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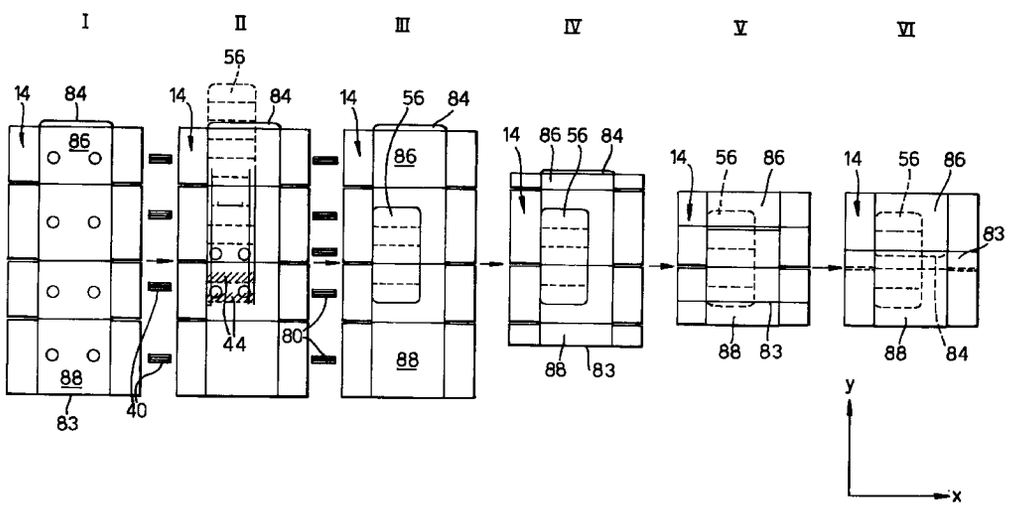
(54) Cases and divisions

(57) A process and apparatus for the manufacture of cartons, cases or the like use the steps of:-

forming a blank (14) for the case from sheet material and separately forming divisions (56);
and are characterised by using the further steps of :-
securing the divisions (56) to the blank (14) and subsequently folding the blank (14) to enfold the divisions.

This enables reliable joining of the case and divisions (56) using a quick setting adhesive such as a hot melt adhesive. The invention also extends to a case and divisions (56) so joined.

Fig.3.



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Description

[0001] This invention relates to the manufacture of cartons, cases or the like (hereafter called "cases") in which are secured divisions subdividing the available space into a number of cells for receiving individual items such as bottles. It also relates to cases with such secured divisions themselves.

[0002] In a known process for making cases with secured divisions, opposite edges of a blank are folded to overlie each other and are fastened together to form a flattened sleeve. A set of divisions is assembled from individual sheets of corrugated board and adhesive is applied to it in the flattened state. The sleeve and divisions are then erected, the divisions inserted in the sleeve and the sleeve and divisions collapsed flat again so as to bring the adhesive into contact with the sleeve interior and secure the divisions in place. The assembled sleeve and divisions may be conveniently transported to a filling line in this flattened state. Because of the glued joint between the sleeve and divisions, erection of the sleeve at the filling line may be arranged to cause erection of the divisions. The glued joint ensures that the divisions are properly retained within the flattened sleeve during transport. It also ensures that the divisions are maintained in the proper position in the erected case on the filling line. This is particularly important with 1x2, 2x2 and 2x3 cell divisions, which are not inherently stable in the case. Such divisions cannot readily be used on automatic filling lines without being fixed in the case.

[0003] This process and the resulting cases with secured divisions suffer from various drawbacks. The separate sleeve and division forming, adhesive application, erection, insertion, and collapsing steps are relatively complex. Also, because of the time interval between application of the adhesive and re-collapsing of the sleeve to form the glued joint (this interval being needed to complete the erection and insertion steps) only adhesives which retain their tackiness for a relatively long period of time after application can be used, for example slow setting or contact adhesives. Such adhesives tend to require the application of pressure to the assembled joint for a relatively long time before a proper bond is achieved. Because such pressure must be applied through the comparatively thick material of the case and because of the overall time constraints on the manufacturing process, the glued joints are not always reliably produced.

