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(54) Collapsible box and blank for making the same.

(57) A collabsible corrugated card board box and blank for making the same having a known way oblique folding lines (8) connecting end flaps (16) and side flaps (2) is strengthened in a considerable extend by providing the side flaps (2) with extension portions (7) and with back folding portions (5), which themselves are provided with extension portions (9), the side flap back folding portions (5) and their extension portions (9) being glued on the side flaps (2) and their extension portions (7), the extension portions being folded over 90° when still connected by folding lines (6, 10) to the flaps and the back folding portions and rest on a bottom portion, the corrugations of the card board being in the direction of said folding lines (6, 10).

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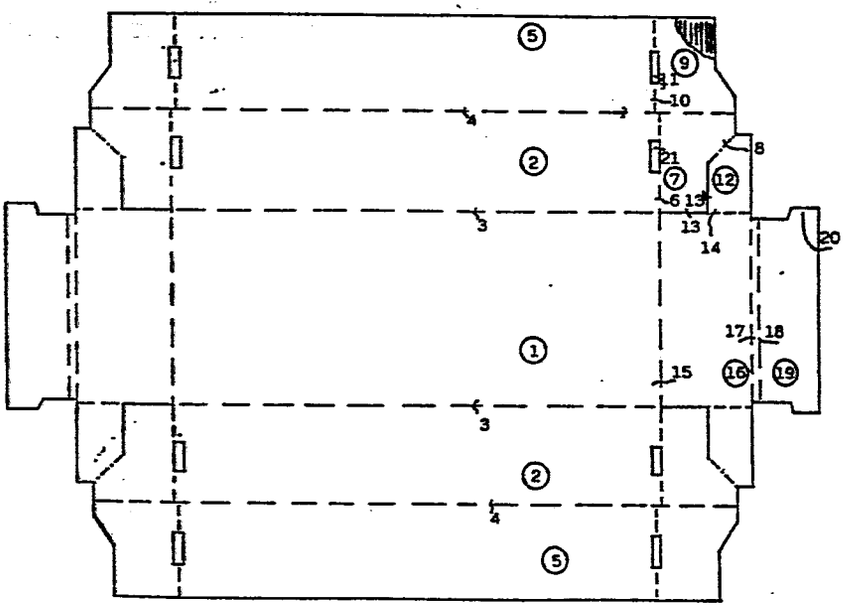
Fig. 1



Collapsible box and blank for making the same.

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The invention relates to a collapsible box of corrugated card board with a rectangular bottom portion, a pair of side flaps foldably connected to opposite side edges of said bottom portion, a side flap back folding portion being foldably connected to each side flap along a folding line parallel to said side edges, said side flaps each being provided at each end with an extension portion by means of a folding line, a further portion being located in a longitudinal extension region of said side flap folding back portion and foldably connected to the side flap extension portion by means of a folding line, end flaps being foldably connected to end edges of said bottom portion, each of said end flaps being connected to an end flap back folding portion by means of a double fold line, a first cut being at least partly present between said end flap and said side flap extension portion, a further cut being oriented perpendicularly to said first cut, an oblique folding line running outward from the end of said further cut away from said first cut, said oblique folding line forming a connection between on the one hand the end flap and tis back folding portion and at the other hand the side flap extension and a blank for making the same.

It is remarked that the term box in this specification encompasses all trays, cartons or other containers having in their erected position a bottom and side and end walls, irrespective whether they are adapted to cooperate with a lid or not. Further in the erected position the walls are mostly perpendicular to the bottom, but not necessarily so.

Collapsible boxes of the indicated type are known in several forms, for instance from the Dutch Patent Applications NL-A-6509557 and NL-A-6614457 to Koenders.

This known construction has by means of said oblique folding lines connections between the side flaps and the end flaps, making erection of the box easier because both types of flaps can be bended upwardly by the same action.

On the other side this box is liable to improvement, specially with respect to strength. In this respect it is remarked that, though in the erected position at the corners a number of layers of the card board material are present, these layers do not cooperate in an optimal manner to increase the strength of the construction when vertically loaded. Specially it should be remarked that only one time an immediate connection between two mutually perpendicular layers is present. Such a construction element is analogous to an angle bar and gives a high resistance against collapse under vertical load.

