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

(57) The invention relates to a box (20;120;220) with corner reinforcements set up from a blank (1;101;201). The box comprises a bottom panel (2;102), surrounded by upstanding sidewall panels (4;6;104;106) which are mutually connected by corner panels (12;112;212). Each corner panel (12;112;212) is pivotally connected to one of the sidewall panels via a first folding line (13;113) and further comprises at least one further folding line (15;115A,B;215A,B) which extends substantially parallel

to the first folding line (13;113). Each corner panel (12;112;212) is designed to be multi-layered over at least a portion of its surface. Yet, at the location of the or each further folding line (15;115A,B;215A,B), the corner panel is designed to be substantially, i.e. over more than 50% of the length of the respective folding line (15;115A,B;215A,B), one-layered.

The invention further relates to a blank (1;101;201) and a method for setting up this blank (1;101;201) to form a box (20;120;220) according to the invention.

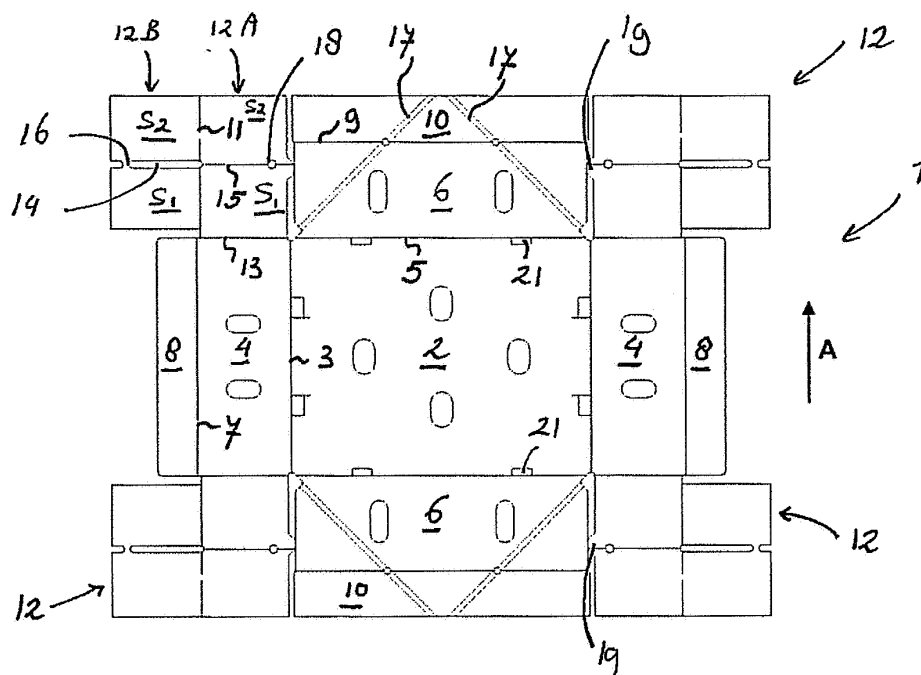


FIG. 1

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. From, for instance, EP 0 621 192 of applicant, a box is known wherein corner reinforcements have been formed from corner panels which are connected to first sidewall panels so as to be pivotable 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 to a second sidewall panel by a first strip adjacent the first folding line. The second strip is folded back and glued against the first strip and the third strip is glued against the first sidewall panel.

[0003] Further, boxes are known wherein the corner panels are folded over to form tubular corner reinforcements with, for instance, a triangular, quadrangular or chevron-shaped cross-section. In the two latter cases, the corner panels comprise at least three folding lines subdividing the corner panel into four strips.

[0004] Such corner reinforcements enhance the stiffness and rigidity of the box, in particular the stacking strength or compression strength. Further, material can be saved in that a lighter or thinner blank can be used.

[0005] A drawback of these known boxes is that the maximum load bearing capacity of the blank material is not optimally utilized. This maximum load bearing capacity depends, on the one side, on the load bearing capacity of the cutting edges of the blank material and depends, on the other side, on the buckling load (the load at which the blank material buckles). In the design of the known boxes, the aforementioned buckling load is the limiting factor. As a result, the load bearing capacity of the cutting edges is not fully used.

[0006] It has already been suggested to design the corner panels to be multi-layered, i.e. build them up from several layers of blank material. As a result, the buckling load increases and the load bearing capacity of the cutting edges can be utilized more optimally.

[0007] However, a drawback of the above-mentioned solution is that for setting up such boxes, a relatively expensive, complex corner folding device is required, wherein a conveying or feed-through direction of the blank through the device can be changed, so that, in each case, multilayer blank parts can be folded over in a folding direction which is substantially parallel to the feed-through direction.

[0008] The object of the invention is to provide a box of the aforementioned type, wherein the drawback of the known boxes is eliminated, while maintaining the advantages thereof. More particularly, the invention contemplates providing a box, wherein, on the one side, the load bearing capacity of the used blank material is optimally utilized and wherein, on the other side, the box can be set up on a simple line folding device, i.e. a device with only one feed-through direction.

[0009] To that end, a box according to the invention is characterized by the features according to Fig. 1.

[0010] By designing the corner panels to be single-layered at the location of the folding lines, at least over the largest portion of said folding line, i.e. over more than 50%, the corner panels maintain a relatively low folding resistance. As a result, these corner panels can be folded over with relatively little force, and need not necessarily be folded over in a folding direction which is parallel to a conveying direction of the respective panel. This offers the possibility of manufacturing boxes on a simple line folding device, wherein the conveying direction of the blank material does not change when the different operating steps are traversed. A number of the folding operations will then have a folding direction which is substantially parallel to that of the conveying direction, yet also, a number of folding operations will have a folding direction deviating from this conveying direction, in particular being perpendicular thereto.

