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(54) **Box with corner reinforcements, and blank intended therefor**

(57) De uitvinding heeft betrekking op een doos, omvattende een bodempaneel (2) omringd door opstaande eerste (4) en tweede (6) zijwandpanelen die onderling zijn verbonden door hoekversteving (22) vormende hoekpanelen (12), waarbij elk zijwandpaneel (4, 6) is verbonden met het bodempaneel (2) via een eerste vouwlijn (3, 5), waarbij elk hoekpaneel (12) verder met een aan het eerste zijwandpaneel (4) voorzien bevestigingsdeel (8c) is verbonden, waarbij het bevestigingsdeel (8c) zich

althans gedeeltelijk van een overig deel (8a) van het eerste zijwandpaneel (4) in een richting (R1) naar een inwendige ruimte (I) van de doos (1) uitstrekt zodanig dat het bevestigingsdeel (8c) ten minste gedeeltelijk van het overige deel (8a) van het eerste zijwandpaneel (4) af staat waardoor een ruimte (20) tussen het bevestigingsdeel (8c) en althans het overige deel (8a) wordt gedefinieerd. De uitvinding heeft verder betrekking op een plano (P) voor een dergelijke doos (1).

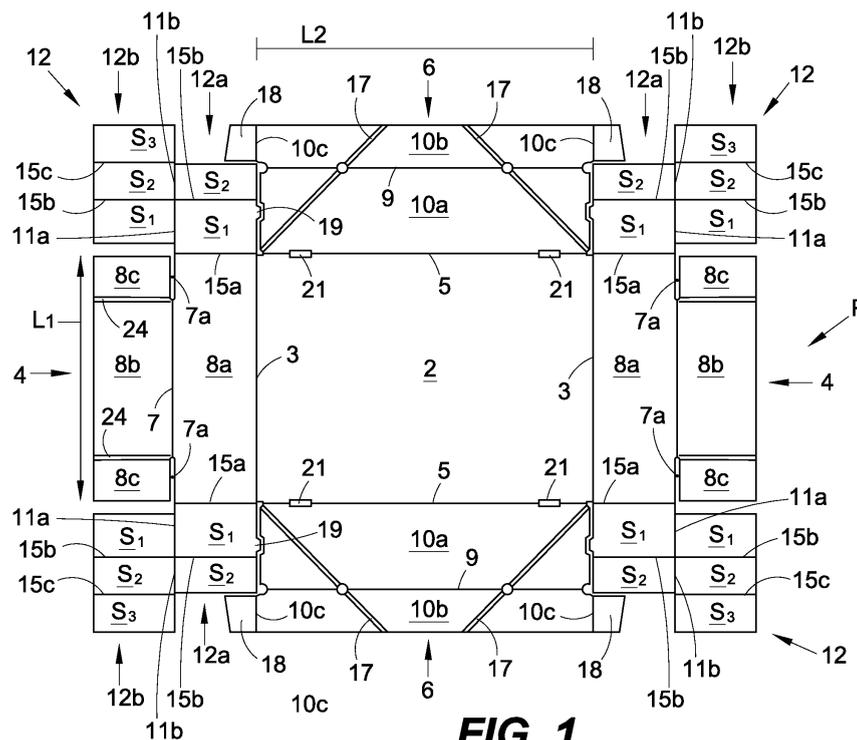


FIG. 1

Description

[0001] The invention relates to a box, in particular a box with corner reinforcements set up from a blank.

[0002] Such boxes are known. A known box comprises for instance corner reinforcements which are formed from corner panels which are connected to first sidewall panels along a first folding line. The corner panels are each subdivided into three strips by two further folding lines extending substantially parallel to the first folding line. The corner panels are glued with a first strip, contiguous to the first folding line, to a second sidewall panel. The second strip is folded back against the first strip and glued thereto, and the third strip is glued against the first sidewall panel.

[0003] Further known are boxes in which the corner panels are folded over to form tubular corner reinforcements having, for instance, a triangular, quadrangular or chevron-shaped cross section. In the latter two cases, the corner panels comprise at least three folding lines, which subdivide the corner panel into four strips. Such corner reinforcements enhance the stiffness and strength of the box, in particular the stacking or compression strength. Furthermore, material can be saved in that a lighter or thinner blank can be used. Such boxes, after they have been set up from the blank, are often folded up so that the boxes can be transported to a user with a minimal volume. On site, the boxes can be folded out to allow them to be filled with desired products, such as, for instance, cucumbers.

