(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 767 103 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
09.04.1997 Bulletin 1997/15

(51) Int Cl.[6]: **B65D 5/00**

(21) Application number: **96307244.2**

(22) Date of filing: **03.10.1996**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

(30) Priority: **04.10.1995 GB 9520259**
30.01.1996 GB 9601861

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(54) Stackable and nestable tray

(57) The tray has a base (1) and four walls (2,3) and is part-erected by securing the walls (2,3) to each other so that they slope outwards from the base (1) and allow nesting and fully erected by folding an upwardly projecting sidewall portion (4) of the tray about a pair of parallel fold lines (5') to form a stacking ledge (5). A distal end (6) of the sidewall portion beyond the parallel fold lines (5') may carry a pair of flaps (15) foldable so that distal end (6) is in the fully erected tray made of more than one thickness of material. The tray may be provided in a variety of sizes compatible with a standard returnable plastics crates. Several small trays placed side by side preferably occupy the same plan area as a large tray. The larger trays have cutouts (17,18) in their longer sides which receive webs (20) formed in the upper corners of stacked smaller trays.

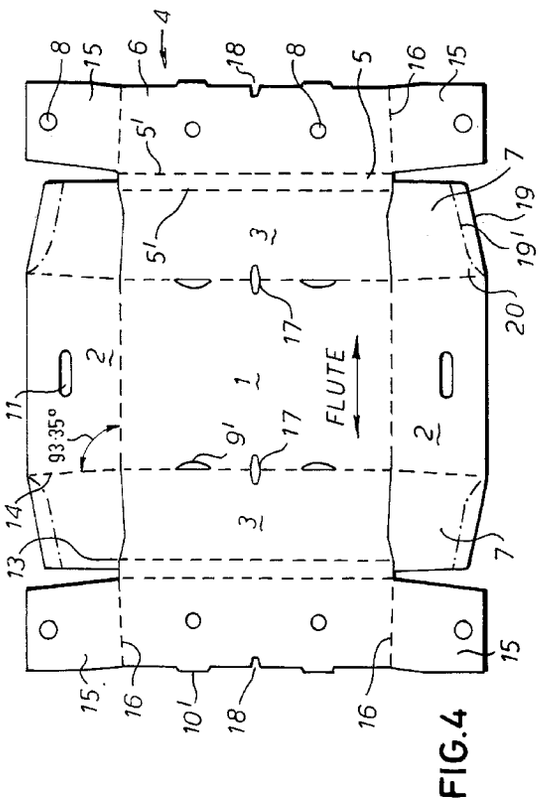

FIG.4

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Description

The invention relates to trays, particularly of corrugated board.

Trays erected from board are well established but as a one-trip product, the returnables market being dominated by plastics crates. Costs however are high, both in production and in constant pilfering of the crates, which are far too useful for everything but their proper purpose to escape attention.

Considering the market, and the present-day emphasis on re-usable rather than throw away products, we have seen scope for returnable board trays. Costings, even in suitable heavy duty board can be low, of the order of 15% of plastic crate costings, and pilfering is scarcely a problem. Compared to one-trip trays, costs are of course up, but only by around 30%, so that even a two-trip average life gives a saving on first cost, and in fact we aim for at least five or six trips.

Various trays folded from board, formed to nest in one configuration and stack in another, are known: see e.g. GB 1579535, GB 2081224, GB1295281.

In accordance with a first aspect of the invention we provide a tray folded from board or other flexible sheet material, as a blank or in part or fully erected form, the tray having a base and four walls and being part-erected by securing the walls to each other so that they slope outwards from the base and allow nesting and fully erected by folding an upwardly projecting sidewall portion of the tray about a pair of parallel fold lines to form a stacking ledge, characterised in that a distal end of the sidewall portion beyond the parallel fold lines is in the fully erected tray made of more than one thickness of material. The provision of such double thickness material can considerably increase (e.g. approximately double) the vertical crushing strength of the stacking ledge.

