view of a bag according to an embodiment of the invention in.

15 Fig. 2 is a cross section along line A-A in fig. 1.

Fig. 3 is a schematic perspective view of the bag shown in fig. 1.

Fig. 4 is a schematic plan view of a blank for forming the bag shown in fig. 1

Fig. 5 is a schematic perspective view of a paper bag converting machine for forming a bag according to the invention from a web of paper material;

20 Fig. 6a is a schematic perspective view of the converting machine shown in fig. 5 and fig. 6b shows a detail thereof in enlarged scale.

Fig. 7a is a schematic perspective view of the converting machine shown in fig. 5 and fig. 7b shows a detail thereof in enlarged scale.

25 Fig. 8a is a schematic perspective view of the converting machine shown in fig. 5 and fig. 8b shows a detail thereof in enlarged scale.

Fig. 9a is a schematic perspective view of the converting machine shown in fig. 5 and fig. 9b shows a detail thereof in enlarged scale.

30 Fig. 10a is a schematic perspective view of the converting machine shown in fig. 5 and fig. 10b shows a detail thereof in enlarged scale. Fig. 10c is a cross-section of the detail shown in fig. 10b.

Fig. 11a is a schematic perspective view an alternative embodiment of the converting machine according to the invention. Fig. 11b is a cross-section thereof in enlarged scale and fig. 11c is a perspective view illustrating some details thereof.

- 5 Fig. 12a is a schematic perspective view of the converting machine shown in fig. 5 and fig. 12b shows a detail thereof in enlarged scale.

### Detailed Description

In the following, a paper bag according to the invention for receiving and containing goods will be described. The same reference numerals will be used  
10 to denote the same or similar structural features.

Fig. 1 schematically represents a blank 62 for forming the bag 10. However, as will be described further in detail below, when forming the bag in a paper converting machine, a web of paper material is fed in a feed direction from an upstream end to a down stream end of the machine. The web is continuously  
15 folded and glued into a tubular configuration which is thereafter cut generally transversely to the feed direction, thereby to form individual bags.

With reference to figs. 1-4, the bag 10 comprises a first wall panel 10 with longitudinal side edges 11, 12, a first longitudinal end 13 and a second longitudinal end 14. A second wall panel 20 comprises longitudinal side  
20 edges 21, 22 a fist longitudinal end 23 and a second longitudinal end 24.

First longitudinal edges 11, 21 of the first 10 and second 20 wall panels are connected by means of a first gusset section 31, The first gusset section 31 comprises fold lines which extend along the first side edges 11, 21 and an intermediate fold line which extends centrally between the first side edges.  
25 Correspondingly, second side edges 12, 22 of the first 10 and second 20 wall panels are connected by means of a second gusset section 33. The second gusset section 33 is extended sidewise by a longitudinal glue flap 35 which extends in parallel with the second side edges 12, 22 and is connected to the second gusset section by a fold line 36. As best seen in fig. 3 the glue flap 35 is  
30 adhered to the inside of an edge portion of the second panel 20, such that the

glue flap's fold line 36 coincides with the second wall panel's second side edge 22. The second gusset section 33 thus comprises a fold line along the second side edge 12 of the first wall panel 10, the glue flap's fold line 36 and an intermediate fold line 34 extending centrally between fold lines 12 and 36.

- 5 By this means the first 31 and second 33 gusset sections exhibit a generally V-shaped configuration allowing these sections and the bag to be expanded and retracted to a generally flat configuration

A first flap 41 is connected to the first end 13 of the first wall panel 10 by means of a fold line 43 extending in parallel with the first end 13. The first  
10 foldable flap 41 is provided with an adhesive (not shown) such that it may be folded over the second wall panel 20 and adhered to the outside of the second wall panel 20 for closing the first end of the bag 10. Normally, the first flap is folded and permanently adhered to the second wall panel 20 already during manufacturing of the bag, in the paper bag converting machine. A second flap  
15 43 is foldably connected to the second end 14 of the first wall panel 10 by means of a fold line 44. The second foldable flap 43 exhibits a proximal portion 45 and a distal portion 46 which is connected to the proximal portion 45 by means of a tear strip 47. The proximal 45 and distal 46 portions are each provided with an adhesive covered by a peel strip 48, 49.

- 20 At a first closing of the bag the peel strip 49 covering the adhesive on the distal portion may be removed, the second foldable flap folded over the second wall panel 20 and the distal portion 46 adhered to the outside of the second panel. The bag may thereafter be opened by tearing the tear strip 47 thereby releasing the proximal portion 45 but leaving the distal portion  
25 adhered to the second panel 20. For re-closing the bag, the peel strip 48 on the proximal portion is removed and this portion is folded over the second wall panel 20 and adhered to its outside.

The bag 10 is further provided with first handle-forming cuts 51, 52 arranged in the first 10 and second 20 wall panels. The first cuts 51, 52 are positioned

centrally in the respective wall panel and in proximity to the first ends 13, 23.  
The first cuts 51, 52 are identical and aligned.

In the shown example each first cut 51, 52 comprises a tearable perforation.  
The cuts are generally C-shaped such that they define a handle zone 50 but  
5 does not completely surround the handle zone 50 circumferentially. Thus, in  
use, the handle is not formed until the perforation is teared by applying  
pressure to the handle zone 50, from either side of the bag. By this means the  
handle zone 50 remains integral with the wall panels 10, 20 e.g. during  
transportation to the goods loading cite, loading and shipping to the end  
10 consumer. This provides for that the handle does not interfere with such  
handling of the bag.

When the first cuts 51, 52 have been teared and the handle has been formed  
by the creation of a handle opening through the first 10 and second 20 wall  
panels, the handle zone remains connected to the bag 10. This is achieved by  
15 the non-perforated portion of the handle zone's circumference. This non-  
perforated portion forms a fold line or a hinge such that the handle zone 50  
may be folded to overlap the wall panels, thereby increasing the strength of  
the bag in proximity to the handle.

According to a not shown embodiment, the first cuts may completely  
20 surround the handle zone circumferentially such that the material of the  
handle zone is completely removed when the cuts are teared. According to a  
further not shown embodiment the first cuts are continuous die-cuts instead  
of perforations such that the handle is formed when producing the bag. Such  
die-cuts may or may not completely surround the handle zone  
25 circumferentially. In a further not shown embodiment, non perforating lines  
of weakness are use instead of die-cuts or perforations.

The bag further comprises a reinforcement patch 60 which is arranged to  
reinforce the bag 10 at the area surrounding the handle, thereby increasing  
the strength of the handle and allowing a greater weight to be carried in the  
30 bag, by means of the handle.

In the shown example, the reinforcement patch 60 comprises a rectangular piece of paper. The paper may be of the same sort and quality as the paper forming the other parts of the bag 10. However, the reinforcement patch may alternatively be formed of an other sort and quality of paper or of another material such as of polymer material.

The reinforcement patch 60 is adhered to the inside of both the first 10 and the second 20 wall panel at a position such that it fully overlaps the first cuts 51, 52 forming the handle. Preferably the reinforcement patch also extends somewhat beyond the first cuts 51, 52 in both longitudinal and transverse directions of the bag. Especially, it is advantageous if the reinforcement patch extends in the longitudinal direction from the first cuts all the way to the first end 13, 23 of the first and second wall panels 10, 20. The area between the first cuts and the first end 13, 23 is arranged above the handle in use and is thus exposed to comparatively great forces and shear stress.

Preferably however, the reinforcement patch 60 does not extend onto the first foldable flap 41, since this would complicate the manufacturing of the bag and adversely increase the thickness of the first end of the bag when the first foldable flap 41 has been folded over for closing the first end of the bag.

At the shown example a handle-forming second cut 53 is arranged in the reinforcement patch 60. The second cut also comprise a tearable perforation and has shape and position which fully corresponds to the first cuts 51, 52 such that the second cut 53 is fully aligned with the first cuts 51, 52. By this means the formation of a uniform handle is facilitated.

