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(71) Applicant: SPARREBOOM KARTONNAGE B.V.
Postbus 31
NL-9665 ZG Oude Pekela(NL)

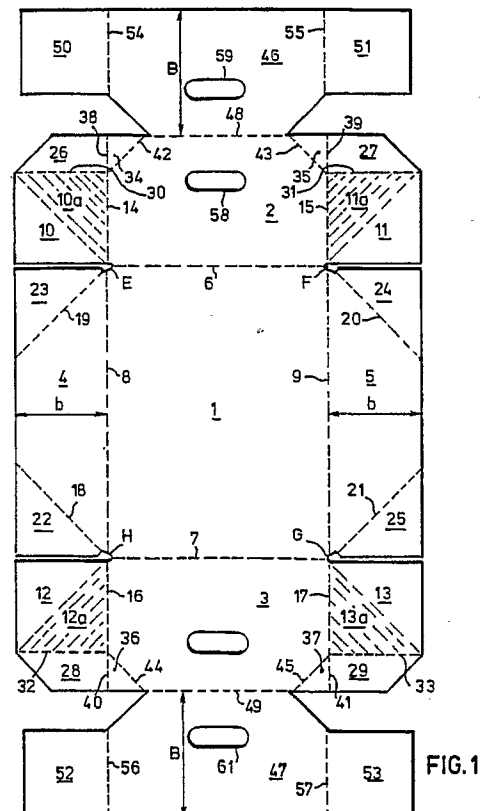
**(72) Inventor: van Gorp, Paulus Maria
Marne 52
NL-9642 JZ Veendam(NL)**

74 Representative: **Kooy, Leendert Willem et al**
OCTROOIBUREAU VRIESENDORP & GAADE
P.O. Box 266
NL-2501 AW The Hague(NL)

54 A box and a foldable box respectively, and a blank therefor.

57 A box has been described provided with a bottom (1) and with two pairs of opposite upright side walls (2,3 and 4,5).

According to the invention the one pair of opposite upright side walls (2, 3) are over at least a part of their length higher than the other pair of opposite upright walls (4, 5), the other pair of opposite upright walls (2, 3) are each provided with at least one widening strip (26-29), which is bent approximately square to the corresponding side wall (2, 3) and each widening strip (26-29) at at least one end is provided with a connecting portion (34-37), which is connected with the widening strip (26-29) and is approximately square to the widening strip (26-29) and which lies flat on the adjacent higher side wall (2, 3) and is connected with said higher side wall (2, 3).



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A box and foldable box respectively and a blank for the manufacture thereof.

The present invention relates to a box provided with a bottom and with two pairs of opposite upright side walls.

Such a box, which is usually made from solid cardboard, is used on a large scale. It has the advantage that it can be manufactured simply and cheap, but a great disadvantage is that without a lid it is not or hardly stackable, because there is no connection in the stack and because the side walls have only little supporting power, that as a rule has to be produced by two opposite side walls.

The invention aims at removing these objections of the known box.

This aim is achieved in that according to the invention the one pair of opposite side walls over at least a part of their length are higher than the other pair of opposite side walls, in that the other pair of opposite side walls each are provided with at least one widening strip, which is bent approximately square to the corresponding side wall and in that each widening strip at at least one end is provided with a connecting portion, which is connected with the widening strip and is approximately square to the widening strip and which lies flat on the adjacent higher side wall and is connected with said higher side wall.

By applying said measures it is achieved, that the boxes can be nested into each other, in that the lower part of the upper box is locked in between the pair of higher side walls, whereby when stacking the boxes a relatively large stack stability exists. The widening strips which are folded square to the other side walls form supporting planes which transfer a part of the weight to the lower side walls, but the largest part thereof to the higher side walls by means of the connecting portions, whereby the supporting power is increased considerably. Moreover the nesting improves the form stability of the boxes considerably with respect to that of the known boxes.

The invention also relates to a foldable box provided with a one-piece bottom and with two pairs of opposite upright side walls, which are folded approximately square to the bottom, two opposite side walls at both ends each being provided with a first lengthening flap which is folded approximately square to the side wall, which lengthening flap with a part of its outer surface is secured to a corresponding part of the inner surface of an adjacent side wall of the other pair and whereby in said adjacent side wall each time from both bottom corner points a first oblique folding line is provided extending upwardly at an angle of $\pm 45^\circ$, such, that the part of said side wall which is secured to the lengthening flap, is at the side of the

first oblique folding line turned away from the bottom.

Recently, a foldable box of the above described type has become known which has the advantage that it takes relatively less space when transporting and storing the empty boxes, whereby storage and transport costs are saved with respect to that with the old and unfoldable boxes. This known box can be easily transferred from the folded position into the position of use. However, a disadvantage of this known foldable box is that the side walls, in which the first oblique folding line is applied, under load have the tendency to yield inwardly at the oblique folding line, whereby also the complete side wall yields inwardly. Because of this these side walls do not, or only very little, serve as support for a part of the load.

The invention aims at removing this objection of the known foldable box.

This aim is achieved, in that according to the invention the one pair of side walls over at least a part of the length have a greater height than the other pair of side walls, in that each first lengthening flap at the side opposite the bottom is provided with a first widening strip, which is folded approximately square to the lengthening flap and in that each first widening strip at the side of the higher side wall is provided with a triangular wall portion, which is folded approximately square to the widening strip and is folded double on the higher side wall.

By applying these measures not only the above described advantages of the unfoldable box are achieved, but it is also achieved that the side walls, in which the first oblique folding line is provided, are stretched, whereby the yielding inwardly thereof is almost completely prevented. As a result of this these side walls keep supporting a proportional part of the load. The stretching of said side walls takes place, in that the lower part of the upper box is nested between the higher side walls of the lower box, whereby said higher side walls and thus also the lower side walls with the first oblique folding line cannot yield inwardly.

The invention will be elucidated with a pair of examples on the basis of the drawing.

Figure 1 is a plan view of a blank in a preferred embodiment according to the invention,

figure 2 is a perspective view of a box, which is folded and erected from the blank according to figure 1,

figure 3 is a perspective view of a part of the folded box according to the invention in the embodiment according to the figures 1 and 2,

the figures 4 up to and including 13 each

time show a version of the blank according to figure 1 and the foldable box according to figure 2 respectively, whereby to simplify the drawing each time only one corner portion of the blank and the erected box respectively is drawn,

the figures 14 up to and including 21 each time show another alternative of a blank and foldable box respectively according to the invention, both also on the basis of a corner portion, and

the figures 22 and 23 show a blank and erected box respectively according to the invention in the most elementary form.

The figures 1 and 2 show a blank and an erected and foldable box respectively according to the invention.

The blank according to figure 1 is provided with a bottom panel 1 and with two pairs of opposite side wall panes 2, 3 and 4, 5, which are foldably connected with the bottom panel by means of folding lines 6, 7 and 8, 9 respectively. The side wall panels 2 and 3 are at both ends provided with a first lengthening flap 10, 11 and 12, 13, which is foldably connected with the side wall panel by means of a folding line 14, 15 and 16, 17 respectively. In the side wall panels 4 and 5 each time from the corner points E, F, G and H of the bottom panel 1, a first oblique folding line 18, 19 and 20, 21 is provided, which encloses an angle of $\pm 45^\circ$ with the folding lines 8 and 9 respectively, which limit side wall panel portions 22, 23 and 24, 25 respectively and the function of which will be elucidated hereafter.

According to the invention the width $\bar{B}$ of the side wall panels 2 and 3 over at least a part of their length is greater than the width $\bar{b}$ of the side wall panels 4 and 5, each first lengthening flap 10-13 at the side opposite the folding lines 6 and 7 respectively is provided with a first widening strip 26-29, which is foldably connected with the first lengthening flap 10-13 about a folding line 30-33 and between each first widening strip 10-13 and the wider side wall panel 2, 3 a first triangular panel portion 34-37 is formed, which about a folding line 38-41, which is substantially in line with the folding line 14-17, is foldably connected with the first widening strip 26-29 and which about a second oblique folding line 42-45, which encloses an angle of $\pm 45^\circ$ with the folding line 38-41, is foldably connected with the side wall panel 2, 3.

Further in the embodiment of the blank according to figure 1 each relatively wide side wall panel 2 and 3 at the side opposite the bottom panel 1 is provided with a second widening strip 46 and 47 respectively, which about a folding line 48 and 49 respectively is foldably connected with the side wall panel 2 and 3 respectively and each second widening strip 46 and 47 is provided with two opposite second lengthening flaps 50, 51 and 52,

53 respectively, which are foldably connected with the second widening strip 46 and 47 respectively about folding lines 54-57.

