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(54) Tray with bottom reinforcement.

(57) In a tray or similar box of the ready-to-use type which can be made from a blank by folding and adhesion, where the corner connections between upright walls are such that, while the connection is being maintained, the upright walls can be collapsed over the bottom panel, according to the invention, two opposite upright walls (8,9) are connected with a bottom panel through a swivel panel (12,13) and an intermediate panel (10,11) which has a width substantially equal to half the bottom width as measured between the corresponding opposite bottom folding lines. By means of the swivel panels the intermediate panel can be placed under or on top of the bottom panel (1) in such a manner that the relevant upright walls come to lie directly against the bottom panel.

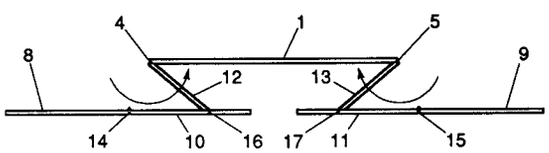

FIG. 2A

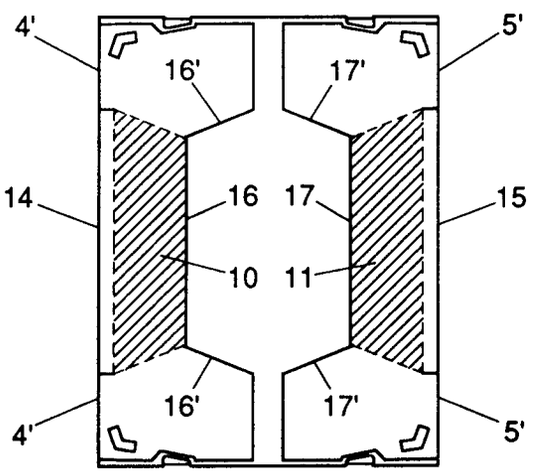

FIG. 2C

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This invention relates to a tray or similar box, which can be made from a blank by folding and adhesion, comprising a bottom panel and upright walls connected thereto through four folding lines bounding the bottom panel, wherein at the location of the bottom corners where upright walls meet, in one of the upright walls a triangular connecting zone is bounded, which, after being folded back, as viewed from the inside of the box, against the outside of this upright wall, is connected to the other upright wall with interposition of a connecting flap hingedly connected with one of the upright walls.

Such trays, which are of the so-called ready-to-use type, are well known. By 'ready-to-use type' is meant that, by virtue of the specific corner connection, the upright walls of the tray, already connected to each other, can be collapsed onto the bottom of the box, so that the finished tray can be stored without occupying much space. To make the tray ready for use, only the collapsed walls need to be erected and the tray is ready for receiving objects. Also well known, in addition to ready-to-use trays, are set-up trays, which can also be formed from a blank but require a number of operations to be performed for making them ready for use, such as the separate erection of the sidewalls and the effectuation of corner connections through stapling, glueing, by slipping locking tabs in one upright wall into receiving openings in the other upright wall, or other operations for which typically no time is available after the vegetables or fruits to be packaged have been harvested. If set-up trays are supplied in ready-to-use condition, they take up a great deal of space.

Dutch laid-open patent application no. 8900888 discloses a box of the type described in the preamble, where the bottom panel, at two opposite folding lines bounding the bottom panel, is connected with the corresponding walls by two intermediate panels which, in the finished box, are adhered to each other and against the bottom panel.

By virtue of this feature, the vertical loadability is improved, in particular in the case of a stack of boxes or trays, in that in the edge zones of the tray directly adjacent to the upright walls, where, in the case of a stack, the vertical forces are transmitted, the bending strength is increased.

Because the above feature involves the bottom panel locally acquiring a triple layer thickness along two upright walls, the resistance to sagging of the bottom has already been improved considerably as well.

The object of the present invention is to provide such a tray which, in addition to maintaining good vertical loadability, better counteracts the sagging of the bottom in cases of heavy and/or moist tray fillings, which reduce the bending strength of the bottom cardboard.

To that end, according to the invention, the bottom panel, at two opposite folding lines bounding the bottom panel, is connected to the corresponding upright walls through a swivel panel and an intermediate panel which has a width substantially equal to half the bottom width as measured between the two opposite bottom folding lines, the swivel panel which connects the intermediate panel with the bottom panel being connected to the intermediate panel and the bottom panel through two folding lines which are parallel to each other and to the corresponding bottom folding line, and which are shorter than the length of that bottom folding line, the first of the two folding lines substantially coinciding with the corresponding bottom folding line and the second being laterally displaced over substantially half the width of the intermediate panel.