A first aim of the invention is to increase this resistance in a very considerable extend by doubling this angle bar construction in an overall construction, which is even better than merely such a doubling and without need of additional material or discarding the indicated advantages of the known device.

According to the invention the above aim is realized by providing that the first cut only covers part of the height of the end flap and that the further cut only covers part of the height of the side flap extension portion, the oblique folding line being located between said side flap extension portion and a connection portion internally delimited by a folding line between it and said end flap, said further cut, said oblique folding line and the outside of the box, said further portion being an side flap folding back extension portion connected by means of a folding line to said side flap folding back portion, the folding line between the side flap extension portion and the side flap folding back extension portion being a prolongation of the folding line between the side flap and the side flap back folding portion, said side flap back folding extension portion having such a shape that it is encompassed within the mirro image of the side flap extension portion with respect to said prolongation of the folding line.

It is remarked that with the invention two such angle bar constructions are obtained such that the card board of one

angle bar construction lies flat on that of the second one, which leads to a doubling of the thickness of the angled material. This allows for a better strength than two separate angle bar constructions of this type.

A further advantage of the invention is, that the side flaps are double over their complete length and have the same height at the corners as elsewhere, so that they contribute everywhere to the supporting capacity of the box.

It is remarked that British Patent Specification GB-A-386 103 shows such a double angle construction for a box of considerable simpler construction having no connection between the side flaps and the end flaps.

Further it is remarked, that another known construction (GB-A-979 878) shows side flaps having extension portions connected to them by means of folding lines and lid portions, which can be compared to the back folding portions used with the invention.

These latter portions are provided with extension portions foldably connected to them. The extension portions of this known construction are, however, not connected to each other by a folding line and do not lay flat on each other in the erected position of the box.

According to a preferred embodiment of the invention it is provided that the corrugation ribs of the corrugated layer of the card board are perpendicular to the said side edges. This means that the folding lines between the side flaps and their extension portions and those between the side flap back folding portions and their extension portions are parallel to the corrugations of the corrugated layer of the card board material. Firstly this feature increases strength, because corrugated card board has considerable more resistance to forces applied in the direction of the corrugations than in a direction transverse to the corrugations. Further it has appeared that the construction with two angled

layers flatly lying on each other can easier and better mutual engagement of the layers be realized, when the folding lines are in the direction of the corrugations.

It is remarked that this orientation of the corrugation per se is known from the cited GB-A-979 878, but with far less effect than with the invention.

According to a further preferred embodiment of the invention it is provided that the side flaps, the side flap back folding portions, the side flap extension portions and the side flap back folding extension portions all have the same height. In this embodiment the folded back portions and their extensions bear upon the bottom, a feature that is favourable for the total strength of the box. The citation GB-A-386 103 shows this feature in a very simple collapsible box construction devoid of the main advantage of the device according to the publications NL-A-6509557 and NL-A-6614457, which advantage is maintained with the invention.

An optimal effect of the doubling of the side flaps and their extension portions is obtained by providing that the side flap back folding flaps with their extensions are identical to the side flaps with their extensions.

An important disadvantage of the known construction according to the Dutch Patent Applications NL-A-6509557 and NL-A-6614457 is the fact that there are openings in the bottom portion. When using the box for moist containing of bearing objects, such as flowers or fruits, the penetration of moisture between the cover layers (f.i. of Kraft paper) will deteriorate the stiffness of the corrugated layer. Openings in the bottom will allow water to reach this layer considerably faster. In order to avoid such openings in the bottom and nevertheless to provide a construction which easily locks itself, it is provided that the folding lines between the side flap folding back portion and their extension portions are offset with respect to the folding lines between the side flaps and their extensions over a distance corresponding to the thickness of the corrugated

card board.