[0004] A drawback of these conventional boxes is that their resistance to unfolding is relatively high, which is unwanted from the viewpoint of user convenience. Further, the corners of such an unfolded box do not always remain erect in the desired initial position. The corner may spring back such that the box does not obtain the desired stability.

[0005] Accordingly, the invention seeks to provide a box set up from a blank that can be transported in collapsed condition and that can be easily unfolded, while the box after unfolding remains in the desired position so that the box is stable.

[0006] To this end, the invention provides a box set up from a blank of the type mentioned in the preamble, characterized in that the box comprises a bottom panel surrounded by upstanding first and second sidewall panels which are mutually connected by corner panels forming corner reinforcement, wherein each sidewall panel is connected to the bottom panel via a first folding line, wherein each corner panel is further connected to a fastening part provided on the first sidewall panel, wherein the fastening part extends at least partly from a remaining part of the first sidewall panel in a direction towards an interior space of the box, such that the fastening part at least partly stands away from the remaining part of the first sidewall panel, thereby defining a space between the fastening part and at least the remaining part of the first sidewall panel.

[0007] Through this construction of the corner reinforcements with respect to the sidewall panels, that is, with the respective corner panels being connected to a pivotable fastening part of the first sidewall panels, the box can be easily unfolded. This is because, since the fastening part can move away from the first sidewall panels, the box is less rigid during unfolding and the corner of the box can be easily set up. Further, the respective fastening parts, which extend from the first sidewall panels towards an interior of the box, ensure that in unfolded condition of the box the corner remains in an erect condition with respect to the bottom panel. The fastening part in fact works as a retaining element, so that the corner cannot spring back to the collapsed position of the box. As a result, the box, after it has been unfolded, obtains a certain dimensional stability and stacking strength that remains constant after the box has been folded out. Also, the corner reinforcement according to the above-described construction ensures that the stacking strength of the box when not provided with a so-called bridge is sufficiently great to enable stacking of boxes provided with products. This provides a box which, while maintaining stacking strength, can be manufactured from a blank having a smaller surface than when the box is provided with a bridge, which results in less material use and hence in lower material cost.

[0008] To further enhance the stacking strength of the box, it is favorable that according to a further elaboration of the invention each first sidewall panel comprises a further folding line which extends substantially parallel to the first folding line, which further folding line divides the first sidewall panel into a first segment situated between the folding lines and a second segment situated against the first segment, wherein the fastening part is pivotably connected to the second segment. Such a design of the first sidewall panels provides panels of double-layer design that have a greater stacking strength than single-layer panels. Especially in the case where the box is made from solid cardboard, such a sidewall panel having an improved stacking strength is favorable. The segments may optionally be fastened together, for instance through a glued joint, while the fastening part is not attached, so that it can move freely along, for instance, a folding line which is perpendicular to the folding line of the first sidewall panel.

[0009] When it is desired that the box is provided with a bridge, that is, a flap provided along a sidewall of a box, situated substantially perpendicularly thereto, then, in a further advantageous elaboration of the invention, the second sidewall panel may be provided with a further folding line which extends substantially parallel to the first folding line, which further folding line divides the second sidewall panel into a first segment situated between the folding lines and a second segment forming a bridge, wherein the second segment, on sides situated near the first sidewall panels, is provided with connecting parts connected thereto, which connecting parts are connected to the respective first sidewall panels. Such a second

segment of the second sidewall panel, in a folded-out condition of the box, provides the bridge. Such a bridge can for instance be substantially parallel to the bottom panel and extend along an upper side of the second sidewall panel between the two first sidewall panels. The bridge is fastened to the first sidewall panels with the aid of the connecting parts. Depending on the shape and the dimensions of the connecting parts, these may be attached to the first sidewall panels in different ways. The connecting parts may for instance be inserted into the above-described space between the fastening part and the remaining part of the respective first sidewall panels. This makes it possible that the box can be filled with the desired products and that the bridge cannot be positioned and fixed until after filling. As a consequence, the filling opening of the box is maximal during filling, so that the products can be simply placed in the box. Also, it is possible that the connecting parts are glued to the first sidewall panels. Such a box has a greater stacking strength than when the connecting parts are inserted. As a consequence, however, the filling opening then has a more limited magnitude.

[0010] The invention thus provides a flexible box which can easily be adapted to the wishes of the user.

[0011] The invention further relates to a blank for a box according to the invention, comprising a substantially quadrangular bottom panel, first and second sidewall panels situated opposite each other in pairs, which are pivotably connected to the bottom panel along folding lines, corner panels which are pivotably connected to the first sidewall panels along first folding lines, wherein each first sidewall panel comprises a further folding line which extends substantially parallel to the first folding line, which further folding line divides the first sidewall panel into a first segment situated between the folding lines and a second segment situated against the first segment, wherein the fastening part is pivotably connected to the second segment, at least to a side thereof situated near the corner panel.

