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This invention relates to boxes made of corrugated cardboard comprising walls, a bottom and a top, with the lower face of the bottom being provided with recesses and the top comprising tabs on its upper face, plumb with the recesses, of complementary shape. Such packaging is known for example in FR 2 757 833, FR 2 925 880, FR 2 761 5 341.

It also relates to cut-outs or sets of cut-outs for the constitution of such boxes, as well as a method and a device for manufacturing boxes using said cut-outs or said sets.

It has a particularly important, although not exclusive, application in the field of stackable boxes on pallets, which can tend to slide with respect to one another during 10 the handling thereof or during the transport phases.

Systems for centring boxes are already known making it possible to avoid the sliding thereof, by lateral lugs that cooperate with orifices placed on the edges, or in the vicinity.

Boxes are also known (DE 20 2010 010 168) that have buttons that collaborate 15 via slight snap-clipping with corresponding holes in a superimposed box.

Such systems are fragile and do not resist repeated manipulations, and/or are complicated to manufacture.

Packaging is also known (FR-A-2.311.717) of which the lid is formed of tabs of which some are of complementary shape to that of the notches made in the bottom also 20 formed of tabs, allowing for an embedding and therefore a lateral blocking.

Other than such an embodiment imposes a form of a blank with a double set of tabs, this is not suitable for low grammage and does not always allow for a perfectly vertical stacking, due to the offsets that can exist during the forming of the box.

A box is also known with a top with tongues taken in the side walls and glued to 25 the upper face of the latter by folding back around the fold line between walls and tabs.

Although such a box allows for good centring and excellent blocking, it usually results in a weakening of the walls.

This invention aims to provide a box, a set of cut-outs, a device and a method for mounting that responds better than those known in prior art to the requirements of 30 the practice, in particular because on the one hand it proposes a centring of the boxes one on the other making possible a perfect stacking of the boxes and on the other hand it allows for a forming of boxes that is simple and inexpensive.

With the invention it will therefore be possible to avoid any sliding of the packaging when stacked on one another during the palletization thereof and to as such 35 allow for the usage of light grammage, and this by avoiding the use of expensive palletization accessories and additional handling generators.

The configuration of the boxes allows moreover for an optimised decrease in the load of the weights of the upper boxes on the lower boxes, authorising an excellent centring of the walls plumb with one another.

With this purpose, this invention proposes in particular a packaging box
5 according to claim 1.

The term situated entirely within means that all of these edges, whether they are cut out or connected to the carton, are inside the face, i.e. at least several mm from the fold line or separation between walls and bottom and/or top and for example at least 5 mm from the inside of the face in relation to said fold line, or advantageously and for
10 example at least 1 cm, at least 2 cm or at least 5 cm.

In advantageous embodiments, there is more recourse to one and/or to the other of the following arrangements:

- the portion forming the tongues is rectangular or trapezoidal, with the first part being delimited by three sides and the second part by the fourth side forming the fold
15 line;

- the tongues have a first part with a rounded shape, for example in shape of a half-moon, half-round or half-oval;

- the box is formed from a blank comprising a series of at least four main flaps, with two of the main flaps forming the bottom and the top of the box and the two others
20 forming two first facing side walls, said series being provided on one side with a first set of tabs and on the other side with a second set of tabs, said sets forming at least partially the other two side walls adjacent to the first facing walls, said recesses and said tongues being formed in said main flaps forming the bottom and the top;

- the tongues and the recesses are central with respect to the flaps concerned
25 and respectively symmetrical with respect to a longitudinal central axis of the series of flaps.

The term central with respect to the flaps means that they are situated on a line that separates the flap into two equal parts perpendicular to the longitudinal central axis of the series of flaps;

- the tongues and the recesses are symmetrical with respect to a central point of the flap concerned;
30

- the fold line of the second part of the tongues formed by a portion of the upper face of the top is situated at a distance with the junction line between tabs and corresponding main flaps equal to the width of the tongue;

- the box is formed from a blank comprising a series of at least four main flaps, forming the side walls of the box, said series being provided on one side with a first set
35

of tabs forming the bottom of the box and on the other side with a second set of tabs forming the top, said recesses and said tongues being formed in said tabs;

- the tongues and the recesses are centred in the width of the tab with respect to the tabs concerned;

- 5 - each tab concerned comprises two recesses or two tongues;
- the tongues have their first cut out part opposite the second part connected to the face by a fold line, which coincides with the external edge of the corresponding tab;
- the recesses are situated at the edge of a lateral side of the corresponding tab;
- the recesses have a cut-out side that coincides or coincides substantially with

10 the junction line between tabs and corresponding main flaps;

- the box comprises eight sides, namely four main flaps and four intermediate flaps forming cut corners, and is formed around a mandrel;

- the box is formed from two cut-outs made of corrugated cardboard sheet material, namely a first cut-out capable of forming a tray for the bottom of the box and a
- 15 second cut-out capable of forming the top of said box, said first cut-out comprising the tongues or the recesses and said second cut-out comprising a series of three flaps connected to one another by first junction lines provided on either side through the intermediary respectively of second and third junction lines with a first and a second series of tabs, said central flap of the series of flaps comprising the recesses or tongues
- 20 corresponding to the tongues or recesses of the first cut-out;

- the box is formed from two cut-outs made of corrugated cardboard sheet material, namely a first cut-out capable of forming a tray for the bottom of the box and a second cut-out capable of forming the top of said box, said first cut-out comprising the
- 25 tongues or the recesses and said second cut-out comprising a series of four flaps connected to one another by junction lines provided on one side with a series of tabs, said tabs comprising the recesses or tongues corresponding to the tongues or recesses of the first cut-out;

- the box comprises in addition corner lugs for the centring of a box on the others obtaining but cutting out tongues at at least two corners of the box.

30 The invention also proposes a cut-out or a set of cut-outs for the constitution of a box according to claim 2.

It also proposes a method for the production of a box according to claim 6.

The invention also proposes a device for the production of a box of corrugated cardboard sheet material from a cut-out or a set of cut-outs according to claim 7.

Advantageously, the stack of cut-outs being vertical, the means for feeding the stack comprise an elevator platform for raising the stack to a plane for picking up the top cut-out,

and the device comprises means for preparing for removal arranged to separate
5 the top cut-out from the rest of the stack and means for jogging the said cut-out to align it and keep it separate from the rest of the stack in position for picking up by the means for feeding after retraction of the means for preparing for removal.

In an advantageous embodiment the device comprises means for maintaining the stack when the cut-out at the bottom of the stack has reached a given level and
10 means for automatically placing a new stack underneath the remaining part of the preceding stack, capable of guaranteeing the continuity of the feeding.

Advantageously, the means for holding up comprise free blocks pivoting between a position of sliding along the stack of cut-outs and a position of supporting the bottom of the stack under the effect of gravity.

Also advantageously the device comprises means for telemetric measurement
15 of the position (p_i) of the top cut-out and means for calculating the course of the means for feeding according to said position (p_i) arranged to control the movement of said means of feeding between a position for picking up the cut-out and a position for positioning on a given work station, and to calculate during the moving time the course
20 for the following position (P_{i+1}) of the cut-out and so on.

In another advantageous embodiment the device comprises means for helping to unstick the top cut-out from the rest of the stack, by blowing air over the top of the cut-out.

Further advantageously, the means for feeding comprise an on-board system
25 provided with a robotic arm for moving said cut-out to a following station, for its forming, before returning empty to pick up the following top cut-out, said robotic arm comprising the means for folding through 180° .

Advantageously the device comprises at least two magazines and/or stacks of cut-outs from which at least two cut-outs from the top are taken in order to be glued and
30 placed one on the other in order to form a box in at least two parties.

In an advantageous embodiment the device comprises a forming station by winding of the cut-outs around a given volume.

The invention shall be better understood when reading the description of embodiments that follow given as non-limiting examples.

35 It refers to the drawings that accompany it wherein:

Figures 1, 1A, 1B, 1C and 1D show a flat view, and in perspective two examples of a first embodiment of boxes according to the invention.

Figures 2A and 2B show more precisely in perspective a recess and a tongue (figure 2A), and a tongue turned back through 180° and glued (figure 2B), with the two
5 being situated entirely within the face concerned, according to the invention.