By swivelling a swivel panel through 180° about the folding line at the bottom, the corresponding intermediate panel, while remaining parallel to itself at all times, can be placed against the underside of the bottom panel or on top of the bottom panel, so that the folding line through which the intermediate panel is connected with the upright wall comes to lie along the relevant side of the bottom panel and the typical ready-to-use-tray corner connections with adjacent upright walls can be effected.

The intermediate panels thus brought into overlap with the bottom panel provide for a doubling of the material thickness over a large part of the bottom surface, with the exception of those panel portions from which the swivel panels have been separated. However, these non-doubled portions of the bottom panel border on zones where the swivel panels are located between the bottom panel and the intermediate panels and where accordingly the material thickness is tripled.

The swivel panels can have been cut to the desired size from the intermediate panels or from the bottom panel.

Although the swivel panels can, in principle, be located at any point along the bottom folding line, it is preferred, with a view to a uniform torsion rigidity of the tray, that they be arranged centrally, symmetrically relative to the central plane of the tray extending transversely to the intermediate panels. The reason is that in the case where the swivel panels are cut from the intermediate panels, at least a bottom doubling along substantially the entire circumference of the bottom is effected and the central zone, where no material thickening occurs, is flanked by zones of triple material thickness, which ensures a very good resistance to sagging.

In the case where the swivel panels are cut from the bottom panel, a material doubling is effected along the short ends and in the centre of the bottom panel. In that case, too, the non-thickened bottom zones are bounded by a central zone having a triple material thickness.

After doubling of the material thickness of the bottom panel by means of the intermediate panels slipped under or over the bottom panel, the typical ready-to-use-tray corner connections can be effected, that is, at the location of the bottom corners where upright walls meet, a triangular connecting zone is defined in one of the upright walls, which connecting zone, after being folded back against the outside, as viewed from the inside of the box, of this upright wall, is connected by adhesion against the outside of a connecting flap hingedly connected with the other upright wall.

In further elaboration of the invention, the connecting flaps may be made up of corner support panels interconnected through parallel folding lines, which corner support panels, after being folded accordion-fashion and glued, can be formed into crush-resistant corner supports with a connecting flap portion by which the above-described corner connection for a ready-to-use tray with the adjacent upright wall can be effected.

Thus a tray or box is obtained with a good resistance to sagging and robust corner connections, forming corner supports, which are capable of absorbing high vertical loads.

According to the invention, optimum material use can be achieved if the assembly of corner support panels interconnected by parallel folding lines is designed with a length substantially equal to the sum of the widths of an intermediate panel and an upright wall panel and if this assembly is produced in line with the upright walls which are connected directly to the bottom panel without intermediate panel. In fact, in this way virtually all of the material of a blank is utilized in the box or tray.

Because the bottom of the tray according to the invention is better resistant to sagging, it is possible to slightly reduce the height of the tray while retaining sufficient total bending stiffness of the tray. This makes it possible to stack more trays, which is important with regard to storage and transport of goods.

Because of the reinforced bottom the torsional stiffness of the entire tray is improved. Moisture-proofing coatings on the material from which the bottom is made for the purpose of preventing weakening through moisture uptake, can therefore be omitted, so that the tray can be manufactured at lower cost.

To clarify the invention, some exemplary embodiments of the tray with reinforced bottom will be described with reference to the accompanying drawings.

Fig. 1 shows a blank for making a tray in a first embodiment;

Figs. 2A and 2B show folding operations on the blank, viewed in a section taken on line II-II of Fig. 1;

Fig. 2C is a bottom view of the blank in the condition according to Fig. 2B;

Figs. 3A, 3B and 3C show further folding operations, in top plan view of the blank shown in Fig. 1;

Fig. 4 shows a blank for making the tray in a second embodiment;

Figs. 5A and 5B show folding operations on the blank, viewed in a section taken on the line V-V of Fig. 4; and

Figs. 6A, 6B and 6C show further folding operations, in top plan view of the blank shown in Fig. 4.

In the embodiment shown in Figs. 1-3, the tray blank comprises a rectangular bottom panel 1 which is bounded by four folding lines 2, 3, 4 and 5. In this embodiment short upright walls 6 and 7 are connected directly to the bottom panel through the folding lines 2 and 3. Long upright walls 8 and 9 are connected indirectly to the bottom panel 1 through intermediate panels 10 and 11 and swivel panels 12 and 13, the intermediate folding lines being indicated by 14, 15 and 16, 17, respectively.

The folding lines 4, 5; 16, 17 and 14, 15 are shorter than the corresponding dimension of the bottom panel 1. Provided in the blank in line with the folding lines 4, 5, 14 and 15 are cuts 4', 5', 14' and 15'.

The folding lines 16 and 17 are located in the intermediate panels 10 and 11 approximately halfway between the bottom panel 1 and the long upright walls 8 and 9.