[0012] Such a blank provides similar advantages and effects to those mentioned in respect of the above-described box set up from a blank.

[0013] In the further dependent claims, further advantageous embodiments are described of a box according to the invention and a blank suitable therefor.

[0014] Further elaborations of the invention are described in the dependent claims and will be further clarified hereinafter, with reference to the drawings. In the drawings:

Fig. 1 shows a schematic top plan view of a blank according to a first embodiment of the invention;
 Fig. 2 shows schematically in top plan view a corner set up from the blank of Fig. 1;
 Fig. 3 shows schematically in top plan view a corner provided with a bridge, set up from the blank of Fig. 1; and
 Fig. 4 shows a schematic top plan view of a blank,

at least of a corner thereof, according to a second embodiment of the invention.

[0015] Fig. 1 shows a blank P for setting up a box 1 (see Figs. 2 and 3) according to the invention. The blank P is manufactured from cardboard, in particular solid cardboard or corrugated cardboard. The blank P comprises a quadrangular bottom panel 2, a pair of opposed first sidewall panels 4 which are pivotably connected to the bottom panel 2 along folding lines 3, and a pair of opposed second sidewall panels 6 which are pivotably connected to the bottom panel 2, along folding lines 5, which extend substantially at right angles to the folding lines 3. Each first sidewall panel 4 comprises a further folding line 7 which extends substantially parallel to the first folding line 3. This further second folding line 7 divides the respective sidewall panels 4 into two segments 8a, 8b. The first segment 8a is situated between the first and second folding lines 3, 7, and the second segment 8b extends from the second folding line 7 in a direction away from the first segment 8a. The second segment 8b comprises two fastening parts 8c, pivotably provided on both sides of the segment 8b, which are situated near the respective corner panels 12. The fastening parts 8c can be pivotable about a folding line 24 and are separated from the first segment 8a through a partial cut 7a of the folding line 7. The second segment 8b and the fastening parts 8c provided thereon in total have substantially a same or lesser length L1 than the first segment 8a. When forming the box 1, the second segment 8b inclusive of the fastening parts 8c is folded about the second folding line 7 towards an interior I of the box 1, such that the second segment 8b comes to lie against the first segment 8b (see Fig. 2), so that the first sidewall panel 4 is of double-layer design. Optionally, the second segment 8b may be glued onto the first segment 8a of the first sidewall panel 4.

[0016] The second sidewall panels 6 in this exemplary embodiment of the invention are provided with a second folding line 9 dividing also the second sidewall panel 6 into two segments 10a, 10b which are mutually pivotably connected. The second folding line 9 is provided substantially parallel to the first folding line 5 of the second sidewall panel 6. The second segment 10b, the segment forming the bridge 26 (see Fig. 3), extends from the second folding line 9 of the first segment 10a. The second segment 10b forming the bridge 26 has substantially a same length L2 as the first segment 10a. The second segment 10b forming the bridge 26 is provided on both sides 10c thereof with connecting parts 18 pivotably connected to the second segment 10b. These connecting parts 18 can be connected to the respective first sidewall panels 4 in order to form a bridge 26 on two opposite sides of the box 1, which bridges 26 extend substantially in a plane parallel to the bottom panel 2. Such connecting parts 18, when setting up the box 1, may be inserted between the fastening parts 8c and the first segment 8a of the first sidewall panels 4 (see Figs. 2 and 3) or, in an

alternative embodiment of the invention, be glued to the first sidewall panels 4. Also, in an alternative embodiment, the bridges 26 may be omitted.

[0017] Furthermore, each second sidewall panel 6 in the exemplary embodiment shown is provided with two diagonal folding lines 17. This makes the box 1 to be set up from the blank P a so-called ready-for-use box. This is a box 1 which can be supplied with sidewall panels 4, 6 folded down. These sidewall panels 4, 6, for the purpose of use, only need to be pulled up and fixed in this position, by means of tabs 19 which can be inserted into recesses 21 provided in the bottom panel 2 for that purpose. The diagonal folding lines 17, tabs 19 and/or recesses 21 may be omitted in an alternative embodiment. The corner reinforcements 22 (see Fig. 2) and the fastening parts 8c fastened thereto, in the folded-out condition of the box 1, extend in the direction R1 towards an interior I of the box 1, so that the corner is fixed with respect to the bottom panel 2.