[0011] Surprisingly, it has appeared from tests carried out by applicant that the single layer design of the folding lines of the corner reinforcements does not appreciably compromise the stacking strength of these corner reinforcements and, consequently, the boxes. In other words, the stacking strength remains high, while still the box can be realized with considerably simpler means.

[0012] Preferably, the corner panel is single-layered over as great a length as possible of the respective folding lines. The fact is that as a result, the folding resistance of these folding lines can remain minimal. According to one embodiment of the invention, strips of a second (or further) layer located on both sides of these folding lines, are preferably mutually connected through at least one bridge. This simplifies manipulation and/or positioning of the layers. Consequently, the corner panel is preferably single-layered over at least 50%, more particularly over at least 75%, and preferably over at least approximately 90% of the length of the respective folding line.

[0013] According to a further advantageous aspect of the invention, at the location of the bridges, an opening is provided in the adjacent layer, at least in those cases where the bridge, when folded over of the corner panel, is located on an inner side of the realized fold. Then, superfluous bridge material can be included in this opening. With bridges located on an outer side of the realized fold, such an opening is not required. Precisely these bridges will lack material and break or tear upon realization of the fold. Such advantages are also achieved when, according to an alternative embodiment of the invention, the at least one further folding line extends in one of a first corner panel layer or a further corner panel layer lying thereagainst, wherein the further folding line is located on a first side of a fold which is realized at the location of the further folding line, and wherein the other of the first corner panel layer or a further corner panel layer lying thereagainst comprises an opening at the location of each further folding line, which opening is located on a second side of the realized fold, wherein the

opening is formed by a cut line or perforation line or the like located opposite the further folding line in the other corner panel layer partly tearing. With such an embodiment of the invention, opposite the further folding line in one corner panel layer, a weakening is provided in the other corner panel layer. Depending on the position of the cut line or perforation line with respect to the further folding line, upon realizing a fold, at the location of each further fold, the cut line or perforation line will be located on an outer side of the fold and the further folding line will be located on an inner side of the fold. With this position of the cut line or perforation line with respect to the folding line, it is favourable that before the cut line or perforation line tears upon realizing the fold, the cut line or perforation line has been provided substantially parallel to the further folding line. Such a positioning can for instance be used when, for attaching the respective corner panel layers one on top of the other, a glue is used that cures rapidly. As a weakening is provided in the outermost of the corner panel layers at the location of the fold to be realized, the cut line or perforation line will tear in a controlled manner during realization of this fold. The fact is that the length of circumference on the outer side of the fold is larger than the length of circumference on the inner side of the fold. As a result, an opening is formed at the location of the cut line or the perforation line and, at the location of the further folding line, the corner panel will be substantially one-layered. In this opening, superfluous material of the folding line located on the inner side of the fold can be included. In another elaboration of the invention, the cut line or perforation line will be located on an inner side of the realized fold and the further fold line will be located on the outer side of the fold. With this relative positioning of the respective lines it is favourable that before the cut line or perforation line tears, upon realisation of the fold, the cut line or perforation line has been provided substantially somewhat displaced with respect to the further folding line. Such a relative positioning of the respective lines can be utilised when, for attachment of the respective corner panel layers onto each other, a glue is used that does not cure instantly. As the cut line or perforation line is provided somewhat displaced with respect to the folding line, the difference in length between the length of circumference on the outer side of the fold and the length of circumference on the inner side of the fold can be compensated by the difference in position between the cut line or perforation line. As the glue does not cure instantly, the folding line can move with respect to the cut line or the perforation line upon realization of the fold. Simultaneously, the cut line or perforation line will tear at least partly. It is noted that the further folding line(s) in these exemplary embodiments of the invention can be bending lines are of a closed nature over their entire lengths.

[0014] According to another advantageous aspect of the invention, a first and second corner panel layer are connected to each other so as to be pivotable preferably along their long sides. As a result, accurate positioning

of these layers against each other is simplified, as the layers are joined over a large folding length.

[0015] In a further elaboration of the invention, it is particularly favourable when the corner panel is multi-layered over substantially an entirety of its surface, the second corner panel layer being connected to the first corner panel layer over substantially an entire corner panel layer surface. Preferably, the respective corner panel layers can be interconnected by means of a glue layer. Such a design of the corner panel entails that the corner panel is located as far into the corner as possible so that no loss of size of the interior of the box occurs. To that end, it is further particularly advantageous when a first strip of the corner panel located next to the first sidewall panel is connected to the other sidewall panel, preferably by means of a glue layer and when a strip of the corner panel located farthest from the first strip is connected to the first sidewall panel or to another strip of the corner panel, preferably by a glue layer, such that all strips of the corner panel extend along one of the sidewall panels.

[0016] The multi-layered corner panels according to the invention can then be set up to form corner reinforcements known per se, for instance tubular corner reinforcements with a triangular or multi-angular cross-section, or corner reinforcements which abut substantially flatly in the respective corners of the box, against the adjacent sidewall panels. Preferably, such a box according to the invention is manufactured from cardboard, in particular solid cardboard or corrugated cardboard. Such a box is further preferably a ready-for-use box.

[0017] The invention further relates to a method for setting up a box according to the invention from a blank according to the invention, wherein the method comprises a number of successive folding steps, wherein the blank is folded over along the various folding lines, wherein at least a number of these folding lines extend substantially at right angles to each other, and wherein the blank, while traversing these folding steps, maintains the same conveying direction.

[0018] In the further subclaims, further advantageous embodiments are described of a box according to the invention and of a blank suitable therefor.