The swivel panels 12 and 13 are separated from the respective intermediate panels 10 and 11 through cuts 16' and 17'.

In the short upright walls 6 and 7, triangular connecting zones 20, 21 are bounded by folding lines 18 and 19 inclined at 45°.

Connecting flaps 26-29 are connected to, and in line with, the short upright walls 6 and 7 through folding lines 22-25, which connecting flaps 26-29, in the embodiment shown, are comprised of corner support panels 34a-e, 35a-e, 36a-e and 37a-e interconnected through parallel folding lines 30a-d, 31a-d, 32a-d and 33a-d.

Further shown are overlap panels 40 and 41, connected to the upright wall panels 8 and 9 through folding lines 38 and 39.

From such a blank, of which virtually the entire available rectangular surface has been utilized, a tray of the ready-to-use type in the collapsed transport and storage form can be formed. See Figs. 2

and 3.

The elevations of Figs. 2A and 2B show how the intermediate panels 10, 11 are placed under the bottom panel 1 by means of the swivel panels 12, 13, so that, as appears from the bottom view of Fig. 2C, except for the central zone, the entire bottom has a double material thickness. Indicated by hatching, directly adjacent the single central zone, are areas of triple material thickness, where the swivel panels 12, 13, as also appears from Fig. 2B, are clamped between the bottom 1 and the intermediate panels 10, 11.

The basic operations for effecting the specific ready-to-use-tray corner connections are depicted in Figs. 3A-C.

Fig. 3A shows an operation which is performed after the phase depicted in Fig. 2B, where the intermediate panels have been placed under the bottom panel. This operation is illustated only for the upright wall 6. Of course, the same applies to the upright wall 7.

First the corner support panels 34a-e, 35a-e, 36a-e and 37a-e constituting the connecting flaps 26-29 are folded and adhered to each other in the manner indicated for the corner support panels 35a-e, so that the panels 35a and 35e on the one hand and the panels 35b and 35d on the other are joined and can be hinged relative to each other about the coinciding folding lines 31a and 31d.

While simultaneously folding the upright sidewall 6 over the bottom panel 1 and folding back the connecting zones 20 against the outside, as viewed from the inside of the tray, of the upright wall 6, the prefolded and glued connecting flaps 26 and 27 are placed on the upright wall 6 already placed on the bottom panel (Fig. 3B) and then the upright longitudinal walls 8 and 9 are folded over the bottom panel and stuck to the connecting flaps 26 and 27, in particular to the uppermost corner support panels 34b and 35b (Fig. 3C).

The tray is now ready and is disposed in the collapsed storage condition.

To render the tray ready for use, only the upright longitudinal walls need to be gripped and erected.

In the variant design according to Figs. 4-6 corresponding parts are designated by the same reference numerals as in Figs. 1-3.

The blank in the embodiment according to Figs. 4-6 deviates in some respects from that according to Figs. 1-3. Firstly, the swivel panels 12, 13 are not separated in the intermediate panels 10, 11 but in the bottom panel 1 and, secondly, the connecting panels 26-29 are not attached to the shorter upright walls 6, 7 but to the longer upright walls 8, 9. Further, the connecting panels 26-29 are not made up of corner support panels.

Because of the single design of the connecting panels 26-29, a less strong corner support-forming corner connection is obtained, but the manner of folding the tray requires fewer operations and is therefore simpler. Thus the corner connections that lead to a ready-to-use tray are performed in the usual manner, as will be described hereinafter for the short upright wall 6.

First the upright sidewall 6 is folded over the bottom panel 1. Then the triangular connecting zones are folded back against the outside, as viewed from the inside of the tray, of the upright wall 6. Then the connecting flaps 26 and 27 are placed on the upright wall 6 already placed onto the bottom panel (Fig. 6B). For this purpose, the connecting flaps 26, 27 are folded over the upright longitudinal walls 8 and 9 (see Fig. 6B, left-hand side) and the upright walls 8, 9 are folded over the bottom panel 1, the connecting flaps 26 and 27 being adhered to the triangular connecting zones 20 (see Fig. 6C, left-hand side).

Another difference with the embodiment according to Figs. 1-3 is that in folding the box, the intermediate panels are not placed under the bottom 1 but on top of it. The necessary operations therefor are depicted in Fig. 5.

Referring to the embodiment according to Figs. 1-3, it is further observed that the reinforced corner supports, in particular connecting flaps 26-29, which are formed by folding over each other and adhering the corner support panels 34a-e, 35a-e, 36a-e and 37a-e, can, by virtue of an additional feature of the blank, indeed be made to bear effectively, i.e. in the erected condition of the box or tray, the corner support panels rest on the bottom 1 by their lower ends even in unloaded condition.