[0004] The present invention provides a process for the manufacture of cartons, cases or the like comprising the steps of:

> forming a blank for the case from sheet material and separately forming divisions; characterised by the further steps of:-
> securing the divisions to the blank and subsequently folding the blank to enfold the divisions.

[0005] Preferably the divisions are secured to the blank in a flattened state, and the folded blank is flat, for convenience in handling and transport.

[0006] The folding step may bring opposed edges of the blank together, these edges subsequently being secured to one another to form a sleeve surrounding the divisions.

[0007] Advantageously, the divisions are secured to the blank by a quick setting adhesive such as a hot melt adhesive. In this way a strong bond may be formed between the blank and divisions almost as soon as they are brought together, without the need to apply sustained pressure for a substantial time interval whilst the glued joint forms.

[0008] The invention also provides apparatus for automatically carrying out the above process steps.

[0009] The invention correspondingly provides, in a fully or partly erected state, a case formed from a blank of sheet material having divisions secured therein, characterised in that the divisions are secured in the case by a quick setting adhesive such as a hot melt adhesive.

[0010] One end of at least one sheet of material comprising the division may be secured to the blank; an opposite end or ends of the division sheet or sheets terminating short of a wall of the erected case, to economise on material.

[0011] Preferably at least two different sheets of material comprising the divisions are secured to the blank, whereby erection of the blank from a flattened state may be arranged to cause the divisions to be erected from a flattened state.

[0012] The blank may be divided into panels by hinge lines, said two sheets being secured to the same panel or to different panels, for example adjacent panels. Preferably the blank includes opposed edges brought together and secured to one another to form a sleeve, these edges being on different panels to the one(s) to which the division is secured. During manufacture, the division may thus be placed on a central region of the open blank and the opposed edge bearing panels brought together and secured over the divisions to form the sleeve enclosing the divisions.

[0013] These and other preferred features and advantages of the invention are described below with reference to the drawings which show an illustrative case forming apparatus and cases embodying the invention. In particular:-

> Fig. 1 is a schematic side view of the case forming apparatus with certain parts omitted for clarity;
> Fig. 2 is a view on arrow II in Fig. 1, with other parts omitted for clarity;
> Fig. 3 schematically indicates a blank and divisions assembly and folding sequence;
> Figs. 4a-h are schematic plan views of various cases with secured divisions which can be manufactured using the apparatus of Figs. 1 and 2.

[0014] The case forming apparatus 10 shown in figure 1 comprises an infeed belt conveyor 12 onto which batches of flat case blanks 14 are placed on end, to be carried into a feed hopper 16. The blanks 14 may be formed by any conventional means, for example die cutting. At the mouth of the feed hopper 16 opposite to the conveyor 12, the blanks 14 are engaged by a pick-and-place mechanism 18 comprising a sucker head 20. Individual blanks 14 are pulled past spring fingers or other retaining means at the feed hopper mouth, the sucker head 20 being pivotably carried at the end of a swing arm 22 actuated by a motor 24, crank 26 and connecting rod 28. A guide rod indicated by line 30 is rigidly mounted to the sucker head 20 and slides in a linear bearing 32 itself rotatably mounted to the apparatus frame. As the arm 22 swings away from the hopper 16, the sucker head and the blank which it carries therefore rotate to the horizontal position indicated at 20'. The blank is then released by the sucker head 20 to lie on a horizontal table indicated at 34 and the sucker head 20 and swing arm 22 move back towards the hopper 16 to pick and place the next blank 14.

[0015] Edges of the blank 14 on the table 34 are engaged by two sets of fingers 36 (only one set visible in figure 1) movable towards and away from each other perpendicularly to the plane of figure 1, i.e. in the y direction in figure 3, to centralise the blank at a datum position in the y direction. A pusher 38 then moves the blank 14 into the nip of a set of feed rollers 40 which carry it past glue heads 42 which apply hot melt adhesive at the hatched areas 44 shown in figure 3. A stop 46 is placed to intercept the blank as it leaves the rollers 40. A positioning finger 48 is moved upwardly behind the blank 14 by an actuator 50 and then forwardly in the x direction (figure 3) by an actuator 52 to push the blank 14 against the stop 46. In this way the blank is accurately positioned in the x and y directions for placement of the divisions.

