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(54) **Package with corner reinforcements, set up from a cardboard blank, and method for setting up such package**

(57) The invention relates to a package provided with corner reinforcements, set up from a cardboard blank. Each corner reinforcement is formed from a corner reinforcing panel that is integrally connected to a first sidewall panel, along a first folding line, and is folded back partly upon itself along a second folding line extending substantially parallel to the first folding line. The parts folded back upon each other are glued against each other. Then, the corner reinforcing panel is folded into a corner profile

that is attached against the first sidewall panel and a second sidewall panel adjacent thereto, in a manner such that the corner profile has a shape closed upon itself wherein an edge of the corner reinforcing panel located opposite the first folding line or the second folding line is located near the first folding line.

The invention also relates to a method for setting up such a package.

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## Description

**[0001]** The invention relates to a package with corner reinforcements, set up from a cardboard blank.

**[0002]** Such packages are known. From EP 0 621 192 of applicant for instance, a package is known wherein corner reinforcements are formed from corner reinforcing panels which are integrally connected to first sidewall panels along a first folding line. The corner reinforcing panels are each subdivided into three strips by two further folding lines. The corner reinforcing panels are glued by a first strip, adjacent the first folding line, to a second side wall panel. The second strip is folded back against the first strip and glued and the third strip is glued against the first sidewall panel.

**[0003]** From EP 0 453 015 of applicant, a package with similar corner reinforcing panels is known, these panels, however, being rolled-up into tubes with a triangular cross-section. Further, packages are known wherein the corner reinforcing panels are subdivided into four strips. These corner reinforcing panels too are rolled up into tubes with a multiangular cross-section, the first and fourth strips being glued against the second and first sidewall panel, respectively.

**[0004]** Such corner reinforcements enhance the rigidity and strength of the package, in particular the stacking strength or compression strength. As a result, such packages can compete with similar packages of plastic or wood. Further, packaging material can be economized on, as, with a lighter or thinner type of cardboard, still, a sufficiently rigid package can be constructed.

**[0005]** Notwithstanding the already achieved advantages, there remains a need for even stronger cardboard packages and/or farther reaching material reduction. The object of the invention is to meet this need. More particularly, the invention contemplates providing a package of the above-mentioned type which has a greater strength than the known packages while using the same amount of cardboard. To that end, a package according to the invention is characterized by the features of claim 1.

**[0006]** With a package according to the invention, the reinforcing corner profiles have a form closed upon themselves, and at least one part of each profile is of double-walled or multi-walled design. Both aspects have a favourable effect on the buckling resistance of the respective corner profile, so that the compression strength or stacking strength of this profile and, hence, of the package as a whole can be enhanced considerably. Gluing the folded back parts enables these parts to cooperate as one wall and to absorb forces, and therefore contributes to the realization of the above-mentioned favourable effect.

**[0007]** In this description, a form "closed upon itself" is understood to mean any form with which an end edge of the corner reinforcing panel abuts against, or extends at a small distance from the starting edge of the corner reinforcing panel. Here, the starting edge is formed by the first folding line with which the corner reinforcing panel

is pivotally connected to the first sidewall panel and the end edge is formed by the end edge of the corner reinforcing panel folded over upon itself. Hence, this end edge can be formed by the second folding line, along which an end part of the corner reinforcing panel is folded over, or be formed by the single-walled end edge of the original corner reinforcing panel, when an end part of this panel is not folded over upon itself but is folded back upon itself somewhere half-way, according to a Z-fold.

**[0008]** It is preferred that a corner reinforcing panel according to the invention has the same length as a corner reinforcing panel according to the prior art. This means that the corner reinforcing panel according to the invention is not additionally lengthened for the purpose of the part to be folded back. When, therefore, this panel has been partly folded back upon itself, the then resulting corner reinforcing panel will have a smaller length than a corner reinforcing panel according to the prior art (the length being defined as the linear perpendicular distance between the first folding line and the opposite end edge of the corner reinforcing panel). When, from this, a similar type of corner profile is set up as in the prior art, it will be clear that the corner profile according to the invention will have an accordingly smaller cross-section. This too contributes to the enhancement of the buckling resistance of the corner profile formed.