Such a tray combines the economically necessary features of a returnable tray, which are nesting for initial supply to a user and for return, and stacking when filled. The stacking feature construction gives very simple erection to final form, the upwardly projecting sidewall portion extending in the plane of the walls in the nested configuration but readily being folded over and in by hand to form the fully erected tray. It also restores to the tray the crushing strength lost by having sloping walls, while taking up very little of the nominal tray area. Further the flaps may fold so that the stacking ledge is below the level of the tops of the other walls, which, particularly if those walls have end sections folded round and secured to the flap-carrying walls, give positive sideways location all round in the stacking configuration.

The trays may, according to the product to be packed, be provided with a throwaway plastic liner at negligible cost.

In a further aspect, the invention provides a system in which goods are supplied in trays folded from board or other flexible sheet material, the trays being emptied and returned for re-filling, wherein the trays are formed to stack when filled and nest when empty by folding upwardly projecting sidewall portions of the tray inwardly about a pair of parallel fold lines from the empty configuration to form stacking ledges in the filled configuration.

The change from filled (stackable) to empty (nestable) configuration is simple to achieve: an important advantage, permitting use of unskilled labour in handling the goods. A fully-erected tray and corresponding blank capable of use in such a system are disclosed in GB 1295281, but such use is nowhere suggested.

In a yet further aspect, the invention provides a tray folded from board or other flexible material, formed to nest in one configuration and stack in another, the tray in the stacked configuration being dimensioned to be compatible with a standard returnable plastics crate. Such trays can readily be used together with the crates. Preferably the trays are of large and small sizes, with a plurality of the small trays stacked side-by-side occupying the same plan area as a large tray. In this way trays (or trays and crates) of various sizes can be assembled to form a regular stack.

Conveniently the trays are rectangular in plan, the ratio of the long side to the short side of the base being $\sqrt{2}$, whereby two smaller trays side-by-side may occupy the same plan area as the next largest tray.

The bases of the larger trays may be provided with slots in their longest sides which, when the larger trays are stacked on the smaller trays, receive webs formed in the upper corners of the small trays.

Illustrative embodiments of the invention in its various aspects are shown in the accompanying drawings in which:-

Figure 1 is a tray blank for the nesting/stacking system of the invention;

Figure 2 a view of the corresponding erected tray;

Figure 3 shows in shaded drawings the erected tray from the same view point as in Figure 2 and also the nested trays (bottom right) and stacked trays (bottom left).

Figure 4 shows a modification of the blank of figure 1;

Figure 5 shows a stack of trays together with standard returnable plastics crates;

Figure 6 shows a stack of large and small trays and

Figure 7 schematically illustrates the stacking of various preferred tray sizes.

In figures 1 and 4 scorings are conventionally represented by dotted lines, and waste portions as cut out by shading. The parts are numbered as follows:

Base 1, end walls 2, side walls 3;
Flap 4 consisting of stacking ledge portion 5 and distal portion 6;
End wall end sections 7;
Finger holes 8;
Cuts 9 that cooperate with locking tabs 10 on the distal portions of the flaps in the erected tray; and
Hand holes 11.

Flap 4 forms the upwardly projecting sidewall portion in the partly erected tray. It can be seen how the folds dividing the end walls 2 from their end sections 7 are directed so that a slope is provided in the side walls of the part erected box, for nesting. The same function as regards the end walls is served by portion 13 of the cut at the end of the side wall lying beyond the line of the score dividing the base from the end wall. This portion in the part erected tray contacts portion 14 of the corner formed between the end wall and its end sections and positions the end wall to slope also for the nesting.

In the line drawing of Figure 2, parts are numbered as in the blank and it can in particular be seen how the distal portion of the flap 6 extends to the base 1 dividing the load applied to the stacking edge 5 between the side wall proper and the flap. The drawing also shows how the stacking ledge 5 is disposed below the top edge of the end walls 2 and their folded round end sections 7 to provide positive location of the base of a tray resting on the stacking ledges.

The drawings of Figure 3 need little explanation, it being clear how the part erected trays nest with the flaps 4 extending in the plane of the side walls 3, with only about a third of the depth of a given tray projecting above the one below. In the stacked form the product in the tray is safely below the level of the stacking ledge and the only loads applied to the base of the tray are those of the product itself, except along the edges where the load is carried by the stacking ledges. The stacked form also shows where the material of the end wall is warped outwards slightly at the cuts 9 to accommodate the locking tabs 10 (arrowed position 12), the parts being indicated in the nested form.

