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BE DE ES FR GB LU NL(71) Applicant: **Trimbach Verpakking B.V.**
Ravelstraat 28
NL-4614 XD Bergen op Zoom(NL)(72) Inventor: **Trimbach, Raijmundus Gerardus**
Lambertus Joseph
Jeneverbes 1
NL-4635 BN Huybergen(NL)
Inventor: **van der Poel, Cornelus Ludovicus**

Maria
Heijmansven 6
NL-4635 DE Huybergen(NL)
Inventor: **Gelauff, Johannes George**
Kerkwerf 13 A
NL-4873 CE Etten-Leur(NL)
Inventor: **Buuron, Petrus**
Acacialaan 6
NL-4621 EZ Bergen op Zoom(NL)

(74) Representative: **Smulders, Theodorus A.H.J.,**
Ir. et al
Vereenigde Octrooibureaux Nieuwe Parklaan
97
NL-2587 BN 's-Gravenhage (NL)

(54) **Ready-to-use box with reinforced corners.**

(57) A ready-to-use box comprising a bottom panel (1) and upright longitudinal (2) and transverse walls (3) connected thereto by fold lines (4,5). Owing to the specific corner connection, the upright walls can be collapsed onto the bottom of the box. At each corner, where two walls meet, one of the walls (2) is provided with a reinforced end part of multiple wall thickness, either of flat construction or of Y or "butterfly" construction, terminating at a short distance from the adjacent upright wall. In the erected box, at each corner, a vertical support panel (20) extends obliquely between the upright walls (2, 3) along the free end edge of the reinforced wall end part. Cooperating locking means (23, 24) at the reinforced wall end part and at the vertical support panel (20) fix the reinforced wall end part at a slight angle relative to the plane of that wall part (2) in the direction of the adjacent upright wall (3).

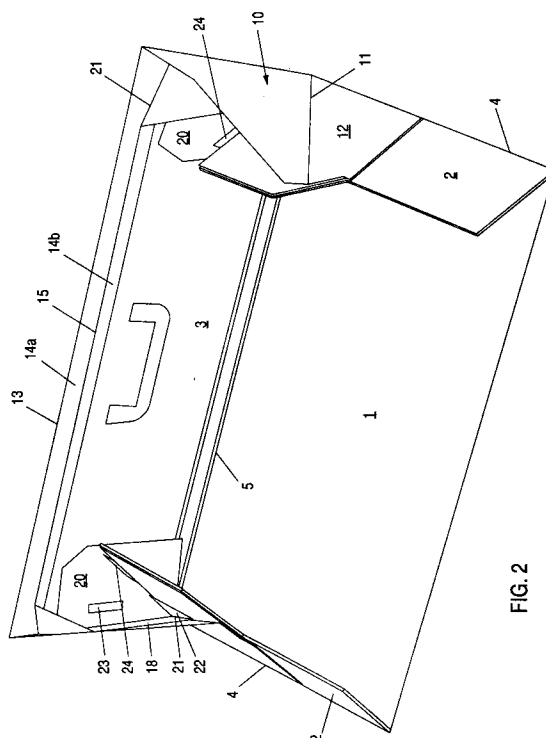


FIG. 2

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The invention relates to a ready-to-use box whose corner zones are reinforced.

A ready-to-use box is a box which, by virtue of a specific corner connection, permits the-upright walls thereof, while mutually connected, to be collapsed onto the bottom of the box, so that the finished box can be stored without occupying much space. To make the box ready for use, only the collapsed walls need to be erected and the box is ready for receiving products. Known in addition to ready-to-use boxes are set-up boxes which can likewise 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 effecting corner connections through stapling, glueing, by placing locking tabs into receiving openings, or other operations which consume time that is often not available when vegetables or fruit are being packaged directly after harvesting.

Various constructions are known for reinforcing the corner zones of a ready-to-use tray with a view to preventing the vertical walls of boxes in a stack from bending under the influence of the weight of superjacent boxes. Use can for instance be made of corner support tubes which are formed from flaps provided with parallel fold lines, these flaps being situated between the collapsed walls and the bottom of the box in the collapsed position of the box. In the erected box, the corner support tubes have the form of 4- or 5-sided prisms. A drawback of such prismatic corner supports in a ready-to-use box is that if the sharp edges reaching into the interior of the box are to be avoided, the corner support tubes must be deformed by hand into tubes with a concave profile facing the interior of the box. Such operations take time and thus detract from the principle of a ready-to-use box.