[0016] As shown primarily in figure 2, a feed mechanism 54 for divisions 56 comprises an infeed conveyor 58, a hopper 60, and a pick-and-place mechanism 62 including a sucker head 64, a swing arm 66, and a guide rod 70, whose construction and operation is similar to conveyor 12, hopper 60, sucker head 20, guide rod 30 and bearing 32 of figure 1. Individual divisions are thereby brought to a horizontal position above the glued regions 44 on the blank 14. The divisions are assembled from flat sheets of solid board, by conventional means such as by hand or using apparatus such as described in UK patent no. GB2236274. They are placed in batches flattened and on edge on the infeed conveyor 58.

[0017] As it is released from the sucker head 64 above the blank 14, edges of each individual set of divisions are engaged by two sets of fingers 72 (only one set visible in figure 2) movable towards and away from each other perpendicularly to the plane of figure 2, i.e. in the x direction in figure 3, to centralise the blank at a datum position in the x direction. A pusher 74 then moves the blank to a datum position in the y direction set by a stop 76. The divisions are thus correctly positioned in the x and y directions for proper alignment with the blank 14 and its glued regions 44. The time interval between the application of adhesive by the heads 42 and placement of the divisions 56 on top of the blank 14 and glued regions 44 is very short, allowing the use of rapid setting hot melt adhesive. A strong adhesive bond develops between the blank and divisions in a short time interval during which the sucker head 64 is allowed to rest on top of the divisions 56 and blank 14. The sucker head 64 briefly presses lightly and directly against the divisions 54 to help form the glued joint.

[0018] The stop 46 is then lowered by an actuator 78 and the blank 14 and secured divisions 56 are pushed into the nip of feed rollers 80 by actuator 52 and finger 48. The rollers 80 carry the blank and divisions past a glue head 82, figure 1, which applies for example PVA adhesive to an edge of the blank 83 opposite to a glue flap 84 (figure 3). The blank is then folded by conventional means (for example helical folding belts) to form a glued sleeve enfolding the divisions 56.

[0019] Figure 3 illustrates the manufacturing sequence in plan view. At I the blank 14 is placed on the table 34. At II the divisions 56 are placed on the glued region 44 of the blank 14. At III adhesive is applied to the edge 83. At IV end panels 86, 88 of the blank 14 are folded upwardly towards the vertical by folding belts (not shown). At V the end panels 86, 88 have been folded by the belts 90° through the vertical and are being folded through a further 90° towards the horizontal. At VI the panels 86, 88 have been folded through 180° so that panel edge 83 overlies and is fastened to glue flap 84 to form the sleeve.

[0020] Figures 4a-h are plan illustrations of various case and division combinations possible in accordance with the invention. Figure 4a shows a 2x2 cell case in which the division sheets are fastened to adjacent case panels which are not the blank end panels and therefore do not border the sleeve glued joint ("manufacturer's joint"). The free ends of the sheets terminate slightly more than half way across the adjacent cells, short of the opposite case wall. Figure 4b shows a 2x3 case in which all division sheets are fastened to two adjacent case panels not forming the sleeve joint. Two of the sheets are formed from a single U-shaped piece of board and the free ends of all three sheets terminate short of the adjacent case walls. Figure 4c is the same as figure 4b except that the longitudinal sheet is free at both ends and for stability of the divisions during case filling extends the entire length of the case. Figures 4d and 4e show 3x4 cases with the two longitudinal sheets fixed to the same panel with their free ends terminating short of the opposite panel. In figure 4d the longitudinal sheets are L-shaped, with the foot of the L secured to the case (like figure 4a). In figure 4e the longitudinal sheets are formed from a single U-shaped piece of