Conversion from stacked to nested form is simply by swinging in the sides two-handed from the nesting configuration, as arrowed, until tabs 10, or any alternative provided, lock in. Reversal is by use of the finger holes 8, pulling outwards to free the tabs 10, when the flaps 6 spring most of the way out to their original position. Further trays are easily stacked in.

The blank of figure 4 is generally similar to that of figure 1, the same reference numbers being used to refer to the same parts where appropriate. The locking tabs 10 and cuts 9 are replaced by tabs 10' on the flap distal portions 6 engageable in slots 9' at the bases of the side walls 3. As previously, the flap distal portions and stacking ledge portions are folded about parallel score lines 5' to convert the tray from partly erected to fully erected form. The flap distal portions 6 also carry further flaps 15 foldable about scores 16 to lie between the distal portion 6 and each side wall 3 in the fully erected tray. The blanks for the larger trays include cutouts 17, 18 for purposes described below. In the smaller trays, the cutouts 17, 18 are absent, and straight edges 19 of the end wall end sections 7 are replaced by kinked edges 19' defining web sections 20.

As shown in figures 5 and 6, the larger trays 21 may be stacked together with smaller trays 22 or standard returnable plastics crates 23. In the larger trays 21 upper parts of the end walls 2 and end sections 7 extend above the stacking ledges to locate the next layer securely in place. With the smaller trays 22 the same function is served by the upper end wall parts and the webs 20. The adjacent webs 20 of a pair of small trays 22 placed together side-by-side are engageable in the cutouts 17, 18 of a larger tray 23 to permit stacking of the larger tray on top of the small ones. Such engagement further locks the stack together. Alternatively, trays of the same size can be stacked in the same orientation on top of one another.

Figure 7 shows in plan view a stacking arrangement possible with three different tray sizes, the base side ratio in each tray being $\sqrt{2}$, each successively smaller tray being half the base area of the previous one.

Claims

1. A tray folded from board or other flexible sheet material, as a blank or in part or fully erected form, the tray having a base (1) and four walls (2,3) and being part-erected by securing the walls (2,3) to each other so that they slope outwards from the base (1) and allow nesting and fully erected by folding an upwardly projecting sidewall portion (4) of the tray about a pair of parallel fold lines (5') to form a stacking ledge (5), characterised in that a distal end (6) of the sidewall portion beyond the parallel fold lines (5') is in the fully erected tray made of more than one thickness of material.

2. A tray (21,22) folded from board or other flexible material, formed to nest in one configuration and stack in another, the tray (21,22) in the stacked configuration being dimensioned to be compatible with a standard returnable plastics crate (23).

3. A system of trays as defined in Claim 2 comprising trays of large (21) and small (22) sizes, wherein a plurality of small trays (22) stacked side-by-side occupy the same plan area as a large tray (21).

4. A system of trays as defined in Claim 3 wherein each tray (21,22) is rectangular in plan and the ratio of the long side to the short side of its base is substantially $\sqrt{2}$.

5. A system as defined in Claim 3 or 4 wherein the bases of the larger trays (21) are provided with cut-outs (17,18) in their longer sides which when the larger trays are stacked on the smaller trays, receive webs (20) formed in the upper corners of the smaller trays (22).

6. A system in which goods are supplied in trays folded from board or other flexible sheet material, the trays being emptied and returned for re-filling, wherein the trays are formed to stack when filled and nest when empty by folding upwardly projecting sidewall portions (4) of the tray inwardly about a pair of parallel fold lines (5') from the empty configuration to form stacking ledges (5) in the filled configuration.

7. A tray as a blank or in part or fully erected form, for use in the system of claim 6 and comprising locking tabs (10) carried on lateral edges of the projecting sidewall portions (4) and engageable in cuts (9) formed in the sidewalls (2) at or adjacent to the tray corners.