The above-outlined problem of corner support tubes can be avoided according to the invention by providing one of the upright walls, through folding a stiffening panel located in the produced part of the relevant wall panel, with a reinforced end part of multiple wall thickness, either of flat construction or of Y construction (the so-called butterfly design), with one of the legs of the Y extending substantially in the produced part of the web portion of the Y in the plane of the relevant wall toward the upright corner edge and the other leg of the Y extending obliquely along the corner edge into the interior of the box.

The choice of the construction of the corner supports, tubes or thickened end portions of upright walls partly depends on the further construction of the tray. Thus, it is conceivable that with a tray having a fully open top, apart from the above-mentioned disadvantage that certain additional operations are required to make the box ready to be

used for packaging frail articles, tubular stacking supports in the corners are a possible solution to the problem encountered when stacking such trays. With trays that are provided along two opposite upright walls, at the top thereof, with horizontal stacking strips for bearing a superjacent tray, these stacking strips providing the possibility of sliding the trays onto each other during stacking, corner supports in the form of thickened wall end portions or "butterfly" supports extending in the corner zones under the end parts of the stacking strips, are in principle less convenient than prismatic support tubes because in particular flat wall end portions are not located under the end zones of the stacking strips, although they are generally more convenient with regard to the use of the free interior space of the box and with regard to ease in erecting a ready-to-use box.

The invention relates to an improved ready-to-use box of the type comprising stacking strips at two opposite walls and corner stiffening provisions in the form of thickened flat wall end portions or Y-shaped, so-called butterfly, supports. In particular, the invention relates to a box that can be made from a blank by folding and adhesion, comprising a bottom panel and upright longitudinal and transverse walls connected to said bottom panel by four fold lines bounding said bottom panel, whilst at the corners where upright walls meet, one of the upright walls is provided with a corner stiffening provision by folding a stiffening panel located in the produced part of the relevant wall panel, and the other upright wall is extended so as to include a flap connected to said upright wall along a fold line, said flap comprising a triangular connection zone bounded by a fold line starting from the corner point of the bottom at a 45° angle, which connection zone, after being folded over against the inside of that upright wall, is attached by adhesion to the outside of said reinforced end part, whilst the upright walls that are not provided with reinforced end parts are equipped, adjacent their upper edges, with stacking strips directly or indirectly connected thereto via fold lines, said stacking strips, in the erected service position of the box, extending along the relevant upright walls at the level of the open top of the box, between the reinforced end parts of the other upright box walls.

A drawback of this known ready-to-use box construction is that as the box is unfolded from the flat transport position to the erected service position, the wall parts that constitute the reinforced, and hence stiffened, corner strengtheners can only be shifted under and along the non-reinforced walls with difficulty. Oftentimes, this forced transformation leads to such deformation of the relevant wall part that this remains visible in the erected box and provides an undesired onset for the tray to bend

under a vertical load.

The object of the invention is to provide a ready-to-use box of the subject type, in which this drawback is avoided.

To that end, according to the invention, the corner strengtheners are formed by a reinforced end part of multiple wall thickness, either of flat construction or of Y-construction (the so-called butterfly design) and the reinforced end parts of oppositely disposed upright box walls terminate at a short distance from the other upright box walls, whilst in the erected box, at each corner of the box, a vertical support panel extends obliquely between the upright walls meeting there, along the free end edge of the reinforced wall end part, and cooperating locking means are provided at the reinforced wall end part and at the vertical support panel, the arrangement being such that the reinforced wall end part is fixed at a slight angle relative to the plane of that wall part in the direction of the adjacent upright wall.

By shortening the reinforced box walls, the outlined problem encountered during erection of the ready-to-use box is overcome, but by this feature alone the stability of the box would have been reduced because the corner connection is less rigid than with walls normally extending as far as the upright corner edges. A consequence of the looser corner connection is that the reinforced box walls in the erected position do not remain vertically oriented but lean towards the interior of the box. However, the desired stability is ensured because, according to the invention, in the interspace a vertical support panel is arranged which receives support from the two walls meeting at a corner and relative to which the reinforced wall end part can be locked. Moreover, the reinforced wall end parts can be locked by the vertical support panel in a position where they extend obliquely under the ends of the superjacent stacking strips, which provides a better support of the stacking strips for taking up vertical loads.

Further advantages of the box according to the invention are that the upright walls not provided with reinforced end parts are supported to some extent by the vertical support panel so that they bend less easily under a vertical load and that the multi-angular configuration of the reinforced wall end parts stabilizes the vertical support panel and the flap with the triangular connection zone attached to the nonreinforced wall with regard to horizontal forces as well, so that boxes can be stacked by sliding one onto the other, which is most handy with boxes located higher up.