At an alternative embodiment, which is not shown the second cut is instead die-cut and at a further alternative no second cut is arranged in the reinforcement patch. In this later alternative the first cuts are sufficient for tearing the material of the wall panels and the intermediate reinforcement patch. As for the first cuts, the second cut in the reinforcement patch may be replaced by at least one non-perforating line of weakness.

However, it is advantageous if the first 51, 52 and second 53 cuts are identical since they may then be simultaneously formed by a single die-cut or perforation tool in the paper converting machine, at a position downstream of the tube forming station.

- 5 With reference to figs 5-12c a paper converting machine and a method for manufacturing the bag according to the invention will now be described.

The paper converting machine 100 exhibits an upstream end 101 and a downstream end 102. A web 104 of paper material is fed from a roll 106 at the upstream end 102 in a web feed direction FD towards the downstream end  
10 102. A first adhesive or glue applicator 108 intermittently applies separate rectangular fields 60' of glue to a portion of the web 104 which will form the inside of the first wall panel 10 of the bag 10. Each field 60' of glue positioned and sized for receiving a reinforcement patch 60.

A second glue applicator 110 continuously applies a string of glue to an edge  
15 portion of the web 104, which edge portion will form the side edge 22 of the second wall panel 20.

A rotating vacuum cylinder 114 receives reinforcement patches 60 from a reinforcement patch feeding roll (not shown), holds them by vacuum and releases and presses individual reinforcement patches 60 onto the web 104 at  
20 the positions of the glue fields 60'. By this means the reinforcement patches are attached to the inside of the first panel at the correct position where the handle zone 50 will later be formed. At an alternative embodiment (not shown) the glue for attaching the reinforcement patch to the web may be applied to the reinforcement patch when it is held by the rotating cylinder.

25 The web is feed further towards a folding and gusset forming station which comprises a first, upper 116 and a second, lower 118 gusset plate. The gusset plates 116, 118 extend in the feed direction FD and are arranged such that the distance between them decreases in the feed direction FD. At the upstream end of the gusset plates 116, 118 they are separated by approx. 100-150 mm  
30 and at the downstream end this distance is reduced to approx. 5-20 mm.

The folding and gusset forming station further comprises a first fold guide 120 which folds the second panel forming portion of the web 104 onto the first panel forming portion of the web 104. A second fold guide (not shown) folds an edge portion of the web to form the glue flap 35.

- 5 For forming the gusset sections 31, 33 and as best seen in fig. 8b, the folding and gusset forming station further comprises a first 121 and a second 122 gusset guides which urges a respective portion of the web in between the first 116 and second 118 gusset plates to thereby form the gusset fold lines. In this way first gusset guide 121 forms, together with corresponding edges of the
- 10 first 116 and second 118 gusset plate, fold lines 12, 34, 36. Second gusset guide 122 forms, in a corresponding manner, gusset fold lines 11, 32, 21.

In fig. 9b it is illustrated how the portion of the web 104 forming the second panel, further downstream, has been approached to the first panel forming portion of the web 104 such that the left hand edge (as seen in fig 9b) of the

15 second wall panel 20 has made contact with the glue flap 35.

The so formed tubular configuration of the web is fed to and in between a pair of rolls 124 arranged downstream of the gusset plates 116, 118. The rolls 124 urges the first 10 and second 20 wall panels towards each other such that the tube is given a flat and thin configuration. The rolls 124 also presses the

20 left side edge of the second wall panel 20 towards the glue flap, such that the glue string 112 securely attaches the second wall panel 20 to the glue flap 35.

For attaching the reinforcement patch 60 also to the inside of the second wall panel 20, the paper converting machine comprises a third glue applicator.

Figs. 10a-c illustrates schematically a first embodiment of the third glue

25 applicator 126. The third glue applicator comprises a plurality of nozzles 128 which are fed with glue by a feed line 130. The third glue applicator also comprises an accurately controllable valve for precise application of glue to the reinforcement patches 60 as they pass the third glue applicator at the high speed by which the web is feed.

In the example shown in figs 10a-c the third glue applicator 126 is arranged at the upstream end of a recess 132 which extends upstream from the downstream end of the first, upper gusset plate 116. The width of the recess 132 is equal to or somewhat greater than the width of the reinforcement patch 60. The third glue applicator 126 applies a field of glue 60" to the inside of the second wall panel 20 at successive positions such that each field of glue 60" will contact and coincide with a corresponding reinforcement patch 60 which has earlier been attached to the inside of the first wall panel.

An important advantage of this arrangement of the third glue applicator 126 is that it is arranged at a position comparatively far downstream of the paper converting machine. By this means the risk of the exposed glue field 60" to make contact with the web or the gusset plates or other parts of the machine is reduced.

At the specific embodiment shown in figs. 10a-b the recess formed in the first, upper gusset plate 116 further reduces this risk. Since the third glue applicator is arranged at the upstream edge of the recess 132, the glue field 60" can not make contact with the first upper gusset plate 116. Additionally, since the upper first gusset plate 116 is arranged at a certain distance from the second gusset plate, the glue field is prevented for making contact with the upper side of the second lower gusset plate 118. The side portions 134 of the first gusset plate 116 arranged on both transverse sides of the recess 132 also contribute to keep the second wall panel 20 and the glue field 60" out of contact from the lower gusset plate 118.

The arrangement of the third glue applicator 126 thus allows for a secure attachment of the reinforcement patch 60 to the inside of both the first 10 and the second 20 wall panel, also at very high web feed rates.

At a not shown alternative of the embodiment shown in figs. 10a-c, a corresponding recess may also be formed in the second, lower gusset plate 118. Such a recess should preferably have the same width as the recess 132 formed in the first upper gusset plate 116. The length of the recess formed in

the lower gusset plate 118 may be equal to the length of the recess 132 formed in in upper gusset plate 116. However, the side portions 134 of the upper gusset plate will normally prevent the second wall panel 20 to hang down by the action gravity through the upper recess 132 at least along a certain distance downstream of the third glue applicator 126. It may thus be sufficient to arrange a recess in the lower gusset plate 118 such that it extends only a shorter distances upstream from the downstream end of the lower gusset plate 118.

At a further not shown embodiment, the side portions 134 of the upper gusset plate may be supported e.g. by means of supporting studs arranged between the side portions 134 and the upper side of the second, lower gusset plates. By such means the risk of the side portions to bend down toward the second gusset plate 118 is reduced and thereby also the risk that the second wall panel 20 with the glue field 60" makes contact with the lower gusset plate 118.

Figs. 11a-c illustrates schematically an alternative embodiment of the third glue applicator 226. At this embodiment the third glue applicator 226 is arranged for applying a glue field 60"" directly to the upper side of the reinforcement patch 60, which as in the previous embodiment has earlier been attached to the first wall panel 10. The third glue applicator 226 is generally arranged upstream of the position where the second wall panel 20 is folded onto the first wall panel 10. This allows for that the third glue applicator 226 may have greater vertical dimensions and that it may extend up above the first upper gusset plate 216. The first upper gusset plate is provided with a through hole 240. The third glue applicator extends through the through hole 240. The second lower gusset plate 218 is provided with a recess 232 which extends from the downstream end of the second gusset plate 218 upstream to the position of the through hole 240 and the third glue applicator 226. As in the previous embodiments, the width of the recess 232 should be equal to or somewhat greater than the width of the reinforcement patch 60 and the glue filed 60"".

The third glue applicator 226 applies a glue filed 60''' directly to the upper side of each reinforcement patch passing at high speed. Since the recess 232 extends from the position of the third glue applicator 226 all the way to the downstream end of the second lower gusset plate 218, the glue field 60''' will not risk to come into contact with the lower gusset plate 218. Additionally, at this embodiment the gravity acting on the first wall panel 10 strives to bring the first wall panel 10 further away from the first upper gusset plate 216. Thereby there is no risk that the glue filed 60''' makes contact with the first upper gusset plate 216. At a not shown alternative of this embodiment the side portions 234 arranged on both transverse sides of the recess 232 may be supported by suspension means arranged between these side portions 243 and the first upper gusset plate.