**[0009]** According to an advantageous aspect of the invention, the corner profile can be tubular, while the cross section may be triangular or multi-angular. Such a tubular form is favourable to the compression strength of the corner reinforcement and can furthermore help simplify stacking the packages, as the tubes provide a certain stacking surface.

**[0010]** According to a particularly advantageous aspect of the invention, the folded-over parts of the corner reinforcing panel are glued with a glue with a relatively long curing time, at least a glue with which the parts are not instantly immovably connected to each other. As a result, during setting up of the tubular profiles, the folded-over parts can move somewhat relative to each other, and undesired stresses in these parts can be prevented. Alternatively, for the same purpose, a somewhat elastic glue can be utilized and/or a glue that can be activated at a later moment in time through, for instance, exposure to heat. Once the corner reinforcements formed, they can be glued with the same glue against the first and second sidewall panel, but can also be attached with a different type of glue, for instance a glue that does cure instantly.

**[0011]** It will be clear that, at will, the corner reinforcing panel can be folded back upon itself in two directions. Depending on the selected fold-back direction, and on the selected corner profile, the location of the folded back panel part will differ in the eventual corner reinforcement. For instance, this part can extend against an inside or outside of a tubular corner profile, or be confined between this profile and one of the sidewall panels.

**[0012]** The invention further relates to a method for

setting up a package with corner reinforcements from a cardboard blank, according to the features of claim 9.

**[0013]** With such a method, first, the corner reinforcing panel is folded back upon itself and glued. Then, this panel is set up in a known manner for forming a corner reinforcing profile. As a result, this new method can be carried out for the greater part in a conventional set-up device. Existing set-up devices need only be expanded with a fold-back station where the corner reinforcing panel is folded back upon itself. Thus, a manufacturing method according to the invention can be implemented on existing devices with minimal investment.

**[0014]** In the further subclaims, further advantageous embodiments of a package and method according to the invention are described. In clarification of the invention, exemplary embodiments of a package according to the invention will be explained in further detail with reference to the drawing. In the drawing:

Fig. 1 shows a quarter of a blank, for a package with tubular corner reinforcements according to the prior art;

Fig. 2 schematically shows, in top plan view, a corner reinforcement set up from the blank of Figure 1, according to the prior art;

Fig. 3 shows a quarter of a blank, comparable to the blank of Figure 1, but adapted for setting up therefrom a package with tubular corner reinforcements according to the invention;

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

Fig. 5 shows a graph in which the stacking strength is shown, for a package with corner reinforcements according to Figures 2 and 4;

Figs. 6 and 7 schematically show, in top plan view, two alternative embodiments of a corner reinforcement according to the invention, which corner reinforcements can both be set up from substantially the same blank;

Fig. 8 shows the blank on which Figures 6 and 7 are based;

Figs. 9 and 10 schematically show, in top plan view, two alternative embodiments of a triangular corner reinforcement, with two double-walled sides, while the corner reinforcing panel is folded back inwards upon itself and outwards upon itself, respectively; and

Figs. 11 and 12 schematically show, in top plan view, two alternative embodiments of a corner reinforcement, which can be set up from a blank comparable to that of the corner reinforcements of Figs. 9 and 10, and wherein the corner reinforcing panel, once again, is folded back upon itself inwards and folded back upon itself outwards, respectively.

**[0015]** Figs. 1 and 2 show a blank 2 (at least a quarter thereof) and a package 1 set up therefrom with corner reinforcement 10 according to the prior art, respectively.

**[0016]** The blank 2 comprises a substantially rectangular bottom panel 3, first and second sidewall panels 4, 5 which are pivotally connected to the bottom panel 3, and corner reinforcing panels 6 which are pivotally connected to both sides of the first sidewall panels 4, along first folding lines 11. By means of three further folding lines 12, 13, 14, which extend substantially parallel to the first folding line 11, the corner reinforcing panel 6 is divided into four strips 6A-D. As shown, the first and second sidewall panels 4, 5 can further be provided, on a side remote from the bottom panel 3, with a further panel 7, 8, for forming stacking bridges, or for reinforcing the second sidewall panels 5, respectively.