[0018] The blank P furthermore comprises four corner panels 12, each subdivided into two segments 12a, 12b by a folding line 11a, 11b. The folding lines 11a, 11b extend substantially in line with the folding lines 7 between the first segments 8a and second segments 8b of the first sidewall panels 4. It is noted that the term folding line in the present application should be interpreted broadly. Thus, folding lines may be bending lines, perforated lines, half cut folding lines or completely cut lines. In this case, the folding line 11a, 11b comprises partly a completely cut line 11a and partly a half cut folding line 11b. The corner panels 12 are pivotably fastened with a first segment 12a to both sides of the first segments 8a of the first sidewall panels 4, along first folding lines 15a. Each first segment 12a is divided into two strips S1, S2 by a further folding line 15b which extends substantially parallel to the first folding line 15a. Each second segment 12b is divided into similar strips S1, S2, S3 through folding lines 15b, 15c. The strips S1, S2, S3 of the second segment 12b of the corner panel 12 may be provided at least partly pivotably on the strips S1, S2 of the first segment 12a of the corner panel 12. The folding lines 15a, 15b, 15c can be different kinds of lines, for instance bending lines, perforated lines or half cut lines. Also, the folding lines may be for instance partly bending lines and partly perforated lines. It is favorable when for instance folding line 15b of the first segment 12a of the corner panel 12 is a bending line, and folding line 15b of the second segment 12b of the corner panel 12 is a perforated line. In this way, the folding resistance of the corner panel 12 about the folding line 15b, that is, when the segment 12b has been folded over the folding line 11a, 11b and is situated against the first segment 12a, is relatively low. What is thus effected is that the corner panels 12 can be folded up with relatively little force to form the eventual corner reinforcements 22 of the box 1.

[0019] Fig. 2 shows schematically in top plan view a corner of a box 1 which can be set up from the blank P according to Fig. 1. To this end, the second corner panel

segment 12b has been folded upwards from the plane of the drawing, along folding line 11a, 11b, and placed against the first corner panel segment 12a. The corner panel segments 12a, 12b can optionally be secured, for instance with glue. Thus, a double-layer corner panel 12 is obtained, with the first corner panel segment 12a forming a first corner panel layer and the second corner panel segment 12b forming a second corner panel layer.

[0020] Next, the corner panel 12, at least strip S2 and S3, has been folded about the further folding line 15b (up from the plane of the drawing) and strip S3 has been folded back in opposite direction about the further folding line 15c. After this, the respective second segments 8b of the first sidewall panels 4 have been folded about the folding line 7 (up from the plane of the drawing) and placed onto the first segments 8a. The fastening parts 8c are pivotable both with respect to the first segment 8a and with respect to the second segment 8b in a direction up from the plane of the drawing. Optionally, the first and second segments 8a, 8b may be secured with respect to each other, for instance using glue. The fastening part 8c is not secured. The corner panels 12, at least the strips S3 thereof, have thereupon been secured against the fastening parts 8c. After this, the corner panels 12 can have been secured against the second sidewall panels 6 in a conventional manner, for instance with glue, while the strip S1 of the second segment 12b of the corner panel 12 may be secured against the first segment 10a of the second sidewall panel 6. When the corner panels 12 have been secured, a space 20 has been created between the fastening parts 8c and the first segments 8a of the first sidewall panels 4 in that the fastening parts 8c extend in the direction R1 towards an interior I of the box 1. Further, a space 25 between the strips S1, S2 of the corner panels may have been created.

[0021] The thus obtained box 1 is accordingly provided with corner reinforcements 22, which extend against the fastening part 8c of the first sidewall panel and against the second sidewall panel 6. Surprisingly, it has been found that with such corner reinforcements 22 a high stacking strength can be obtained, while moreover the load-bearing capacity of the blank material is utilized optimally.

[0022] Fig. 3 schematically shows in top plan view a corner of a box 1 as set up and shown in Fig. 2. In Fig. 3 it can further be seen that the box 1 is provided with a segment 10b forming a bridge 26, while the connecting parts 18 provided on the segment 10b forming the bridge 26 have been inserted into the space 20. For the bridge 26 to be formed, before the box 1 has been put together, the second segment 10b of the second sidewall panel 6 has been folded about folding line 9 up from the plane of the drawing, and so have the connecting parts 18. After the box 1 has been set up at a user and has been filled with products, for instance cucumbers, the connecting parts 18 have been inserted into the space 20 and the segment 10b forming the bridge 26 is situated substantially parallel to the bottom panel 2 of the box 1. The

connecting parts 18 may also be glued, for instance, to an outwardly facing side of the first segment 8a of the first sidewall panel 4. Such connecting parts 18 can then have a different shape or different dimensions than the connecting parts 18 as shown in Fig. 1, as represented in Fig. 4.