Figs. 12a and b schematically illustrates how the handle zone 50 is formed at a cutting station 150 which is arranged downstream of the folding and gusset forming station and downstream of the gusset plates 116, 118 with the third glue applicator 126. The cutting station comprises a perforating tool which simultaneously punches a tearable perforation 51, 52, 53 through the first wall panel 10, the second wall panel 20 and the intermediate reinforcement patch 60. In a not shown alternative embodiment the tearable perforations 51, 52, 53 may be formed by means a rotational perforating roll. As explained above the cutting tool may either be a perforation tool or a die-cut and the handle zone 50 may be partially or completely circumferentially surrounded by the cut. Alternatively, the tool may be arranged to create a non-penetrating line of weakness for forming the cut-out handle by tearing or breaking the line of weaknes

The converting machine may also comprise a station for forming weakening lines, such as perforations, in the web 104 for separating successive bags from each other and a station which separates the bags from each other by breaking the weakening lines. Such stations and means for separating the bags are well know and not further disclosed here.

While the present disclosure has been described with reference to exemplary embodiments, it will be appreciated that the present invention is not limited to what has been described above. Although the bag 10 may be produced with the dimension ratios presented in the drawings, it will be appreciated that the dimensions of the parts may be varied as needed. Accordingly, it is intended that the present invention may be limited only by the scope of the claims appended hereto.

## CLAIMS

1. A paper bag (1) for receiving and containing goods, the bag (1) comprising:
  - a first wall panel (10) having two longitudinal side edges (11, 12);
  - 5 - a second wall panel (20) having two longitudinal side edges (21, 22);
  - two gusset sections (31, 33), each gusset section connecting a longitudinal side edge of the first wall panel with a corresponding longitudinal side edge of the second panel; wherein
  - the first (10) and second panels (20) exhibit respective, mutually
  - 10 aligned first cuts (51, 52) or lines of weakness, which are arranged in proximity to a first longitudinal end (13, 23) of the first and second wall panels and configured to form a cut-out handle; and wherein
  - at least one reinforcement patch (60) is arranged between the first (10) and second (20) panels, overlapping said first cuts (51, 52) and
  - 15 adhered to the first (10) and second (20) wall panels.
2. The bag according to claim 1, wherein the reinforcement patch (60) is provided with a handle-forming second cut (63), which is aligned with the first cuts (51, 52).
3. The bag according to claim 1 or 2, wherein the first (51, 52) and/or
- 20 second (53) cuts comprise a perforation.
4. The bag according to any of claims 1-3, wherein the first and second wall panels are connected along their first longitudinal ends (13, 23) for closing the corresponding first end of the bag.
5. The bag according to claim 4, wherein the first and second wall panels
- 25 are connected by means of a first flap (41) which extends from the first end of the first wall panel and is folded onto and adhered to the second wall panel (20).
6. The bag according to claim 5, wherein the first flap (41) is permanently adhered to the second wall panel (20).

7. The bag according to any of claims 5-6-, wherein the cuts (51, 52, 53) do not extend into the first foldable flap (41).
8. The bag according to any of claims 5-7, wherein the reinforcement patch (60) does not extend onto the first foldable flap (41).
- 5 9. The bag according to any of claims 1-8, wherein the reinforcement patch (60) extends over between 30 and 90 % of the width of the first (10) and second (20) panel, preferably between 40 and 80 % and more preferably between 55 and 75 %.
- 10 10 The bag according to any of claims 1-9, wherein the reinforcement patch (60) extends over between 5 and 35 % of the longitudinal length of the first (10) and second (20) panel, preferably between 10 and 30% and more preferably between 15 and 25 %
11. The bag according to claim 1, wherein a second flap (43) is foldably arranged at the second end (14) of the bag (1).
- 15 12. The bag according to claim 11, wherein the second flap (43) is arranged as an extension of the first panel (10).
13. The bag according to claim 11 or 12, wherein the second flap (43) comprises a first adhesive portion for original closing of the bag, a first tear strip (47) for opening the second foldable flap and a second adhesive portion for reclosing the second foldable flap.
- 20 14. The bag according to any of claims 1-13, wherein the bag (1) is substantially flat in a collapsed state.
15. The bag according to any of claims 4-14, wherein the first end (13) of the bag (1) is substantially flat in an expanded state of the bag.
- 25 16. The bag (1) according to any of the preceding claims, wherein the first wall panel (10) and the second wall panel (20) are formed from a single piece of material.

17. Method of producing a bag (1), the method comprising the steps of:
- providing a web (104) of paper material;
  - feeding the web from an upstream end (101) to a downstream end (102) of a paper bag converting machine (100)
  - 5 - converting the web into a tube exhibiting a first wall panel (10) and a second wall panel (20);
  - folding the web (104) around edges of a first (116, 216) and a second (118, 218) gusset plate for forming gusset sections (31, 33) connecting each longitudinal side edge of the first (10) and second (20) wall panels;
  - 10 - attaching a reinforcement patch (60) to the first wall panel (10) and the second wall panel (20), wherein
  - attaching the reinforcement patch (60) to the first (10) and second (20) wall panels comprises the step of applying an adhesive (60", 60''')
  - 15 to at least one of the wall panels (10, 20) and/or to at least one side of the reinforcement patch (60) by means of an adhesive applicator (126, 226) which is arranged at the first (116, 216) and /or the second (118, 218) gusset plate.
18. Method according to claim 15, wherein the step of applying an adhesive (60", 60''') to at least one of the wall panels (10, 20) and/or to at least
- 20 one side of the reinforcement patch (60) comprises applying the adhesive (60") by means of an adhesive applicator which is arranged at or in proximity to the downstream end of said first and/or second gusset plate.
19. Method according to claim 15 or 16, wherein the step of applying an
- 25 adhesive (60", 60''') to at least one of the wall panels (10, 20) and/or to at least one side of the reinforcement patch (60) comprises applying the adhesive (60", 60''') by means of an adhesive applicator (126, 226) which is arranged at a recess (132, 223) which is arranged in at least one of said gusset plates (116, 118, 216, 218) and which extends through said
- 30 at least one gusset plate centrally and in the upstream direction from an downstream end of said at least one gusset plate.

20. A paper bag converting arrangement for forming a paper bag from a web (104) of paper material, said arrangement comprising
- means for feeding a web of paper material in a downstream feed direction,
  - 5       - means (114) for adhering a reinforcement patch (60) at different positions along the web (104);
  - a fold guide (120) arranged to convert the web (104) into a tube exhibiting a first wall panel (10) and a second wall panel (20)
  - a first a gusset plate (116, 216) and a second gusset (118, 218) plate
  - 10       arranged one over the other for forming at least one gusset section (31, 33) connecting the first (10) and second (20) wall panels; and
  - an adhesive applicator (126, 226) which is arranged to apply a glue filed (60", 60") to each reinforcement patch (60) or to respective
  - portions of the web (104), which portions make contact with a
  - 15       respective reinforcement patch (60) after forming the tube; wherein
  - the adhesive applicator (126, 226) is arranged a at a recess (132, 232) formed in one of said first (116) and second (218) gusset plates; and
  - wherein
  - said recess (132, 232) extends upstream from a downstream edge of
  - 20       said gusset plate.