In the side wall panels 2 and 3 and in the second widening strips oblong holes 58, 59 and 60, 61 are yet formed, which are used for forming carrying handles 62.

Folding and erecting of the box according to the figures 1, 2 and 3 takes place as follows:

first the second widening strips 46 and 47 with the second lengthening flaps 48, 49 and 50, 51 are folded about the folding lines 48 and 49 over 180° on the relative wide side wall panels 2 and 3 with the lengthening flaps 10, 11 and 12, 13 glued thereon.

Subsequently the pairs of lengthening flaps 10, 50 - 13, 53 glued on each other and the first widening strips 26-29 are folded inwardly over $\pm 180^\circ$ about the pairs of folding lines 14, 38, 54 - 17, 41, 57, the side wall panels 4 and 5 are folded inwardly over $\pm 180^\circ$ about the folding lines 8 and 9 and the side wall panel portions 22-25 are folded outwardly over $\pm 180^\circ$ about the folding lines 18-21.

Then the surfaces of the side wall panel parts 22-25 visible in figure 1 are provided with glue and the portions of the rear planes of the first lengthening flaps, which are indicated with the hatched planes 10a-13a, are glued on the side wall panel portions 22-25.

Now the folded condition of the box according to figure 3 is achieved. For erecting the box one grabs the carrying handles 62 and pulls them upwardly so far in the direction of the arrow P, until they almost stand upright. Thereafter one pushes the glued lengthening flaps 10, 50 - 13, 53 with the corresponding first widening strips 26-29 outwardly in the direction of the arrows Q (figure 2), until the side walls 4 and 5 and consequently also the side walls 2 and 3 are substantially vertical (figure 2). Finally the first widening strips 26-29 are folded square inwardly about the folding lines 30-33 and simultaneously the first triangular wall portions 34-37 are folded inwardly over $\pm 180^\circ$ on the second widening strips 46 and 47 respectively about the folding lines 42-45.

As a result of this the box is erected in the condition according to figure 2, the position of use. In this position of the box the widening strips 26-29, which are folded square to the side walls 4 and 5, form supporting planes, on which the next upper box will rest with its bottom in a stack of said boxes. Because the boxes are nested in each other, the side walls 2 and 3 of the upper box push at the inside against the side walls 2 and 3 of the lower box, so that the side walls 4 and 5 are stretched and consequently cannot yield inwardly, so that they can contribute considerably to the

supporting power of the box.

Owing to the triangular wall portions 34-37, which are folded double on the side walls 2 and 3, the largest part of the weight of the upper boxes is transferred via the side walls 2 and 3, which due to the nesting, but also and especially due to the "double" construction, have a great solidity and form stability. Because of the nesting of the side walls 2 and 3 of the boxes also a great stability of the stack of boxes is reached.

Although the box in practice is meant for use only once it can be transferred from the position according to figure 2 again easily into the position according to figure 3 by first folding back the first widening strips 26-29 and the first triangular wall portions 34-37 connected therewith into the plane of the side walls 4, 5 and 2, 3 respectively and then simply pushing the glued lengthening flaps 10, 50 - 13, 53 with the corresponding first widening strips 26-29 towards the side walls 2 and 3 and opposite to the direction of the arrows Q in figure 2 and simultaneously folding the side walls 4 and 5 inwardly and subsequently folding the side walls 2 and 3 inwardly.

The invention can also be well applied to a box (not drawn), wherein the side walls 2 and 3 and the lengthening flaps 10, 11 and 12, 13 attached thereto are "single-walled", consequently a box which is folded and erected from a blank according to figure 1, the second widening strips 46 and 47 with the second lengthening flaps 50, 51 and 52, 53 attached thereto being omitted. Folding, glueing, erecting and folding the box again takes place in the same manner as with the box according to the figures 1, 2 and 3.

Of the embodiments of the blank and the foldable box according to the figures 4 up to and including 21 each time only one corner portion of the blank and of the foldable box respectively is indicated in the drawing and described hereafter. The other three corner portions, which with a view to simplicity and overview are not reproduced in the drawing, have the same construction and shape and the drawn corner portion.

In the drawing of the version according to the figures 4 and 5 the parts of the blank and the box, which are similar to those of the embodiment according to the figures 1 and 2, are provided with the same reference numerals, so that a further explanation thereof is superfluous.

With the blank according to figure 4 the second lengthening flap 50 at the side turned towards the first widening strip 26 is provided with a third widening strip 63, which is connected with the second lengthening flap 50 by a folding line 64, which can be partly cut loose.

In the point of intersection of the folding lines 14; 38 and 42 a circle 65 with a diameter of ± 10

mm can be cut out to facilitate folding.

Upon folding the box from the blank according to figure 4 in the shape according to figure 3 and erecting the folded box according to figure 5, which takes place in the same manner as with the embodiment of blank and box according to the figures 1 and 2, the third widening strip 63 is folded and glued on the first widening strip 26, which glued widening strips 62 and 63 after erection are folded together inwardly about the folding lines 30 and 64.

With this "double" construction of the first widening strip the supporting planes made therefrom obtain a greater rigidity and solidity than with the embodiment according to the figures 1, 2 and 3.

The version of blank and foldable box according to the figures 6 and 7 is equal to that according to the figures 4 and 5, wherein between the third widening strip 63 and the second widening strip 46 is a second triangular panel portion 66 is formed, which about a folding line 67 approximately in line with the folding line 54, is foldably connected with the third widening strip 63 and which about a folding line 68, which encloses an angle of $\pm 45^\circ$ with the folding line 67 and which extends from the intersection point of the folding lines 54, 64 and 67, is foldably connected with the second widening strip 46.

In the point of intersection of the folding lines 54, 64, 67 and 68 again a circle 69 having a diameter of ± 10 mm can be cut out to facilitate folding.

Folding and erecting the box according to figure 7 takes place in the same manner as with the embodiment according to figure 5, the second triangular panel portion 66 being folded on the first triangular panel portion 34, however, not glued. Upon folding the first and third widening strips 26 and 63 square to the side wall 4 the triangular panel portions 34 and 66 are folded together substantially simultaneously over $\pm 180^\circ$ on the double side wall 2, 46. With the embodiment according to the figures 6 and 7 the connection between the supporting planes and the side walls is considerably reinforced due to the "double" triangular panel or wall portions.

The version of blank and foldable box according to the figures 8 and 9 is almost equal to that according to the figures 1, 2 and 3, wherein the same parts are provided with the same reference numerals. In the first widening strip 26, however, a fourth oblique folding line 70 is provided, which extends from the point of intersection of the folding lines 30 and 38 and encloses an angle of $\pm 45^\circ$ with said folding lines 30 and 38. The fourth oblique folding line 70 aims at facilitating folding of the first widening strip 26 and the first triangular panel and wall portion 34 respectively in the position according to figure 9.

The version of blank and foldable box according to the figures 10 and 11 is based on the "single-walled" embodiment of the blank and the foldable box according to the figures 1, 2 and 3, which are above described. With the version according to the figures 10 and 11 the folding line 30 between the first widening strip 26 and the first lengthening flap 10 is partly replaced by a cut 71 from the free end. Further in the first widening strip 26 a fifth oblique folding line 72 is provided from the closed end of the cut 71, which is connected with the free end of the folding line 38 and which encloses an angle of $\pm 45^\circ$ with the folding line 30. Finally in the first widening strip 46 a folding line 73 is provided from the closed end of the cut 71, which is approximately perpendicular to the cut. The portion of the first widening strip at the right side of the folding line 73 is divided into two triangular portions 74 and 75 by means of the diagonal folding line 72 and at the left side of the folding line 73 a cut loose portion 76 is formed.

For erecting the box according to figure 11 first the portions 76 and 75 are folded about the diagonal folding line 72 over 180° on the lengthening flap 10 and the triangular portion 74 respectively and the portion 76 is glued on the first lengthening flap 10 and optionally the triangular portion 75 is glued on the triangular portion 74. Then the side wall 4 is folded inwardly on the bottom 1 about the folding line 8 over 180° and the side wall panel portion 23 is folded back over 180° on the side wall 4 about the folding line 19 and the upper surface of the panel portion is provided with glue. Subsequently the first lengthening flap 10 with the portions 74-76 attached thereto are folded over 180° on the side wall 2 and the corresponding portion of the lengthening flap 10 (compare portion 10a in figure 1) is glued on the panel 23.

Then the box is erected as is described with the embodiment according to figure 1 and the triangular portions 74 and 75 folded on each other and optionally glued, are folded inwardly over 90° and the first triangular panel portion 34 is folded over 180° on the side wall 2.