In a ready-to-use tray in which a stiff construction of some kind is present in the corners, it is required that at the underside thereof some space relative to the bottom be left clear, because otherwise during the transition from the storage condition to the service condition the corner constructions cannot move over the bottom surface.

Because the intermediate panels 10, 11 are connected to the bottom through swivel panels 12, 13 and the swivel panels have a shorter length than the bottom panel, the bottom folding line on the side of the intermediate panels is also shorter and cuts are present in the parts 4' and 5' (Fig. 1).

These cuts enable the corner zones of the bottom to recede during the transition from the storage position to the service position and the attendant sliding motion of the lower ends of the corner supports over the bottom.

Claims

1. A tray or similar box, which can be made from a blank by folding and adhesion, comprising a bottom panel (1) and upright walls (6-9) connected thereto through four folding lines (2-5) bounding the bottom panel (1), wherein at the location of the bottom corners where upright walls (6-9) meet, in one of the upright walls (6, 7) a triangular connecting zone (20) is bounded, which, after being folded back, as viewed from the inside of the box, against the outside of this upright wall (6, 7), is connected to the other upright wall (8, 9) with interposition of a connecting flap (26-29) hingedly connected with one of the upright walls (6-9), **characterized in that** the bottom panel (1), at two opposite folding lines (4, 5) bounding the bottom panel, is connected to the corresponding upright walls (8, 9) through a swivel panel (12, 13) and an intermediate panel (10, 11) which has a width substantially equal to half the bottom width as measured between said opposite bottom folding lines (4, 5), the swivel panel (12, 13) which connects the intermediate panel (10, 11) with the bottom panel (1) being connected to the intermediate panel (10, 11) and the bottom panel (1) through two folding lines (4, 16; 5, 17) which are parallel to each other and to the corresponding bottom folding line (4, 5), and which are shorter than the length of that bottom folding line (4, 5), the first substantially coinciding with the corresponding bottom folding line (4, 5) and the second (16, 17) being laterally displaced over substantially half the width of the intermediate panel (10, 11).

2. A tray according to claim 1, characterized in that the swivel panels (12, 13) separated between the assemblies of parallel folding lines (4, 16; 5, 17) are arranged symmetrically relative to the central plane of the tray extending transversely to the intermediate panels (10, 11).

3. A tray according to claim 1 or 2, characterized in that the connecting flaps (26-29) are made up of corner support panels (34a-e, 35a-e, 36a-e, 37a-e) interconnected through parallel folding lines (30a-d, 31a-d, 32a-d, 33a-d), which corner support panels (34a-e, 35a-e, 36a-e, 37a-e), after folding and adhesion, can be formed into crush-resistant corner supports with a connecting flap portion (34e + d, 35e + d, 36e + d, 37e + d) by which the above-described corner connection for a ready-to-use tray with the adjacent upright wall can be effected.

4. A tray according to claim 3, characterized in that the assembly of corner support panels interconnected through parallel folding lines is designed with a length substantially equal to the sum of the widths of an intermediate panel (10, 11) and an upright wall panel (8, 9), this assembly being located in line with the upright walls (6, 7) which are connected directly to the bottom panel (1) without intermediate panel.

5. A tray according to any one of the preceding claims, characterized in that the connecting flaps (26-29) have substantially the same height as the upright walls (6, 7; 8, 9).