board, with the base of the U secured to the case (like figure 4c). Figure 4f is like figure 4d, except that two of the transverse sheets terminate short of the adjacent case panels. For stability of the division during filling, the third transverse sheet extends the full width of the case. The joint forming the sleeve is also at a different corner compared to fig. 4d, but still does not border the panel to which the division sheets are fixed. In figure 4g, two sheets of a set of 3x4 cell divisions are shortened and secured to respective adjacent case panels. Figure 4h is similar, except that all the division sheets are shortened. For maximum effectiveness of erection of the divisions as the case is erected ("self erection"), the two secured divisions are those lying furthest from the corner formed by the two panels to which the sheets are attached.

[0021] Where L-shaped division sheets are used, it is preferred that the foot of the L is folded to lie adjacent to the remainder of the sheet in the flattened division, for securing to the case blank 14. The resulting double thickness of material ensures that the sucker head 64 rests more evenly on the division and this, together with the slight resiliency at the fold line defining the foot of the L, ensures that glued joints are reliably produced. It is preferred that the foot of the L points towards the fold-line on the blank 14 defining the corner of the case opposite to the sleeve joint. This ensures that the divisions overlie the central panels of the blank before folding, allowing the outer panels to be readily folded and joined to enfold the divisions.

[0022] In figures 4a, 4b, 4g and 4h the divisions are self erecting when the case lies in any orientation. In figures 4c, 4d, 4e and 4f the divisions are self erecting when their sheets are vertically orientated, or with gravity assistance when the panel to which the division is attached lies uppermost in the flattened assembly. Although not shown in figures 4a-h, it is possible for the division sheets to be attached to panels which border the sleeve joint. Then, either a group of panels and the glue flap on one side only of the blank will be folded over and attached to the free edge of the panel at the other side to enfold the divisions; or only the glue flap at one side, and a group of panels at the other side, will be folded to produce the sleeve joint and enclose the divisions. The various individual features shown in figs. 4a-h can be used in other combinations as desired. It is not necessary for at least two division sheets to be secured to the case; although then the divisions will not be as effective in self erection and may not be stable in the case for filling.

Claims

1. A process for the manufacture of cartons, cases or the like comprising the steps of:-

   forming a blank (14) for the case from sheet material and separately forming divisions (56);

   characterised by the further steps of :-

   securing the divisions (56) to the blank (14) and subsequently folding the blank (14) to enfold the divisions.

2. A process as defined in claim 1, further characterised in that the divisions (56) are secured to the blank (14) in a flattened state, and the folded blank (14) is flat.

3. A process as defined in claim 1 or 2, further characterised in that the folding step brings opposed edges (84,83) of the blank together, these edges subsequently being secured to one another to form a sleeve surrounding the divisions (56).

4. A process as defined in any preceding claim, further characterised in that the divisions (56) are secured to the blank (14) by a quick setting adhesive such as a hot melt adhesive.

5. Apparatus (10, 54) for automatically carrying out the above process steps.

6. In a fully or partly erected state, a case formed from a blank (14) of sheet material having divisions (56) secured therein, characterised in that the divisions (56) are secured in the case by a quick setting adhesive such as a hot melt adhesive.

7. A case as defined in claim 6 or a process as defined in any of claims 1-5 further characterised in that one end of at least one sheet of material comprising the division (56) is secured to the blank (14); an opposite end or ends of the division sheet or sheets terminating short of a wall of the erected case.

8. A case or a process as defined in claim 7 further characterised in that at least two different sheets of material comprising the divisions (56) are secured to the blank (14), whereby erection of the blank (14) from a flattened state may be arranged to cause the divisions (56) to be erected from a flattened state.

9. A case or a process as defined in claim 8 further characterised in that the blank (14) is divided into panels by hinge lines and said different sheets of division material are secured to adjacent ones of the panels.

10. A case or a process as defined in claim 8 further characterised in that the blank (14) is divided into panels by hinge lines and said different sheets of division material are secured to one of the panels.