[0023] Fig. 4 shows an alternative embodiment of a blank P according to the invention, at least one corner thereof. The other corners are identical, though mirrored with respect to the X and Y axes. In Fig. 4 parts corresponding to the blank P of Fig. 1 are designated with corresponding reference numerals. The chief difference with respect to the blank P of Fig. 1 is that the connecting parts 18 of the second sidewall panels 6 have substantially a larger surface than the connecting parts 18 according to the first embodiment of the blank P according to the invention. Such connecting parts 18 are not suitable to be inserted into the space 20 but can be fastened, for instance using glue, to an outer side of the first sidewall panel 4, at least of the first segment 8a of the sidewall panel 4. Such boxes have a relatively high stacking strength. Naturally, in other embodiments of the invention the connecting parts 18 can have different shapes and dimensions.

[0024] Naturally, in other embodiments of the invention, also the corner panels 12 can have a different shape and different folding lines. Also, different modes of folding these corner panels 12 are possible. Thus, the third strip S3 of the corner panel 12 may be folded in the same direction as the strip S2 of the corner panel 12. The third strip S3 is then fastened with the other side thereof against the fastening part 8c of the first sidewall panel 4. In this way, a tubular corner reinforcement 22 of a triangular cross section is obtained.

[0025] The exemplary embodiments described and shown above have in common that the corner panels 12 can be folded over with relatively little folding resistance when the folding line 15b comprises in part a bending line and in part a perforated line or a half cut line. The required folding force is of the same order of magnitude as the folding force that is needed for folding over the remaining (single-layer) blank parts.

[0026] The invention is not limited in any way to the exemplary embodiments shown in the description and the drawing. All combinations of (parts of) embodiments described and/or shown are understood to fall within the concept of the invention. Moreover, many variations thereon are possible within the framework of the invention outlined by the claims.

[0027] Thus, the corner panel 12 may be built up from loose blank parts, with only one of these parts being pivotably connected to a sidewall panel 4, 6. The other blank parts may be fastened onto each other, for instance through gluing, prior to the setting up of the blank P. Also, the corner panels 12 may be built up from more than two layers.

[0028] The corner panel 12 may be subdivided through further folding lines into more than three strips. Such a

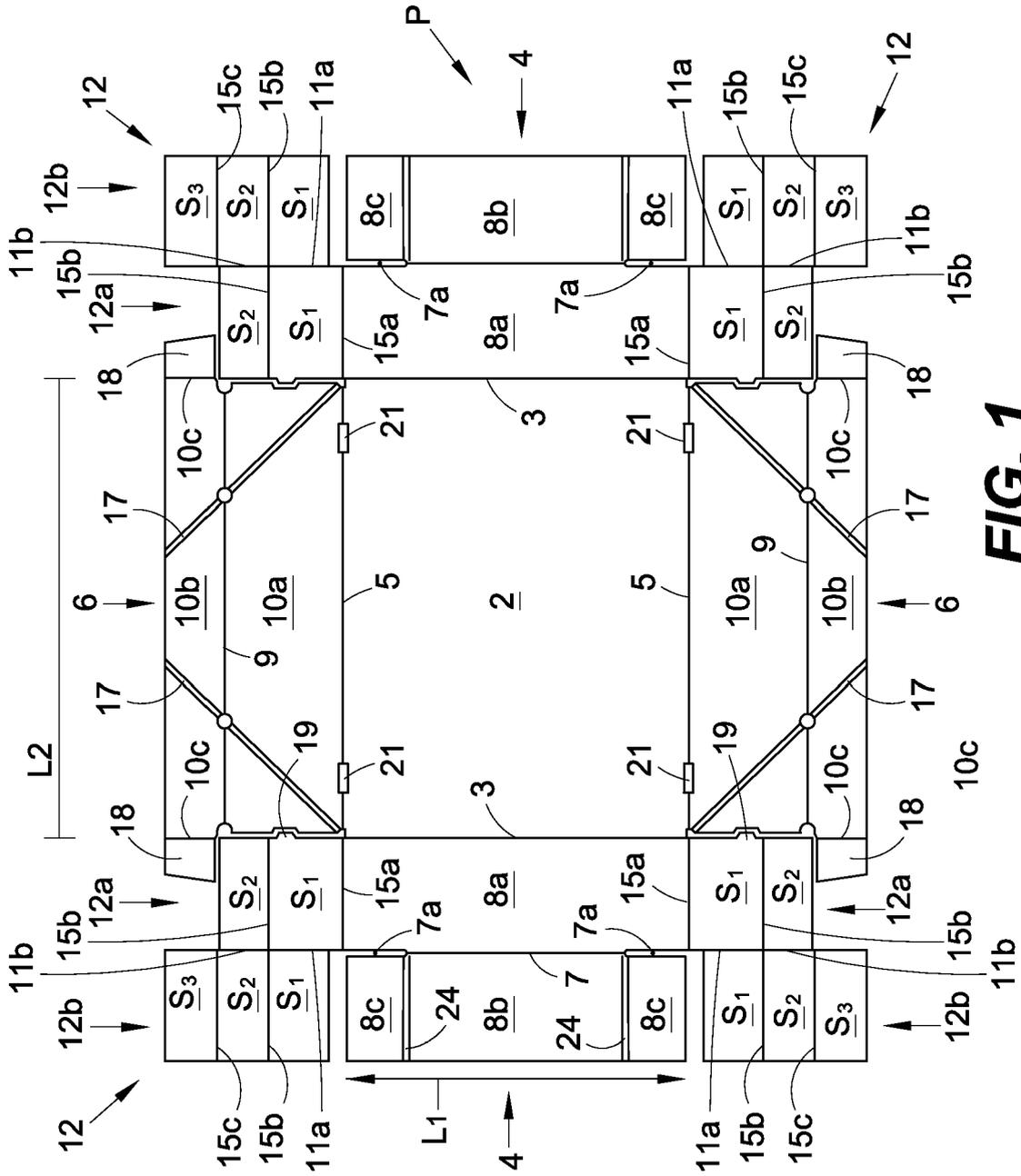
corner panel 12 can be folded into any corner reinforcement 22 known per se, for instance a tubular corner profile having a triangular or polygonal cross section, while in each case a strip of the corner panel 12 is connected to the fastening part 8c. Also, such a corner reinforcement 22 may be provided in a box which cannot be folded up. Such a box has a relatively high stacking strength and dimensional stability while material use is relatively low.