[0019] In clarification of the invention, exemplary embodiments of a box and blank according to the invention will be elucidated on the basis of the drawing. In the drawing:

Fig. 1 shows corner of a blank according to the invention;

Fig. 2 schematically shows, in top plan view, a corner set up from the blank of Fig. 1;

Fig. 3 shows an alternative embodiment of a blank according to the invention, at least a corner thereof;

Fig. 4 schematically shows, in top plan view, a corner of a box set up from the blank of Fig. 3;

Fig. 5 shows a different alternative embodiment of a blank according to the invention, at least a corner thereof; and

Fig. 6 schematically shows, in top plan view, a corner of a box set up from the blank of Fig. 5.

[0020] Fig. 1 shows a blank 1 according to the invention. The blank 1 comprises a quadrangular bottom panel 2, a pair of mutually opposed first sidewall panels 4 which are connected to the bottom panel 2 so as to be pivotable along folding lines 3, and a pair of mutually opposed second sidewall panels 6 which are connected to the bottom panel 2 so as to be pivotable along folding lines 5, which extend substantially at right angles to the above-mentioned folding lines 3. In the example shown, both the first sidewall panels 4 and the second sidewall panels 6 are provided with an edge panel 8, 10, respectively, which is connected to an edge of said sidewall panels 4, 6 remote from the bottom panel 2, so as to be pivotable along respective folding lines 7 and 9. In set-up condition, these edge panels 8 and/or 10 form an upper edge extending around the opening. In an alternative embodiment, they can be omitted. Further, in the exemplary embodiment shown, each second sidewall panel 6 is provided with two diagonal folding lines 17. With this, the box 20 to be set up from the blank 1 becomes a so-called ready-for-use box. This is a box which can be supplied with folded down sidewall panels 4, 6. These sidewall panels 4, 6 need only be pulled up before use and be fixed in this position, by means of projections 19 which can be inserted in recesses 21 provided thereto in the bottom panel 2. The diagonal folding lines 17, projections 19 and/or recesses 21 can be omitted in an alternative embodiment.

[0021] The blank 1 further comprises four corner panels 12, which are each subdivided by means of a folding line 11 into two substantially equally large segments 12A, 12B. The folding lines 11 extend substantially in line with the folding lines 7 between the first sidewall panels 4 and the bridges 18. The corner panels 12 are connected by a first segment 12A on both sides of the first sidewall panels 4, so as to be pivotable along first folding lines 13. Each first segment 12A is divided into two strips S1, S2 by a further folding line 15 which extends substantially parallel to the first folding line 13. Each second segment 12B is divided into similar strips S1, S2 by means of an elongated incision 14 which extends in line with the further folding line 15 over the full width of the second segment 12B. The strips S1, S2 extending on both sides of this incision 14 are mutually connected by means of a bridge 16. In the example shown, this bridge 16 is located at some distance from a longitudinal edge of the second segment 12B remote from the first segment 12A. In an alternative embodiment, the bridge 16 can be located closer to this longitudinal edge or, conversely, farther away therefrom. It is also possible to interconnect the strips S1, S2 of segment 12B via several bridges 16 (not shown).

[0022] The first corner panel segment 12A further comprises an opening 18. This opening 18 is substantially equally large as the bridge 16 and is located on the further

folding line 15, at the same distance from folding line 11 as the bridge 16.

[0023] Fig. 2 schematically shows, in top plan view, a corner of a box 20 which can be set up from the blank 1 according to Fig. 1. To that end, the second corner panel segment 12B is folded upwards from the plane of the drawing, along folding line 11, and attached against the first corner panel segment 12A with, for instance, glue. Thus, a double-layered corner panel 12 is obtained, wherein the first corner panel segment 12A forms a first corner panel layer and the second corner panel segment 12B forms a second corner panel layer and wherein the incision 14 is located substantially above the further folding line 15 and the bridge 16 above the opening 18.

[0024] Then, the corner panel 12 is folded around the further folding line 15 (upwards from the plane of the drawing) and attached against itself with, for instance, glue. Here, the superfluous blank material of the bridge 16 can bulge through the opening 18.

[0025] After this, the corner panels 12 can be attached in a conventional manner against the second sidewall panels 6 with, for instance, glue, for forming the above-mentioned ready-for-use box 20.

[0026] The thus obtained box 20 is provided with four-layered corner reinforcements 22, which extend against the second sidewall panel 6. Surprisingly, it has appeared that with such corner reinforcements 22, a great stacking strength can be obtained, while furthermore the load bearing capacity of the blank material can be optimally used.

[0027] Fig. 3 shows an alternative embodiment of a blank 101 according to the invention, at least one corner thereof. The remaining corners are identical, but mirrored about the X-axis and Y-axis. In Fig. 3, parts corresponding with the blank 1 from Fig. 1 are indicated with corresponding reference numerals, increased by 100. The principal difference with respect to the blank of Fig. 1 is that the first corner panel segment 112A comprises a second further folding line 115B. As a result, the corner panel segment 112A is subdivided into three strips S1-S3 instead of two. The second corner panel segment 112B comprises two incisions 114A, B located in line with these folding lines 115A, B. The first corner panel segment 112A further comprises, once more, an opening 118 at the location where, in set up condition, the bridge 116A is located. For bridge 116B, no opening 118B is provided. This is not required because after the corner panel segments 112A, B have been attached to each other, the third strip S3 of the corner panel 112 is folded over in opposite direction along folding line 115B, i.e. downwards from the plane of the drawing. This appears from the double line indicating the folding line 115B. As a result, the bridge 116B will be located on the outer side of the thus formed fold, and break.

[0028] In an alternative embodiment, the third strip S3 can be folded upwards from the plane of the drawing, around folding line 115B. In that case however, a second opening 118 is required for providing space for superflu-

ous blank material of bridge 116B.