**[0017]** In use, the corner reinforcing panel 6 can be folded along the respective folding lines 11-14 into a tubular corner reinforcement 10 with a substantially chevron shaped cross-section, as shown in Fig. 2A, or a substantially square cross-section (not shown). Here, a first strip 6A adjoining the first folding line 11 is glued against the second sidewall panel 5 and a fourth strip 6D located remotest from this first folding line 11 is glued against the first sidewall panel 4.

**[0018]** Figs. 3 and 4 show a quarter blank 102 and a package 101 set up therefrom with a corner reinforcement 110 according to the invention, respectively. Parts corresponding to Figs. 1 and 2 are indicated with corresponding reference numerals, increased by 100.

**[0019]** The blank 101 shown in Fig. 3 differs from the blank 1 shown in Fig.-1 only in that the corner reinforcing panel 106 is subdivided into five strips 106A-E instead of four, while the total length h of the corner reinforcing panel 6 is chosen to be substantially equal to that of the corner reinforcing panel 6 of Fig. 1, and the five strips 106A-E are therefore each somewhat narrower than the four strips 6A-D of Fig. 1.

**[0020]** In use, the fifth strip 106E, i.e., the strip remotest from the first folding line 111, can be provided with a glue layer on the side facing the underside of the paper in Fig. 3, and be folded over outwards (downwards, from the plane of the drawing) around second folding line 115. Then, the corner reinforcing panel 106 can be folded in the same manner into a tubular corner reinforcement and be glued against sidewall panels 104, 105 as described hereinabove with reference to Fig. 2. This results in a corner reinforcement 110 as shown in Fig. 4, with the folded-over fifth strip 106E extending between the first sidewall panel 104 and the fourth strip 6D. It will be clear that the fifth strip 106E can also be folded over and glued in opposite direction around the second folding line 115, and then, in set-up condition, will be located in the tubular corner reinforcement 110 against the fourth strip 6D (not shown). The corner reinforcement 110 can further have a substantially square cross-section, instead of the chevron-shape shown, while, once again, the fifth strip 106E can be folded outwards or inwards.

**[0021]** Thus, a corner reinforcement 110 is obtained with a form closed upon itself and a partly double-walled circumferential jacket. As a result, the compression

strength of the corner reinforcement 110 increases considerably and, hence, the total stacking strength of the package 102. This can be seen in Figure 5, where the stacking strength of a package 1 with corner reinforcement 10 (according to the prior art) is compared to the stacking strength of a package 101 with a corner reinforcement 110 (according to the invention, in particular Figure 4). Here, on the Y-axis, the stacking load is plotted in Newton and, on the X-axis, the compression is plotted in millimetres. The compression shown starts at a pre-load of 250 Newton. The measuring results are average measuring results, obtained by measurements on test boxes at 23°C and a relative humidity of 50%. It is clearly visible that initially, the two corner reinforcements 10, 110 keep up with each other, but that, starting from approximately  $X = 7$  mm, they exhibit a considerable difference in stacking load. That is why the load on package according to Fig. 4 can be considerably heavier. Here, no significant difference was measured between a corner reinforcement 110 according to the invention with a fifth strip 106E folded inwards or a fifth strip 106E folded outwards.

**[0022]** Figs. 6 and 7 schematically show, in top plan view, two further embodiments of corner reinforcements 210, 210' according to the invention, which can both be set up from a blank 202 as represented in Fig. 8. Identical or corresponding parts are, once again, indicated with identical or corresponding reference numerals, increased by 200. In this case, the corner reinforcing panel 206 is subdivided by means of folding lines 211, 212, 215 into four strips 206A-D. The fourth strip 206D is folded inwards around folding line 215, i.e., upward from the plane of the drawing, and glued against the third strip 206C. Then, the corner reinforcing panel 206 is folded into a tubular corner reinforcement 210 with a triangular cross-section, as shown in Fig. 6, while the third strip 206C is glued against the first sidewall panel 204 and the first strip 206A is glued against the second sidewall panel 205.