In further elaboration of the invention, the flap, which is situated at each corner of the box in the produced part of the upright wall that is not fitted with reinforced end parts and comprises the trian-

gular connection zone bounded by a 45° fold line, may be provided on the inside with a lip-shaped part hinging on the 45° fold line, the lip-shaped part being attached to the outside of the oppositely located reinforced wall part.

The hinging lip, which, in the collapsed position of the box, is disposed flat between the flap to which it is attached and the reinforced wall end part to which the lip is also attached, will, as the box is erected into the service position, be folded over about the fold line and, owing to the resistance which the material of the lip will offer to its being folded over, the lip will tend to stand away from the flap. As a result, during erection of the box, the thickened wall part will automatically be urged towards the interior of the box by the lip, so that the cooperating locking means, if in the form of a locking lip connected to the reinforced wall end part and a locking slot provided in the vertical support panel, are automatically forced into the locking position.

The invention further relates to a blank for making a ready-to-use tray of the type as described hereinabove, involving a minimum of waste material, which blank according to the invention is constructed as described in claim 3.

To clarify the invention, one embodiment of the ready-to-use tray with reinforced corner zones will now be described, with reference to the accompanying drawings.

Fig. 1 is a perspective view of one half of the ready-to-use box in the erected service position;

Fig. 2 is also a perspective view of the ready-to-use box shown in Fig. 1 in a transitional position between the collapsed storage position and the erected service position;

Fig. 3 is a quarter of a blank for making a box according to Figs 1 and 2;

Figs 3A and 3B are sections taken on the line AB-AB in the blank and show two possibilities of folding the stiffening panel; and

Fig. 4 is a quarter of a blank for making a box according to Figs 1-3, with additionally reinforced bottom and upright end walls.

According to the drawings, each showing only one half or a quarter of the box or blank because the other parts are identical, the box comprises a bottom wall 1, upright longitudinal walls 2 and transverse walls 3, connected to the bottom wall along fold lines 4 and 5.

The longitudinal walls 2, which, in the form shown, have been folded over along a fold line 6, are extended via a fold line 7 (see in particular the blank shown in Fig. 3) to include a stiffening panel 8 with fold lines 8a and 8b. As can be clearly seen in the blank in Fig. 3, the longitudinal walls 2 are shorter than the side of the bottom 1 that is bounded by the fold line 4.

Via a fold line 9, the transverse walls 3 are connected to a flap 10, in which a triangular connection zone 12 is defined by means of a fold line 11 inclined at an angle of approximately 45° . Via a fold line 13, each transverse wall 3 is connected with a stacking strip panel 14. In the embodiment shown, the stacking strip panel 14 is composed of parts 14a and 14b which are separated by a fold line 15. Provided in part 14b is a 45° fold line 16 and via a fold line 17 an attachment strip panel 18 is connected with the part 14b of the stacking strip panel 14.

The attachment strip panel 18 is connected with a support panel 20 via a fold line 19.

In a particular embodiment, a triangular lip 22 is connected to the attachment strip panel 18 via a 45° fold line 21.

The blank of Fig. 3 further shows a locking opening 23 which, in the erected position of the box, cooperates with a locking lip 24 at the fold line of the longitudinal wall 2.

Attention is drawn to the space S (see Fig. 3) between the facing end edges of the longitudinal edge 2 and the flap 10.

The manner of folding and interconnecting the various panels and flaps so as to form the ready-to-use box from the blank will not be discussed in detail here because this concerns operations that will not present any problems to a skilled person to whom the end product is made available. Reference is only made to the corner connection by means of the connection zone 12 which, after being folded back against the inside of the transverse wall 3, is attached by adhesion to the outside of the longitudinal wall 2 collapsed onto the bottom 1. Further, reference is made to two possibilities of reinforcing the end part of the longitudinal wall 2 by means of the stiffening panel 8 with the fold lines 8a and 8b. Figs 3A and 3B illustrate these possibilities of constructing the end part in question as a 5-layer part, i.e., as a "flat" thickened wall end part according to Fig. 3A and as a Y-shaped ("butterfly") support according to Fig. 3B.

Figs 1 and 2 show a box in which the end part of the longitudinal wall 2 is thickened as shown in Fig. 3A, i.e., as a flat, 5-layer end part.