1/13

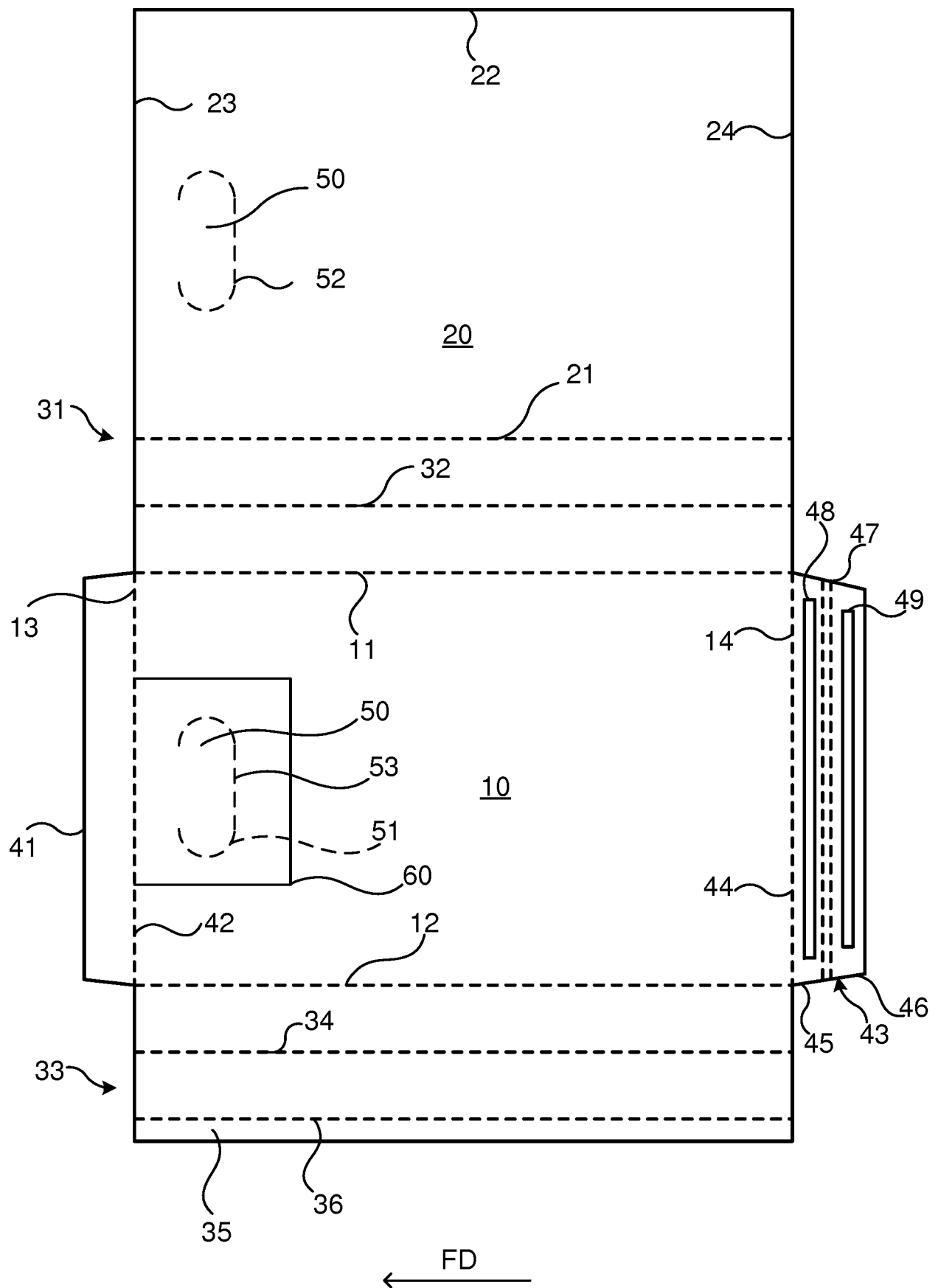


Fig. 1

2/13

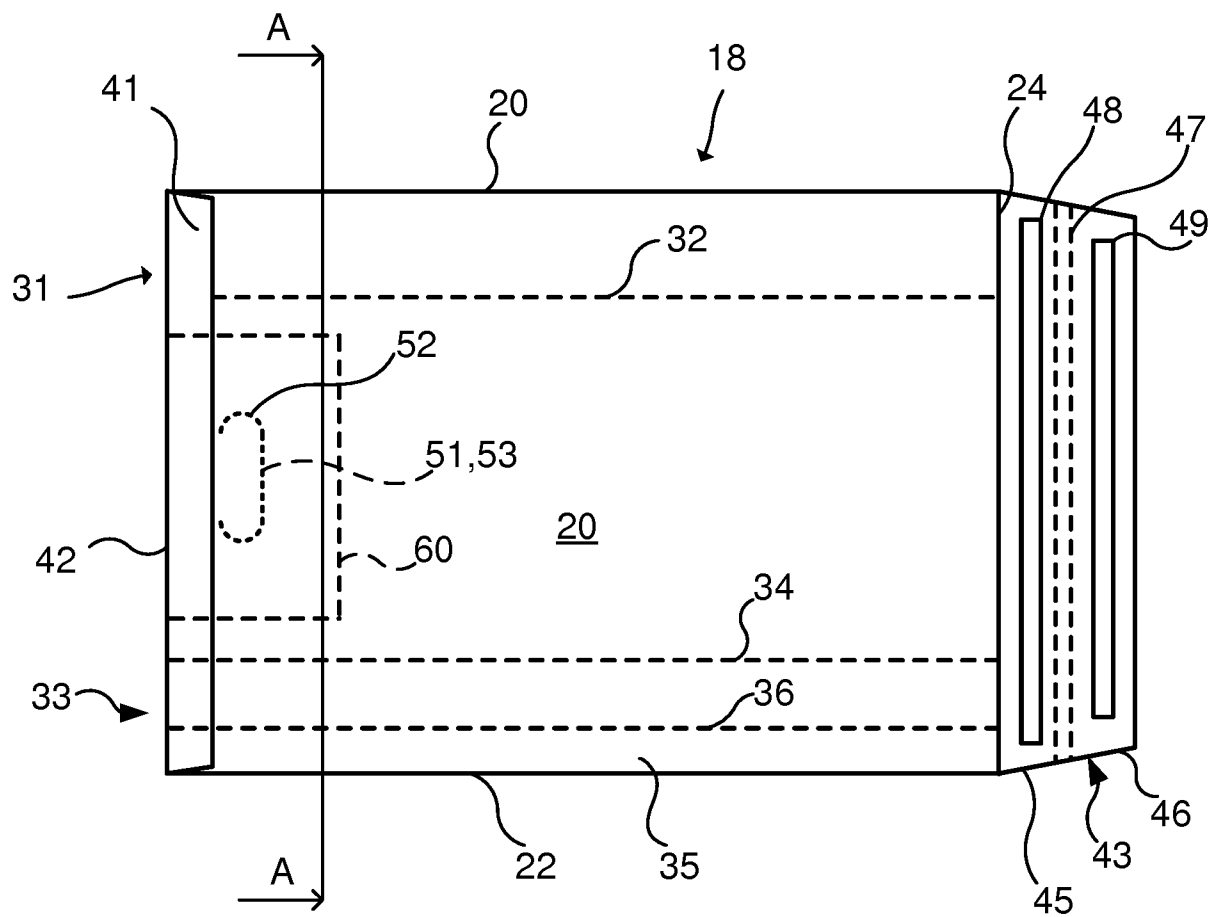
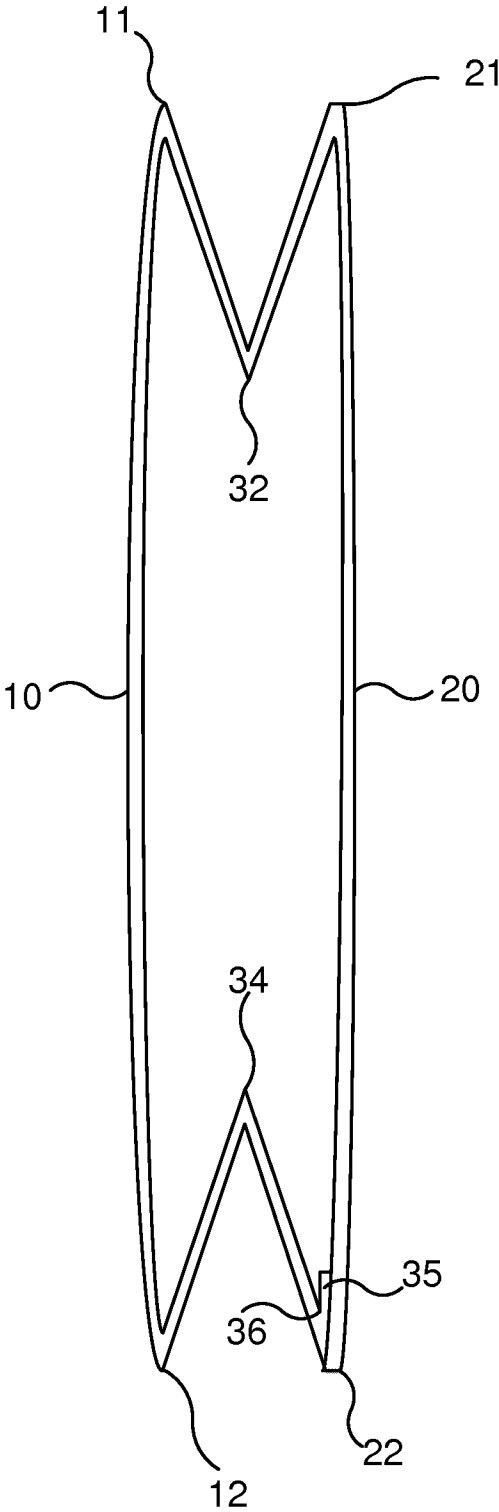