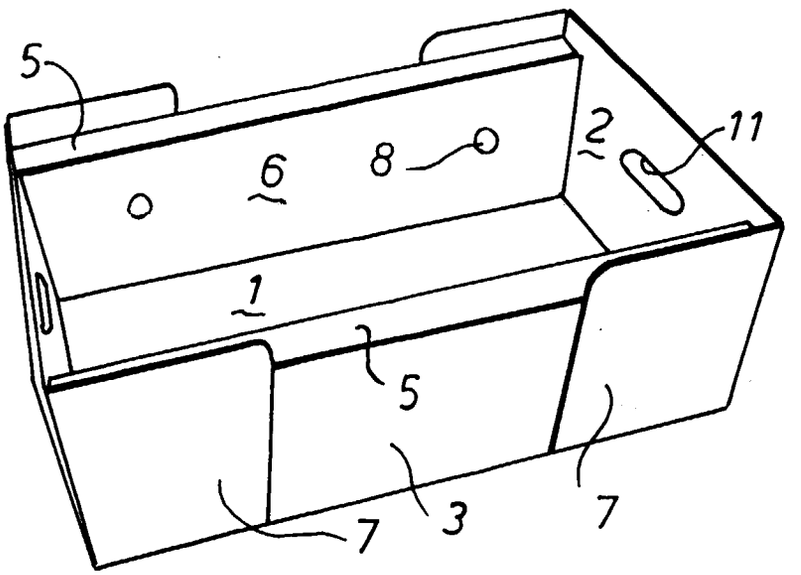


FIG.2

FIG.1