In the service position according to Fig. 1, this end part of the wall 2 extends obliquely into the interior of the box and terminates at a distance from the adjacent upright wall 3 owing to the presence of distance s (see blank). The support panel 20 extends vertically in this interspace, from wall 2 to wall 3, resting on the bottom 1. The thickened end part of the wall 2 is retained in the position indicated in that the locking lip 24, which projects from the front edge of the thickened wall end part, engages in the locking opening 23 in the support panel 20. This support panel 20 and the thickened

wall end part extend under part 14b of the stacking panel 14 whose part 14a forms an upright edge contributing to the centering of a superjacent box resting on part 14b.

In the transitional phase as depicted in Fig. 2, the attachment strip 18 is visible, via which the stacking panel 14 is connected to the inside of the flap 10 and, via this flap, with the upright longitudinal wall 2. As shown by dotted lines in the blank of Fig. 3, via a fold line 21 a lip 22 is hingedly connected to the attachment strip 18. This lip 22 may be connected with the thickened end part of the wall 2 in the manner shown. Thus, in the collapsed position of the box, the lip will be located in the produced part of the attachment strip, flat between the flap 10 and the wall 2. As the walls of the box are erected, however, the lip 22 will be folded over through approximately 180° about the fold line 21 and resist this because of the material thickness, with the result that the lip 22 pushes the thickened end part of the wall 2 in the direction of the interior of the box, whereby the locking lip 24 is automatically pushed into the locking opening 23.

The blank in the embodiment of Fig. 4 is distinguished from that according to Fig. 3 only in that bottom doubling panels 2c are connected with longitudinal wall doubling panels 2b via fold lines 25. Via fold lines 26, wall reinforcement panels 27 are connected to the bottom doubling panels 2c, on opposite ends thereof, these wall reinforcement panels 27 each being adapted to be folded over by means of a fold line 28.

In a ready-to-use box made from the blank according to Fig. 4, the bottom doubling panels 2c come to lie under the bottom 1 and the wall reinforcement panels 27 are disposed on the outside of the short upright walls 3. After the panels 27 have been folded over, they can be attached to the outside of the wall panels 3, so that the material thickness thereof is tripled. In combination with the doubled bottom and the corner reinforcements according to the invention, the ready-to-use box can be made of a lighter type of cardboard (700-800 g/m², instead of 1000 g/m²) while maintaining the strength thereof.

Claims

1. A box that can be made from a blank by folding and adhesion, comprising a bottom panel (1) and upright longitudinal (2) and transverse walls (3) connected to said bottom panel (1) by four fold lines (4,5) bounding said bottom panel (1), whilst at the corners where upright walls meet, one of the upright walls (2) is provided with a corner stiffening provision by folding a stiffening panel (8) located in the produced part of the relevant wall panel, and

the other upright wall (3) is extended to include a flap (10) connected to said upright wall along a fold line (9), said flap (10) comprising a triangular connection zone (12) bounded by a fold line (11) starting from the corner point of the bottom at a 45° angle, which connection zone (12), after being folded over against the inside of that upright wall (3), is attached by adhesion to the outside of said reinforced end part, whilst the upright walls (3) that are not provided with reinforced end parts are equipped, adjacent their upper edges, with stacking strips (14) directly or indirectly connected thereto via fold lines (13), said stacking strips (14), in the erected service position of the box, extending along the relevant upright walls (3) at the level of the open top of the box, between the reinforced end parts of the other upright box walls (2), **characterized in that** the corner stiffening provisions are formed by a reinforced end part of multiple wall thickness, either of flat construction or of Y-construction (the "butterfly" design) and the reinforced end parts of oppositely disposed upright box walls (2) terminate at a short distance from the other upright box walls (3), whilst in the erected box, at each corner of the box, a vertical support panel (20) extends obliquely between the upright walls (2, 3) meeting there, along the free end edge of the reinforced wall end part, and cooperating locking means (23, 24) are provided at the reinforced wall end part and at the vertical support panel (20), the arrangement being such that the reinforced wall end part is fixed at a slight angle relative to the plane of that wall part (2) in the direction of the adjacent upright wall (3).