Fig. 2



A-A

Fig. 3

4/13

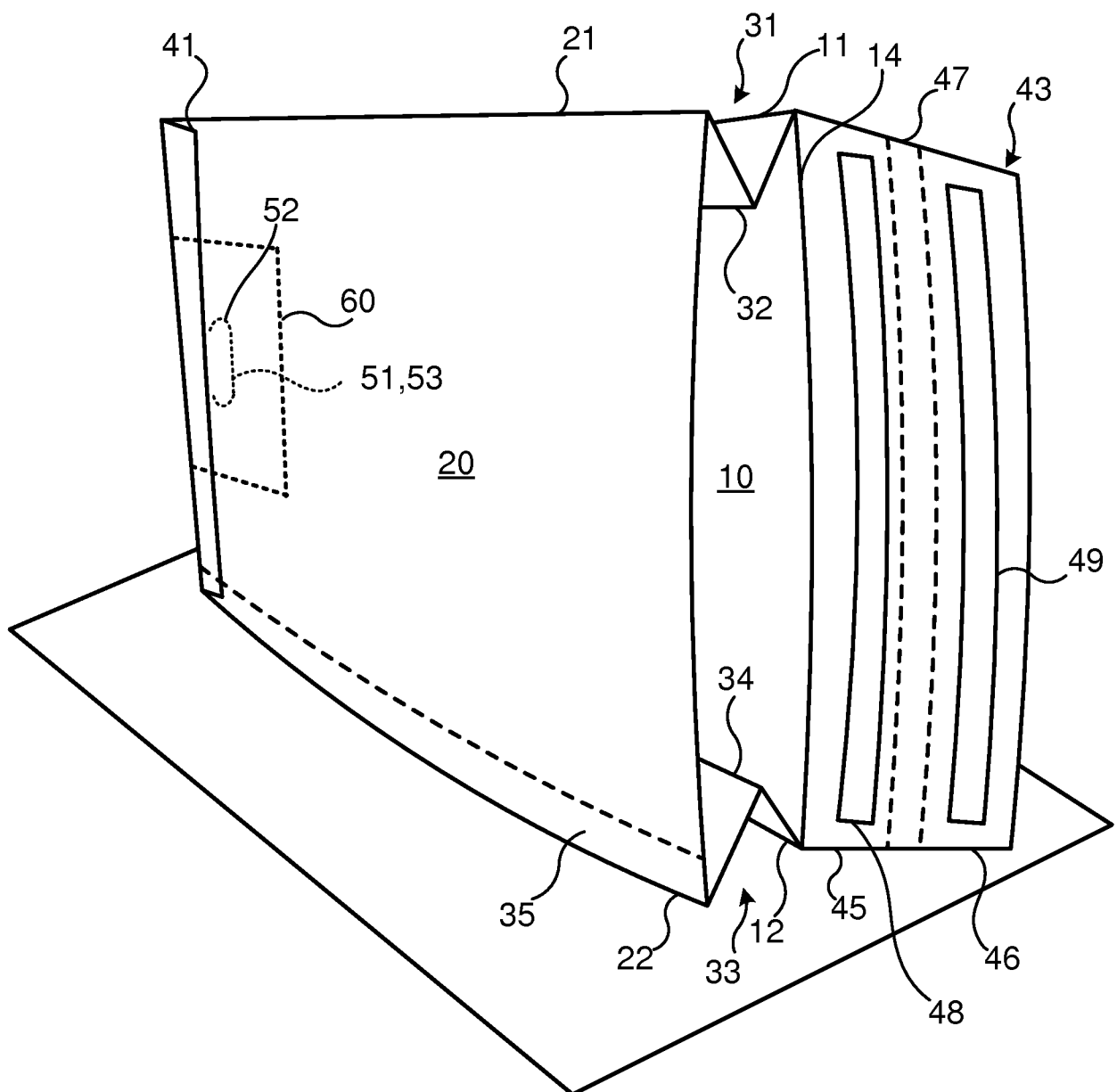


Fig. 4

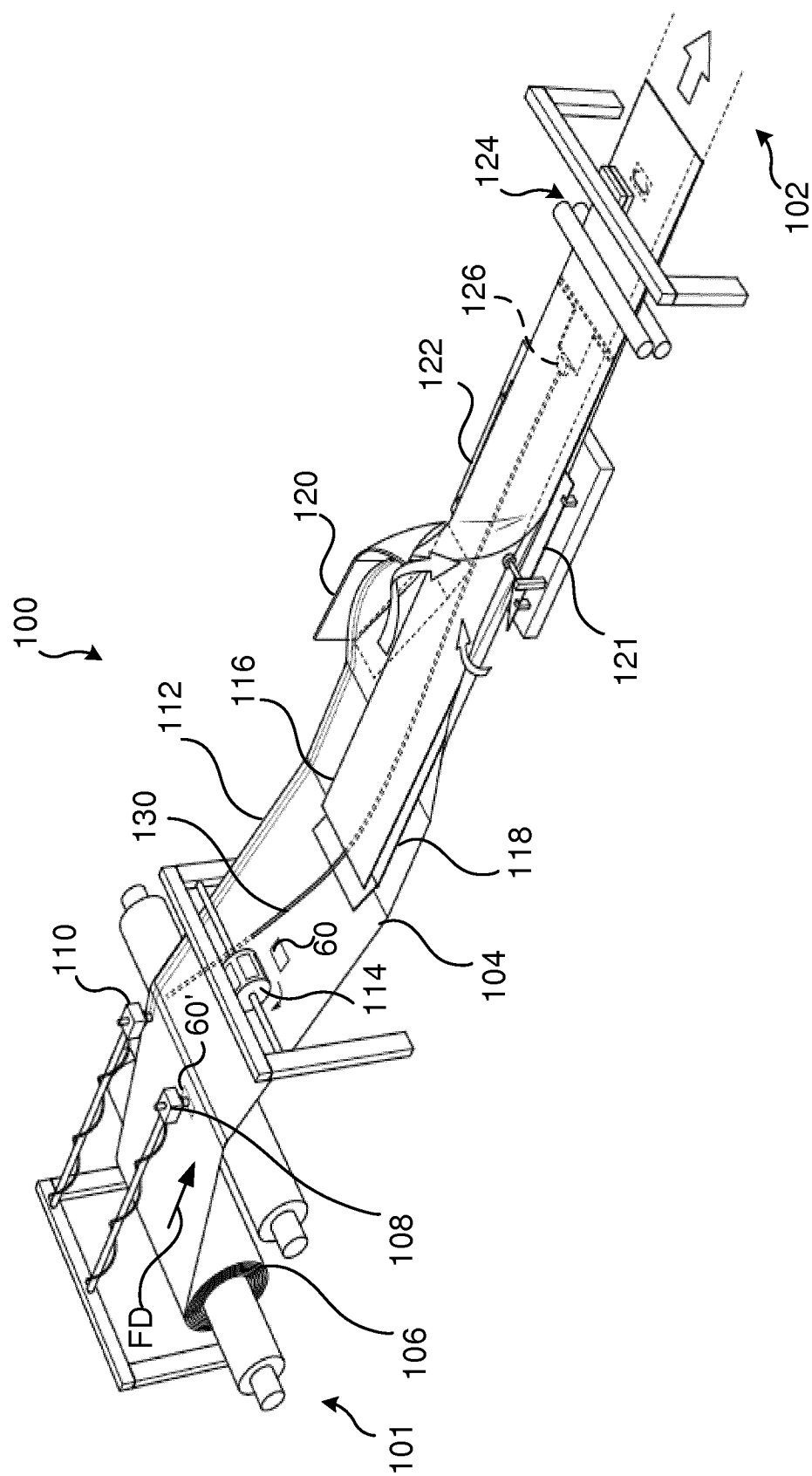
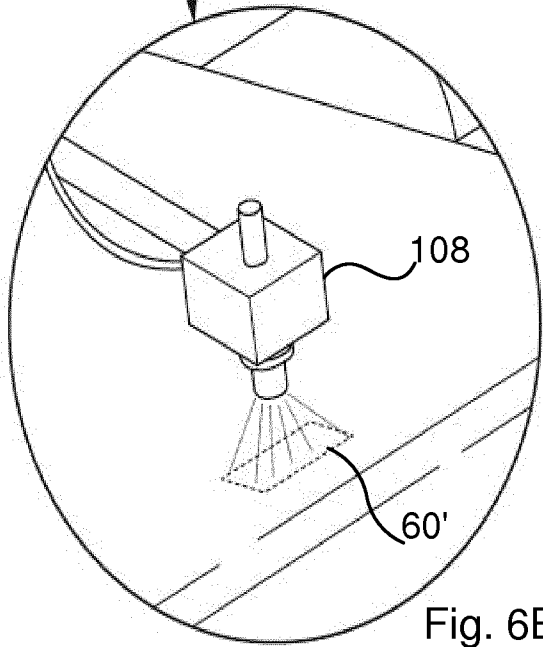