Figures 3 and 3A respectively show a cut-out as a flat view and two boxes each obtained with such a cut-out, in order to be superimposed an in perspective, according to an embodiment of the invention, with recesses and tongues being arranged in the flaps.

10 Figures 4, 4A; 5, 5A; 6, 6A; 7, 7A; 8, 8A; 9, 9A; 10, 10A and 11, 11A are embodiments according to the invention respectively of flat cut-outs and of two boxes in perspectives to be superimposed, of which the recesses and/or tongues are situated in the tabs able to form the bottoms and upper parts of the boxes.

Figures 12 and 12A show a flat set of cut-outs (figure 12) and two boxes (figure
15 12A) in perspective according to another embodiment of the invention with a tray for forming the bottom and/or the top of the box.

Figures 13 and 13A give another set of cut-outs and two boxes with trays according to another embodiment of the invention.

Figures 14 and 14A show flat and in perspective an example of a characteristic
20 that can be combined with boxes according to the invention.

Figure 15 diagrammatically shows a device according to an embodiment of the invention.

Figures 16 to 20 show side views of the means for feeding, of the means for preparing for removal and of the means for feeding a stack, according to the
25 embodiment of the invention more particularly described here.

Figures 21, 22; 23, 24; 25 and 26 show respectively, as a side view and as a top view, the means for feeding and for folding the tongues through 180° according to three embodiments of the invention.

In the rest of the description the same reference numbers shall in general be
30 used to designate identical or similar elements.

Figure 1A shows a blank 1 formed from a series of four rectangular flaps 2, 3, 4, 5 for example of identical size, referred to as main flaps.

Two of the main flaps 2 and 4 form the bottom 6 and the top 7 shown on the parallelepiped boxes 8 of figure 1B.

35 The blanks are for example made of corrugated cardboard with a low thickness for example from 2 to 3 mm thick.

The two other flaps 3 and 5 form the facing side walls 9 of the box.

The series of flaps is provided on the one side with a first set of tabs 10 and on the other side with a second set of tabs 11 said tabs being of a rectangular shape known per se and capable of forming at least partially two other side walls 12 of the boxes 8, adjacent to the first facing side walls 9.

According to the invention the lower face of the bottom 6 and the upper face of the top 7 comprise respectively for one two recesses 13 with a substantially square shape and for the top 7 two tongues 14 of complementary shape with recesses and arranged to be glued by turning back to the upper face of the top 7 plumb with the recesses 13 of complementary shape as shown in figure 1B.

As such when the upper box 15 is placed on the lower box 16 the recesses will nest onto the tongues glued to the upper face of the top allowing for a centring and an alignment of a box in relation to the other which will therefore prevent the relative sliding thereof during the transport thereof.

In the example of figures 1A and 1B the recesses and the tongues are central with respect to the flaps and respectively symmetrical with respect to a longitudinal central axis 17. Each tongue 14 of the flap 4 forming the top 7 is formed by a cut-out part 18 connected to the flap 4 by a fold line 19 around which the tongue will therefore be able to be turned back in order to be glued to the upper face of the top 7.

This fold line 19 is aligned with the side 20 of the corresponding recess 13 with said recess being situated on the other side of the alignment line 21 with respect to the tongue, which makes it possible when the latter is turned back to obtain the coincidences for the centring.

This will be specified again in reference to figures 2A.

In other terms tongues and recesses are located on either side of a line 21 in such a way that when the tongue is turned back around this line which coincide with the fold line 19 the recess and the tongue turned back through 180° will be able to be plumb with one another and coincide between two superimposed boxes.

Figure 1C shows another embodiment of a blank 22 for which the recesses 13 and the tongues 14 are symmetrical with respect to a central point of the flap 23. The series of flaps 22 is terminated in a known manner, with a rectangular tongue 24 glued to the adjacent flap during the forming.

The tabs of the sets 10 and 11 are formed in a manner known per se, by rectangular portions connected by fold lines 25 to the corresponding flaps, namely first tabs 26 intended to form an internal part of corresponding flaps 12 and which are connected by said fold lines 25 to the flaps 2 and 4 comprising the recesses or the

tongues and the tabs 27 which are connected to the flaps 3 and 5 intended to form the walls 9 of the packaging, said tabs being glued to the first tabs and intended to form the walls 12 of the box by being joined at the junction 28 in such a way as to form a complete wall.

5 Figures 2A and 2B show in perspective developed (figure 2A) and in perspective as a folded back part (figure 2B), diagrammatically, a recess and/or a tongue implemented in the boxes and/or cut-outs according to the invention.

 Figure 2A shows a portion of a cut-out 30 that comprises the flaps and/or tabs 31 and 32 intended to form in part the upper and lower faces of a box according to the
10 invention.

 The flap or tab 31 comprises the recess 33 for example rectangular of which the edges are parallel to the fold lines and arranged in the flap at respective distances d1 and d'1 from the first fold lines 34 and 35 (with flap or adjacent tab), in such way that the recess is entirely within the flap or tab 31 (i.e. for example d1 and d'1 greater than 5 mm
15 and/or much greater than the thickness of the carton, for example greater than twice the thickness).

 It is also situated, this time with respect to the fold lines 36 and 37 perpendicular to the first ones, at distances d2 and d'2 for its cut-out end side, here again in such a way that the recess is entirely within the flap or tab concerned, in this direction here also.

20 The flap 32 comprises the tongue 38 intended to be folded back through 180° on the outer wall 39 (arrow 40) in such a way as to obtain (see figure 2B) a turned back tongue 38 glued to the upper face 41 of the outer wall 39 of the flap 32. This tongue is cut out on three of its sides 42, 43, 44, and connected to the face of the flap 32 by its fourth side 45 forming a fold line and which will therefore for example be formed by a
25 double fold line in order to allow for a better turning back of the tongue on itself.

 From the point of view of its arrangement in the flap 32 this tongue is laterally situated at the distances d1 and d'1 with respect to the fold lines with adjacent tabs and/or flaps 46 and 47 corresponding to the fold lines 34 and 35 of the flap wherein the recess 33 is cut out.

30 The distance that exists between the fold line 45 of the tongue 38 and the fold lines 48 and 49 able to be respectively situated plumb with the fold lines 37 and 36 with the flap or tab arranged to form the bottom 31, are such that when the tongue is folded back, its end 50 (cut-out edge 43) is at the distance d'2 from the fold line 48, and therefore plumb with its equivalent 37, with the fold line 45 being situated at the distance
35 d2 from the fold line 49, which will allow for the coincidence, as this appears very clearly in figures 1A and/or 1C.

Figures 3 and 3A show another embodiment of a blank or cut-out 51 and of the corresponding boxes 52, 53, according to the invention.

Here the tongues 54 are arranged so that their fold line 55 with the upper face of the top is situated at a distance equal or substantially equal to the width of the tongue, with the junction line 25 between tab 26 and corresponding flap 57.

The recesses 58 will of course be situated on the other side of the line 59 such as shown in figure 3, entirely within the corresponding flap, i.e. with their side closest to the fold line with the corresponding tab, situated at a distance greater than for example 5 mm.

Figures 4 to 11A show other embodiments of the invention wherein the box is formed from a blank 60 comprising a series of at least four main rectangular flaps 61 forming the side walls 62 of the box 63. The series of flaps 61 is provided on one side with a first set of tabs 64 forming the bottom of the box and on the other side with a second set 65 of tabs forming the top.

As in the case with blanks of the preceding embodiments the series of flaps is of course terminated by a tongue 24 for gluing which will make it possible to form the box in a manner known per se.

The set 65 of tabs comprises two tabs 66 each provided with at least one tongue 67, with the set of tabs 64 comprising at least one recess 68 capable of cooperating with the tongue after the latter has been folded around the fold line 69 in order to be glued to the upper face 70 of the box. This fold line 69 is aligned with one of the sides 71 of the recess 68 in correspondence, with the latter being situated with respect to this alignment on the other side as the cut-out 67 of the tongue.

In figure 5 and 5A there are two tongues per tab which will be folded back towards the inside of the flap with respect to their fold line 69, 69'.