Finally the invention encompasses a blank of corrugated card board having a rectangular bottom portion and side and end flaps connected to said bottom portion by means of bottom folding lines, said side flaps each having extension portions, side flap folding back portions and side flap folding back extension portions, said side flap folding back portions and their extension portions being folded back and glued on said side flaps and their extension portions, said side flaps and their extension portions being connected to each other by first side flap folding lines and said side flap back folding portions and their extension portions by second side flap folding lines, said first and second side flap folding lines being offset with respect to each other over a distance corresponding to the thickness of the corrugated card board material, the line between each side flap extension portion and the juxtapositioned end flap being partly formed by a first cut starting from the bottom portion and partly by a connection folding line, a second cut perpendicular to said first cut being followed by an oblique folding line running between the side flap extension portion and a connection portion to the outside of the blank, the second flap folding lines, the side flap extension portions, the oblique folding lines, the connection portions and the connection folding lines forming together foldable connections between the side flaps and the end flaps, said end flaps being foldably connected to end flap extension portions having side tongues adapted to fit into openings in said side flap back folding portions and their extensions and possibly into openings in the side flaps, the corrugation lines of the card board being parallel to said first and second side flap folding lines.

Because with such a blank the side flaps and their extension portions are glued to the side flap folding back portions and their extension portions, a still higher rigidity is obtained. Further it is very easy to direct a box from such a blank, which box is a solid one without the need of any staple or other fastening means. Finally the box can simply

be collapsed, so that the blank can easily be sent back for reuse.

The invention in the following is further elucidated on hand of the drawing, in which:

Figure 1 shows a blank of an embodiment of the invention;
Figure 2 shows a section through an angle on an enlarged scale.

In the blank of fig. 1 reference 1 indicates a bottom portion having folding lines 3 along the side edges and folding lines 15 along the end edges. Side flaps 2 join the folding lines 3 and have at their side away from the bottom 1 a folding line 4 with which a back folding portion 5 is connected. This back folding portion 5 has such a height that after folding back about folding line 4 it rests just with its end edge on the bottom 1 when the side wall is perpendicular to the bottom.

A folding line 6 connects an extension 7 with the side flap 2. Further the folding back portion 5 is via a folding line 10 extended with a back folding extension portion 9.

At 13 and 13' the portion 7 has been loosen by a cut, whereas at 8 a counter folding line is present under 45°. The right hand upper end of the counter folding line 8 ends in a small recess.

Further at the folding lines 6 and 10 openings 11 and 21 are applied, which, after the portions 5 and 9 firstly have been folded about the folding line 4 and have been glued on the portions 2 and 7 and after this the mutual portions 9 and 7 have been pivoted about line 6, form openings for tongues still to be described.

At the folding line 15 of the end side of the bottom portion 1 an end flap 16 is joined, which at its side away from the bottom by means of two spaced folding lines 17 and 18 has an end back folding portion 19 with tongues 20.

Via a folding line 14, which is located in the extension of the first cut 13 a portion 12 with the end flap 16 has been connected, which portion 12 at the one hand at 13' is cut loose from the extension 7 of the side flap 2 and further has been connected therewith by means of a counter folding line 8. A counter folding line is a folding line, which is suitable for folding in such a way that surfaces located at the outside move toward each other.

The depicted blank is erected as follows: by pressing below the folding line 8 it is folded and the flaps 2 and 16 are raised, wherewith the portion 9 and 7 lying on each other at the one hand pivot about the folding line 6 and at the other hand the unit of flap 2 pivots about the folding line 3, so that in the final position the side of the extension portion 7 adjoining the cut 13 bears on the bottom at the location of the folding line 15. When this has happened the portion 19 is folded inwardly about the folding lines 17 and 18 until the tongue 20 is located opposite the opening 11 behind which the opening 21 is located. Because the side walls 2 can yield relatively easily, it is very easy to bring the tongues 20 into the openings 11 and 21 respectively. One has obtained a box, of which the side walls consist of two portions 2 and 5 glued on each other, which gives a relatively strong side wall. Specially if the blank according to the invention has been made of corrugated card board and this has the direction of the ribs perpendicular to the longitudinal direction both portions 2 and 5 will have the ribs of the corrugated card board perpendicular to the folding lines 3 and 4, which means vertically, when the box has been placed with its bottom portion on a horizontal plane. In this direction corrugated card board is strongest and specially corrugated card board glued on each other gives an additional strength.

Further the portion 7 (doubled with the portion 9) comes to bear at the edge 13 on the bottom. Also here one has again the advantage, that the ribs are vertical when the bottom of the box is oriented horizontally. An additional strength comes here to existance, because the portion 7 with 9 glued

on it gets via the folding line 6 also support from the portion 2 with the portion 5 on it.