[0029] These and many variations are understood to fall within the framework of the invention as set forth in the appended claims.

Claims

1. A box set up from a blank (P), comprising a bottom panel (2) surrounded by upstanding first (4) and second (6) sidewall panels which are mutually connected by corner panels (12) forming corner reinforcement (22), wherein each sidewall panel (4, 6) is connected to the bottom panel (2) via a first folding line (3, 5), wherein each corner panel (12) is further connected to a fastening part (8c) provided on the first sidewall panel (4), wherein the fastening part (8c) extends at least partly from a remaining part (8a) of the first sidewall panel (4) in a direction (R1) towards an interior space (I) of the box (1), such that the fastening part (8c) at least partly stands away from the remaining part (8a) of the first sidewall panel (4), thereby defining a space (20) between the fastening part (8c) and at least the remaining part (8a) of the first sidewall panel (4).
2. A box according to claim 1, wherein each first sidewall panel (4) comprises a further folding line (7) which extends substantially parallel to the first folding line (3), which further folding line (7) divides the first sidewall panel (4) into a first segment (8a) situated between the folding lines (3, 7) and a second segment (8b) situated against the first segment (8a), wherein the fastening part (8c) is pivotably connected to the second segment (8b).
3. A box according to claim 2, wherein the corner panel (12) is pivotably connected to the first segment (8a) of the first sidewall panel (4) via a first folding line (15a).
4. A box according to claim 3, wherein each corner panel (12) comprises at least one further folding line (15b, 15c) which extends substantially parallel to the first folding line (15a), wherein the at least one folding line (15b, 15c) divides the corner panel (12) into several strips (S1, S2, S3).
5. A box according to any one of the preceding claims, wherein each corner panel is provided with a first corner panel layer and, situated substantially therea-