Of course this could be the inverse knowing that the recesses would then be situated on the other side of a line 73 traced in the extension of the fold lines 69, 69'. Here the tongues are small squares for example from 2 to 3 cm on the side.

In the embodiment of figures 4, 4A, 5, 5A the fold lines 69, 69' of the tongues are perpendicular to the axis of symmetry 72 of the series of flaps and tabs.

Figures 6, 7, 8, 9 and 10 show other embodiments of cut-outs for which the recesses and tongues are situated in the tabs.

In the embodiment of the cut-out 74 of figure 6 and of the corresponding boxes of figure 6A, the tongues 67 are arranged so that their fold junction line 75 with the corresponding tab 76 is at a distance from the external edge 77 of said tab equal to the width of the tongue 67, in order to give a tongue configuration such as shown in figure

6A, with the recesses 68 being at a distance from the end 78 of the corresponding tab equal to said thickness or width of the tongue 67.

Figures 7 and 8 show respectively cut-outs 60 provided for one (figure 7) with a single recess and/or tongue per tab and for the other (figure 8) with two recesses and
5 tongues per corresponding tab.

More precisely figure 7 shows tabs 79 and 80 namely a tab 79 provided with a tongue 67 of which the fold junction line with the tab 79 is situated at a distance corresponding to the width of the tongue of the lateral edge 81 of the corresponding tab 79, with the recess 68 of the facing tab being with one of these sides coinciding with the
10 lateral edge 82 of the tab 80 as such forming a serration.

Figure 8 corresponds to the embodiment of figure 7 but with symmetrical tongues and recesses arranged on the same corresponding tab.

Figures 9 and 10 give two other embodiments of cut-outs 60 with one (figure 9) or two (figure 10) tongues per tab 82, 83 and one or two corresponding recesses per
15 facing tab 84, 85.

More precisely the tongues 67 are here arranged around a fold line 69 that is parallel to the longitudinal axis 72 of the blank in such a way that when the tongue is folded back towards the inside of its end edges coincides with the fold line or junction line 25 between tab 82 and corresponding flap 61. The recess is with one of its edges
20 67 in coincidence or substantially in coincidence with the fold line 25 between tab and flap.

The embodiment of figure 10 shows a cut-out 60 with two tongues and/or two recesses per tab arranged on either side symmetrically with respect to a transversal line
86.

Figure 11 shows another embodiment of a cut-out 90 with eight sides namely four main rectangular flaps 91 comprising two sets of tabs on either side namely a first set 92 situated on one side and a second set 93 situated on the other side and connected to one another by fold lines in a manner known per se and intermediate flaps 93 capable of forming cut corners (cf. figure 11A).
25

The tabs 94 comprise tongues 95 which will be able to be turned back through 180° around the fold line 96 and glued to the upper surface 97 of the packaging in such a way as to then be able to cooperate with the recesses 98 situated on the other side of the alignment of the fold line 96 in order to be positioned facing during the superposition of a box in relation to the other as shown in figure 11A.
30

This type of box is advantageously mounted around a mandrel and allows for extremely fast formation speeds.
35

Figures 12 and 12A show another embodiment of cut-outs and of boxes according to the invention.

Figure 12 shows a first cut-out 100 capable of forming a tray known per se in order to form the bottom of the box and a second cut-out 101 capable of forming the top
5 of the box or inversely.

The first cut-out comprises tongues 102 that can be turned back around their fold line 103 and the second cut-out comprises recesses 104 capable of cooperating with the turned back tongues 102.

The second cut-out 101 comprises a series of three flaps 105 connected to one
10 another by first fold lines 106 provided on either side through the intermediary respectively of second and third junction lines 107 of a first 108 and of a second 109 series of tabs, with the central flap of the series of flaps comprising the recesses and the central flap of the tray comprising the tongues.

Of course this can be the inverse.

15 Figure 13 shows another embodiment comprising a first cut-out 109 made of corrugated cardboard capable of forming a tray for the bottom of the box in such a way, here again, known per se and which will comprise the tongues and a second cut-out 110 comprising a series of four flaps 111 connected to one another by junction lines and connected by a perpendicular junction line and on one side, to a series 112 of tabs, said
20 tabs comprising two tabs 113 provided with recesses 114 for example arranged with one of their sides coinciding with the external edge of the tab 113.

In this case the tongues 115 situated on the central flap 116 of the tray are arranged to be folded back around a fold line 115' situated at a distance from the junction line with the tab of the corresponding tray of the width of the tray 115.

25 In addition to the particular characteristics of the invention linked to the positioning of the tongues and of the recesses it is of course possible to complete the packaging and/or the box concerned with other arrangements as for example those shown in reference to figure 14.

Here corner lugs 117 are provided formed by cut-outs of the lateral edges of the
30 tabs 118 whereon are placed the tongue 119, at the angle with the junction of the flaps 120 corresponding to the tabs whereon are fixed the tongues 119 arranged to cooperate with the facing recesses 121 situated on the other side of the line 122 corresponding to the fold line of the tongue 119.

These corner lugs are for example formed by a protruding part 123 with respect
35 to the extension of the junction line 124 between tab and corresponding flap on the wide

of the exterior of the cut-out and cooperate with the angle of the facing top box around which it is embedded.

In reference to figures 15 to 26 an embodiment or embodiments of a device and method according to the invention making it possible to form the boxes such as
5 described hereinabove shall now be described.

The latter indeed give rise to a manufacturing problem in particular during the turning back of the tongue which must be carried out effectively and rapidly and at a high speed from the taking of a centred tongue and/or positioned inside one of the flaps and/or one of the tabs.

10 This is only possible thanks to the means for taking cut-outs arranged to be able to bring said cut-outs in a particularly precise and repetitive manner and, at high speed, facing the location of the processing and/or forming for example around a mandrel.

More precisely figure 15 diagrammatically shows a device 130 for forming a bow such as described hereinabove, comprising at least one vertical magazine 131 with a
15 constant level, of storage of a stack 132 of cut-outs made of corrugated cardboard for example of the type described in reference to figure 11.

The device 130 comprises means for (described hereinafter) feeding the stack as its removal occurs and means for feeding 133 cut-outs via aspiration.

As the stack of cut-outs 132 is vertical the means for feeding comprise an
20 elevator platform (described hereinafter in reference to figures 16 and the following) of the stack vertically to a plane for picking up the cut-out.

The means for feeding 133 include a system 134 formed by a horizontal arm 135 provided with for example three parallel branches 136 for supplying with compressed air and for positioning six suction cups 137, for example two per branch, for grasping via
25 aspiration, in a manner known per se.

The arm 135 can be displaced horizontally for example through the means of a chain and/or an electric motor (not shown), between the position of grasping the cut-outs above the magazine, and the following step, for example of winding around a mandrel 138.

30 A gluing is provided by the guns 139 with liquid glue under pressure of the type known as hot melt, with the box being formed by compressing on the mandrel by pressing means 140 (lower pushing plate 141 capable of being deployed vertically, lateral pushing cylinders 142, etc.).

In the example described here, the cut-out 143 comprises eight flaps, namely
35 four main flaps separated by small intermediate flaps that form cut corners that are terminated by a tongue for gluing on the end intermediate flap.

The flaps are provided on either side as specified hereinabove on the cut-outs according to the invention with tabs, intended to form the bottom and the top of the box.

Recesses 144 and tongues 145 are provided on two of the main flaps of the cut-out 143.

5 Figures 16 to 20 show more precisely as a side view the means for feeding the stack and the means 146 for preparing the feeding according to the embodiment of the invention more particularly described here.

10 The means 133 for feeding the stack comprise an elevator platform 147, for example formed by two corner lugs 148 with horizontal support of the last cut-out of the bottom of the stack 132 and a pushing cylinder 149 vertically, controlled by an automaton 150 authorising a raising of the platform programmed as the cut-outs are removed, controlled by the optical means 151 of measurement.

15 More precisely these optical means are associated, by means known per se, with telemetric measurement means 151 of the laser reader type, of the position p_i of the top cut-out and means 152 for calculating (microprocessor) the course of the means 133 for feeding according to the position p_i , arranged to control the movement of the means for feeding between a position for taking the cut-out and a position for positioning on a given work station such as the mandrel, and for calculating in masked time, i.e. during the moving time, the course for the following position (p_{i+1}) of the cut-out and so
20 on.