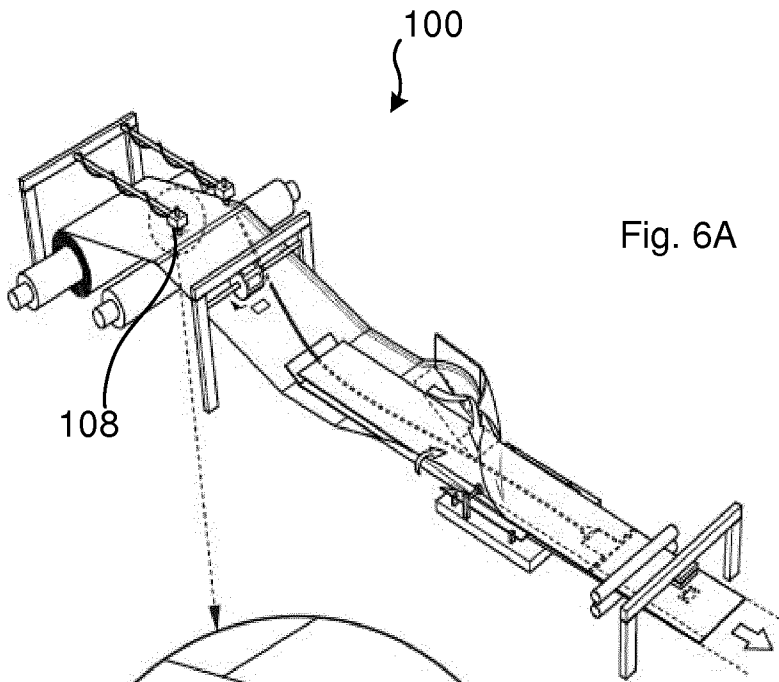
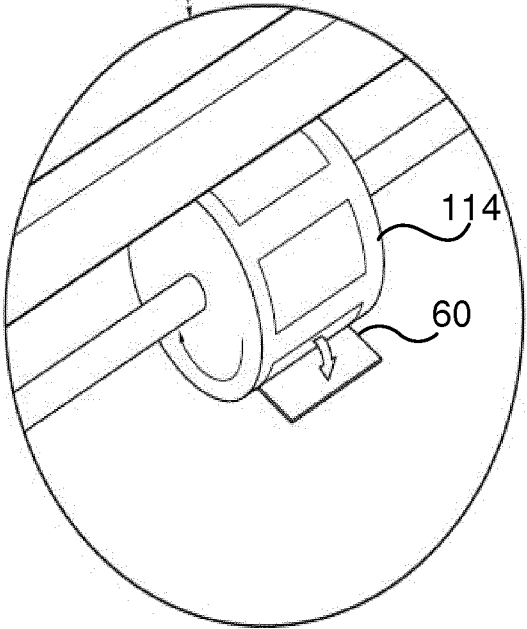
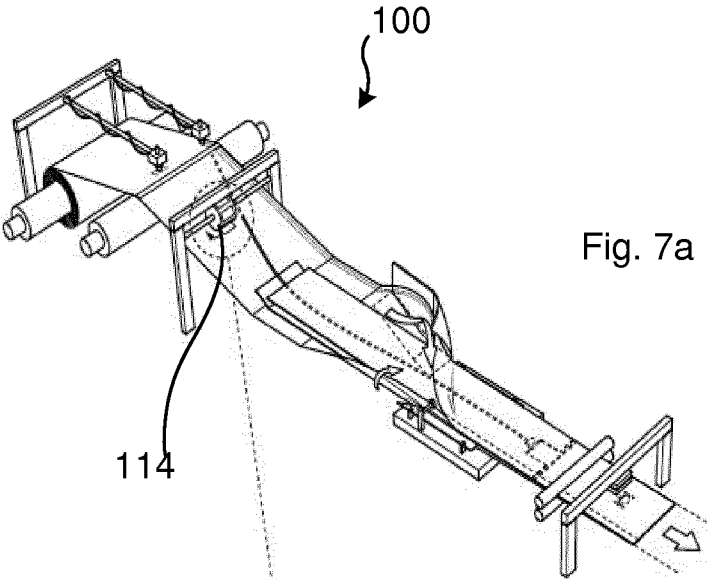