**[0023]** Alternatively, the corner reinforcing panel can be folded into the corner reinforcing profile 210' as shown in Fig. 7, wherein the second strip 206B is folded back against the first strip 206A and the third strip 206C is folded back in the opposite direction, through an angle of approximately 90°, so that the fourth strip 206D, folded-over and glued earlier, comes to lie against the first sidewall panel 204.

**[0024]** In both cases (Fig. 6 and 7), a corner profile closed upon itself is obtained that is partly of double-walled design, and that therefore has a considerably greater compression strength than a corner profile according to the prior art, where there is no folded-over fourth strip 206D. Once again, the fourth strip 206d can also be folded over in the opposite direction, so that in the embodiment according to Fig. 6, it will come to lie between the first sidewall panel 204 and the third strip 206C of the corner reinforcing panel 206, and, in the embodiment according to Fig. 7, will come to lie on the inside

of the package 201, against the third strip 206C. It will be clear that in particular with a folding manner according to Fig. 7, the second and third strip 206B,C have substantially the same width as the first and fourth strip 206A, D, respectively.

**[0025]** According to a further embodiment according to the invention, the corner reinforcement can be designed as shown in Figs. 9 - 12. The embodiment according to Fig. 9 largely corresponds to the corner reinforcement according to Fig. 6, however, the corner reinforcing panel is folded-over over two strips (106D,E) instead of over one strip. As a result, the set-up triangular corner reinforcement has two double-walled sides (106B, E; 10C,D). Such a corner reinforcement can for instance be set up from a blank 102 according to Fig. 3, wherein the corner reinforcing panel 106 is folded along folding line 114 instead of along folding line 115. Thus, strip 106D is glued against strip 106C and strip 106E against strip 106B. Naturally, these pairs of strips 106C,D and 106E, B must have widths geared to each other. The strips can be folded inwards, resulting in the corner profile shown in Fig. 9, wherein the strips 106D, E extend against the inside of the tubular profile, or be folded outwards, resulting in a corner profile according to Fig. 10, wherein the strips 106D,E extend against an outside of the corner profile.

**[0026]** Alternatively, such a corner reinforcing panel with two folded-over strips 10C,D can be folded in a manner according to the embodiment according to Fig. 7, which results in a corner reinforcement according to Figs. 11 and 12, where, in the first case, the two strips are folded inwards and, in a second case, they are folded outwards.

**[0027]** In a corresponding manner, the folded-over part of a corner reinforcing panel can extend over three strips, so that a corner reinforcement set-up therefrom according to Figs. 6 or a corner reinforcement according to Fig. 7 will be completely double-walled. Here, depending on their fold direction (inwards or outwards) the folded-over strips will extend against the inside of the triangular profile or the package, respectively, or against the outside of the triangular profile or be confined against the first sidewall panel or the first strip, respectively. A blank suitable thereto will comprise a corner reinforcing panel that is subdivided into six strips (not shown).

**[0028]** It will be clear that in a similar manner, also, the multi-angular corner reinforcement according to Fig. 4 can be designed to be double-walled along several sides.

**[0029]** For all embodiments it holds, that the folded-over parts of the corner reinforcing panel are preferably glued with a first glue  $G_1$  (represented in hatchings in Figs. 6, 7 and 9 - 12) that does not completely cure instantly. As a result, when setting up the corner reinforcements, these glued parts can still shift somewhat relative to each other, so that undesired stresses can be prevented. The set-up corner reinforcements can be fixed with the same glue  $G_1$ , but are preferably fixed with a second glue  $G_2$  (represented in Figs. 9 - 12 as an oval drop) that

preferably cures virtually completely in an instant. As first glue G<sub>1</sub>, for instance, a PVA (polyvinyl alcohol) or cold glue may be suitable. As second glue G<sub>2</sub>, for instance, a hot melt is suitable.

**[0030]** 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.

**[0031]** For instance, the corner reinforcing panel can be folded back somewhere halfway its length, whereupon, at some distance from this folding line, the folded back part is folded back once more. Thus, a Z-shaped fold is obtained, at which location the panel is three layers thick. Then, the corner reinforcing panel can be folded into a corner profile in one of the above-described manners.