With the embodiment according to the figures 10 and 11 the triangular portions 74 and 74 folded and optionally glued on each other form the supporting widening strips at the side walls 4 and 5, which transfer the largest part of the weight to the side walls 2 and 3 by means of the triangular panel portions 34-37 and by "nesting" the upper box in the lower box the side walls 4 and 5 are stretched, so that said walls also support a part of the weight.

The embodiment of the blank and the foldable box according to the figures 12 and 13 is equal to that corresponding to the figures 10 and 11, except that the cut loose portion 76 is made longer, portion 77, and that the first lengthening flap 10 at the

outside is provided with a third lengthening flap 78, which after folding and glueing the portion 77 on the first lengthening flap 10, is folded about the folding line 79 over 180° on the first lengthening flap 10 and that the portion 77 is glued on both. Folding, glueing, erecting and folding again further takes place in the same manner as with the embodiment according to the figures 10 and 11.

With the embodiment according to the figures 14 and 15 the blank (figure 14) has a rectangular bottom panel 80, a side wall panel 81, which is foldably connected with the bottom panel 80 about a folding line 82, and another side wall panel 83, which is foldably connected with the bottom panel 80 about a folding line 84. The one side wall panel 81 is provided with a first lengthening flap 85, which is foldably connected with the side wall panel 81 about a folding line 86.

In the other side wall panel 83 from the corner point of the bottom panel 80 to a first oblique folding line 87 is provided, enclosing an angle of $\pm 45^\circ$ with the folding line 84, said folding line 87 limiting a side wall panel 88 at the side turned away from the bottom panel 80.

According to the invention the width B of each first lengthening flap 85 is greater than the width b of the side wall panel 81 and the one side wall panel 81 at the side turned away from the bottom panel 80 is provided with a first widening strip 89, which is foldably connected with the side wall panel 81 about a folding line 90.

Further according to the invention between the first widening strip 89 and the first relatively wide lengthening flap 85 a first triangular panel portion 91 is formed, which about a folding line 92, which is substantially in line with the folding line 86 between side wall panel 81 and the first lengthening flap 85, is foldably connected with the first widening strip 89 and about a first oblique folding line 93 in the lengthening flap 91, which encloses an angle of $\pm 45^\circ$ with the folding line 92 and extends from the point of intersection of the folding lines 90 and 92, is foldably connected with the first relatively wide lengthening flap 85.

Folding the blank and erecting the foldable box takes place as follows:

first the side wall panel 83 is folded double on the bottom panel about the folding line 84 and the side wall portion 88 is folded double on the side wall panel 83 about the folding line 87 and is provided with glue. Subsequently the relatively wide lengthening flap 85 is folded double about the folding lines 86 and 92 on the side wall panel 81 and the first widening strip 89 respectively, a corresponding portion of the outer surface of the relatively wide lengthening flap 85 being glued on the side wall panel portion 88.

Then the side wall panel 81 with the first wid-

ening strip 89 is positioned perpendicularly to the bottom 80 and simultaneously the side wall 83 is positioned perpendicularly to the bottom by means of the connection 85-88. Finally, the first widening strip 89 is folded perpendicularly to the side wall 81 and almost simultaneously the first triangular panel portion 91 is folded double over 180° on the relatively broad lengthening flap 85 about the second oblique folding line 93.

In a stack of boxes according to figure 15 the bottoms 80 can be nested between the relatively wide lengthening flaps 85 and thereby the side walls 81 are stretched, whereas the largest part of the weight is transferred by the first widening strips 89 via the first triangular panel portions 91 to the relatively wide lengthening flaps 85 and consequently to the side walls 83.

The blank according to figure 16 is for the largest part equal to that according to figure 14, thereby using the same reference numerals for the same parts. The blank according to figure 16 at the side of the first widening strip 89 turned away from the side wall panel 81 is provided with a second widening strip 94, which with a folding line 92 is foldably connected with the first widening strip 89 and the second widening strip 94 at the side turned away from the first widening strip 89 is provided with a third widening strip 96, which is foldably connected with the second widening strip 94 with a folding line 97. The third widening strip 96 is at both ends provided with a second lengthening flap 98, which is foldably connected with the third widening strip 96 about a folding line 99.

Folding the blank and erecting the foldable box according to figure 17 takes place in the same manner as with the embodiment according to figures 14 and 15, except that with the embodiment according to the figures 16 and 17 the second widening strip 94 is folded double and glued on the first widening strip 89 and the third widening strip 96 is folded double and glued on the side wall 81, and also the second lengthening flap 98 is folded and glued on the wider first lengthening flap 85.

The function and the effect of the embodiment of the box according to figure 17 are the same as that of the box according to figure 15, except that with the foldable box according to figure 17 the supporting power of the side walls 81 and 83 is greater than with the foldable box according to figure 15 because of the double construction.

The blank according to figure 18 is for the greater part equal to that according to figure 16, thereby using the same reference numerals for the same parts. With the blank according to figure 18 the side wall panel 83 is at both ends provided with a wider panel portion 100, which lies at the side of the first oblique folding line 87 turned away from the bottom panel 80, the shape of said wider panel

portion 100 being adapted to that of the wider first lengthening flap 85 and the width of which being indicated with BR, while the side wall 81 has a smaller width br.

5 Folding the blank and erecting the foldable box with the embodiment according to the figures 18 and 19 takes place in the same manner as with the embodiment according to the figures 16 and 17, in which moreover the wider side wall panel portion 100 is glued on a corresponding portion of the wider first lengthening flap 85.

10 The function and the effect of the foldable box according to figure 19 are the same as that of the foldable box according to figure 17, in which moreover the wider side wall panel 100 gives the wider first lengthening flap 85 a greater rigidity and supporting power.

The blank according to figure 20 is for the greater part equal to that according to figure 14. 20 The wider first lengthening flap 85, however, is divided by a folding line 101, which is parallel to the folding line 96 between the lengthening flap 85 and the side wall panel 81, into two approximately equally long portions 102 and 103, the portion 103 at its edge 104, which is parallel to the folding line 101, being provided with a lip 105 and the portion 103 being made in approximately the same width as the side wall panel 81. Further in the side wall panel 81 near the folding line 86 a slot 106 is provided, the length of which is somewhat greater than the width of the lip 105.

25 Folding the blank and erecting the box according to the figures 20 and 21 takes place in the same manner as with the embodiment according to the figures 14 and 15, moreover the portion 103 of the wider first lengthening flap 85 being folded over an angle of $\pm 135^\circ$ about the folding line 101 and the lip 105 being slipped into the slot 106. With this embodiment of the foldable box according to the invention the first widening strip 89 obtains a greater supporting power at the corners of the box because of the support by the portion 103 of the wider first lengthening flap 85.

30 With the embodiment of the foldable box according to the invention, which is drawn in the figures 4 up to and including 21, the box is foldable again from the drawn position and erectable again in the drawn position because of the first oblique folding lines 18-21 and 87 respectively, the triangular side wall portions 22-25, 88 and 100 respectively being glued on a corresponding portion at the outside of the first lengthening flaps 10-13, 85 and 102 respectively.

35 The blank and the box, which are drawn in the figures 22 and 23, form an ordinary rectangular box, which in the position drawn in figure 23 is not foldable, but on which the above described invention can be applied equally well.

The blank according to figure 22 has a bottom, which consists of four separate bottom panels 107, 108 and 109, 100 and has two pairs of side wall panels 111, 112 and 113, 114, wherein the bottom and side wall panels are connected with each other by folding lines 115-118. The side wall panels are connected with each other by folding lines 119, 120 and 121, whereas the side wall panel 111 is provided with a connecting flap 122, which is connected with the panel 111 by a folding line 123.

According to the invention in two first side wall panels 113 and 114, between which a second side wall panel 112 lies, near the free end edge 124 and 125 respectively each time a strip folding line 126 and 127 respectively is provided extending parallel to said end edge, the strip folding line 127 also being provided in the connecting flap 122 and which strip folding lines in the first side wall panels 113 and 114 limit a widening strip 128 and 129 respectively, and in the second side wall panels 111 and 112 each time from the point of intersection of the strip folding lines 126 and 127 with the folding lines 119 and 121 and the folding lines 120 and 123, an oblique folding line 130, 131 and 132, 133 respectively is provided extending at an angle of $\pm 45^\circ$ towards the free end edge, said oblique folding lines limit a triangular connecting portion 134, 135 and 136, 137 respectively, wherein the triangular connecting portions 135 and 137 lie in the side wall panel 111 and the triangular connecting portions 135 and 136 lie in the side wall panel 112.