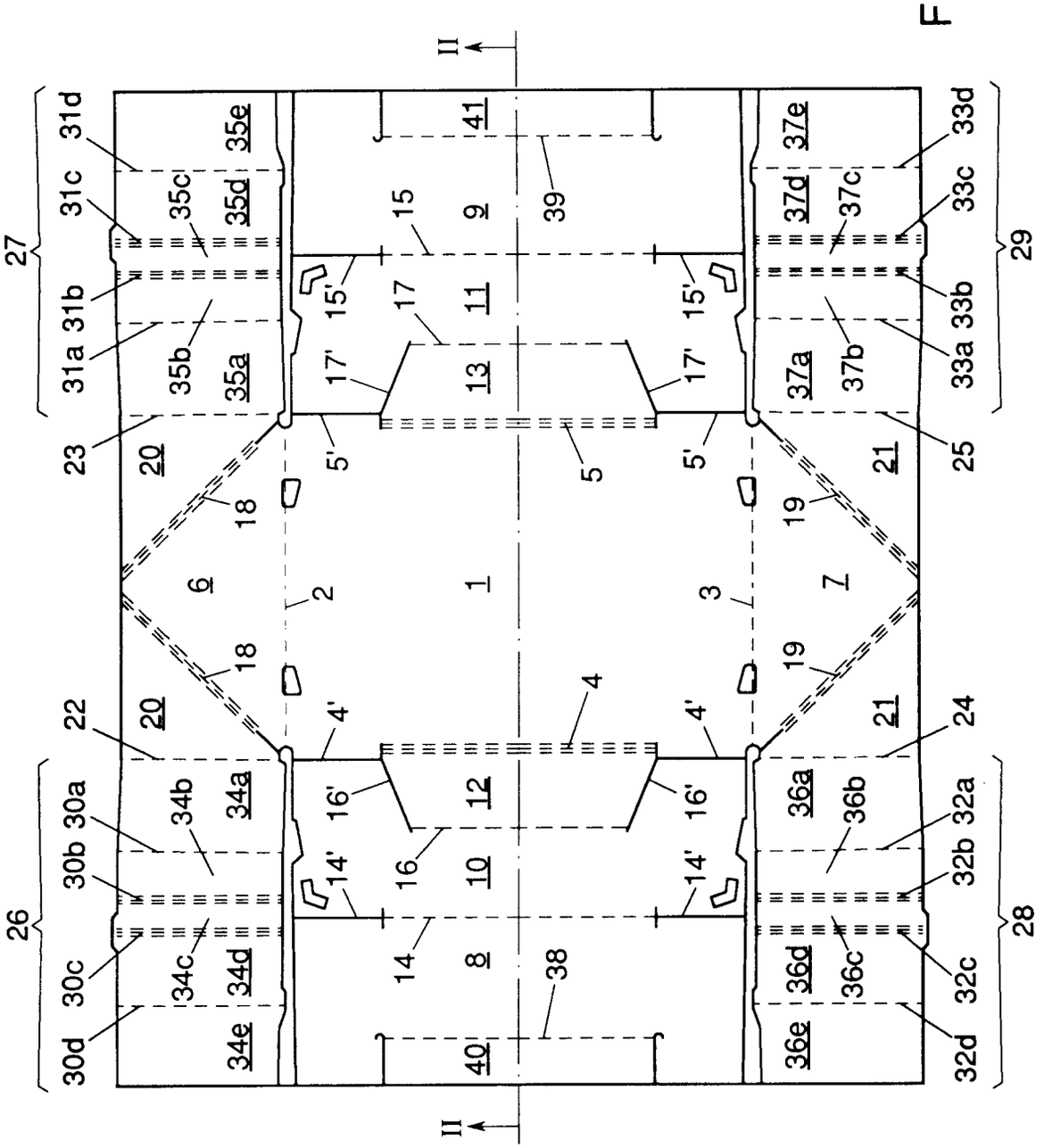
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FIG. 1