- gainst, a second corner panel layer which is connected to the first corner panel layer along a further folding line (11a, 11b) provided substantially perpendicularly to the first folding line (15a).
6. A box according to claim 4 or 5, wherein the at least third strip (S3) is connected to the fastening part (8c) of the sidewall panel (4).
7. A box according to any one of the preceding claims, wherein the second sidewall panel (6) is provided with a further folding line (9) which extends substantially parallel to the first folding line (5), which further folding line (9) divides the second sidewall panel (6) into a first segment (10a) situated between the folding lines (5, 9), and a second segment (10b) forming a bridge (26), wherein the second segment (10b) on sides (10c) situated near the first sidewall panels (4) is provided with connecting parts (18) connected thereto, which connecting parts (18) are connected to the respective first sidewall panels (4).
8. A box according to claim 7, wherein the connecting part (18) extends into the space (20) between the fastening part (8c) and the first segment (8a) of the first sidewall panel (4) to connect the bridge-forming second segment (10b) with the first sidewall panel (4).
9. A blank for a box (1) according to any one of the preceding claims, comprising a substantially quadrangular bottom panel (2), first and second sidewall panels (4, 6) situated opposite each other in pairs, which are pivotably connected to the bottom panel (2) along folding lines (3, 5), corner panels (12) which are pivotably connected to the first sidewall panels (4) along first folding lines (15a), wherein each first sidewall panel (4) comprises a further folding line (7) which extends substantially parallel to the first folding line (3), which further folding line (7) divides the first sidewall panel (4) into a first segment (8a) situated between the folding lines (3, 7) and a second segment (8b) situated against the first segment (8a), wherein the fastening part (8c) is pivotably connected to the second segment (8b), at least to a side thereof situated near the corner panel (12).
10. A blank according to claim 9, wherein each second sidewall panel comprises a second folding line (9) substantially parallel to the first folding line (5) which divides the second sidewall panel into at least two segments (10a, 10b) which are mutually pivotably connected, wherein a second segment (10b) forming a bridge (26) is provided on both sides (10c) with connecting parts (18) pivotably connected to that segment (10b), which are arranged to be connected to the respective first sidewall panels (4).
11. A blank according to claim 10, wherein each connecting part (18) is arranged to be inserted, in use, between the first (8a) and the second (8b) segment, at least the fastening part (8c) thereof, of the respective first sidewall panel (4).
12. A blank according to any one of claims 9-11, wherein each corner panel (12) comprises at least one further folding line (15b, 15c) which extends substantially parallel to the first folding line (15a), wherein the at least one folding line (15b, 15c) divides the corner panel (12) into several strips (S1, S2, S3).
13. A blank according to claim 12, wherein each corner panel is provided with a first corner panel layer (12a) and a second corner panel layer (12b) which is pivotably connected to the first corner panel layer (12a) along a folding line (11a, 11b) provided substantially perpendicularly to the first folding line (15a).