[0029] Fig. 4 schematically shows a possible embodiment of a corner of a box 120 which can be set up from the blank 101 according to Fig. 3. Here, the second corner panel segment 112B is attached against the first corner panel segment 112A in the same manner as described with reference to Figs. 1 and 2. Then, the thus obtained double-layered corner panel 112 is attached against the second corner panel 106 by a first strip S1 adjacent to the first folding line 113. After that, the corner panel 112 is folded back against itself around further folding line 115A, so that the second strip S2 abuts against the first strip S1, and the corner panel 112 is attached against the first sidewall panel 104 by the third strip S3. The second strip S2 can be glued against the first strip S1. Alternatively, between the two strips S1, S2, a wedge-shaped space W can be enclosed, as shown.

[0030] Naturally, other manners of folding are possible too. For instance, the third strip S3 can be folded back and attached against the second strip S2 instead of against the first sidewall panel 104. Also, the third strip S3 can be attached between the first strip S1 and the second strip S2. In both cases, a six-layered corner reinforcement 122 is formed at the location of the second sidewall panel 106. Further, from the corner panel 112, a tubular corner reinforcement can be set up, with a triangular cross-section, wherein the first strip S1 is attached against the second sidewall panel 106 (in accordance with the embodiment according to Fig. 4), the second strip S2 extends diagonally between the first and second sidewall panel 104, 106, and the third strip S3 is attached against the first sidewall panel 104, by layer 112A.

[0031] Fig. 5 shows another alternative embodiment of a blank 201 according to the invention, at least one corner thereof. The remaining corners are identical, but mirrored around the X-axis and Y-axis. This blank 201 is substantially similar to the blank 101 as shown in Fig. 3. For the description of identical parts, reference is therefore made to the descriptions with Figs. 1 and 3. In Fig. 5, substantially identical parts from the blank 101 of Fig. 3 are indicated with identical reference numerals. Corresponding parts are indicated with corresponding reference numerals increased by 100. The principal difference to the blank 101 of Fig. 3 is that the corner panel 212 comprises no bridges and openings at the location of the further folding lines 215A, 215B. Both the first corner panel segment 212A and the second corner panel segment 212B are subdivided into three strips S1-S3. The first segment 212A is connected to the first sidewall panel 104 so as to be pivotable along the first folding line 113. The first further folding line 215A is provided in the second segment 212B and the second further folding line 215B is provided in the first segment 212A. The first segment 212A comprises, between the first S1 and the second strip S2, a cut line or perforation line 216A. This cut line or perforation line 216A is located substantially in line with the first further folding line 215A. The second seg-

ment 212B is provided, between the second strip S2 and the third strip S3, with such a cut line or perforation line 216B. This cut line or perforation line 216B is substantially in line with the second further folding line 215B. In another embodiment of the invention, the cut lines or perforation lines 216A,B can also be somewhat displaced with respect to the respective further folding lines 215A, B in a direction substantially transversely to the respective lines.

[0032] Fig. 6 schematically shows a possible embodiment of a corner of a box 220 which can be set up from the blank 201 according to Fig. 5. When, from the blank 201, a box 220 is set up, at the location of the further folding lines 215A,B respective folds are formed. In this case, to this end, the second segment 212B is folded upwards from the plane of the drawing and attached to the first segment 212A, preferably over substantially the entire corner panel surface. In this exemplary embodiment of the invention, attaching the respective segments 212A, B onto each other is preferably done with the aid of a glue which cures instantly. Then, the corner panel is folded over, over the first further folding line 215A. As the outermost length of circumference of the fold is greater than the innermost length of circumference of the fold, the perforation line or cut line 216A in the first segment 212A will tear in a controlled manner so that an opening 216A' is formed. After this, the third segment S3 of the corner panel 212 is folded back over the second further folding line 215B. As a result, the perforation line or cut line 216B in the second segment 212B will tear in a controlled manner so that an opening 216B' is formed. The openings 216A', B', provide space for superfluous material of the further folding lines 215A,B. It is clear that also, other types of lines having the same effect as the perforation line or cut line 216A,B can be used for forming the opening 216A', B'. It is also self-evident that, depending on the manner of folding the corner panel 212, either the further folding line 215A,B or the perforation line or cut line 216A,B is provided in the first segment 212A or in the second segment 212B so long as the perforation line or cut line 216A,B is located on the outer side of the fold and the further folding line 216A,B on the inner side of the fold. In another embodiment of the invention (not shown) a box 220 can be set up from a blank 201 wherein the cut lines or perforation lines 216A,B are somewhat displaced with respect to the respective folding lines 215A,B in a direction transversely to the respective lines. In other words, the cut lines or perforation lines 216A,B are then substantially parallel to a continuation of the respective folding lines 215A,B. Such a blank 201 is preferably used when, at least before the respective segments 212A,B are attached onto each other, a glue is used that does not cure instantly. When the segments 212A,B are attached onto each other and the respective folds are realized around the respective folding lines 215A,B, in this embodiment of the invention, the respective cut lines or perforation lines 216A,B will be located on an inner side of the fold. The cut lines or perforation

lines 216A,B will partly tear during setting up of the fold. Simultaneously, the difference in length of circumference between the inner side and outer side of the fold is compensated in that the cut line or perforation line 216A,B is somewhat displaced with respect to the respective folding lines 215A,B. In this manner, a multi-layered corner reinforcement 222 can be provided in the box 220. The different strips of the corner reinforcement 222 are preferably attached such that they are near and substantially parallel to the sidewall panels 4, 6. To this end, strip S1 of the first segment 212A is connected to the second sidewall panel 106 with the aid of, for instance, a glue layer. The third strip S3 of the second segment 212B is connected to the first sidewall panel 104 with the aid of, for instance, a glue layer. Preferably, the space W is as small as possible so that the corner reinforcement 222 takes away as little space as possible from the interior of the box 220.