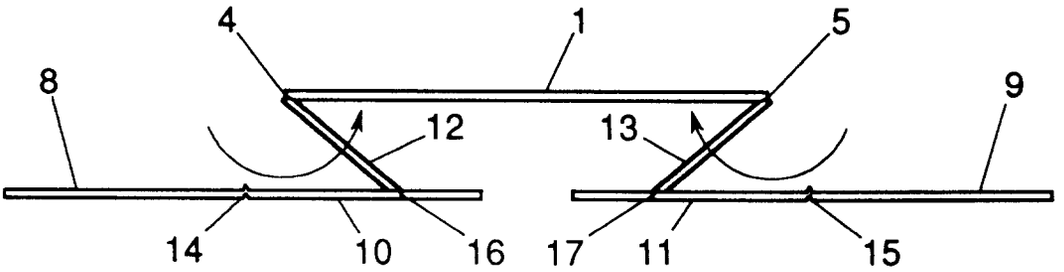

FIG. 2A

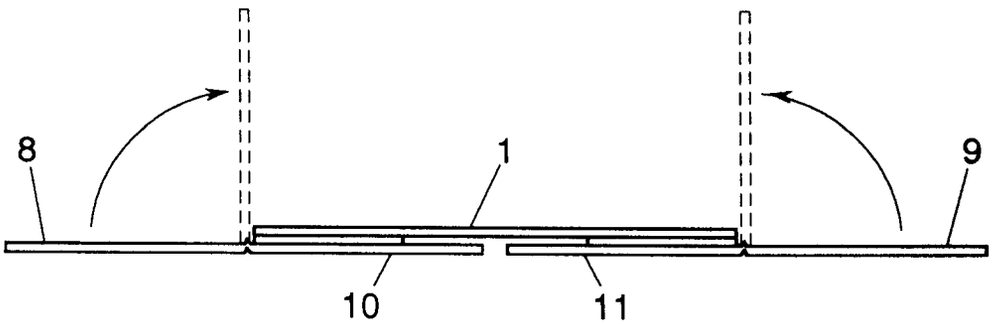

FIG. 2B

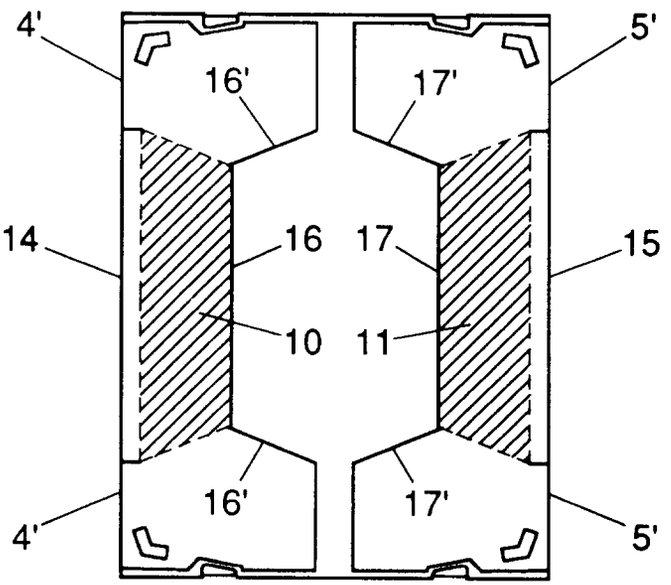

FIG. 2C

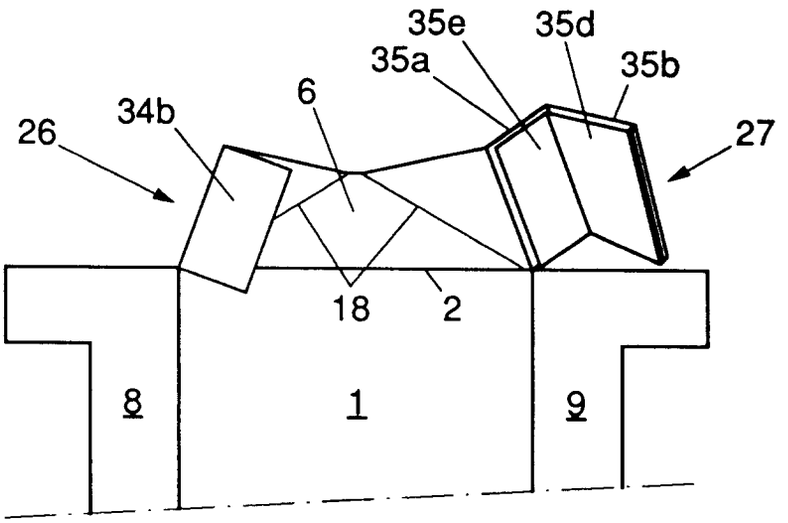

FIG. 3A

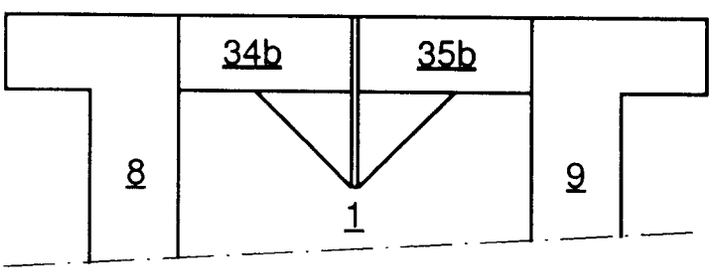

FIG. 3B

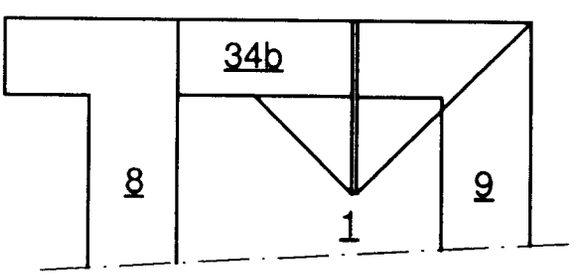

FIG. 3C

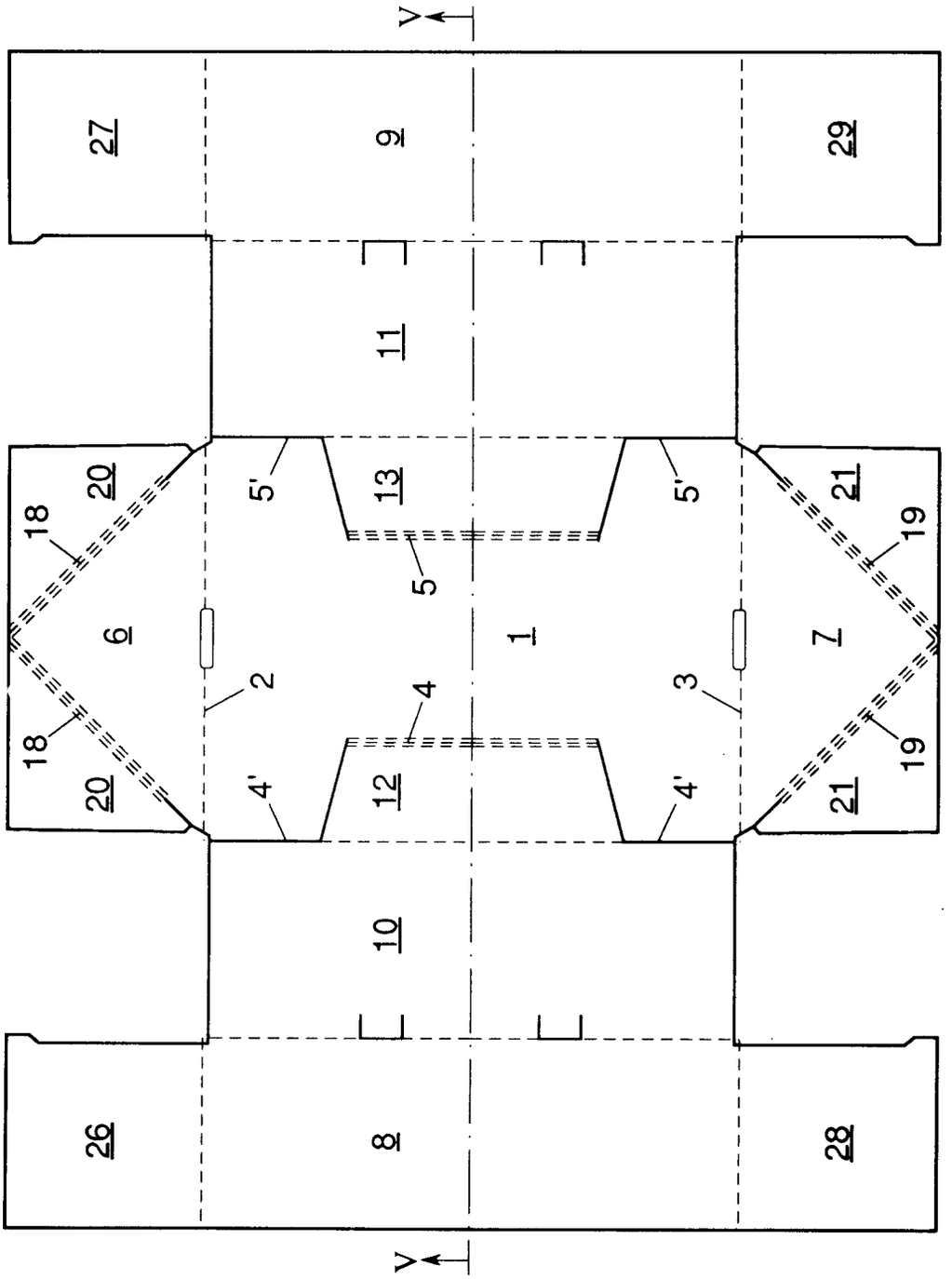

FIG. 4

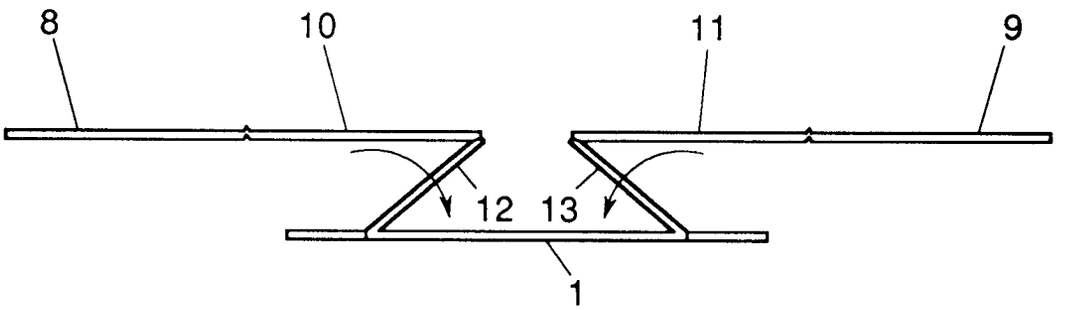

FIG. 5A