11. A case or a process as defined in claim 9 or 10 further characterised in that the blank (14) includes opposed edges (84,83) brought together and

secured to one another to form a sleeve, these edges being on different panels to the one(s) to which the division is secured.

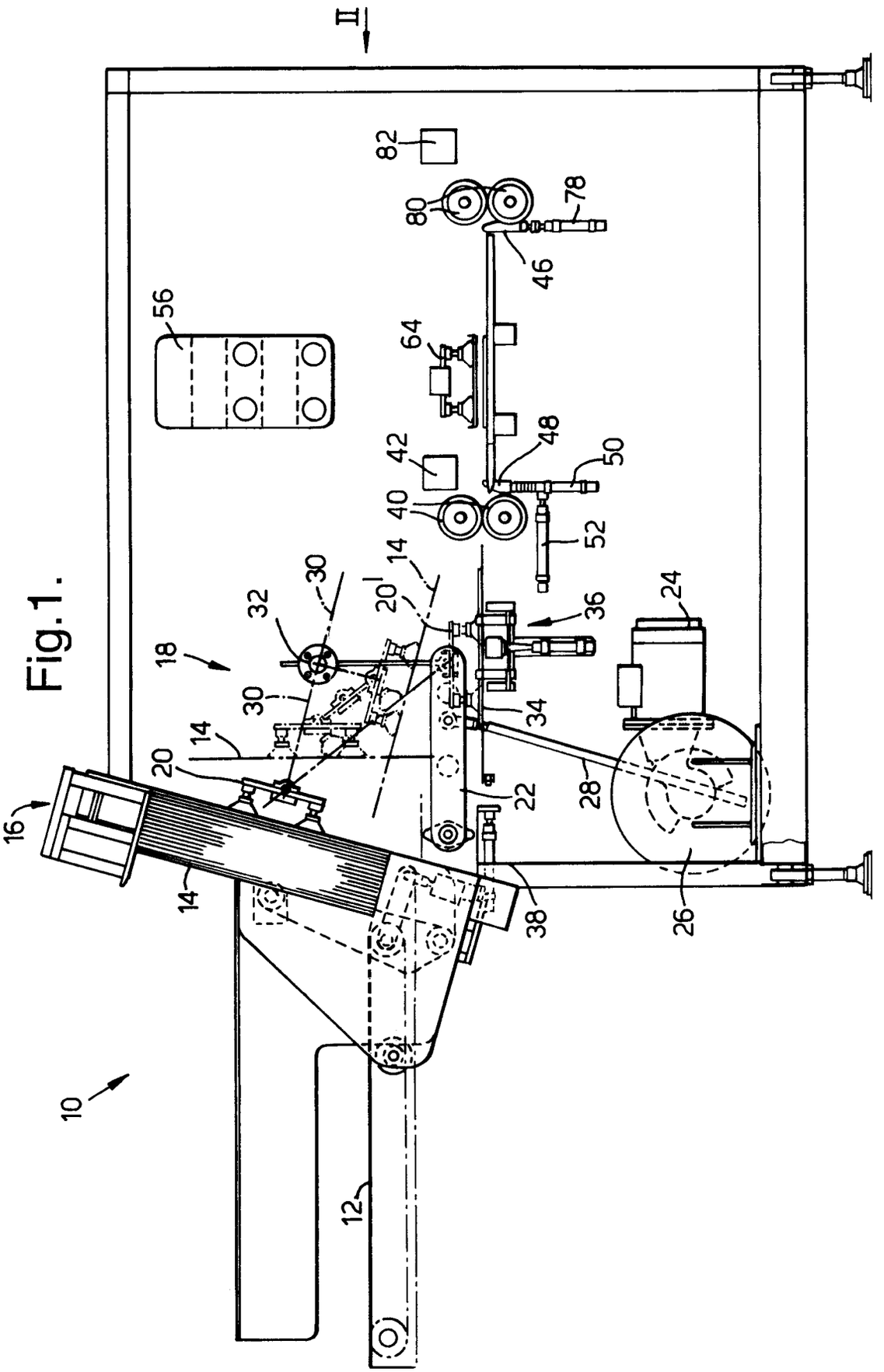
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Fig.1.