The timing chart followed is for example of the following type:

- Initialisation with a choice of offset values according to a format stored in a database,
- movement of the robotic arm to the reference of the magazine and according
25 to the offsets of the format,
- reading via telemetry of the initial position where applicable and/or calculation of the initial position,
- calculation of the outward course
- re jogging on the reference of the magazine of cut-outs,
- 30 - once the position is reached, calculation then lowering on the cut-out according to given values or according to values which are measured thanks to the telemetry,
- placing in a vacuum of the suction cups for aspirating the cut-out,
- execution of the course then where applicable reading of the height of the telemetry,
- 35 - calculation of the return course and otherwise removal of the parameters of the course in the database,

- stopping of the vacuum in order to release the cut-out at the suitable location,
- execution of the return course,
- and restarting of the cycle.

The means 146 for preparing for removal include a horizontal robotic arm 153
5 provided with at least four suction cups 154 for grasping the cut-out, with the arms being fixed to a vertical rod 155 that is off-centred with respect to the stack, arranged next to the latter.

The guided rod 155 fixed by a sleeve 156 to an actuating chain 147 between a position 158 (as a mixed line in the figure 16) of grasping, a position 159 (figure 17) for
10 removal of the cut-out above the means 160 for jogging, a position 161 (figure 18) for depositing the cut-out on said means 162 for jogging and a position 161' (figure 19) for removal in height and laterally which allows the means 133 for feeding (arm 135) to take the jogged cut-out.

More precisely the means 162 for jogging include on either side of the volume
15 occupied by the stack 132 of cut-outs mobile vertically, two channels 163, for example formed by two tubes having a C-shaped transversal section of which the opening of the branches is situated on the side of the stack and wherein are mounted mobile in translation parallel to the branches of the C, respectively at least two sliding blocks 164 formed by metal tongues provided at the upper part 165 with an aligning lug 166 of the
20 periphery 167 of the blank, to align it precisely and maintain it on said blocks in an abutment position once the latter is moved in the removal position thereof as a mixed line 168 (see figure 16). The blocks 164 are for example activated by a system of small cylinders with return springs (not shown) for the putting back into nominal removal position at rest.

25 They are controlled by the automaton 150 in order to move said blocks between their abutment position and their removal position.

During the preparation for removal, the top cut-out is removed from the bottom stack by using means for blowing air over the top of the removed cut-out (not shown), which allows for the effective unsticking thereof at a high speed (greater than thirty or
30 forty, even fifty cut-outs per minute).

As the means for preparing for removal and feeding operate, the stack 132 of cut-outs is emptied and the platform formed by the lugs 148, that support the last cut-out, rise. It moment arrives when it is in a position such that the means 170 for maintaining in the top part of the stack can automatically trigger. These means are for
35 example constituted of blocks 171 formed by a free part and/or mobile in rotation with respect to an axis 172 integral with a rod 173 integral with the frame 174 of the device.

The blocks have an end lug 175 arranged to slide along the edge of the stack.

The lug 175 has for example a substantially triangular section forming contact tip with the edge of the stack 176.

When the tip of the lug 175 is no longer in contact with the edge of the stack,
5 because the latter is too high, the block pivots around its axis 172 (cf. figure 20).

It is then arranged to be placed in a position of horizontal abutment (as a mixed line 176) whereon the last cut-out can freely rest releasing the platform formed by the lugs 148.

It is then possible to lower it by actuating the pushing cylinder vertically to its
10 initial position. A new stack of cut-outs can then be put in place on the platform for example by pushing it from a pallet. It is then sufficient to raise the stack until it comes into contact with the lugs 175 which will then pivot until the last cut-out of the rest of the top stack comes into contact with the first cut-out of the bottom stack.

A stack is as such reconstituted in full without a rupture in load in order to
15 manufacture boxes according to the invention.

Figures 21 to 26 show means for feeding 180 blanks flat 181 one by one from a magazine and from a device for feeding and for preparing for removal such as the one that has just been described.

The device comprises means for applying glue to the tongues such as described
20 hereinabove, and/or the surface capable of being facing, after folding.

Three types of carrying out the means 182 (figure 21), 183 (figure 23) and 184 (figure 25) of folding the tongues through 180° in order to apply them onto said surface of the upper face during and/or after the transfer to the forming station are provided.

In the embodiment of figures 21, 22 the tongues 183 of the cut-out 184 are
25 therein cut out in said cut-out in accordance with the descriptions hereinabove, are pushed by the intermediary of oblique cylinders 185, in order to have them adopt a pre-folded position at more than 90° (see arrow 186), with the facing zones on one side 188 on the cut-out and on the other side 188 on the tongue being one and/or the other glued beforehand.

30 During the journey to the forming station, the collage of the tongues has just been completed by a pressurising (station C) of the tongues by the bias of a tool 189 comprising a plate 190 and a counterplate 191. The cut-out can then be brought to the forming station.

The cylinders 185 and the means 191 for counter-pressure are brought on board
35 on the means for feeding 192 of the type described in reference to the preceding figures.

The cut-out is still maintained thanks to the suction cups 193 for grasping the means 192 for feeding.

Figures 23 and 24 show the means 183 for folding tongues through 180° which will here be able to be used at high speed.

5 This in this case here is a coating upwards. The cut-out 184 is taken by the means 192 for feeding then, after gluing in 194, the tongue is hooked by the bias on the one hand 195, mounted articulated around an axis 196 integral with the means for feeding 192, between a removal position above the cut-out (station B) and a position for pressurising the tongue on the lower face of the cut-out (station C) by the bias of a rotation (arrow 197). This part has the shape of a hook with an end part 198 that makes
10 it possible to compress from below the tongue on the cut-out.

Means of counter-pressure (not shown) are also provided.

Figures 25 and 26 finally show another means for carrying out the means 184 for folding tongues through 180° in order to apply it onto the surface of the upper face,
15 in the case of a coating downwards.

The means 184 include vertical folding cylinders 199 that push from underneath the tongue that is then taken by the pressing cylinders 200 from the top with an angle at 45° for example with respect to the vertical.

These operations are carried out continuously for example at the time of the
20 transfer of the cut-out.

We shall now describe more particularly in reference to figures 15 and the following, the operation of a device for forming boxes according to the embodiment of the invention more particularly described here.

Starting from a cut-out taken in the vertical stack 132 of corrugated cardboard
25 sheet material comprising the recesses and the tongues situated entirely within flaps, as described hereinabove, and after removal of said cut-out from the vertical magazine, it is moved horizontally to bring it into position for forming. After taking the cut-out in an extremely precise manner thanks to the device for jogging and for particular preparing for removal authorising such a precision and/or thanks to the means for telemetric
30 measurement making it possible to calculate the course exactly, and by unsticking the cut-out by blowing, the cut-out is moved in order to deposit therein on the fly the lines of glue, either on the tongue, or on a part that will be in contact with the tongue after folding, then said tongue is placed flat on the corresponding upper faces of the main flap concerned par the bias of one of the devices such as described hereinbefore, chosen
35 according to the speed of formation sought.

The box is then formed around the mandrel as described in reference to figure 15 the recesses and the tongues being situated entirely within corresponding faces.

As it goes without saying and as it results moreover from the preceding, this invention is not limited to the embodiments more particular described. It encompasses
5 on the contrary all of the alternatives and in particular those wherein the means for folding back the tongues and applying glue are different, or those where the tongues are situated on the bottom of the box and the recesses on the top.

PATENTKRAV

1. Emballagekasse (15, 16, 52, 53) fremstillet af bølgepap, omfattende vægge, en bund (6) og en top (7), idet undersiden af bunden er forsynet med i det mindste to udsparinger (13, 33, 41, 58, 68, 98, 104, 114, 121) og toppen omfatter i det mindste to flige (14, 38, 54, 67, 95, 102, 115, 119), som er limede til dennes øvre flade, lodret over udsparingerne med komplementær form, **kendetegnet ved, at** udsparingerne og/eller fligene er placerede helt indenfor den tilsvarende flade eller de tilsvarende flader (31, 32), og at fligene (14) hver især er udformede af en del (18) af den øvre flade af toppen, som er udskåret i en første del og forbundet med en anden del til den nævnte flade via en foldelinie (19).