Folding the blank according to figure 22 and erecting the box according to figure 23 takes place as follows:

The side wall panels 111-114 are folded at right angles on each other about the folding lines 119-123, the connecting flap 122 being glued on the side wall panel 114 and the bottom panels 107-110 being folded square to the side wall panels 111-114, in such a way, that the bottom panel 109 lies with the one half above the bottom panel 108 and with the other half below the bottom panel 107 and that the bottom panel 110 lies with the one half above the bottom panel 107 and with the other half below the bottom panel 108. The bottom panels are preferably glued on each other or adhered to each other with tape at their portions overlapping each other.

Now the widening strips 128 and 129 are folded inwardly about the folding lines 126 and 127 respectively square to the side wall 113 and 114 and simultaneously the triangular connecting portions 134, 135 and 136, 137 are folded inwardly over 180° and double on the side walls 111 and 112 about the oblique folding lines 130, 131 and 132, 133, as a result of which there are formed relatively high side walls 111 and 112 and support-

ing planes 128 and 129 at the other side walls 113 and 114.

With the box according to figure 23 in a stack of said boxes, whether or not filled, a part of the weight of the upper box or boxes is transferred to the side walls 113 and 114 by means of the widening strips 128 and 129 working as supporting planes and a part of the weight is transferred to the other side walls 111 and 112 by means of the widening strips 128 and 129 through the triangular connecting portions 134, 135 and 136, 137, whereas the bottom of the upper box can be nested between the relatively high side walls 111 and 112 of the lower box.

Claims

1. A box provided with a bottom (107-110) and with two pairs of opposite upright side walls (111, 112; 113, 114), **characterized in that** the one pair of opposite side walls (111, 112) over at least a part of their length are higher than the other pair of opposite side walls (113, 114), that the other pair of opposite side walls (113, 114) each are provided with at least one widening strip (128, 129), which is bent approximately square to the corresponding side wall, and that each widening strip (128, 129) at at least one end is provided with a connecting portion (134, 135; 136, 137), which is connected with the widening strip and is approximately square to the widening strip and which lies flat on the adjacent higher side wall (111, 112) and which is connected with said higher side wall (figure 23).

2. A box according to claim 1, **characterized in that** at least one widening strip (128, 129), at least one connecting portion (134, 135; 136, 137) and a higher side wall (111, 112) are made in one piece (figure 23).

3. A foldable box provided with a bottom (1) made in one piece and with two pairs of opposite side walls (2, 3; 4, 5), which are folded approximately square to the bottom, two opposite side walls (2, 3) each at both ends being provided with a first lengthening flap (10, 11; 12, 13), folded approximately square to the side wall, which flap with a portion of its outer surface (10a-13a) is secured to a corresponding portion (22-25) of the inner surface of an adjacent side wall (4-5) of the other pair, whereas in said adjacent side wall (4, 5) each time from both bottom corner points (E, F, G, H) a first oblique folding line (18-21) is provided extending upwardly at an angle of $\pm 45^\circ$, in such a way, that the portion of said side wall, which is secured to the lengthening flap, is at the side of the first oblique folding line turned away from the bottom, **characterized in that**

the one pair of side walls (2, 3) over at least a part of the length have a greater height than the other pair of side walls (4, 5),
 that each first lengthening flap (10, 13) at the side opposite the bottom (1) is provided with a first widening strip (26-29), which is folded approximately square to the lengthening flap and
 that each first widening strip (26-29) at the side of the higher side wall (2, 3) is provided with a triangular wall portion (34-37), which is folded approximately square to the widening strip and is folded double on the higher side wall (figure 2 single-walled).

4. A foldable box according to claim 3, **characterized in that**

each higher side wall (2, 3) is provided with a second widening strip (46, 47), which is folded on the corresponding side wall over an angle of $\pm 180^\circ$ and

that each second widening strip at both ends is provided with a second lengthening flap (50, 51; 52, 53), which are folded double on the first lengthening flaps (10, 11; 12, 13) (figure 2 double-walled).

5. A foldable box according to claim 4, **characterized in that**

each second widening strip (46, 47) is glued on the corresponding higher side wall (2, 3) and
 that each second lengthening flap (50-53) is glued on the corresponding first lengthening flap (10-13) (figure 2 double-walled and glued).

6. A foldable box according to claim 4 or 5, **characterized in that**

each second lengthening flap (50-53) at the side turned towards the first widening strip (26-29) is provided with a third widening strip (63), which is folded inwardly over an angle of $\pm 90^\circ$ with respect to the second lengthening flap (50-53) and lies directly under the first widening strip (26-29) (figure 5).

7. A foldable box according to claim 6, **characterized in that**

the third widening strip (63) is glued on the first widening strip (26-29) (figure 5).

8. A foldable box according to claim 6 or 7, **characterized in that**

in each second widening strip (46, 47) a second triangular wall portion (66) is formed, which is folded square to the third widening strip (63) and is folded double on the second widening strip and lies between the first triangular wall portion (34-37) and the second widening strip (46, 47) (figure 7).

9. A foldable box according to claim 3, 4 or 5, **characterized in that**

in each first widening strip (26-29), from the upper inner corner point of each first lengthening flap (10-13), a second oblique folding line (70) is applied, which encloses an angle of $\pm 45^\circ$ with the folding

line (30-33) between the first lengthening flap (10-13) and the first widening strip (figure 9).

10. A foldable box according to claim 3, **characterized in that**

5 each first widening strip (26-29) is partly cut loose from the corresponding first lengthening flap (10-13),

10 that the cut loose portion (76) is folded double on the first lengthening flap (10-13) about a diagonal folding line (72) in the remaining portion of the first widening strip (26-29) and said portion is glued thereon and that the triangular portions (74,75) of the widening strip (26-29) formed by the diagonal folding line (72) are folded on each other about said diagonal folding line (figure 11).

15 11. A foldable box according to claim 10, **characterized in that**

20 each first lengthening flap (10-13) at the side opposite to the higher side wall (2, 3) is provided with a third lengthening flap (78), which is folded double on the first lengthening flap (10-13) and on a portion (77) at the first widening strip (26-29), that is made longer and cut loose and which is glued both on the first lengthening flap and on the cut loose portion of the first widening strip (figure 13).

25 12. A foldable box provided with a bottom (80) out of one piece and with two pairs of opposite upright side walls (81, 83), which are folded approximately square to the bottom, two opposite side walls (81) each at both ends being provided with a first lengthening flap (85) folded approximately square to the side wall, which flap with a portion of its outer surface is secured on a corresponding portion (88) of the inner surface of an adjacent side wall (83) of the other pair and whereas in said adjacent side wall (83) each time from both bottom corner points a first oblique folding line (87) is applied extending upwardly at an angle of $\pm 45^\circ$, in such a way, that the portion (88) of said side wall secured on the lengthening flap is positioned at the side of the first oblique folding line turned away from the bottom (80), **characterized in that**

40 the other pair of side walls (83) over at least a part of the length have a greater height than the other pair of side walls (81), the higher portion of the other pair of side walls extending above the one pair of side walls, each time being made in one piece with a corresponding first lengthening flap (85),

50 that the lower pair of side walls (81) at the side turned away from the bottom (80) is provided with a first widening strip (89), which is folded inwardly approximately square to the side wall and

55 that each first widening strip (89) at both ends is provided with a first triangular wall portion (91), which is folded square to the first widening strip and which is folded double on the higher portion of

the other pair of side walls (figure 15).

13. A foldable box according to claim 12, **characterized in that**

each first widening strip (89) is provided with a second widening strip (94) which is folded double on the first widening strip and that each second widening strip (94) is provided with a third widening strip (96), which is foldably connected with the second widening strip (94) and which is folded double on the corresponding lower side wall (81) (figure 17).

14. A foldable box according to claim 13, **characterized in that**

each higher side wall (83) has a higher portion (100) at both ends above the first oblique folding line (87), each higher portion of the higher side wall being glued on the outside of each higher portion of each first lengthening flap (85) (figure 19).

15. A foldable box according to claim 13, **characterized in that**

each first lengthening flap (85) is folded over an angle of $\pm 135^\circ$ about a folding line (101) perpendicular to the bottom and lying approximately in the centre of the lengthening flap, the portion (103) of the first lengthening flap, lying at the outside of that folding line, having a height which is approximately equal to that of each lower side wall (81) and

that each first lengthening flap (85), at its free side edge (104) perpendicular to the bottom is provided with a lip (105) which is slipped into a slot (106) in the lower side wall (81) connected with the lengthening flap (figure 21).