After folding of portion 19 about the folding lines 17 and 18 the tongues 20 can be stuck into the openings 11 and 21, which is easily done, because the side wall 2 can yield a little. Moreover this activity can be carried out from the small side of the box, which for boxes of greater dimensions means a commodity for the handling. An additional advantage hereof is, that the box can also be easily collapsed and in fact more easy than the known collapsible box which has been depicted in the opening paragraphs.

Further the end walls need not to give strength to a double construction, so that the portions 19 need not to extend until the bottom after folding about the folding lines 17 and 18. This would only contribute little to the strength, because in these portions the corrugations also after the erection of the box run horizontally and because two loose strips of corrugated card board have considerable less strength than two strips glued on each other.

In the drawing an embodiment has been shown with walls perpendicular to the bottom, after the blank has been erected to a box. Would one, however, desire to make a box of which the walls 2 have a position somewhat deviating from the vertical, then still the possibility is present to obtain the increase of the supporting capacity by choosing the direction of the cut 13 in a corresponding way.

Further it is for applying of the invention also not necessary, that the end walls which are formed from the flaps 16 are oriented perpendicularly to the bottom plane, after the box has been folded out of the blank.

Finally it is not necessary, that the counter folding lines 8 are oriented under 45°. It is only necessary that these folding lines when extended pass through the related corner of the bottom portion 1.

The recess above the blank portion 12 only serves the purpose that it is less desired to have a folding line or counter folding line end at a protruding corner of the blank.

In fig. 2 a cross-section of a corner has been shown, from which appears, that the extension portion 7 joins the side flap 2, via a folding line 6, wherewith on the flap 2 after folding back, the folding back portion 5 has been glued, which via a counter folding line 10 has been connected to the back folding extension portion 9. Outside the portion 7 the portion 12 is present after the erection and outside this one has the end wall 16, wherewith the folded portion 19 of this end wall is located at the innerside, also within the back folding extension portion 9.

In the drawing the openings 21 and 11 are not located exactly above each other, which fact serves the purpose to bring them in register after the folding first about the folding line 4 and afterwards about the folding line 6 and the counter folding line 10.

The box according the invention has the further advantage, that the back folding line 19 of the end flap 16 may have a relatively small height, which is advantageously, because this flap elongates the piece of web that has to be used for the blank, so that the deviations of the rectangular shape remain relatively small, which in general are disadvantageously for the obtainment of the best possible use of materials.

Due to the strenghtening which has been obtained with the portions 7 and 9 the possibility exists to make boxes in a lighter quality having a strength which up till now only could be obtained with a heavier quality.

A further advantage of the invention is, that in card board handling machines the blanks of the web from which they are made move in the longitudinal direction. With the invention it is therefor not the width of the machine, which defines the length of the box to be made. Moreover the glue strips

for gluing the folding back portions 5 and 9 on the flaps 2 and their extensions 7 can be realized as interrupted glue strips when using a suitable glue, which is simple from a manufacturer's view point and gives a very solid bound.

Claims:

1. Collapsible box of corrugated card board with a rectangular bottom portion (1), a pair of side flaps (2) foldably connected to opposite side edges (3) of said bottom portion, a side flap back folding portion (5) being foldably connected to each side flap along a folding line (4) parallel to said side edges (3) said side flaps (2) each being provided at each end with an extension portion (7) by means of a folding line (6), a further portion (9) being located in a longitudinal extension region of said side flap folding back portion (5) and foldably connected to the side flap extension portion by means of a folding line, end flaps (16) being foldably connected to end edges (15) of said bottom portion, each of said end flaps being connected to an end flap back folding portion (19) by means of a double fold line (17,18), a first cut (13) being at least partly present between said end flap (16) and said side flap extension portion (7), a further cut (13') being oriented perpendicularly to said first cut, an oblique folding line (8) running outward from the end of said further cut away from said first cut, said oblique folding line (8) forming a connection between on the one hand the end flap (16) and its back folding portion (19) and on the other hand the side flap extension, characterized in that said first cut only covers part of the height of the end flap (16) and that said further cut only covers part of the height of said side flap extension portion (7), said oblique folding line (8) being located between said side flap extension portion and a connection portion (12) internally delimited by a folding line (14) between it and said end flap (16), said further cut, said oblique folding line (8) and the outside of the box, said further portion (9) being an side flap folding back extension portion connected by means of a folding line (10) to said side flap folding back portion, the folding line between the side flap extension portion (9) and the side flap folding back extension portion (7) being a prolongation of the folding line (4) between the side flap (2) and the side flap back folding portion, said side flap back folding extension portion (9) having such a shape that it is encom-

passed within the mirror image of the side flap extension portion with respect to said prolongation of the folding line (4).