2. Emneark eller sæt af emnekar (1, 22, 60, 64, 74, 90, 100, 101, 109, 110) til dannelse af en emballagekasse, **kendetegnet ved, at** emnearket eller sættet af emneark omfatter en række hovedfløje og tilstødende kantdele, som er i stand til at danne en rektangulær bund og top, idet undersiden af bunden er forsynet med i det mindste to udsparinger (13) og toppen omfatter i det mindste to flige (14), som er i stand til at blive limede til den øvre flade, lodret over udsparingerne med komplementær form, og at udsparingerne og/eller fligene er placerede helt indenfor den eller de tilsvarende flader og at fligene (14) hver især er udformede af en del (18) af den øvre flade af toppen udskåret i en første del og forbundet med en anden del til fladen via en foldelinie (19).

3. Emneark ifølge krav 2, **kendetegnet ved, at** det er dannet af et ark omfattende en række af i det mindste fire hovedfløje (2, 3, 4, 5), idet to af hovedfløjene (2, 4) danner bunden og toppen af kassen, og de øvrige to (3, 5) danner to første overfor hinanden liggende sidevægge, idet rækken er forsynet på én side med et første sæt kantdele og på den anden side med et andet sæt kantdele, idet sættene danner de øvrige to sidevægge i tilstødning til de første overfor hinanden liggende vægge, idet udsparingerne (13) og fligene (14) er udformede i de nævnte hovedfløje, som danner bunden og toppen.

4. Sæt af emneark ifølge krav 2, **kendetegnet ved, at** det er dannet af to emneark (100, 101) fremstillede af bølgepapplademateriale, nemlig et første emneark (100), som er i stand til at danne en bakke til bunden af kassen og et andet emneark (101), som er i stand til at danne toppen af kassen, idet det første emneark omfatter fligene (102) eller udsparingerne (104) og det andet emneark omfatter en række bestående af tre fløje

(105), som er forbundet med hinanden via første forbindelseslinier (106), og forsynet på hver sin side via respektive anden og tredje forbindelseslinie (107) med en første række sidestykker (108) og en anden række sidestykker (109), idet den centrale fløj i rækken af fløje omfatter udsparingerne eller fligene svarende til fligene eller udsparingerne i det

5 første emneark.

5. Sæt af emneark ifølge krav 2, **kendetegnet ved, at** det er dannet af to emneark fremstillede af bølgepapplademateriale, nemlig et første emneark (109), som er i stand til at danne en bakke til bunden af kassen og et andet emneark (110), som er i stand at

10 danne toppen af kassen, idet det første emneark omfatter fligene (115) eller udsparingerne (114) og det andet emneark omfatter en række bestående af fire fløje der er indbyrdes forbundet via forbindelseslinier tilvejebragt på én side med en række sidestykker, idet sidestykkerne omfatter udsparingerne eller fligene svarende til fligene eller udsparingerne i det første emneark.

15

6. Fremgangsmåde til fremstilling af en emballagekasse (15, 16, 52, 53) af i det mindste ét emneark fremstillet af pap eller bølgepapplademateriale ifølge ethvert af kravene 2 til 5, **kendetegnet ved, at** efter fjernelse af emnearket eller emnearkene fra en stak fra et lodret magasin, bevæges emnearkene horisontalt for at bringe disse efterfølgende til en

20 position til dannelse af kassen og under bevægelsen bliver på forhånd limede flige (14) automatisk ombukket og placeret plant imod den tilsvarende øvre overflade af den pågældende hovedfløj med henblik på at lime disse til sidstnævnte.

7. Indretning (130) til fremstilling af en kasse fremstillet af bølgepapplademateriale ud fra et emneark eller et sæt af emneark, idet emnearket eller sættet af emneark omfatter en række hovedfløje og tilstødende sidestykker, som er i stand til at danne en rektangulær bund og top, idet den nævnte overflade af bunden af forsynet med i det mindste to udsparinger og toppen omfatter i det mindste to flige, som er i stand til at blive limede til dennes øvre flade lodret over udsparingerne med komplementær form, idet kassen er

25 indrettet til at blive samlet automatisk i en formningsstation, **kendetegnet ved, at** udsparingerne og/eller fligene er placerede helt inden for den tilsvarende flade eller de tilsvarende flader, idet indretningen, arbejdende fra en stak (132) af emneark, omfatter organer (133, 134, 135) til at fremføre emnearkene plant, enkeltvis,

30 organer (139) til at påføre lim på fligene og/eller den overfor liggende overflade af den

35 øvre overflade på kassen,

og organer til at folde fligene 180° for at påføre disse på den nævnte overflade af den øvre overflade under overføringen til formningsstationen.

8. Indretning (130) ifølge krav 7, **kendetegnet ved, at** stakken (132) af emneark er
5 vertikal, idet organerne til at fremføre fra stakken omfatter en løfteplatform (147) til at løfte stakken til et plan til opsamling af det øvre emneark og at indretningen omfatter organer (146) til at forberede til fjernelse fra stakken, indrettet til at adskille det øvre emneark fra resten af stakken og organer (162) til at skubbe emnearket for at oprette dette og holde det adskilt fra resten af stakken i position til opsamling af organerne til
10 fremføring fra stakken efter tilbagetrækning af organerne til at forberede til fjernelse fra stakken.

9. Indretning ifølge krav 8, **kendetegnet ved, at** den omfatter organer (170) til at holde stakken oppe, når emnearket ved bunden af stakken har nået et givet niveau og organer
15 til automatisk at placere en ny stak under den resterende del af den tidligere stak, som er i stand til at sikre kontinuitet for fremføring fra stakken.

10. Indretning ifølge krav 9, **kendetegnet ved, at** organerne (170) til at holde stakken op, omfatter frie førings- og understøtningsblokke (171), som vipper imellem en position,
20 i hvilken de glider langs stakken af emneark og en position, i hvilken de understøtter bunden af stakken under påvirkning af tyngdekraften.

11. Indretning ifølge ethvert af kravene 7 til 10, **kendetegnet ved, at** den omfatter organer (151) til telemetrisk måling af positionen (p_i) af det øvre emneark og organer
25 (152) til at beregne banen for organerne til fremføring fra stakken som en funktion af den nævnte position (p_i) indrettet til at styre bevægelsen af organerne til fremføring fra stakken imellem en position til opsamling af emnearket og en position til at positionere på en given arbejdsstation og til at beregne, under bevægelsestiden, banen for den efterfølgende position (p_{i+1}) for emnearket osv.

30

12. Indretning ifølge ethvert af kravene 7 til 11, **kendetegnet ved, at** den omfatter organer til at medvirke til at frigøre det øvre emneark fra resten af stakken ved at blæse luft over oversiden af emnearket i en strejfende vinkel.

35 13. Indretning til formning af en kasse ifølge ethvert af kravene 7 til 12, **kendetegnet ved, at** organerne til at fremføre fra stakken omfatter et indlejret system forsynet med

en robotarm til at bevæge emnearket til en efterfølgende station, med henblik på dettes formning, før returnering tom for at opsamle det efterfølgende øvre emneark, hvilken robotarm omfatter organerne til at ombukke 180°.