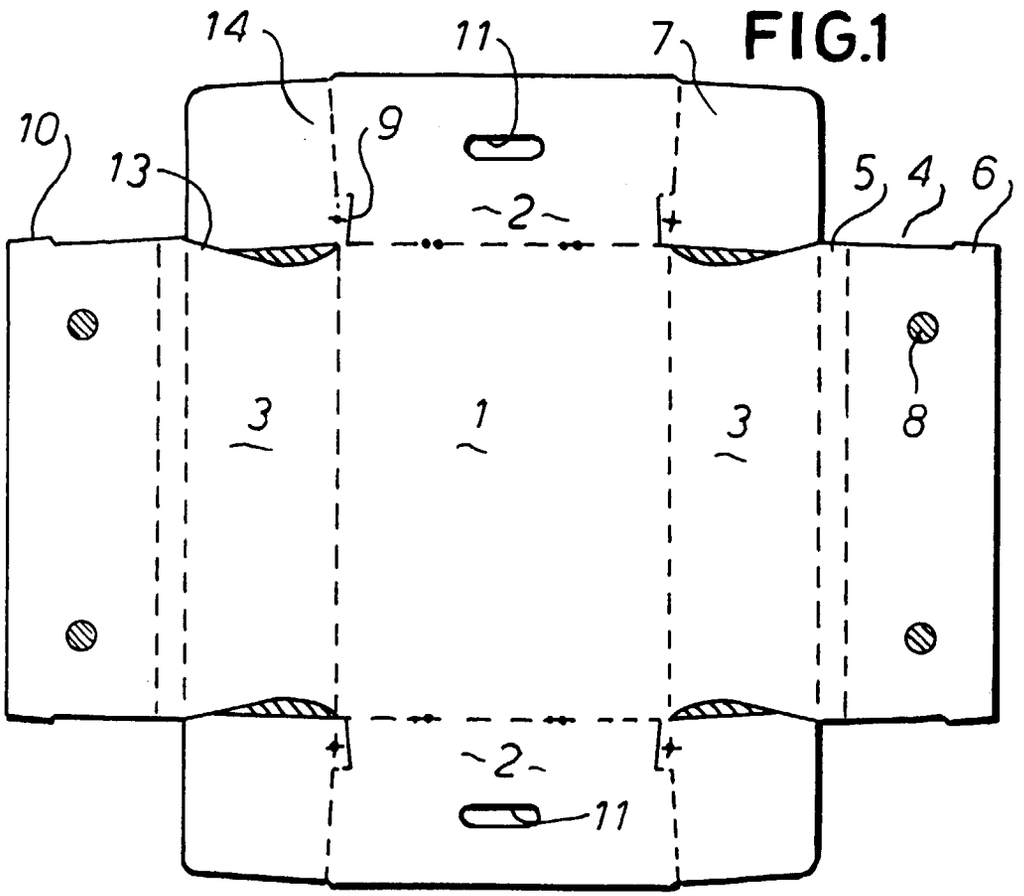
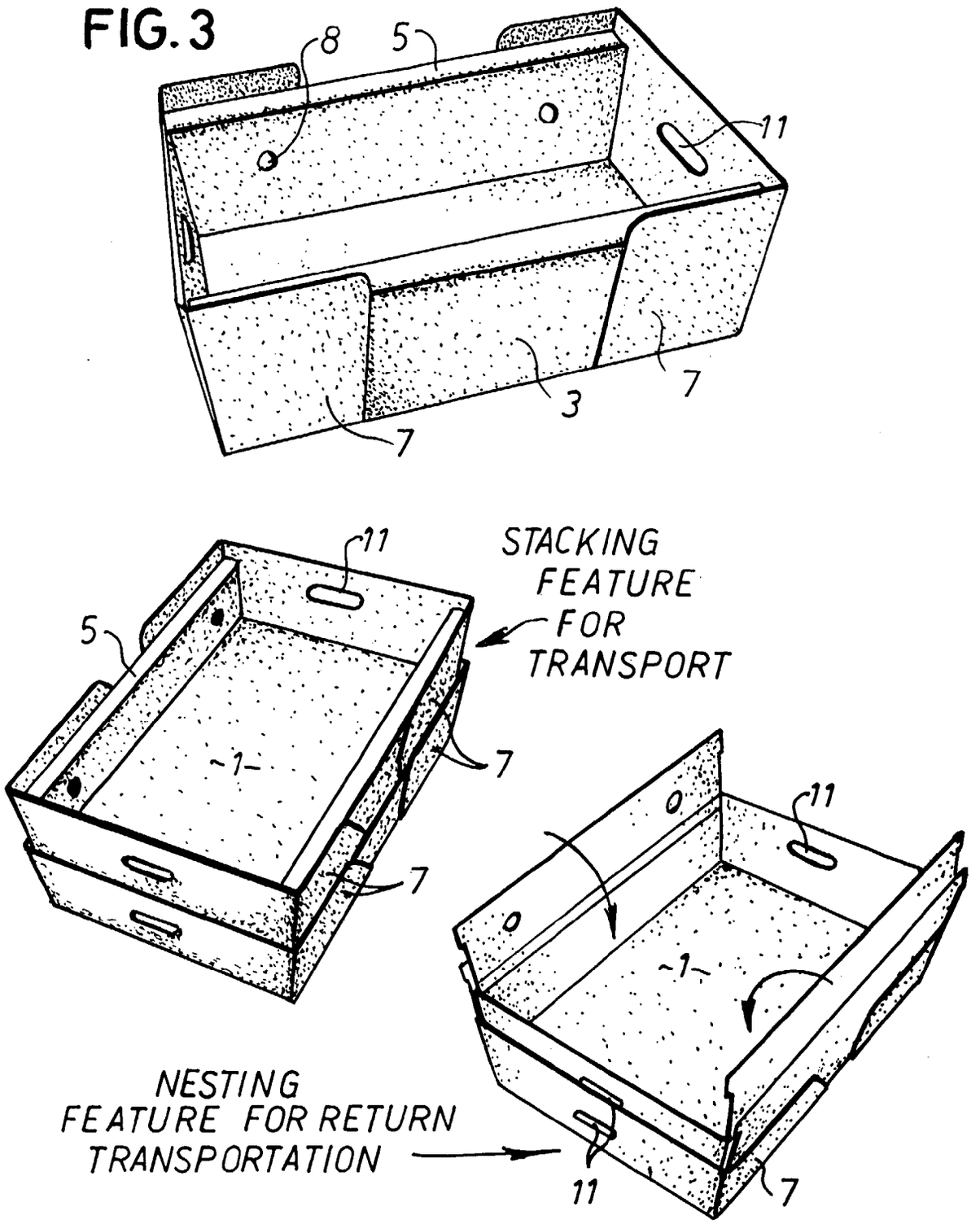