Fig.2.

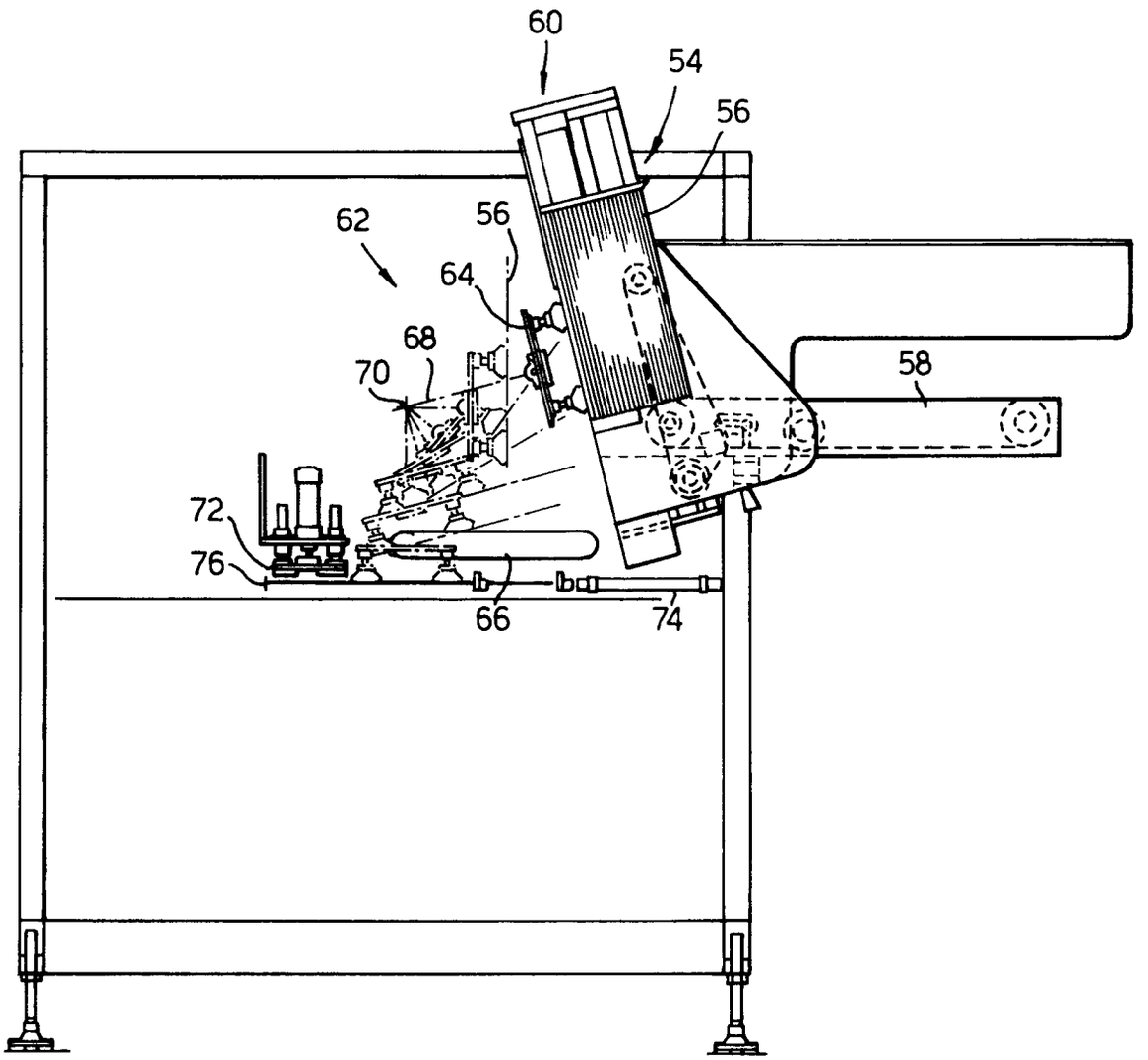


Fig.3.