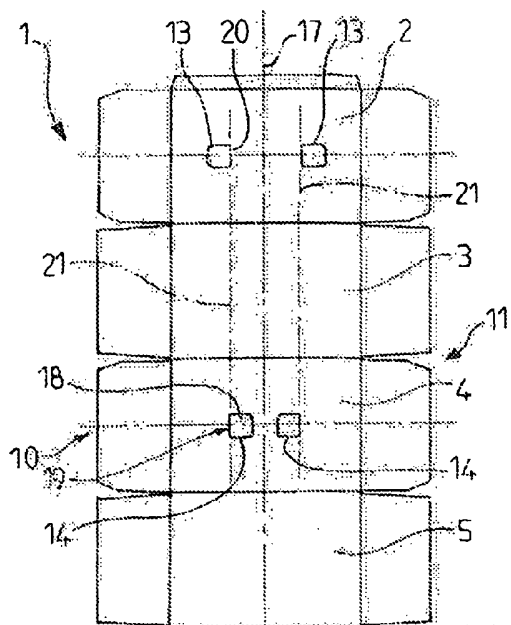


FIG. 1A

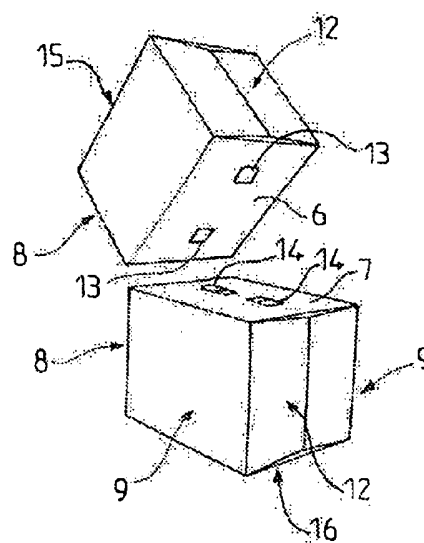


FIG. 1B

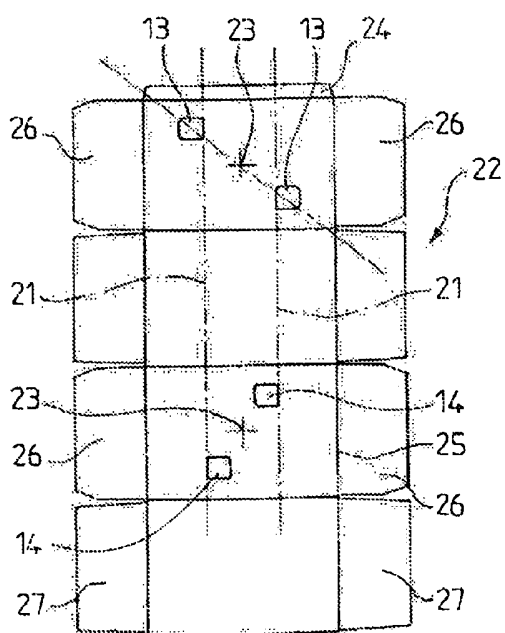


FIG. 1C

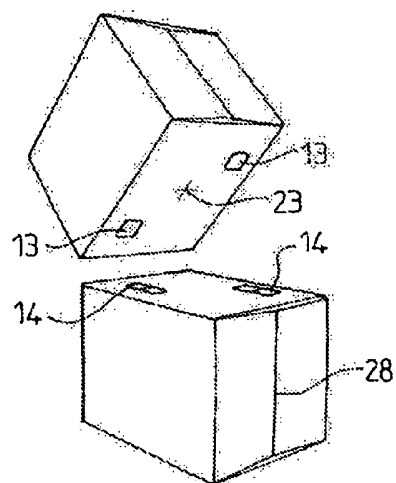


FIG. 1D

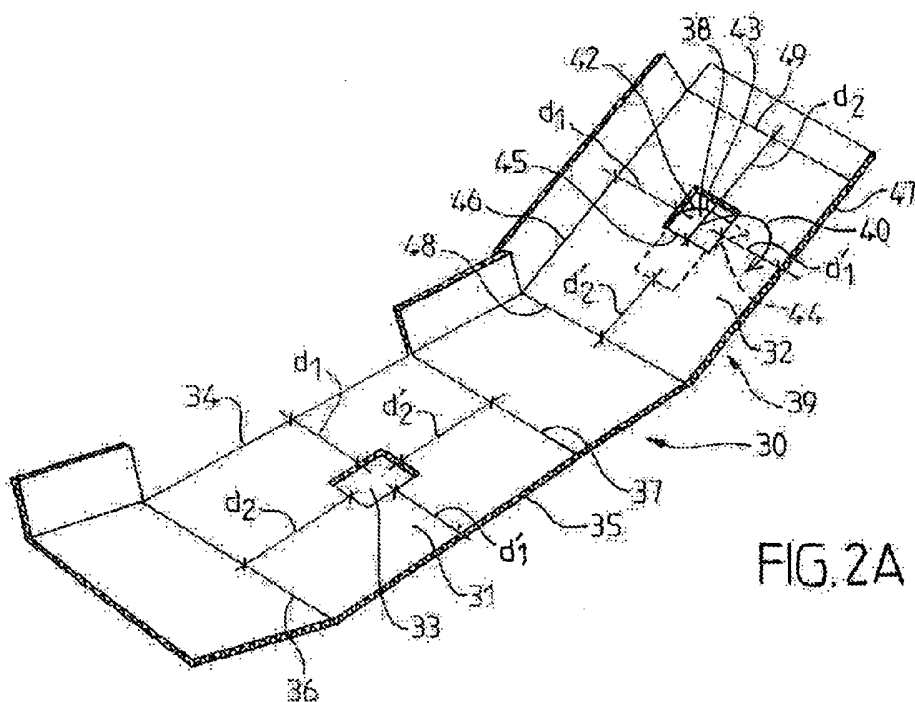


FIG. 2A

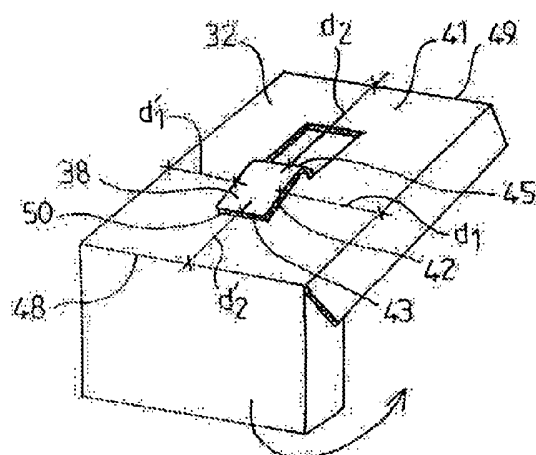


FIG. 2B

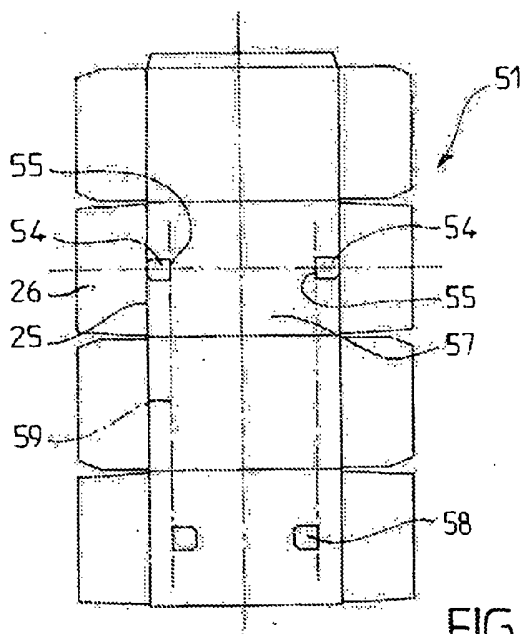


FIG. 3

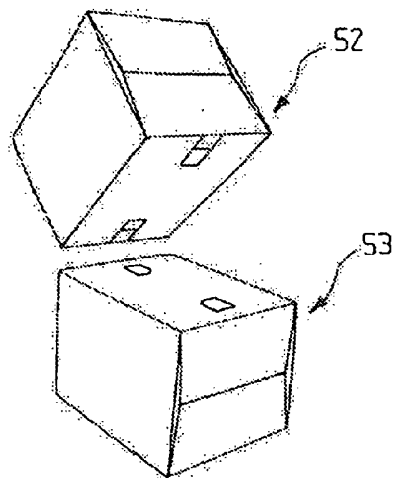


FIG. 3A

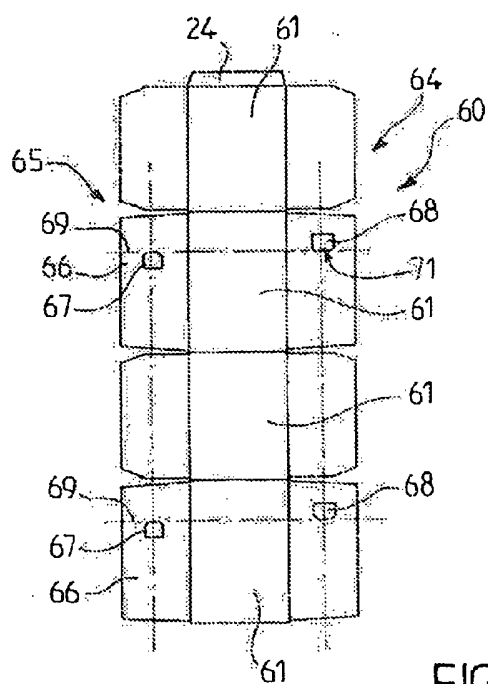


FIG. 4

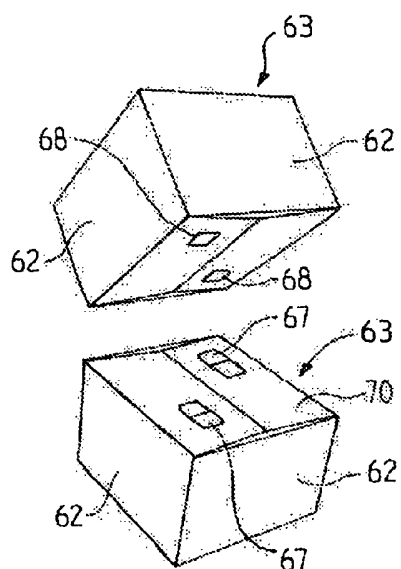