2. Box according to claim 1, characterized in that the corrugation ribs of the corrugated layer of the card board are perpendicular to the said side edges (3).

3. Box according to claim 1 or 2, characterized in that the side flaps, the side flap back folding portions, the side flap extension portions and the side flap back folding extension portions all have the same height.

4. Box according to any of the preceding claims, characterized in that the side flap back folding flaps with their extensions are identical to the side flaps with their extensions.

5. Box according to one or more of the preceding claims, characterized in that the folding lines (10) between the side flap folding back portion and their extension portions are offset with respect to the folding lines (6) between the side flaps and their extensions over a distance corresponding to the thickness of the corrugated card board.

6. Box according to one or more of the preceding claims, characterized in that said end flap back folding portion (19) is provided with side tongues (20) cooperating with openings in the side flap back folding portions and/or the side flaps.

7. Blank of corrugated card board having a rectangular bottom portion (1) and side and end flaps (2,16) connected to said bottom portion by means of bottom folding lines (3,15), said side flaps (2) each having extension portions (7), side flap folding back portions (5) and side flap folding back extension portions (9), said side flap folding back portions (5) and their extension portions (9) being folded back and glued on said side flaps (2) and their extension portions (7), said side flaps and their extension portions being connected to each other by first side flap folding

lines (6) and said side flap back folding portions (5) and their extension portions (9) by second side flap folding lines (10), said first and second side flap folding lines being offset with respect to each other over a distance corresponding to the thickness of the corrugated card board material, the line (13,14) between each side flap extension portion (7) and the juxtapositioned end flap (16) being partly formed by a first cut (13) starting from the bottom portion (1) and partly by a connection folding line (14), a second cut (13') perpendicular to said first cut being followed by an oblique folding line (8) running between the side flap extension portion (7) and a connection portion (12) to the outside of the blank, the second flap folding lines (6), the side flap extension portions (4), the oblique folding lines (8), the connection portions (12) and the connection folding lines (14) forming together foldable connections between the side flaps (2) and the end flaps (16), said end flaps being foldably connected to end flap extension portions (19) having side tongues (20) adapted to fit into openings (11) in said side flap back folding portions and their extensions and possibly into openings (21) in the side flaps (2), the corrugation lines of the card board being parallel to said first and second side flap folding lines (6,10).