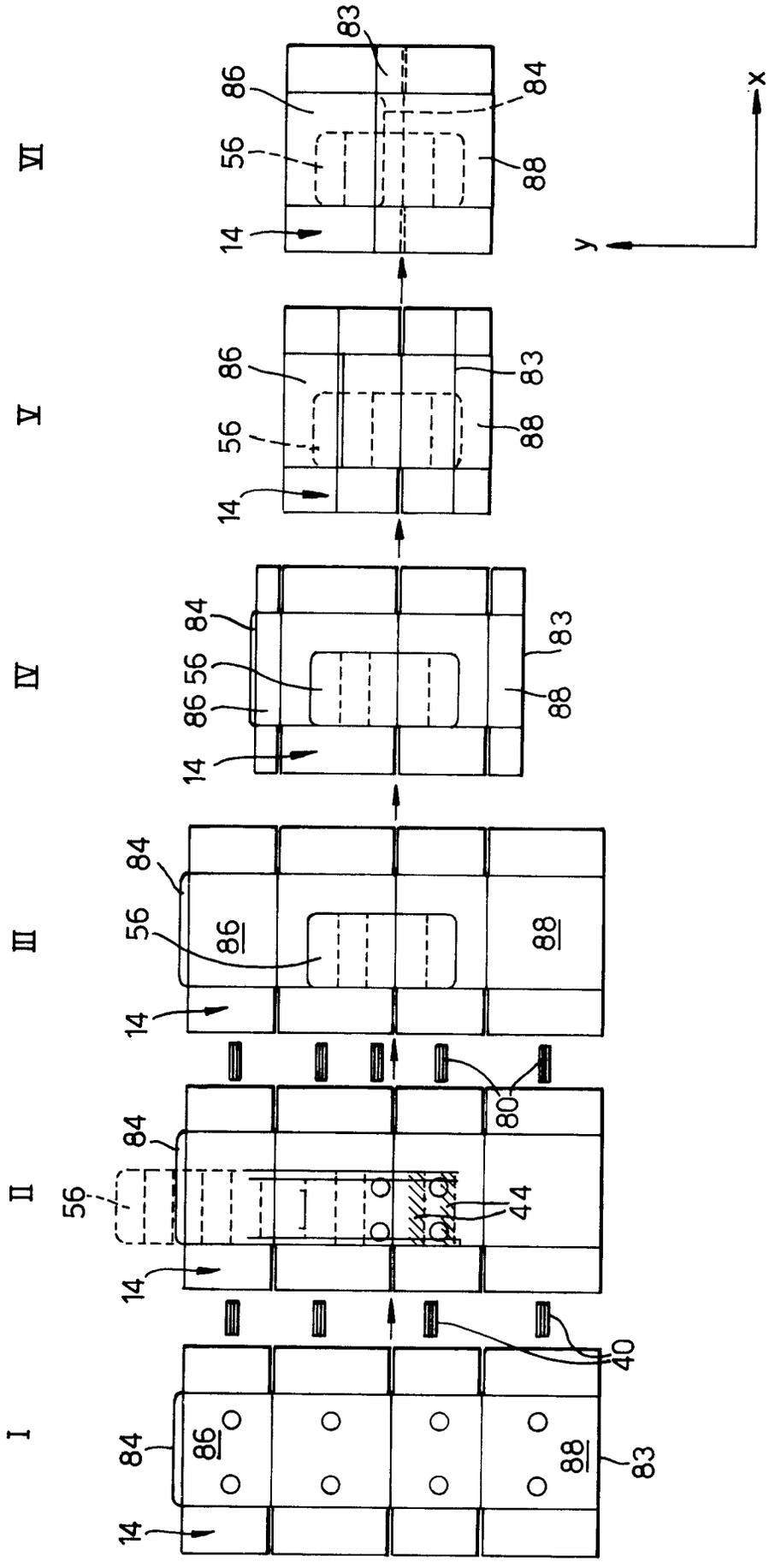


Fig.4a.