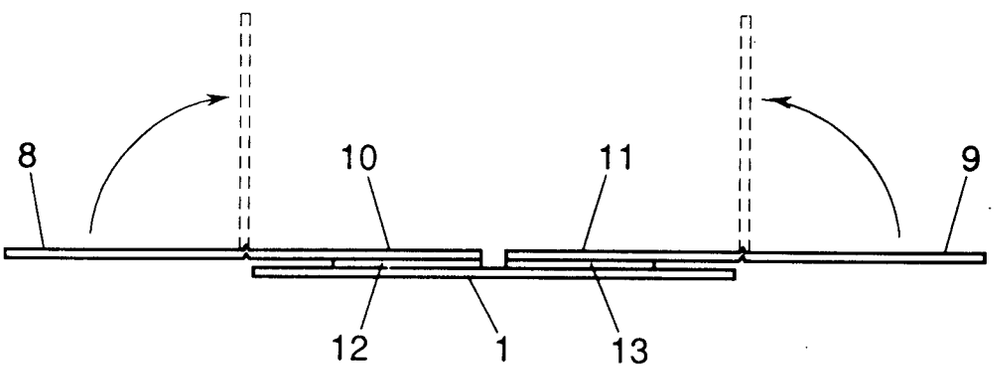

FIG. 5B

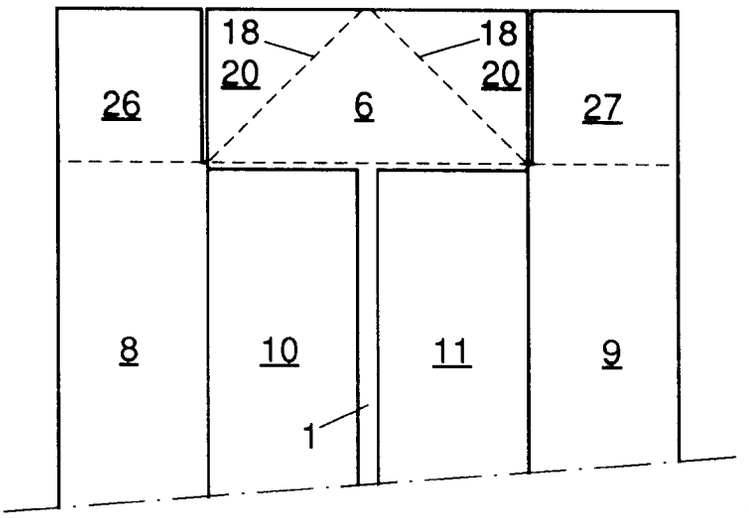

FIG. 6A

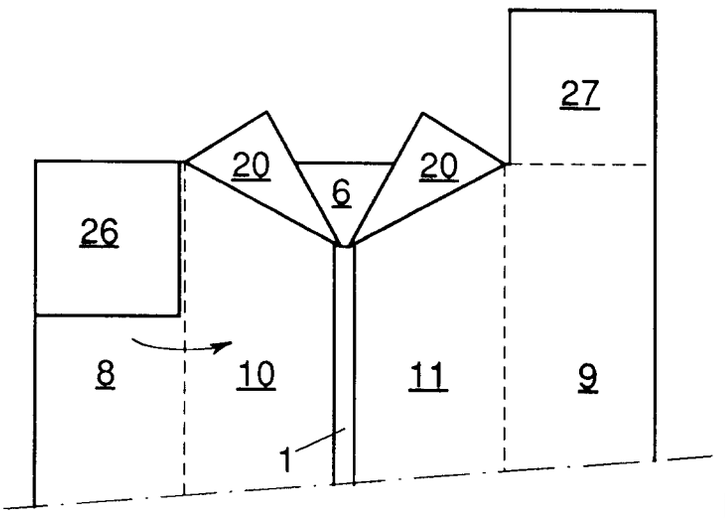

FIG. 6B

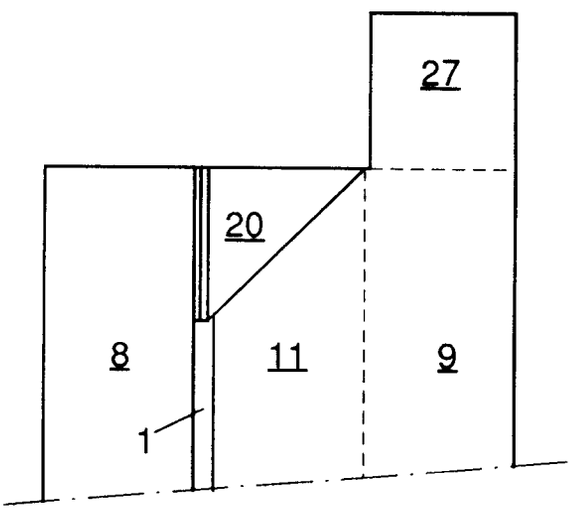

FIG. 6C

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 20 2022

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)
A	EP-A-0 442 552 (TRIMBACH) * claims 1-4; figures 1-7 *	1,5	B65D5/36 B65D5/44
A	GB-A-1 010 936 (BOXFOLIA) * page 2, line 103 - page 3, line 22 * * page 4, line 74 - line 93; figures 1,6 *	1,3-5	

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	7 November 1994	Vantomme, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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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

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