[0033] The exemplary embodiments described and shown hereinabove have in common that the corner panels 12, 112, 212 can be folded over with relatively little folding resistance, owing to the respective folding lines 15, 115A,B, 215A,B being one-layered. The required folding strength is in the same order as the folding strength required for folding over the remaining (single-layered) blank parts. As a result, the first mentioned folding operations can take place at right angles to a conveying direction (indicated with arrow A) of the corner panels 12, 112, 212. As a result, the blank 1, 101, 201 can be set up on a so-called line-device, wherein the blank 1, 101, 201 traverses the entire set-up process in one conveying direction A.

[0034] Further, with the first two described embodiments, the incisions 14, 114 ensure that the segments 12A,B; 112A,B attached onto each other will not move with respect to each other when the corner panel 12, 112 is folded over around the different folding lines 15; 15A, B. As a result, for attaching these segments 12A,B; 112A, B against each other, a simple glue can be used which cures instantly.

[0035] The invention is not limited in any manner to the exemplary embodiments represented in the description and the drawing. All combinations of (parts of) described and/or shown embodiments are understood to fall within the inventive concept. Furthermore, many variations thereon are possible within the framework of the invention as outlined by the claims.

[0036] For instance, the second corner panel segment 12B, 112B, 212B can be pivotally connected to a short side of the first corner panel segment 12A, 112A, 212A instead of to the long side, as shown in Figs. 1, 3 and 5. These second corner panel segments can be attached against an underside of the first corner panel segment instead of against the top side, as described hereinabove. Also, the corner panel can be built up from separate blank parts, with only one of these parts being pivotally connected to a sidewall panel. The remaining blank parts can be attached onto each other before setup of

the blank, for instance through gluing. Also, the corner panels 12, 112, 212 can be built up from more than two layers. In yet another embodiment, it is possible that at least the first sidewall panel 4, 104 comprises two segments which are located in line with the respective segments 12A,B, 112A,B, 212A,B of the corner panels 12, 112, 212. The second corner panel segment 12B, 112B, 212 can be pivotally connected to a short side of the second segment of the first sidewall panel and the first corner panel segment 12A, 112A, 212A can be connected to a short side of the first segment of the sidewall panel 4, 104. The first corner panel segment 12A, 112A, 212A can then either be pivotally connected to the second corner panel segment 12B, 112B, 212B and be provided separately from the second corner panel segment 12B, 112B, 212B. The corner panel can be subdivided by means of further folding lines into more than three strips. Such a corner panel can be folded into any corner reinforcement known per se, for instance a tubular corner section with a triangular of multi-angular cross section.

[0037] These and many variations are understood to fall within the framework of the invention as set forth in the following claims.

Claims

1. A box (20; 120; 220) set up from a blank (1; 101; 201), comprising a bottom panel (2; 102) surrounded by upstanding sidewall panels (4,6;104,106) which are mutually connected by corner panels (12; 112; 212), wherein each corner panel (12; 112; 212) is pivotally connected to one of the sidewall panels via a first folding line (13; 113) and comprises at least one further folding line (15; 115A,B; 215A,B) which extends substantially parallel to the first folding line (13; 113), wherein each corner panel (12; 112; 212) is further designed to be multi-layered over at least a portion of its surface, but at the location of the or each further folding line (15; 115A,B; 215A,B) is designed to be substantially, i.e. over more than 50% of the length of the respective folding line (15; 115A, B; 215A,B), single-layered.
2. A box (20; 120) according to claim 1, wherein the at least one further folding line (15; 115A,B) extends in a first corner panel layer (12A; 112A) and wherein a further corner panel layer (12B; 112B) comprises strips located on both sides of the at least one folding line (15; 115A,B), which are mutually connected by at least one bridge (16; 116A,B) extending across the respective folding line (15; 115A,B).
3. A box (20; 120) according to claim 2, wherein the first corner panel layer (12A;112A) comprises an opening (18; 118) at the location of each bridge (16; 116A) which is located on an inner side of a fold which is realized at the location of the further folding

line (15; 115A).

4. A box (20; 120) according to claim 2 or 3, wherein the first corner panel layer (12A; 112A) is connected to a sidewall panel (4; 6; 104, 106) so as to be pivotable, along the first folding line (13, 113). 5
5. A box (220) according to claim 1, wherein the at least one further folding line (215A,B) extends in one of a first corner panel layer (212A) or a further corner panel layer (212B) lying thereagainst, wherein the further folding line (215A,B) is located on a first side of a fold which is realized at the location of the further folding line (215A,B), and wherein the other of the first corner panel layer (212A) or a further corner panel layer (212B) lying thereagainst comprises an opening (216A',B') at the location of each further folding line (215A,B), which opening (216A',B') is located on a second side of the realized fold, wherein the opening (216A',B') is formed by the at least partly tearing of a cut line or perforation line or the like (216A,B) located opposite the further folding line (215A,B) in the other corner panel layer (212A,B). 10
6. A box (220) according to claim 5, wherein the opening (216A',B') is located on an outer side of the realized fold and is formed from the cut line, or perforation line or the like (216A,B) which, before tearing, has been provided substantially parallel to the further folding line (215A,B). 15
7. A box (220) according to claim 5, wherein the opening (216A',B') is located on an inner side of the realized fold and is formed from the cut line or perforation line or the like (216A,B) which, before tearing, has been provided substantially somewhat displaced with respect to the further folding line (215A,B). 20
8. A box (20; 120; 220) according to any one of claims 2 - 7, wherein a second corner panel layer (12B; 112B; 212B) is pivotally connected to the first corner panel layer (12A; 112A; 212A). 25
9. A box (20; 120; 220) according to claim 8, wherein the second corner panel layer (12B, 112B; 212B) is connected to the first corner panel layer (12A; 112A; 212A) so as to be pivotable along a side thereof extending substantially at right angles to the first folding line (13; 113). 30
10. A box (20, 120; 220) according to any one of the preceding claims, wherein the corner panel (12; 112; 212) is multi-layered over substantially an entirety of its surface and wherein the second corner panel layer (12B; 112B; 212B) is connected to the first corner panel layer (12A; 112A; 212A) over substantially an entire corner panel layer surface. 35