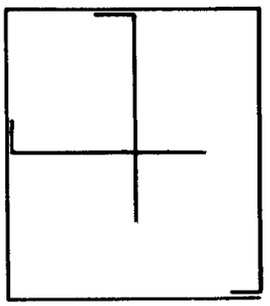


Fig.4b.

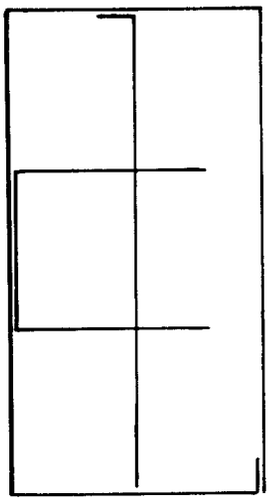


Fig.4c.

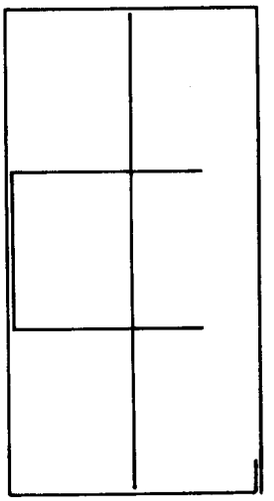


Fig.4d.

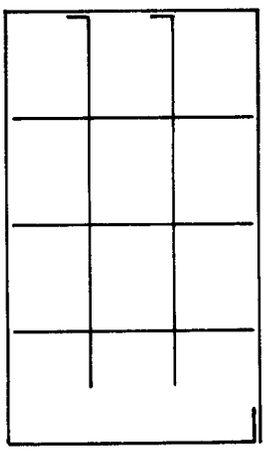


Fig.4e.

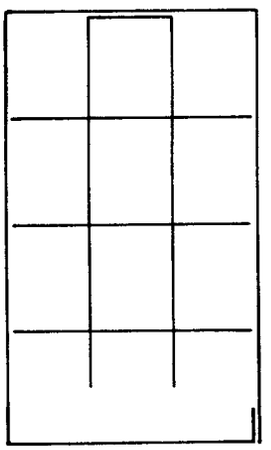


Fig.4f.

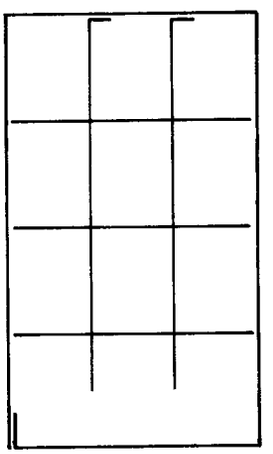


Fig.4g.

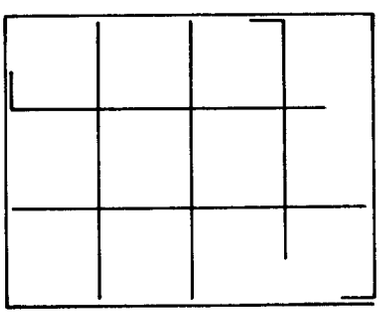
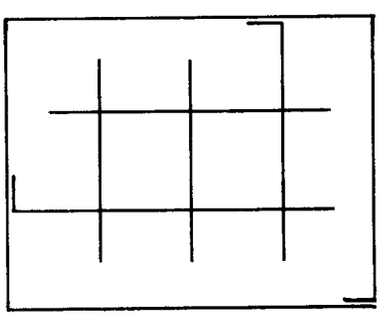


Fig.4h.



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EUROPEAN SEARCH REPORT

Application Number
EP 98 30 0601

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	US 3 813 999 A (REITER E ET AL) 4 June 1974 * column 3, last paragraph; claim 1; figures 1,2 *	1-11	B31B11/00
X	EP 0 042 748 A (DESPACK LIMITED) 30 December 1981 * page 14, line 22 - page 15, line 1; figure 13 *	1-11	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B31B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 June 1998	Pipping, L

CATEGORY OF CITED DOCUMENTS

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