16. A blank for manufacturing a box provided with at least one bottom panel (107-110) and with four side wall panels (111-114), which are foldably connected with each other and with the bottom panel, **characterized in that**

in two first side wall panels (113, 114), between which a second side wall panel (112) lies, near the free end edge (124, 125) a strip folding line (126, 127) is applied extending parallel to said end edge, which folding line limits a widening strip (128, 129) in the first side wall panels, and

that in the second side wall panels (111, 112), each time from the intersection of the strip folding line (126, 127) with the folding lines (119, 121; 120, 123) between the side wall panels (111-114), an oblique folding line (130, 133) is applied, said oblique folding line extending at an angle of $\pm 45^\circ$ towards the free end edge, said folding line in the second side wall panels (111, 112) each time limits two triangular connecting portions (134, 137; 135, 136) (figure 22).

17. A blank for manufacturing a foldable box provided with a one-piece bottom panel (1) and with four side wall panels (2-5), which are foldably connected with the bottom panel, the one pair of

opposite side wall panels (2, 3) each being provided with two opposite first lengthening flaps (10, 11; 12, 13), which are foldably connected with the side wall panel and whereby in the other pair of opposite side wall panels (4, 5) each time from the corner points (E, F, G, H) of the bottom panel a first oblique folding line (18, 21) is provided, enclosing an angle of $\pm 45^\circ$ with the folding line (6, 7; 8, 9) between side wall panel and bottom panel, **characterized in that**

the width (B) of the one pair of side wall panels (2, 3) over at least a part of their length is greater than the width (b) of the other pair of side wall panels (4, 5),

that each first lengthening flap (10, 11; 12, 13) at the side opposite to the folding line (6, 7) between bottom (1) and side wall panel (2, 3) is provided with a first widening strip (26-29), which is foldably connected with the lengthening flap and

that between each first widening strip (26-29) and the wider side wall panel (2, 3) a first triangular panel portion (34-37) is formed, which is foldably connected with the first widening strip about a folding line (38-41), which is substantially in line with the folding line (14-17) between first lengthening flap (10-13) and side wall panel (2, 3), and which is foldably connected with the side wall panel about a second oblique folding line (42, 45), which encloses an angle of $\pm 45^\circ$ with the folding line (38-41) between the first widening strip and the triangular panel portion (34-37) (figure 1 single-walled).

18. A blank according to claim 17, **characterized in that**

each wider side wall panel (2, 3) at the side opposite to the bottom panel (1) is provided with a second widening strip (46, 47), which is foldably connected with said side wall panel and that each second widening strip (46, 47) is provided with two opposite second lengthening flaps (50, 51; 52, 53), which are foldably connected with the second widening strip (figure 1 double-walled).

19. A blank according to claim 18, **characterized in that**

each second lengthening flap (50-53) at the side directed towards the first widening strip (26-29) is provided with a third widening strip (63), which is foldably connected with the second lengthening flap (figure 4).

20. A blank according to claim 19, **characterized in that**

between each third widening strip (63) and each second widening strip (46-49) a second triangular panel portion (66) is formed, which is foldably connected with the third widening strip (63) about a folding line (67), which is substantially in line with the folding line (54) between the second widening strip and the second lengthening flap (50-53), and

is foldably connected with the second widening strip (63) and about a third oblique folding line (68) which encloses an angle of $\pm 45^\circ$ with the folding line (67) between the third widening strip and the second triangular panel portion (66) (figure 6).

21. A blank according to claim 17, **characterized in that**

in the first widening strip (26-29) a fourth oblique folding line (70) is provided, which encloses an angle of $\pm 45^\circ$ with both the folding line (38-41) between the first widening strip and the first triangular panel portion (34-37) and with the folding line (30-33) between the first widening strip (26-29) and the first lengthening flap (10-13) and which extends from the point of intersection of both last mentioned folding lines (figure 8).

22. A blank according to claim 17, **characterized in that**

the folding line (30-33) between each first widening strip (26-29) and each first lengthening flap (10-13) from the free end is partly replaced by a cut (71), that in each first widening strip (26-29) from the closed end of the cut (71) a fifth oblique folding line (72) is provided, which is connected with the free end of the folding line (38-41) between the first widening strip (26-29) and the first triangular panel portion (34-37), and

that in each first widening strip (26-29) from the closed end of the cut (71) a folding line (73) is provided, which is substantially perpendicular to the cut (figure 10).

23. A blank according to claim 22, **characterized in that**

the portion (77) of each first widening strip (26-29), which is adjacent to the cut (71), has been made longer and

that each first lengthening flap (10-13) at the side turned away from the wider side wall panel (2, 3) is provided with a third lengthening flap (78), which is foldably connected with the first lengthening flap (figure 12).

24. A blank for manufacturing a foldable box provided with a one-piece bottom panel (80) and with four side wall panels (81, 83), which are foldably connected with the bottom panel, the one pair of opposite side wall panels (81) each being provided with two opposite first lengthening flaps (85), which are foldably connected with the side wall panel and whereby in the other pair of opposite side wall panels (83) a first oblique folding line (87) is provided each time from the corner points of the bottom panel and enclosing an angle of $\pm 45^\circ$ with the folding line (84) between side wall panel and bottom panel, **characterized in that**

the width (B) of each first lengthening flap (85) is greater than the width (b) of the side wall panels (81) of the one pair, to which the lengthening flaps

are secured,

that the side wall panels (81) of the one pair at the side turned away from the bottom panel (80) both are provided with a first widening strip (89), which is foldably connected with the side wall panel and that between each first widening strip (89) and each wider lengthening flap (85) a first triangular panel portion (91) is provided, which is foldably connected with the first widening strip (89) about a folding line (92), which is substantially in line with the folding line (86) between side wall panel (81) and lengthening flap (85), and which is foldably connected with the broader lengthening flap (85) about a second oblique folding line (93), which encloses an angle of $\pm 45^\circ$ with the folding line (92) between the triangular panel portion (91) and the first widening strip (89) (figure 14).

25. A blank according to claim 24, **characterized in that**

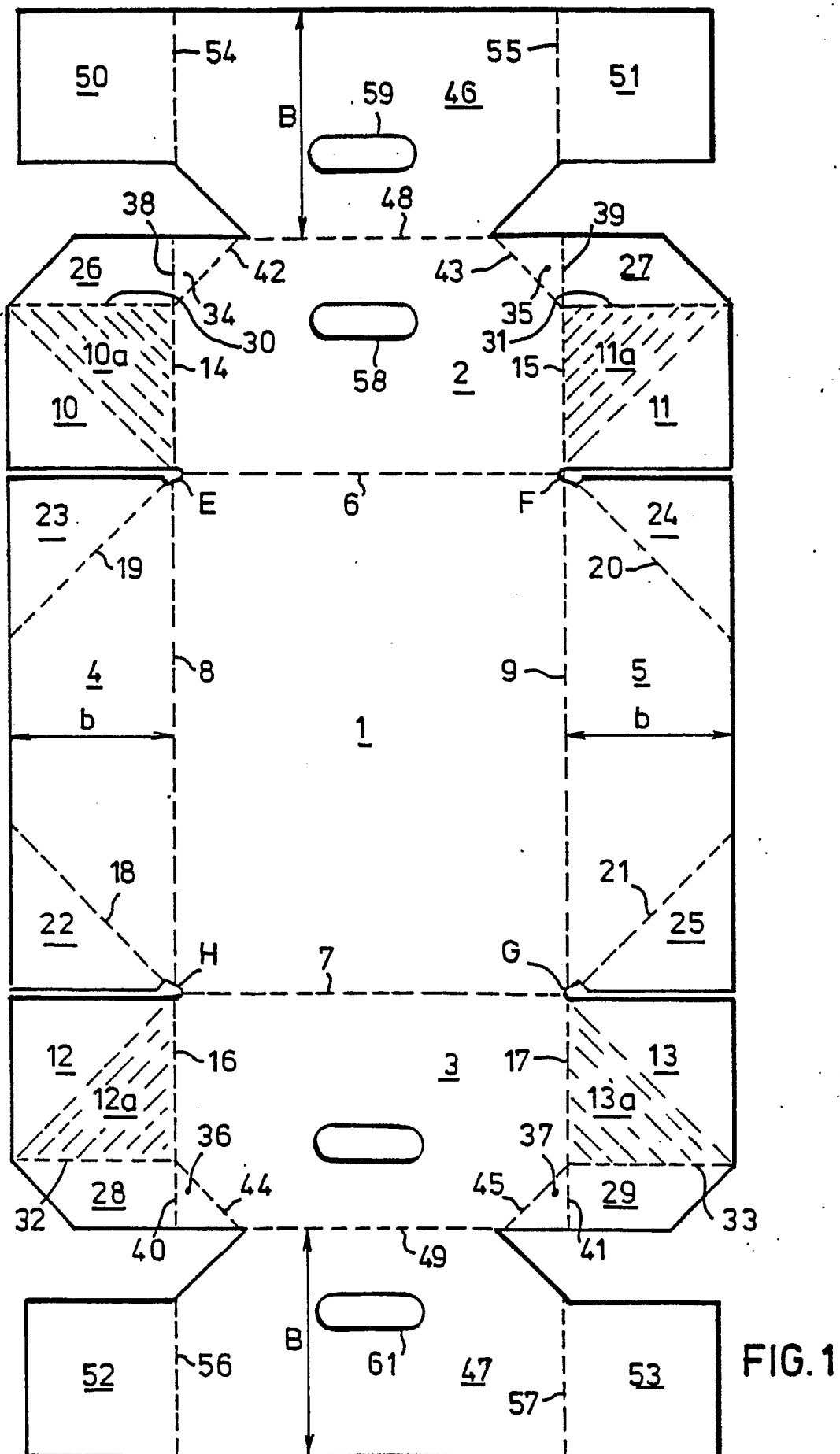
a second widening strip (94) at the side turned away from the one side wall panel (81) is foldably connected with each first widening strip (89), that a third widening strip (96) at the side turned away from the one side wall panel (81) is foldably connected with each second widening strip (94) and that each third widening strip (96) at both ends is provided with a second lengthening flap (98) which is foldably connected with the third widening flap (figure 16).