Fig. 5





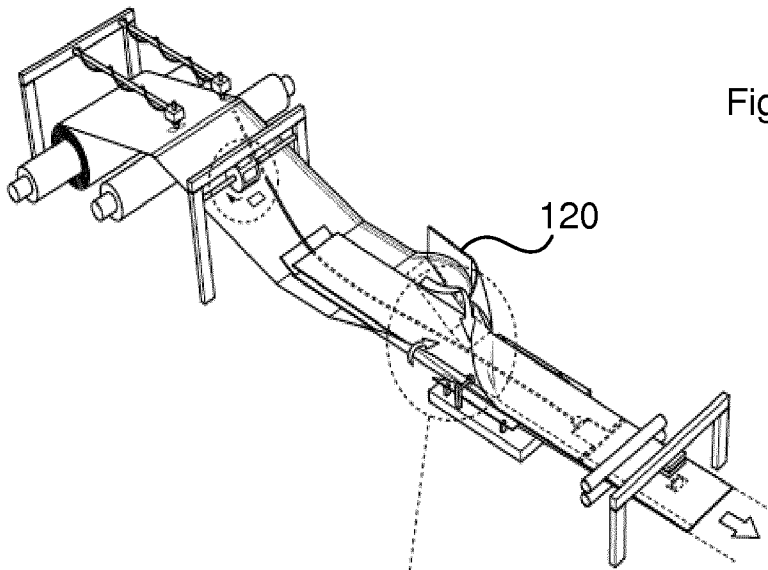


Fig. 8a

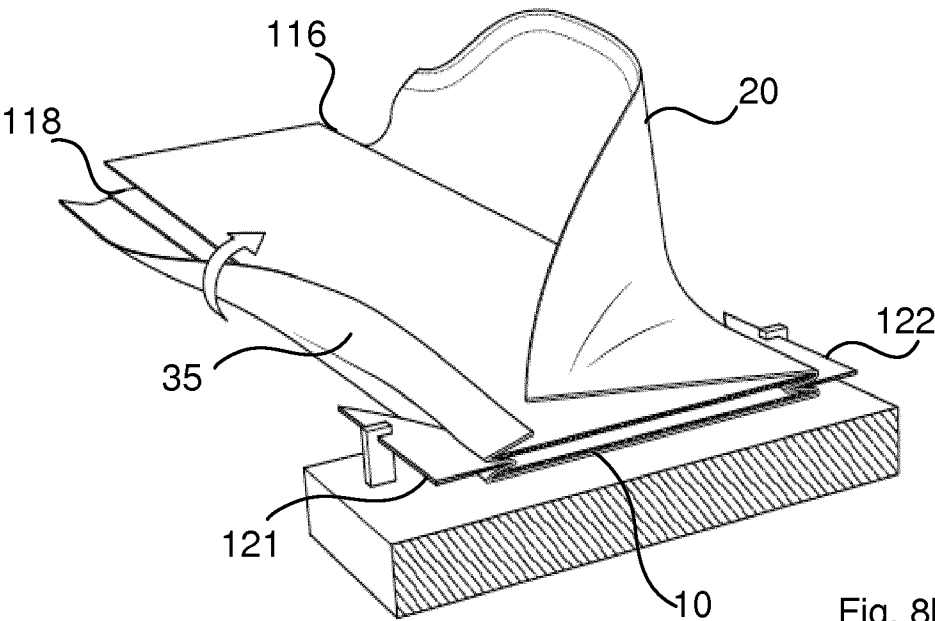


Fig. 8b

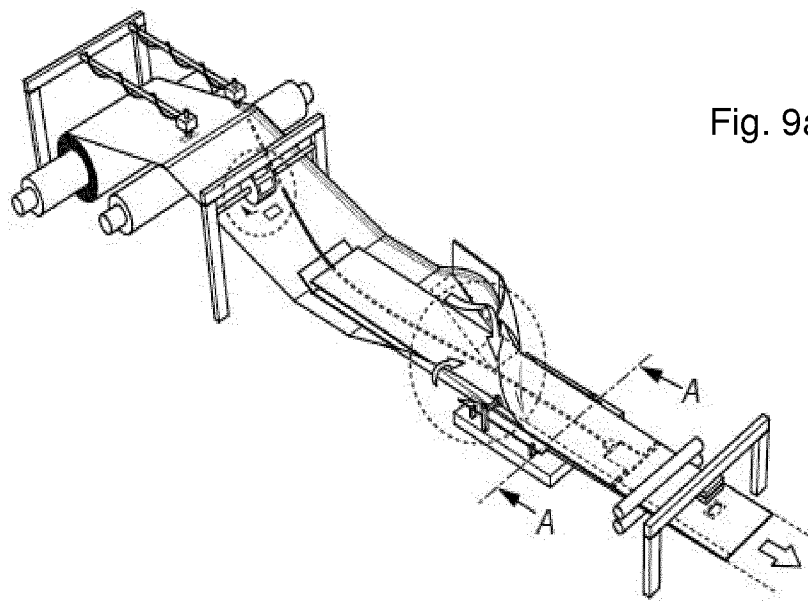


Fig. 9a

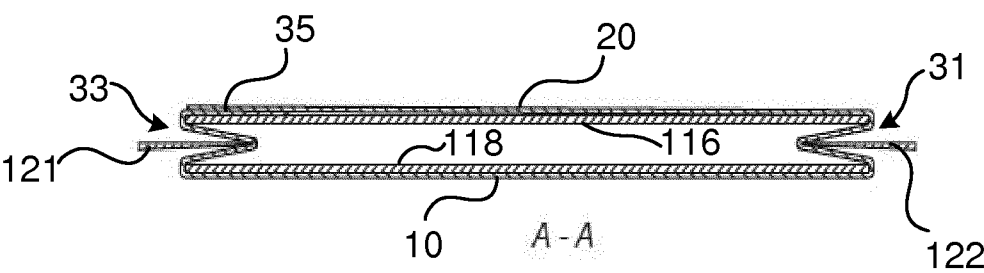


Fig. 9b

Fig.10a

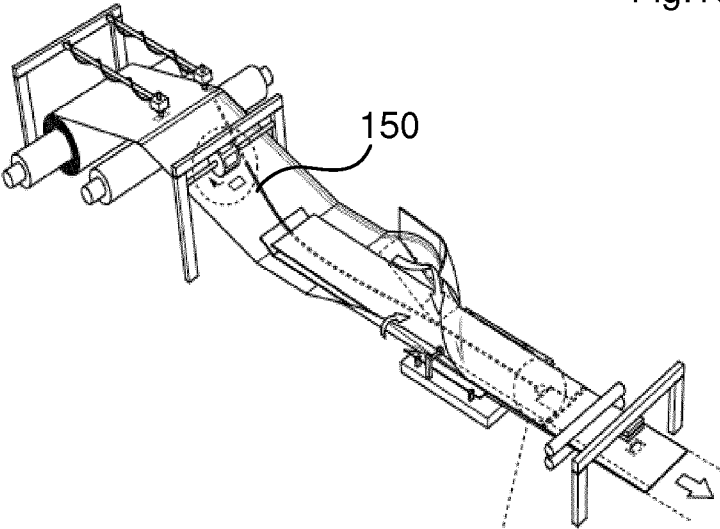


Fig.10b

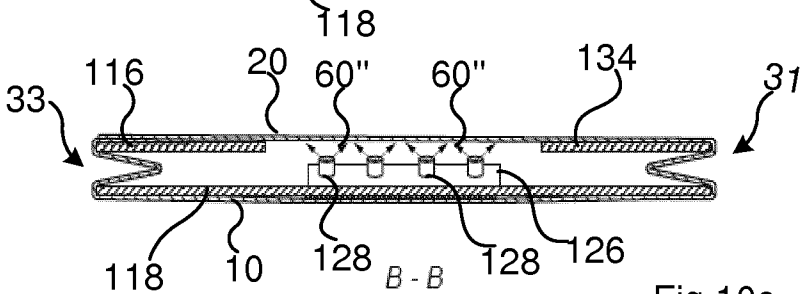
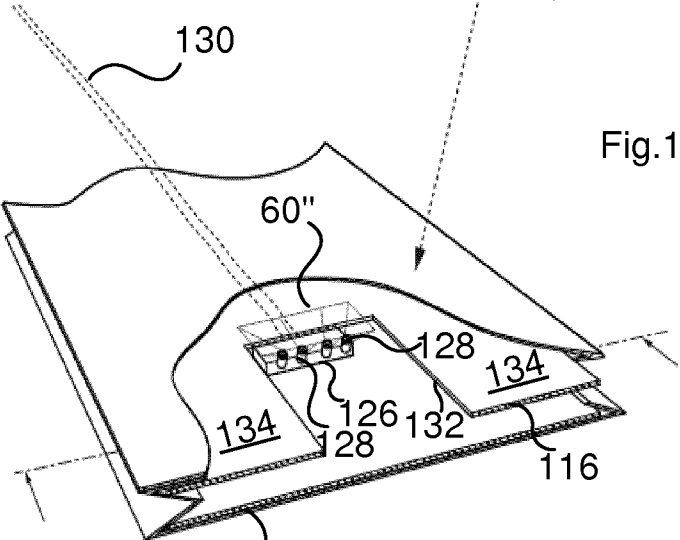