11. A box (20; 120) according to any one of the preceding claims, wherein from the corner panels (12; 112; 212) corner reinforcements (22; 122; 222) are formed which abut substantially flatly against at least one of the sidewall panels (4, 6; 104, 106). 5
12. A blank (20; 120) according to any one of claims 1-11, wherein from the corner panels (12; 112; 212) tubular corner reinforcements are formed, with an open cross-section. 10
13. A blank (1; 101; 201) for a box (20; 120; 220) according to any one of the preceding claims, comprising a substantially quadrangular bottom panel (2; 102), first and second sidewall panels (4; 104, and 6; 106, respectively) lying mutually opposed, in pairs, which are connected to the bottom panel (2; 102) so as to be pivotable along folding lines (3; 103, and 5; 105, respectively), corner panels (12; 112; 212), which are connected to the first sidewall panels (4; 104) so as to be pivotable along first folding lines (13; 113) and which each comprise at least one further folding line (15; 115A,B; 215A,B), wherein the corner panels (12; 112; 212) are built up from several layers over at least a portion of their surface, but at the location of each further folding line (15; 115A; 212A,B) are designed to be substantially, i.e. over more than 50% of the length of this folding line (15; 115A,B; 216A,B), single-layered. 15
14. A blank (1; 101) according to claim 13, wherein the corner panel (12; 112) comprises at least two segments (12A,B; 112A,B) which are mutually pivotally connected and can be folded and attached against each other for forming a substantially multi-layered corner panel (12; 112), wherein a first segment (12A; 112A) is connected to a first sidewall panel (4; 104) so as to be pivotable along the first folding line (13; 113) and comprises at least one further folding line (15; 115A,B), and wherein the or each further segment (12B; 112B) comprises elongated recesses (14; 114A,B), which overlie the further folding lines (15; 115A,B) when the segments (12A,B; 112A,B) are attached against each other, such that these folding lines (15; 115A,B) lie free, i.e. are uncovered, over a large part of their length. 20
15. A blank (201) according to claim 13, wherein the corner panel (212) comprises at least two segments (212A,B) which are mutually pivotally connected and can be folded and attached against each other for forming a substantially multi-layered corner panel (212), wherein a first segment (212A) is connected to a first sidewall panel (4; 104) so as to be pivotable along the first folding line (13; 113), wherein either the first segment (212A) or the further segment (212B) comprises at least one further folding line (215A,B) and wherein the other of the first (212A) or 25

the further segment (212B) comprises a cut line or perforation line or the like which lies substantially opposite the at least one further folding line (215A, B) when the segments (212A,B) are attached against each other, wherein the perforation line or the cut line or the like (216A,B) is designed for at least partly tearing upon realization of the fold. 5

16. A blank (201) according to claim 15, wherein the cut line or the perforation line or the like (216A,B) lies substantially in line with the at least one further folding line (15, 115A,B), wherein, when at least one fold is realized at the location of the further folding line (215A,B), the perforation line or the cut line or the like (216A,B) is located on an outermost side of the fold. 10 15

17. A blank (201) according to claim 15, wherein the cut line or the perforation line or the like (216A,B) lies substantially at least somewhat displaced with respect to the at least one further folding line (15, 115A, B), wherein, when at least one fold is realized at the location of the further folding line (215A,B) the perforation line or the cut line or the like (216A,B) is located on an innermost side of the fold. 20 25

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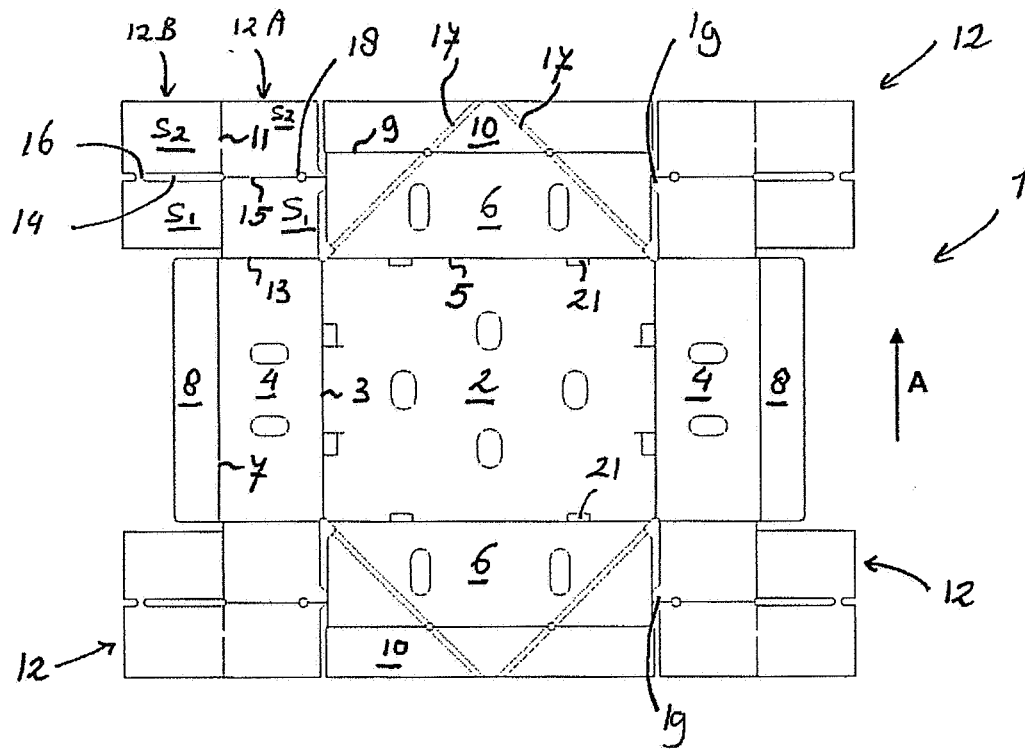