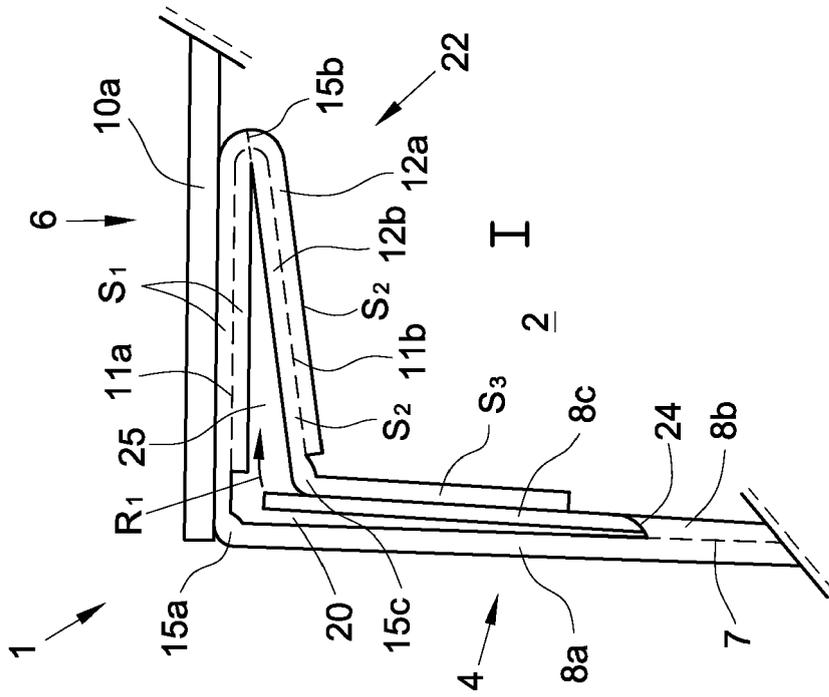


FIG. 2

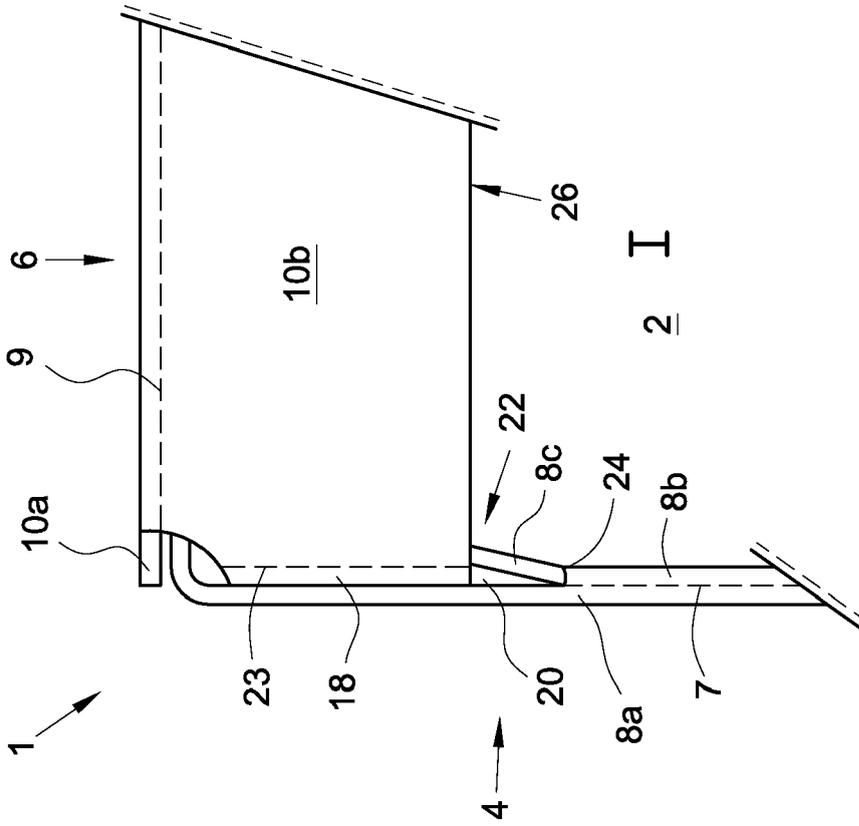


FIG. 3

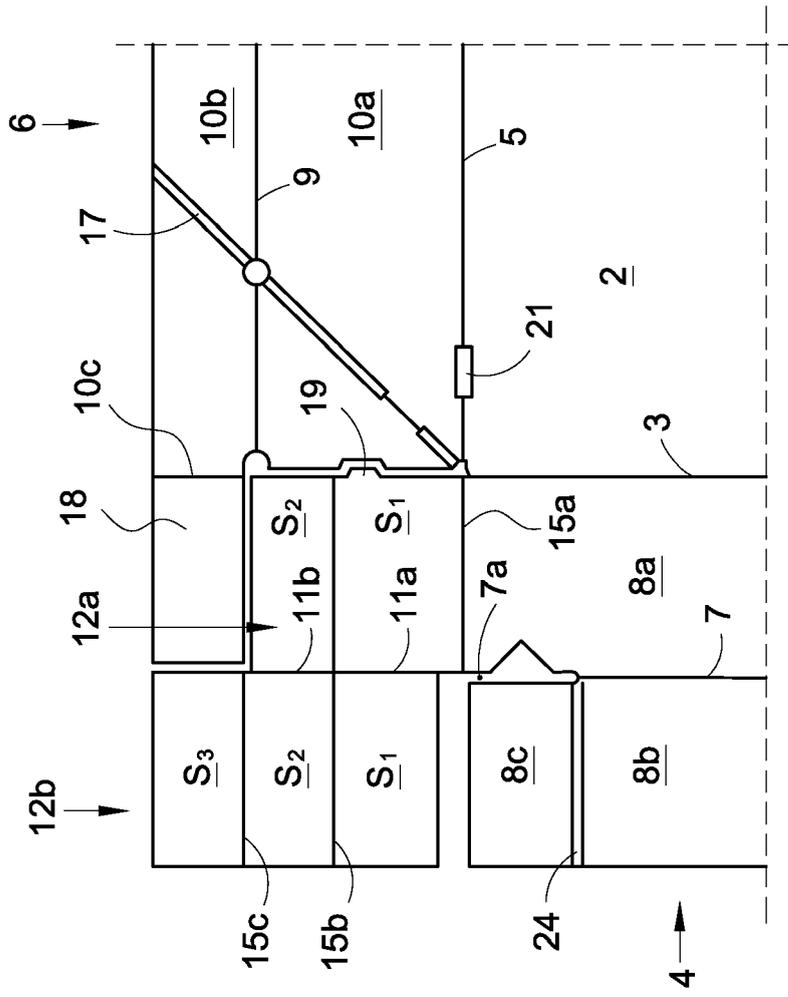


FIG. 4



EUROPEAN SEARCH REPORT

Application Number
EP 09 16 4315

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			B65D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		7 September 2009	Sundell, Olli
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EPO FORM 1503 03.82 (F04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 09 16 4315

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