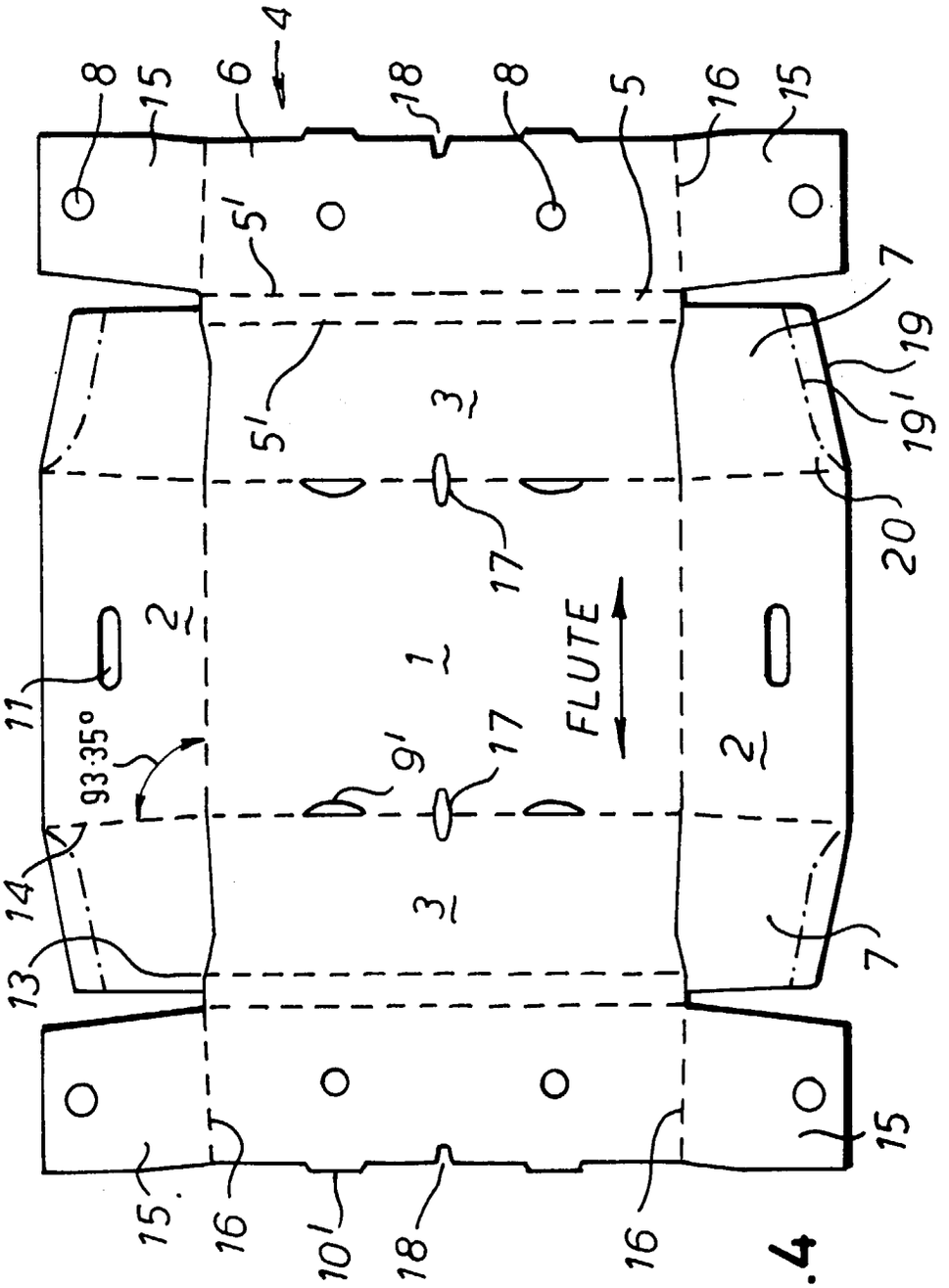