26. A blank according to claim 25, **characterized in that**

each side wall panel (83) of the other pair at both ends is provided with a panel portion (100), which has a greater width (BR) than the width (br) of the side wall panels (81) of the other pair, and that the shape of the wider end portion (100) of each side wall panel (83) of the other pair is adapted to that of the first lengthening flap (85) at each side wall panel (81) of the one pair (figure 18).

27. A blank according to claim 24, **characterized in that**

each first lengthening flap (85), substantially in the middle of its length, is provided with a folding line (101) which is substantially parallel to the folding line (86) between lengthening flap and side wall panel (81), the width of the portion (103) lying outside the first mentioned folding line being approximately equal to the width (b) of the side wall panel (81) of the one pair, that a lip (105) is provided at the outer edge (104) of the lengthening flap (85), which is parallel to the folding line (86) between lengthening flap and side wall panel and that in each side wall panel (81) of the one pair near the ends a slot (106) is provided, the length of which is greater than that of the lip (105) (figure 20).



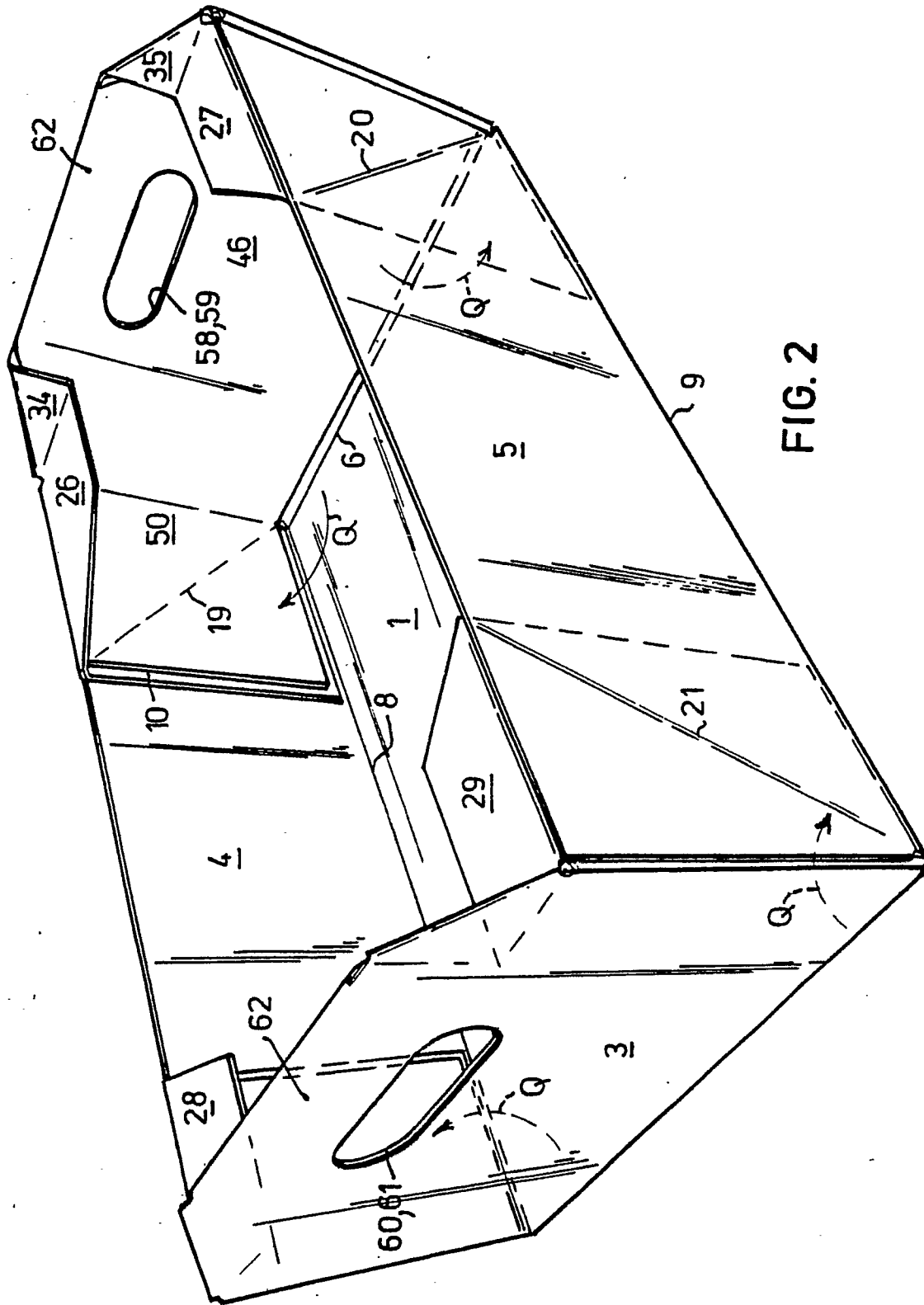


FIG. 2

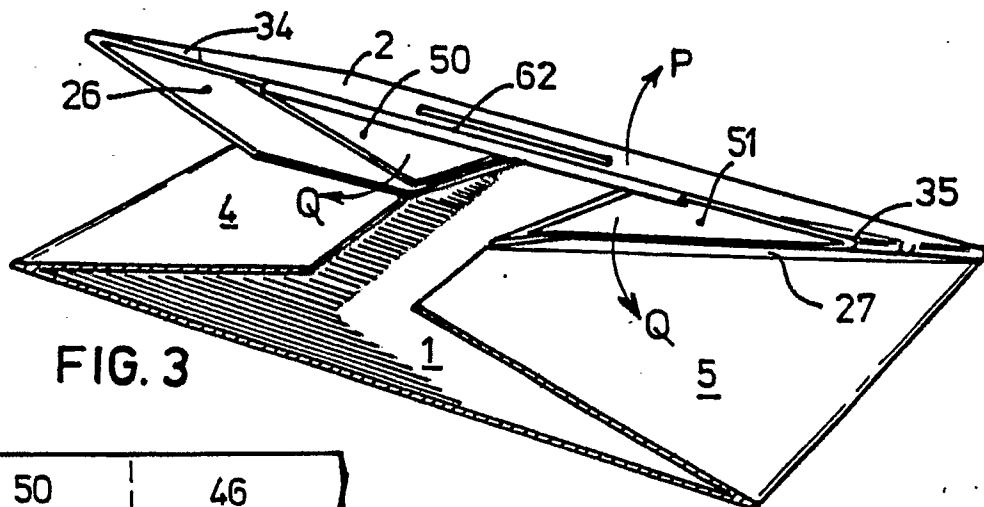


FIG. 3

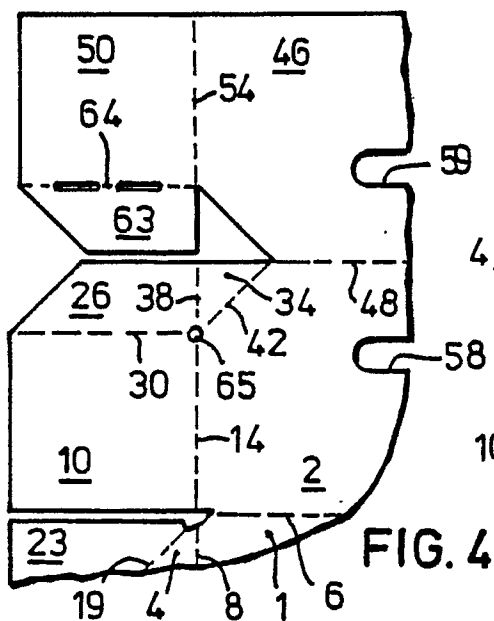


FIG. 4

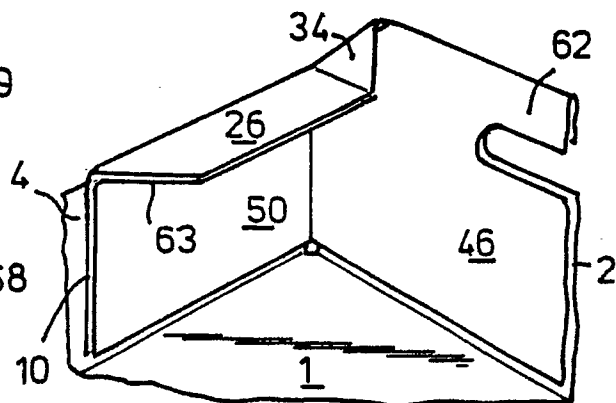


FIG. 5

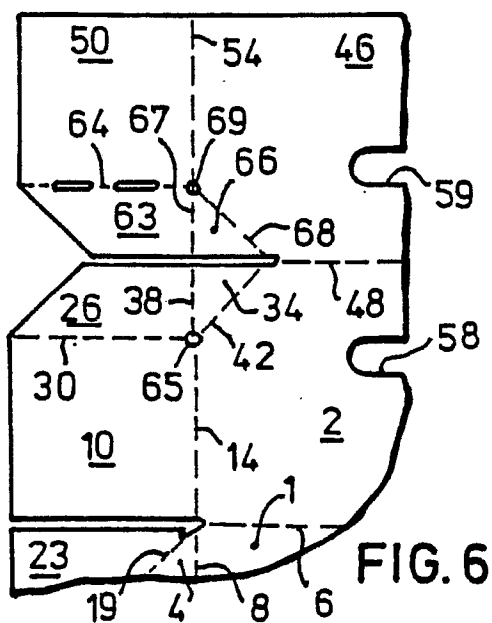


FIG. 6

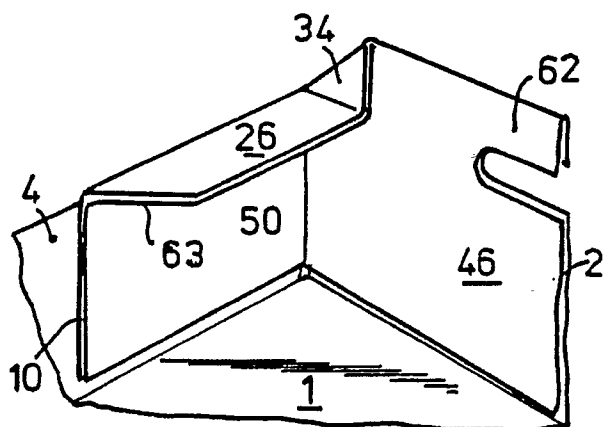
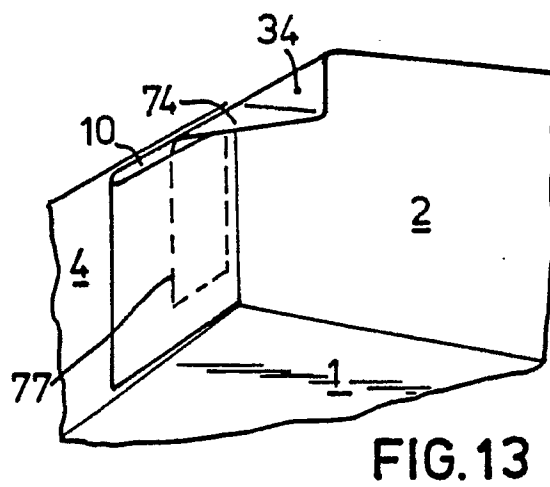
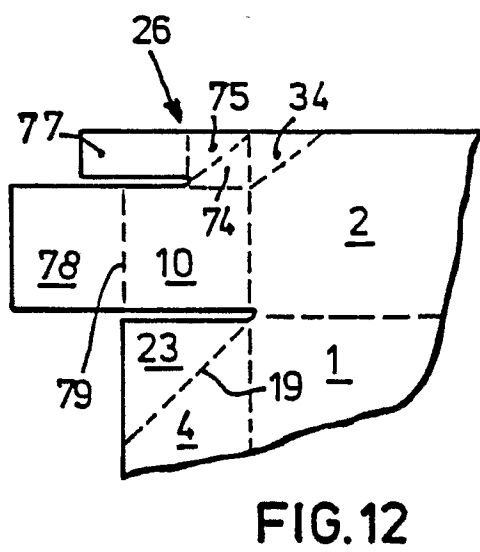
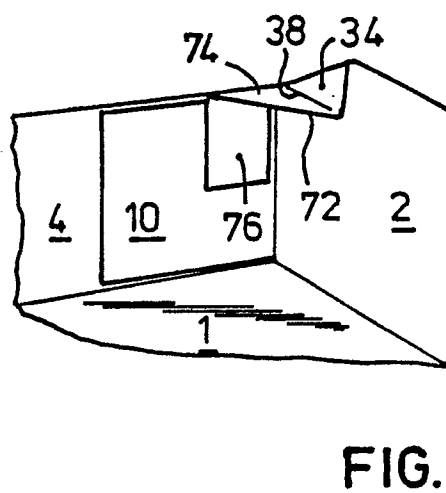
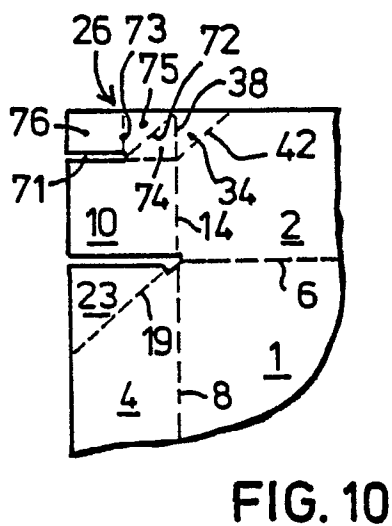
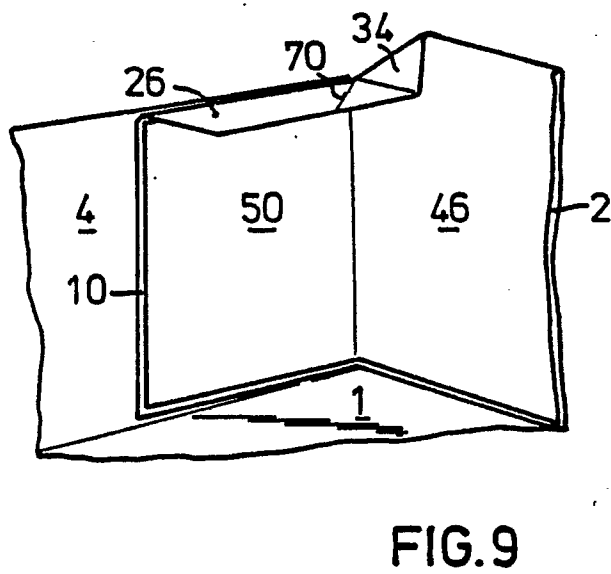
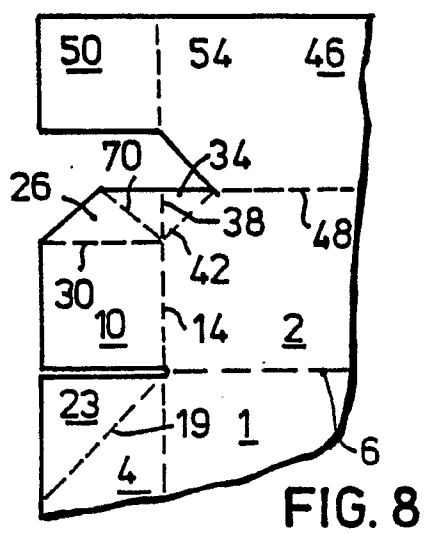