FIG. 1

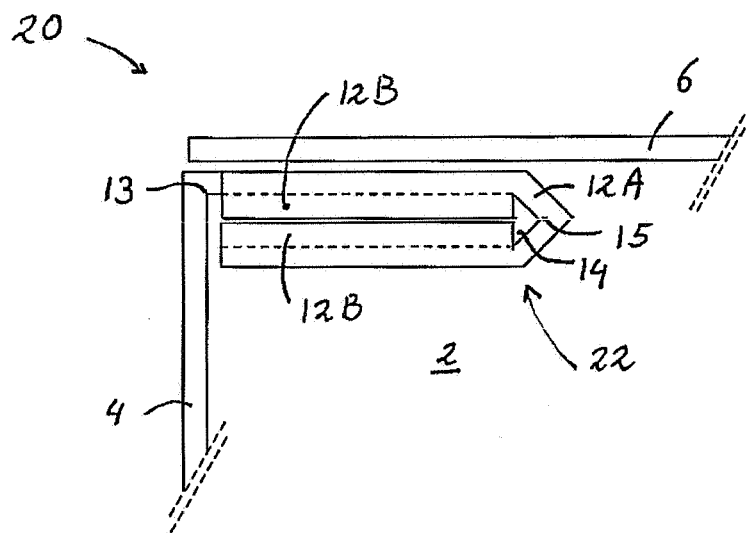


FIG. 2

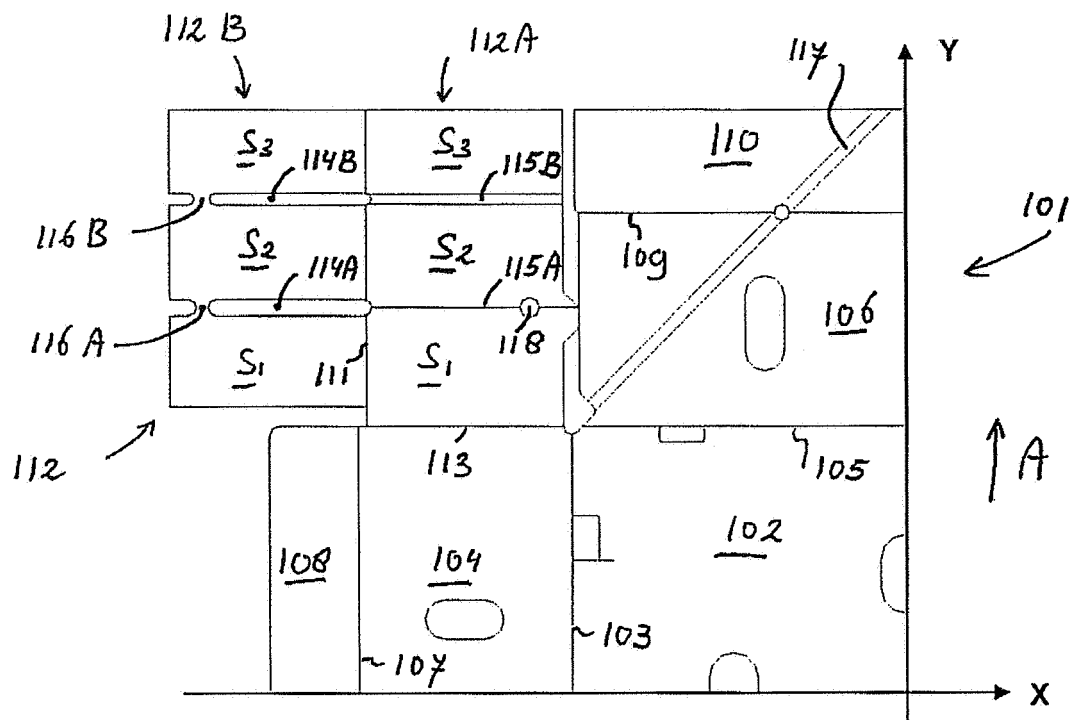


FIG. 3

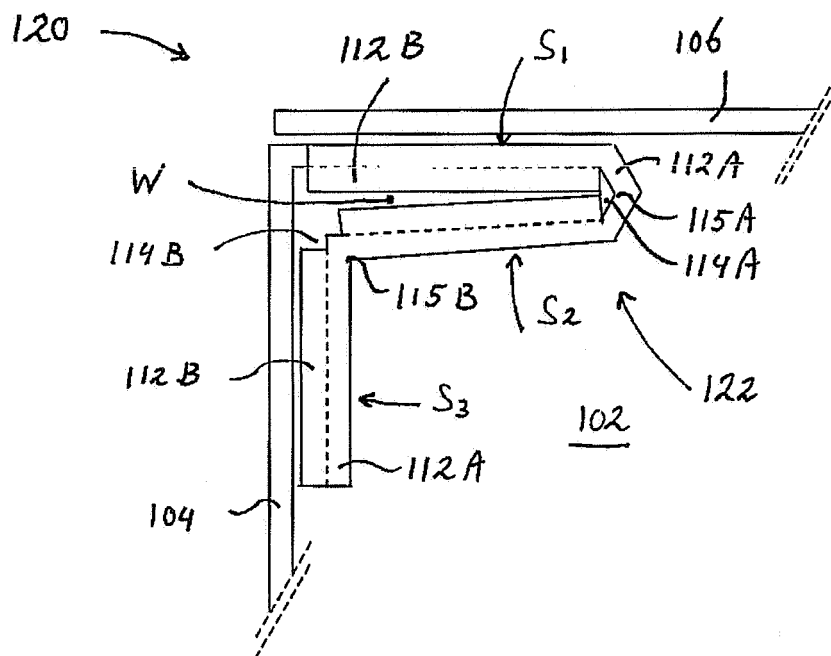


FIG. 4

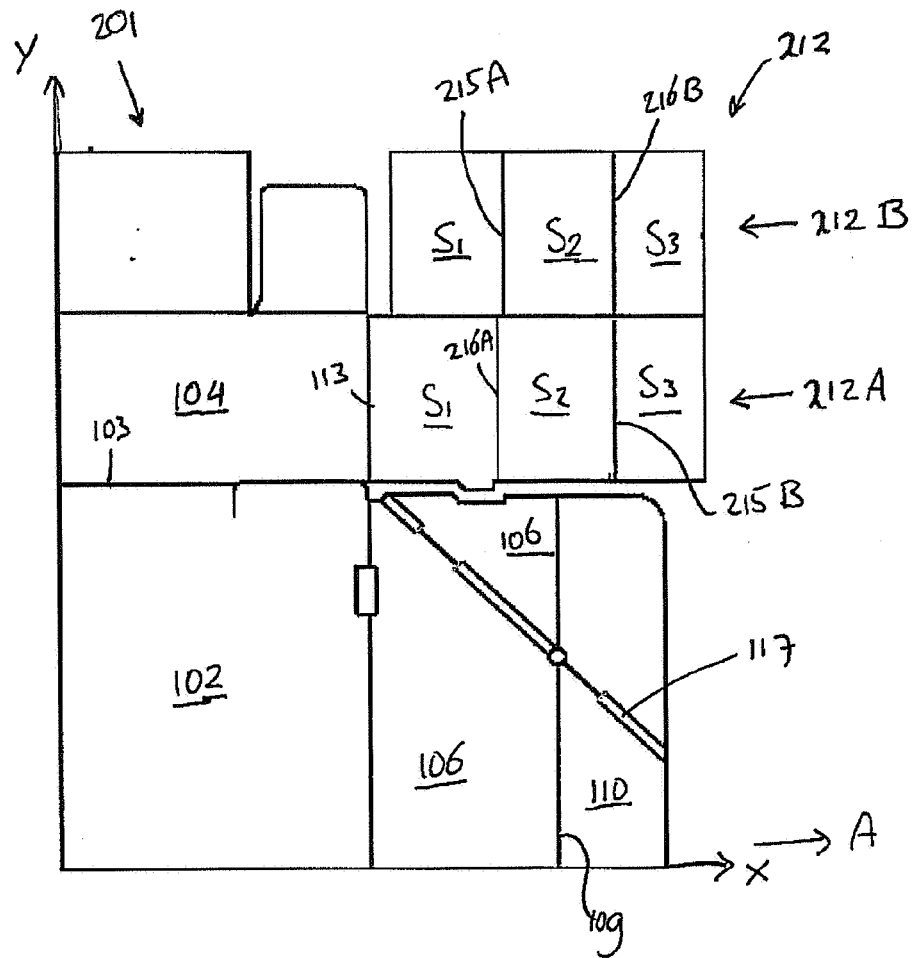


FIG. 5

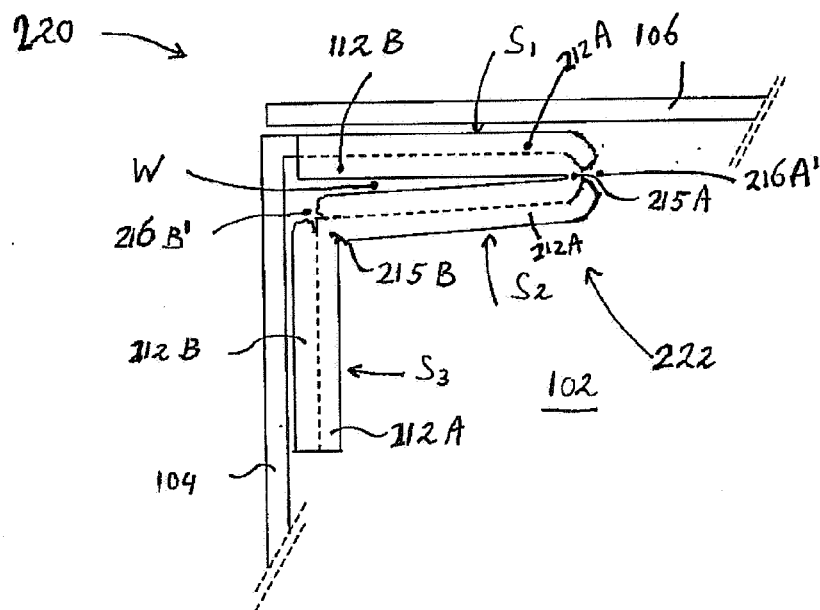


FIG. 6



EUROPEAN SEARCH REPORT

Application Number
EP 08 16 3568

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 764 311 A (R & F FOLDING BOXES [BE]) 21 March 2007 (2007-03-21)	1,11,13	INV. B65D5/28
A	* column 16, line 38 - line 39; figure 9 *	2	ADD. B65D21/00
X	WO 03/033369 A (CARTER HOLT HARVEY LTD [NZ]; BLOMFIELD GREGORY THOMAS [NZ]; COE ROBERT) 24 April 2003 (2003-04-24) * figure 3 *	1,11-13	
X	FR 2 752 222 A (OTOR SA [FR]) 13 February 1998 (1998-02-13) * figures 4-6 *	1,11-13	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 December 2008	Examiner Sundell, Olli
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 08 16 3568

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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17-12-2008

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