FIG. 3


8
5
11
3
7
7
11
5
STACKING
FEATURE
FOR
TRANSPORT
1
7
7
11
NESTING
FEATURE FOR RETURN
TRANSPORTATION
11
7


8
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6
4
18
8
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5'
7
19
19'
20
5'
3
17
2
1
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13
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15
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10'
18
16
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FIG.4

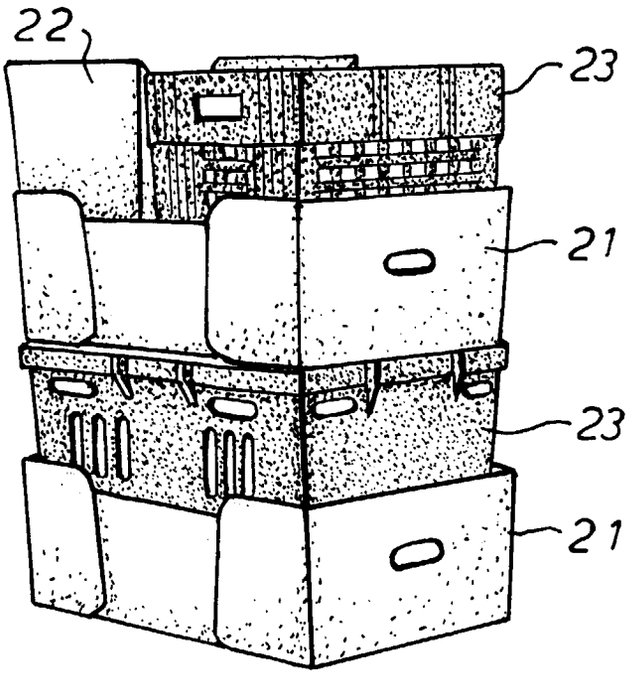

FIG.5

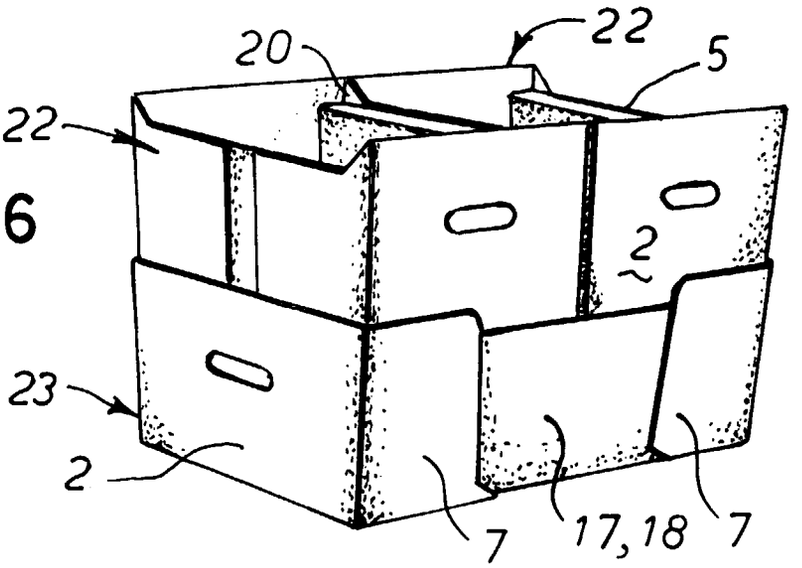

FIG.6

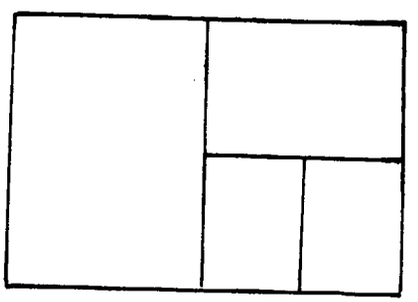

FIG.7

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EUROPEAN SEARCH REPORT

Application Number
EP 96 30 7244

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.6)
X Y	AU-A-538 397 (TIMOTHY FRANCIS FARRAH) * the whole document *	1,6 7	B65D5/00
A	GB-A-2 254 841 (TARLETON PACKAGING LTD) * page 4, line 27 - page 7, line 5; figures 1,2 *	1	
Y	DE-A-23 32 559 (UNILEVER) * figures 5,6 *	7	
X Y	GB-A-1 575 908 (METCALFE) * the whole document *	2 3,4	
Y	EP-A-0 671 335 (MC KECHNIE UK LTD) * column 3, line 3 - line 19 * * column 3, line 54 - column 4, line 6; figure 1 *	3,4	
D,A	GB-A-1 295 281 (MAC MILLAN BLOEDEL CONTAINERS LTD)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 January 1997	Martens, L

CATEGORY OF CITED DOCUMENTS

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