FIG. 4A

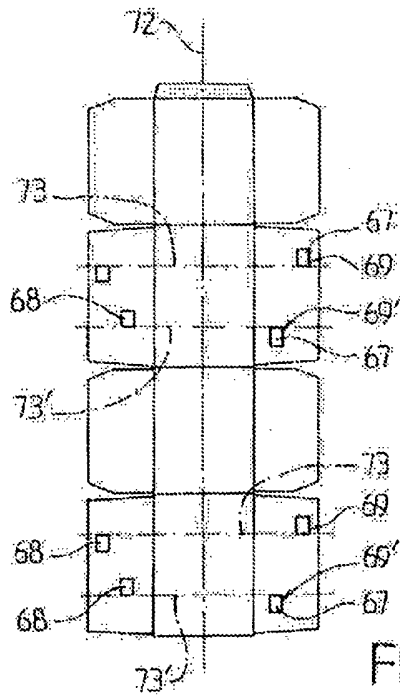


FIG. 5

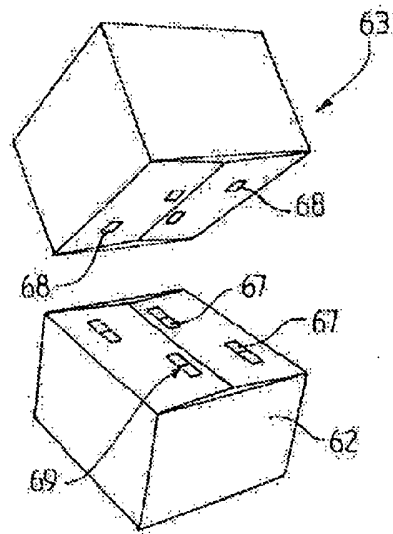


FIG. 5A

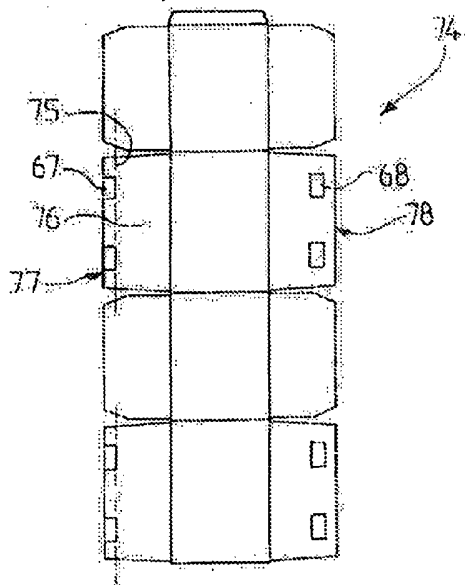


FIG. 6

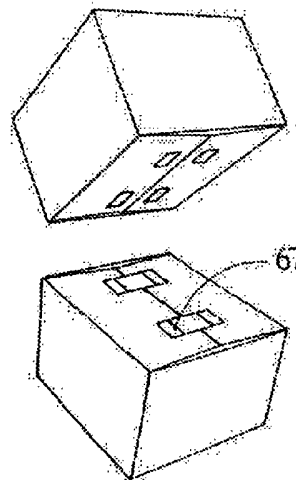


FIG. 6A

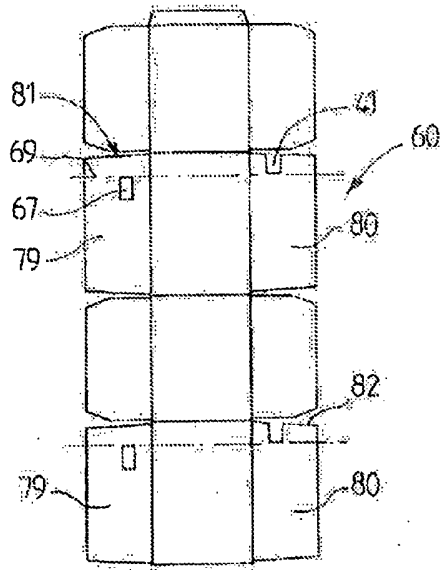


FIG. 7

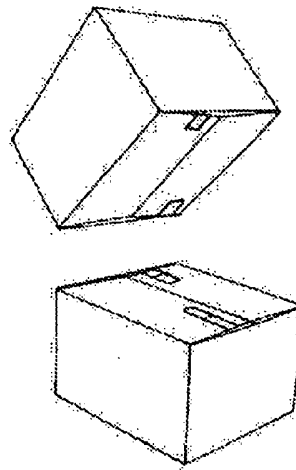


FIG. 7A

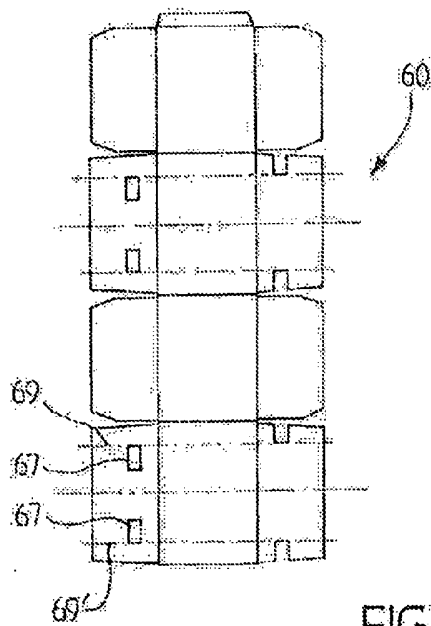


FIG. 8

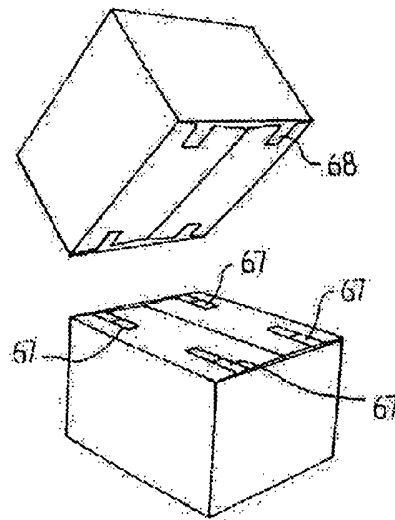


FIG. 8A

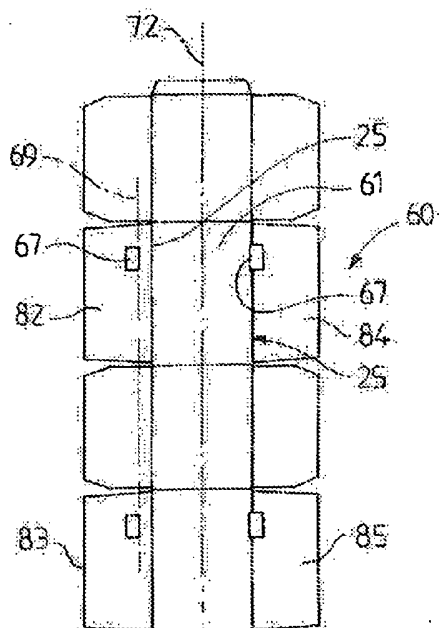


FIG. 9