2. A box according to claim 1, **characterized in that** the flap, which is situated at each corner of the box in the produced part of the upright wall that does not comprise reinforced end parts and comprises the triangular connection zone bounded by a 45° fold line, is provided on the inside with a lip-shaped part hinging on the 45° fold line (11/21), said lip-shaped part (22) being attached to the outside of the oppositely located reinforced wall part.
3. A blank for making a ready-to-use tray of the type as described in claim 1 or 2, comprising a bottom wall panel (1) and longitudinal (2a, 2b) and transverse wall panels (3) connected to said bottom panel (1) by four fold lines (4, 5) bounding said bottom wall panel (1), whilst at the bottom wall corners one of the wall panels (2) is provided with a corner stiffening panel (8) with parallel fold lines (8a, 8b), connected to

one of the wall panels via a fold line (7) and located in the produced part of the relevant wall panel (2b), and in a flap located in the produced part of the other upright wall (3) a triangular connection zone (12) is bounded by a fold line (11) starting from the corner point of the bottom at a 45° angle, the last-mentioned walls (3), at the free end edges thereof, comprising stacking strip panels (14) connected thereto via fold lines (13), whilst the stacking strip panels (14) are connected at the end thereof with attachment strip panels (18) via fold lines (17), said attachment strip panels (18) in turn being connected with support panels (20) via a fold line (19).

4. A blank according to claim 3, characterized in that the attachment strip panels (18) comprise a lip panel (22) bounded by a 45° fold line (21).
5. A blank according to claim 2 or 3, characterized in that bottom doubling panels (2c) are connected with the longitudinal wall doubling panels (2b) via fold lines (25).
6. A blank according to claim 5, characterized in that wall reinforcement panels (27) are connected to the bottom doubling panels (2c) on opposite ends thereof via fold lines (26), said wall reinforcement panels (27) each being adapted to be folded over by means of a fold line (28).