**[0032]** These and many variations are understood to fall within the framework of the invention as set forth in the following claims.

## Claims

1. A package provided with corner reinforcements, set up from a cardboard blank, wherein each corner reinforcement is formed from a corner reinforcing panel that is integrally connected to a first sidewall panel, along a first folding line and is folded back partly upon itself along a second folding line extending substantially parallel to the first folding line, wherein the abutting parts are glued, and wherein the corner reinforcing panel is then folded into a corner profile that is attached against the first sidewall panel and an adjacent second sidewall panel in a manner such that the corner profile has a form closed upon itself wherein an edge of the corner reinforcing panel located opposite the first folding line or the second folding line is located near the first folding line.
2. A package according to claim 1, wherein the corner profile is attached by a double-walled part against the first and/or second sidewall panel.
3. A package according to claim 1 or 2, wherein an end part of the corner reinforcing panel located opposite the first folding line is folded back and glued.
4. A package according to any one of the preceding claims, wherein this end part is folded back in a direction such that in set-up condition it is located between the second sidewall panel and the remaining corner profile.
5. A package according to any one of the preceding claims, wherein the corner profile is tubular.

6. A package according to any one of the preceding claims, wherein a part of the corner profile lying clear from the first and second sidewall panel is double-walled.
7. A package according to any one of the preceding claims, wherein the folded back parts of the corner reinforcing panel are attached against each other by a glue with a relatively long curing time, for instance a PVA (polyvinyl alcohol) so that limited relative movement of these parts is possible during folding and gluing of the corner profile.
8. A package according to any one of the preceding claims, wherein the height of the corner profiles is at least twice as great as a length of a bottom panel extending between the sidewall panels, measured between opposite first sidewall panels.
9. A method for setting up a package with corner reinforcements from a cardboard blank provided with corner reinforcement panels that are integrally connected to first sidewall panels, along first folding lines, wherein each corner reinforcing panel is folded into a corner profile and is attached against the first sidewall panel and a second sidewall panel adjacent thereto, and wherein prior to this, the corner reinforcing panel is at least partly folded back upon itself and glued, around a second folding line extending substantially parallel to the first folding line.



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 07 10 4500

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 2 676 991 A (DISPAC [FR]) 4 December 1992 (1992-12-04)	1-5,9	INV. B65D21/02 B65D5/00
A	* page 1, line 4 - line 5 * * page 5, line 18 - line 33; figures 3-5 *	7	
X	ES 2 070 675 A2 (VIDECART SA [ES]) 1 June 1995 (1995-06-01) * figures 10-12,14 *	1,2,5,9	TECHNICAL FIELDS SEARCHED (IPC)  B65D
X	US 3 034 698 A (FORRER HOMER W) 15 May 1962 (1962-05-15)	1,2,5,9	
A	* column 1, line 10 - line 58 * * column 2, line 49 - line 63; figures 1-3 *	3,4,6	
X	GB 2 196 608 A (REED PACKAGING LTD) 5 May 1988 (1988-05-05) * column 1; figures 1-4 *	1,5,9	
A	EP 1 489 016 A1 (VIDECART SA [ES]) 22 December 2004 (2004-12-22) * figures 2,3,5 *	3,4	
The present search report has been drawn up for all claims			
Place of search <b>The Hague</b>		Date of completion of the search <b>3 August 2007</b>	Examiner <b>MANS-KAMERBEEK, M</b>
<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 &amp; : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 10 4500

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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03-08-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2676991	A	04-12-1992	NONE
ES 2070675	A2	01-06-1995	NONE
US 3034698	A	15-05-1962	NONE
GB 2196608	A	05-05-1988	NONE
EP 1489016	A1	22-12-2004	AT 298706 T 15-07-2005
		AU 2002352266 A1 03-06-2004	
		DE 60204917 D1 04-08-2005	
		WO 2004043796 A1 27-05-2004	
		ES 2244824 T3 16-12-2005	
		US 2005242164 A1 03-11-2005	

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- EP 0621192 A [0002]
- EP 0453015 A [0003]