FIG. 7



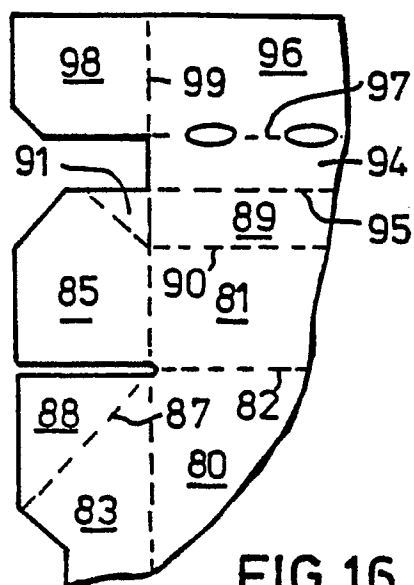


FIG. 16

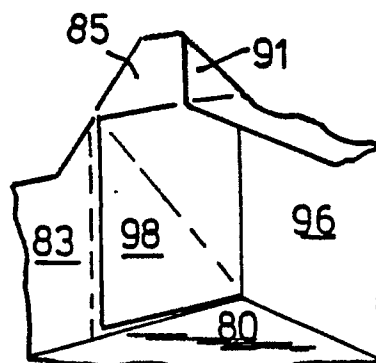


FIG. 17

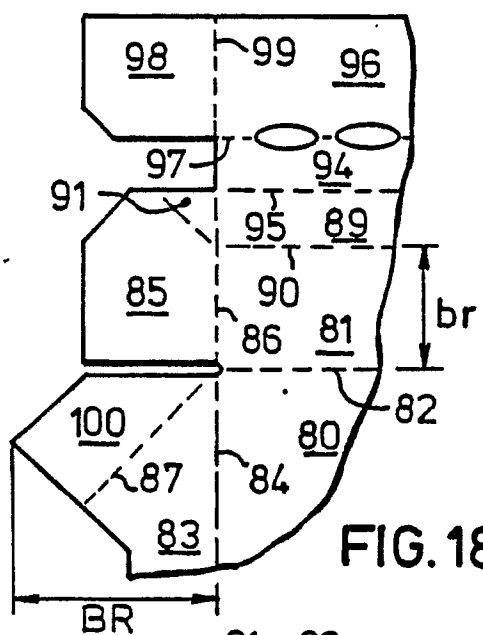


FIG. 18

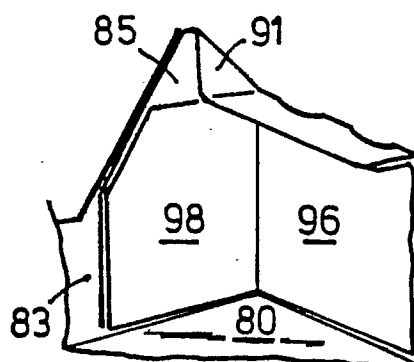


FIG. 19

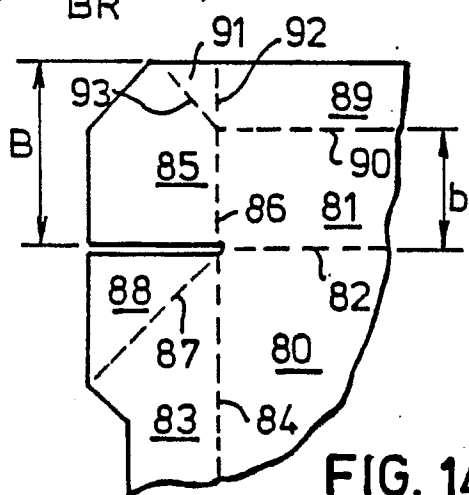


FIG. 14

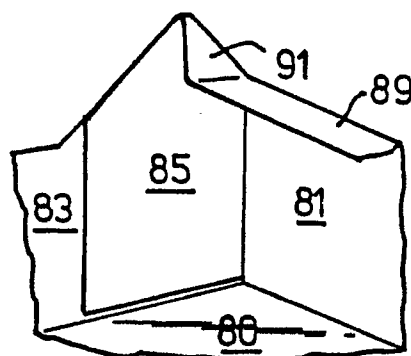


FIG. 15

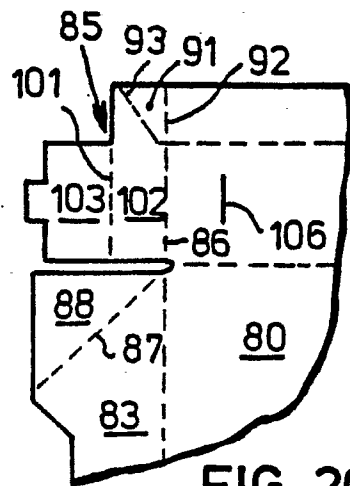


FIG. 20

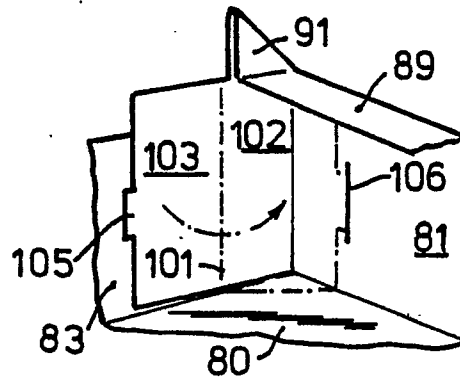


FIG. 21

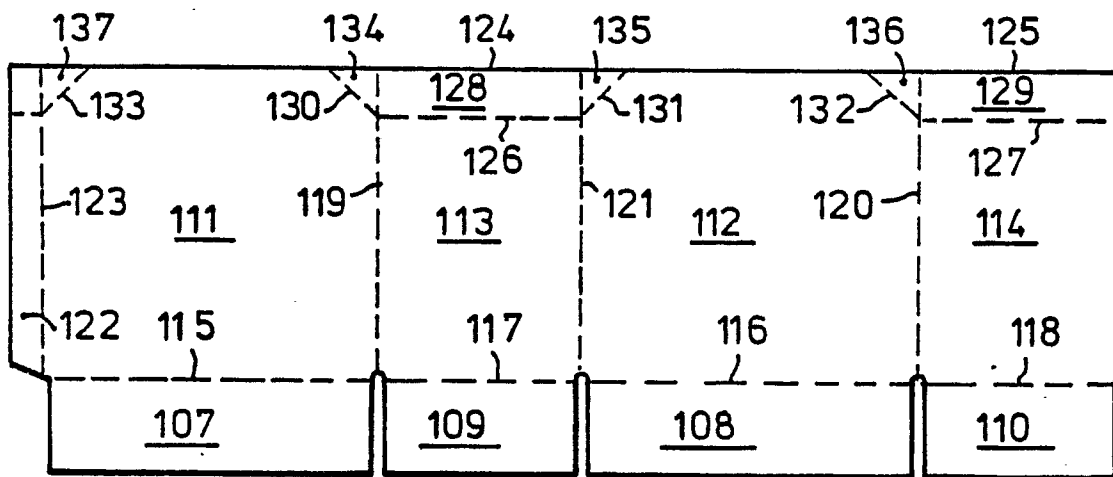


FIG. 22

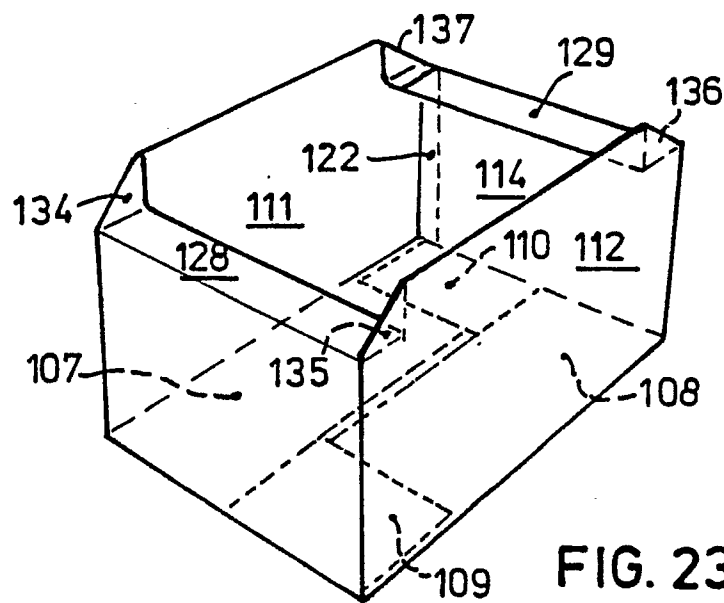


FIG. 23



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 20 1005

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.5)
A	FR-A-2 617 810 (SOCAR) * Page 5, lines 1-22; figures 1-9 * ---	1,3	B 65 D 5/00 B 65 D 5/06
A	GB-A-1 249 884 (LINPAC CONTAINERS) * Page 1, line 63 - page 2, line 36; figures 1-3 * ---	1,3	
A	DE-A-3 302 972 (ALLGÄUER HOLZSPANSCHACHTELFABRIK) * Page 10, line 1 - page 11, line 7; figures 1-3 * ---	1,3,10	
A	GB-A-2 148 254 (CORRUGATED PRODUCTS LTD) * Figures 1,2 * -----	3,15	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 65 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16-11-1989	Examiner BERRINGTON N.M.
CATEGORY OF CITED DOCUMENTS 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 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			