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Fig. 1

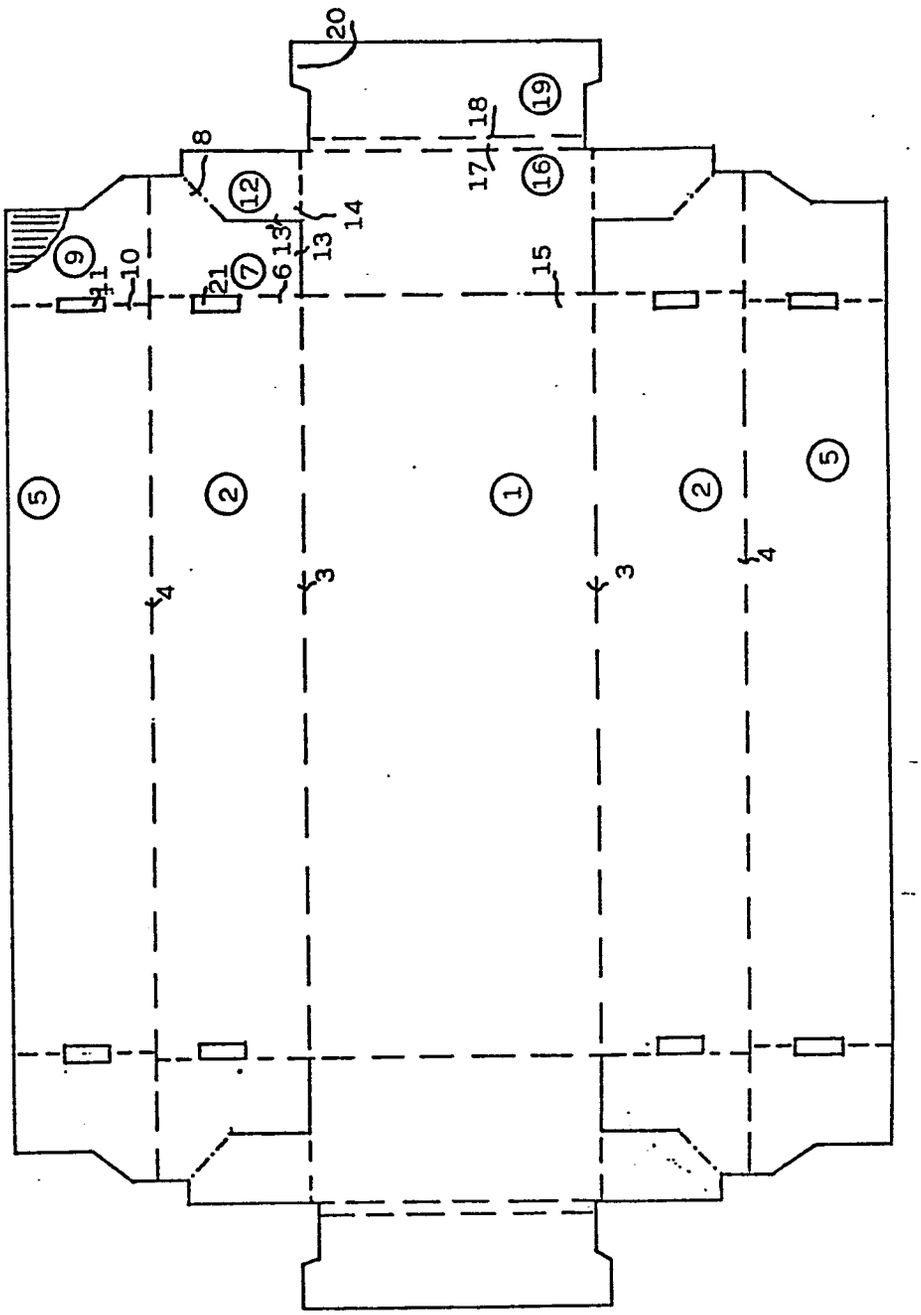

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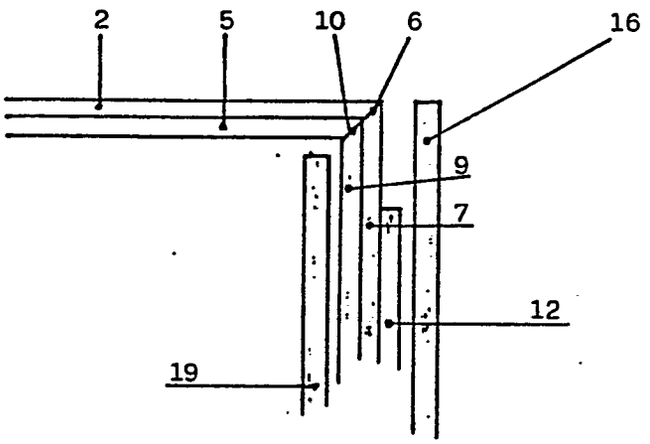
Fig.2.



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EUROPEAN SEARCH REPORT

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Application number

EP 85 20 0363

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
D,A	NL-A-6 509 557 (KOENDERS) * Whole document *	1,7	B 65 D 5/22 B 65 D 5/24
D,A	NL-A-6 614 457 (KOENDERS) * Page 2, line 43 - page 3, line 25; figure 3: 1-4; figure 4: 1-4 *	1,7	
D,A	GB-A- 979 878 (INDUSTRIAL CONTAINERS LTD.) * Figures 1,2 *	1,2,5, 7	
D,A	GB-A- 386 103 (EBURITE CORRUGATED CONTAINERS LTD.) * Page 3, lines 33-102; figures 1-5 *	1,3,4, 7	
A	US-A-2 954 914 (HERLIHY) * Figures 1-3 *	1,6	TECHNICAL FIELDS SEARCHED (Int. Cl.4) B 65 D
A	FR-A-2 045 641 (AUBERY)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10-06-1985	MARTENS L.G.R.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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