Fig.10c

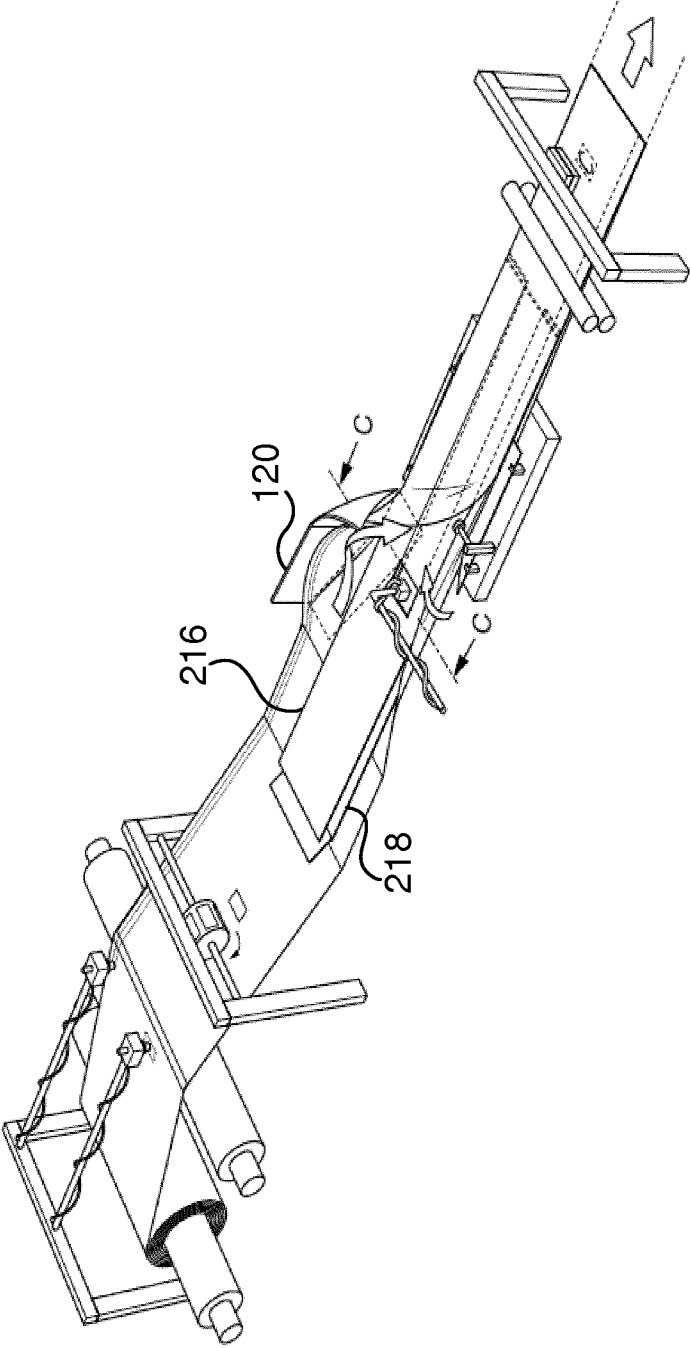


Fig. 11a



Fig.12a

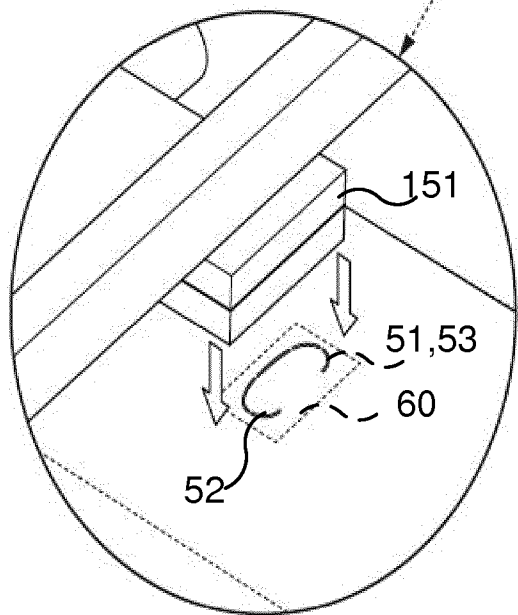
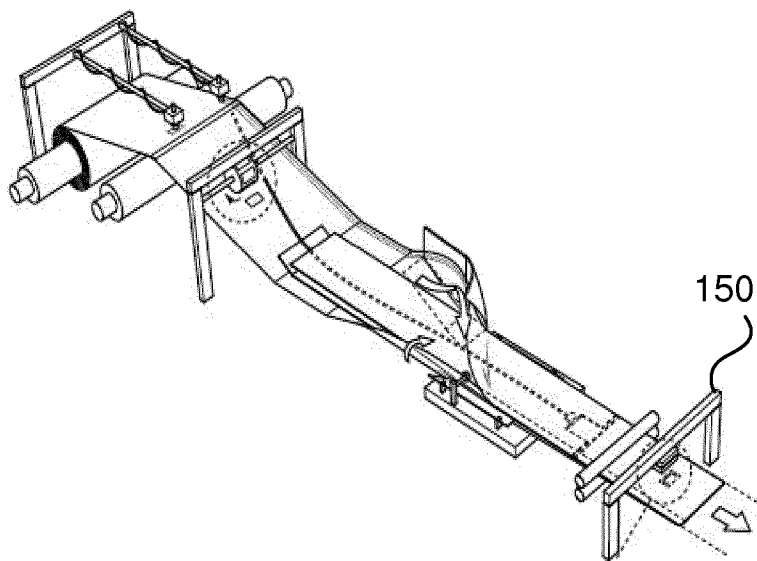


Fig. 12b

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2019/059848

A. CLASSIFICATION OF SUBJECT MATTER  
INV. B65D30/20 B65D33/02 B65D33/08 B65D33/18 B31B70/00  
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
B65D B31B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                           | Relevant to claim No. |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Y         | DE 20 2014 011111 U1 (PAPIER-METTLER KG [DE]) 29 November 2017 (2017-11-29)<br>abstract; figures 1a,2a,3a-3c<br>paragraph [0052] - paragraph [0061]<br>----- | 1-20                  |
| Y         | DE 20 2012 006901 U1 (PAPIER METTLER INHABER MICHAEL METTLER E K [DE]) 10 August 2012 (2012-08-10)<br>abstract; figure 1<br>-----                            | 1,11-13               |
| Y         | US 2015/251815 A1 (BERGER ELLIOT LEWIS [US]) 10 September 2015 (2015-09-10)<br>abstract; figure 1<br>paragraph [0026] - paragraph [0028]<br>-----            | 1-16                  |
| Y         | GB 1 005 121 A (PAPER SACKS LTD) 22 September 1965 (1965-09-22)<br>page 1, line 34 - line 80; figures 1-3<br>-----<br>-/-                                    | 17-20                 |



Further documents are listed in the continuation of Box C.



See patent family annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

8 May 2019

Date of mailing of the international search report

15/05/2019

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040,  
Fax: (+31-70) 340-3016

Authorized officer

Segerer, Heiko

## INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2019/059848

| C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                                                                  |                       |
|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Category*                                            | Citation of document, with indication, where appropriate, of the relevant passages                                               | Relevant to claim No. |
| Y                                                    | US 6 056 681 A (ROSS PHILIP E [US])<br>2 May 2000 (2000-05-02)<br>column 5, line 18 - line 50; figures 2,<br>6A, 6C<br><br>----- | 17-20                 |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2019/059848

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| DE 202014011111 U1                        | 29-11-2017          | NONE                       |                     |
| DE 202012006901 U1                        | 10-08-2012          | NONE                       |                     |
| US 2015251815 A1                          | 10-09-2015          | US 2015251815 A1           | 10-09-2015          |
|                                           |                     | US 2016297164 A1           | 13-10-2016          |
| GB 1005121 A                              | 22-09-1965          | NONE                       |                     |
| US 6056681 A                              | 02-05-2000          | NONE                       |                     |