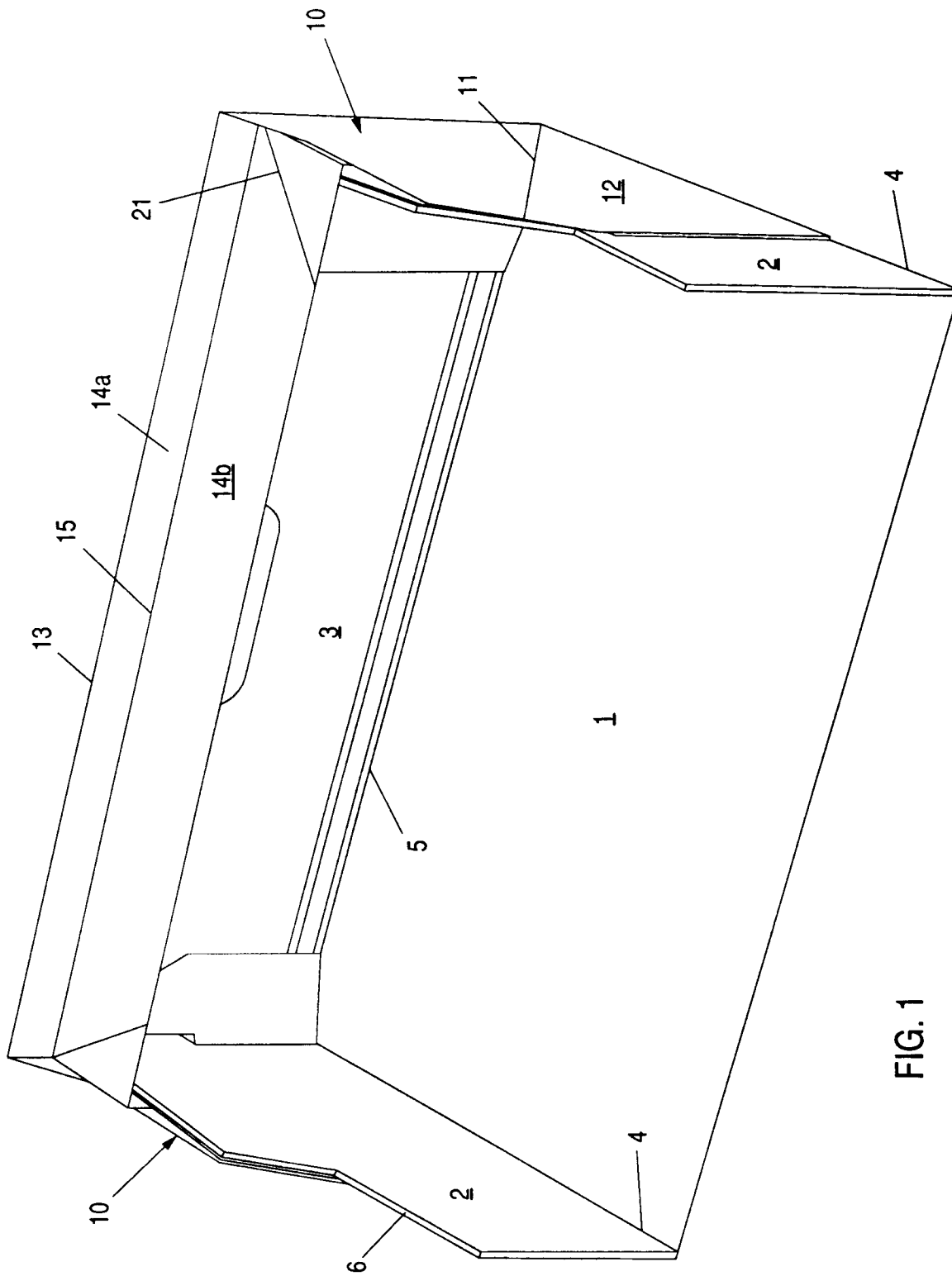


FIG. 1

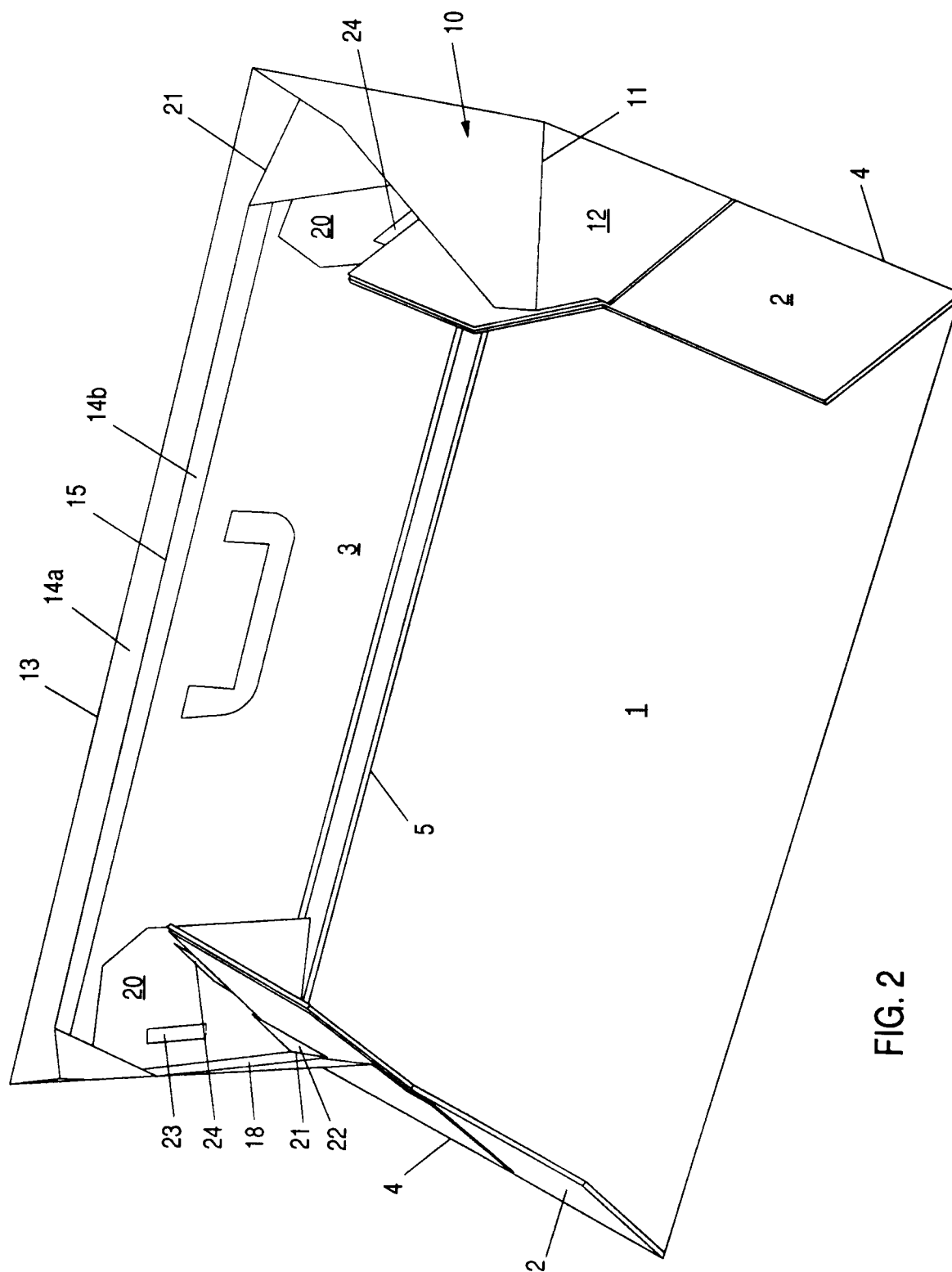


FIG. 2

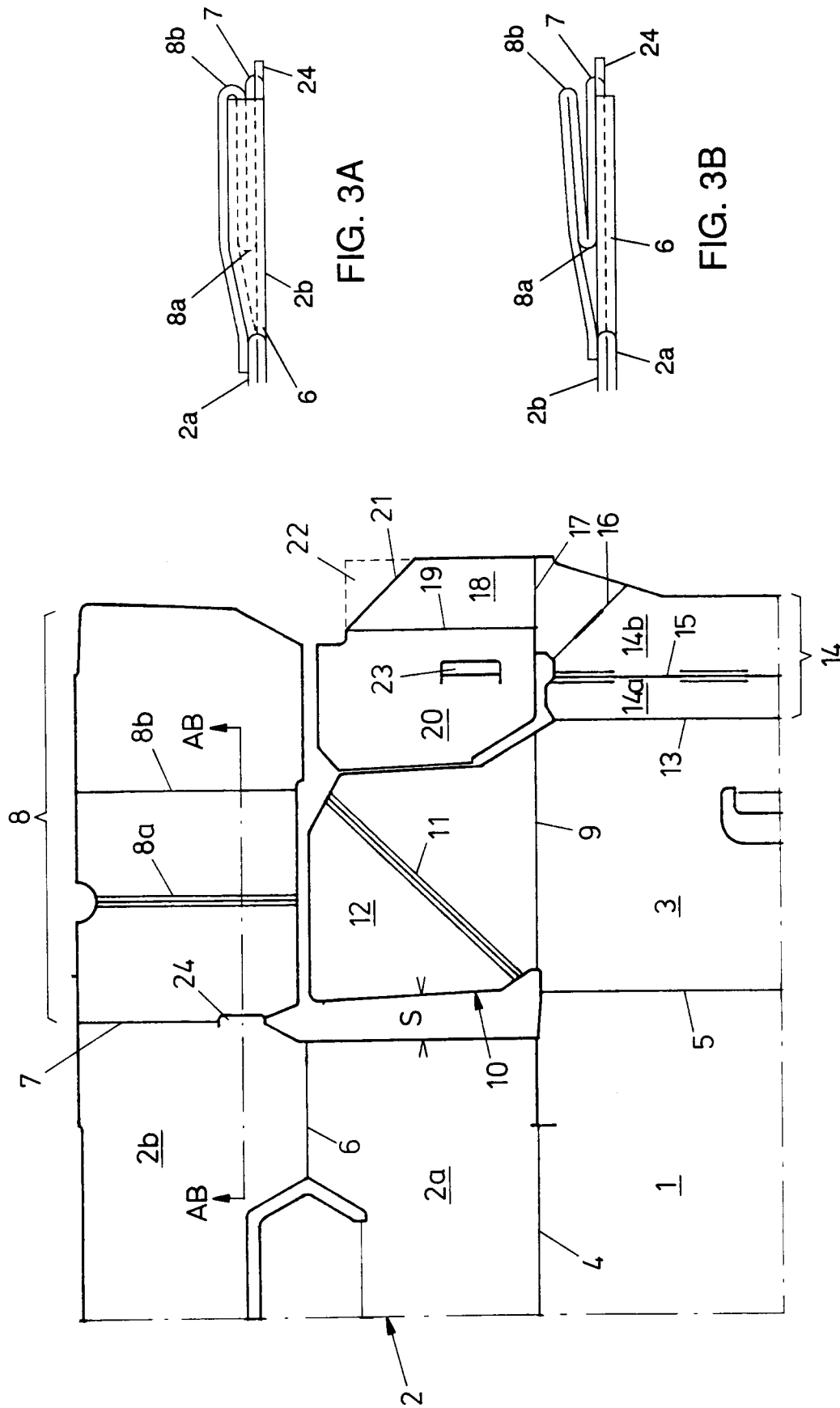


FIG. 3

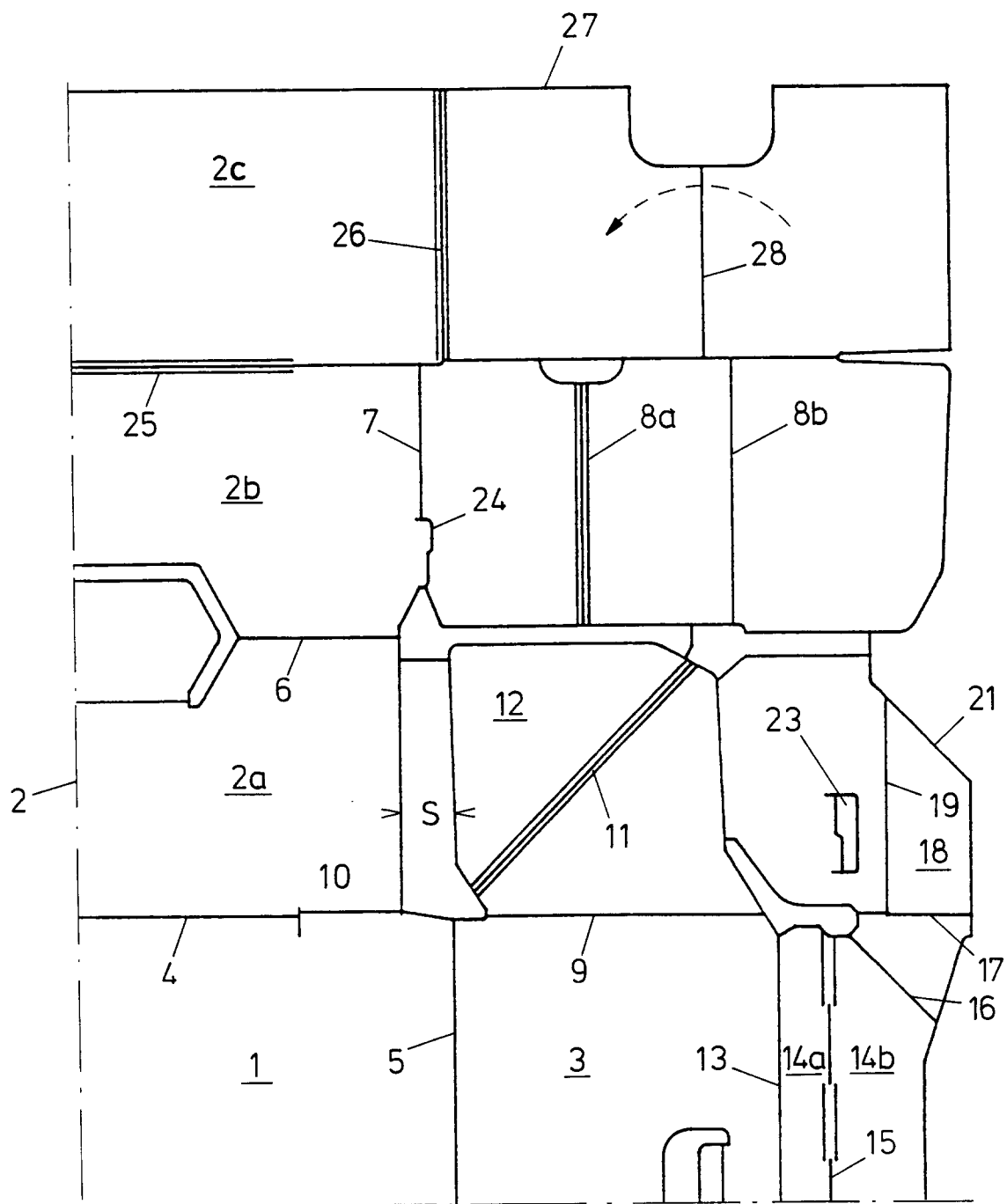


FIG. 4



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EUROPEAN SEARCH REPORT

Application Number

EP 92 20 3784

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	EP-A-0 445 442 (KNP FREE NV) * column 3, line 40 - column 6, line 34; figures 1-5 * ---	1-4	B65D5/44 B65D5/00
A	EP-A-0 453 015 (BUHRMANN-TETTERODE BV) * column 5, line 22 - column 7, line 43; figures 1,2 * ---	1-4	
A	FR-A-1 427 832 (M. TERLE) * page 1, right column, line 25 - page 2, left column, paragraph 2; figures 1,5 * ---	1-4	
A	US-A-4 214 695 (K. A. COOPER) * column 2, line 24 - column 3, line 62; figures 1,2 * -----	1-4	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 17 MARCH 1993	Examiner PERNICE C.
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			