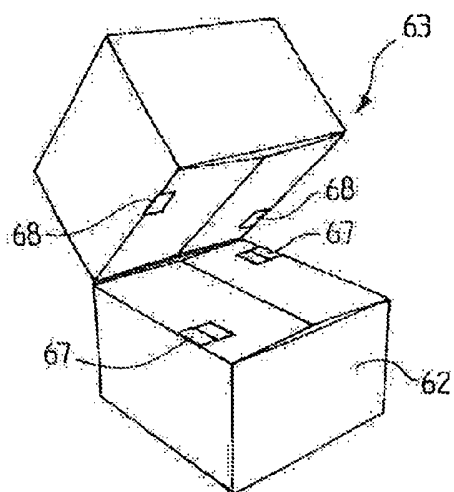


FIG. 9A

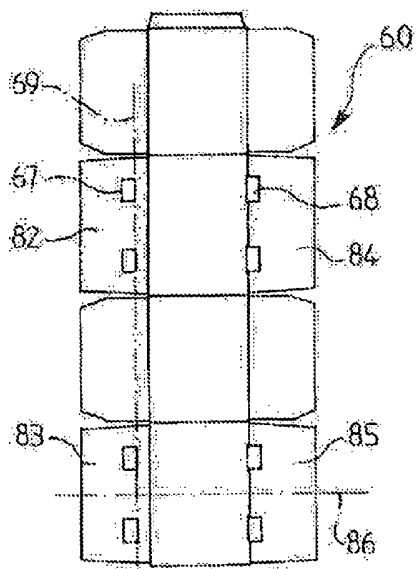


FIG. 10

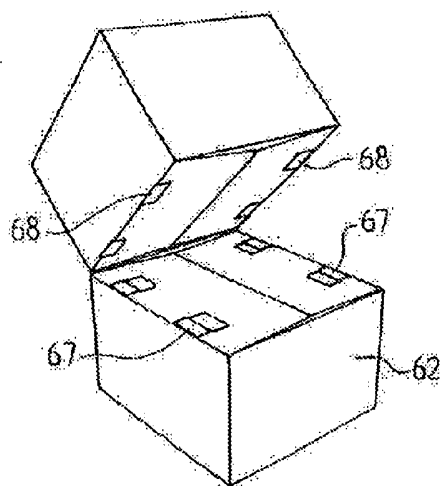


FIG. 10A

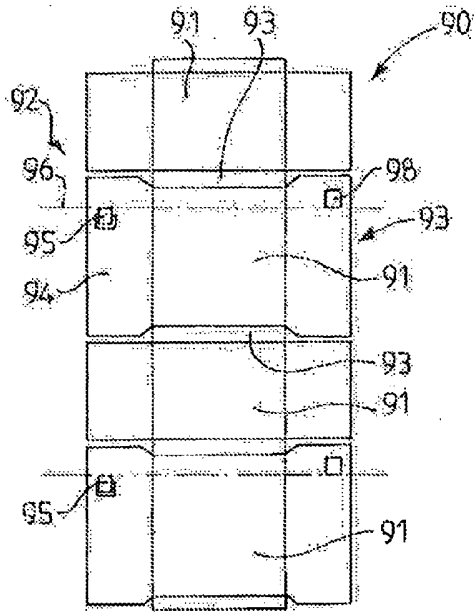


FIG. 11

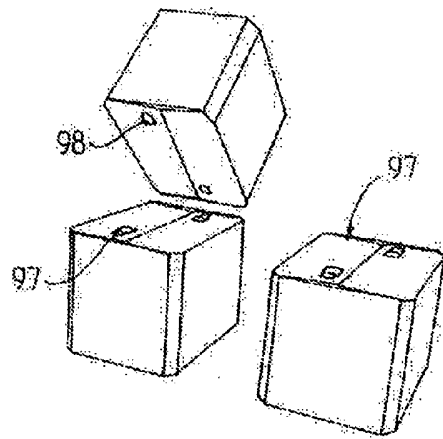


FIG. 11A

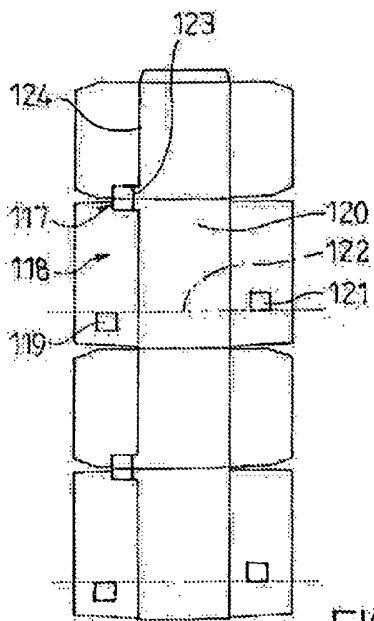


FIG. 14

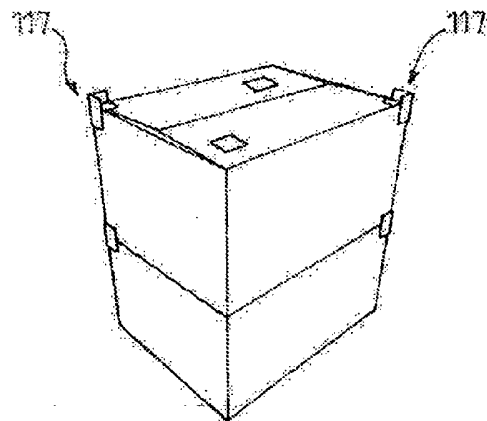


FIG. 14A

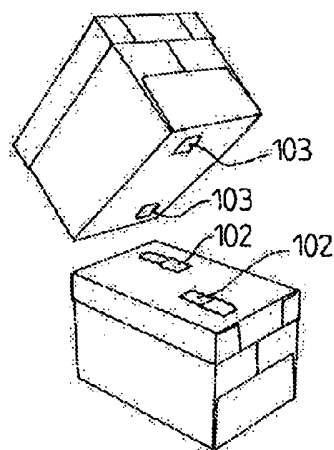
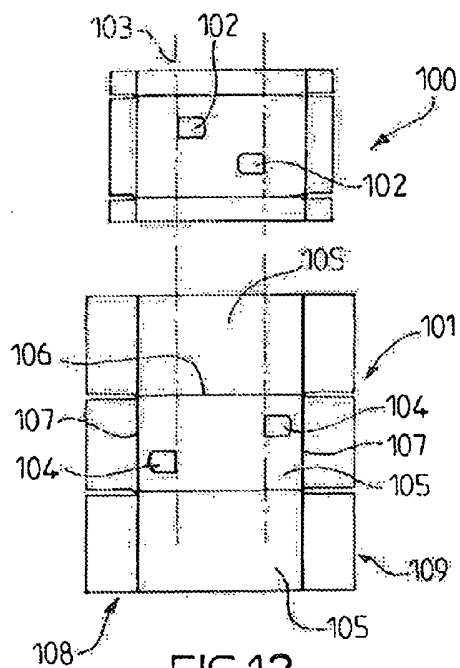


FIG.12A

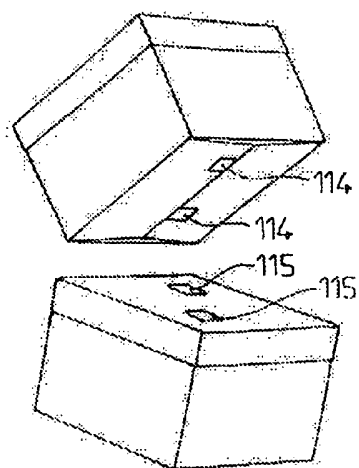
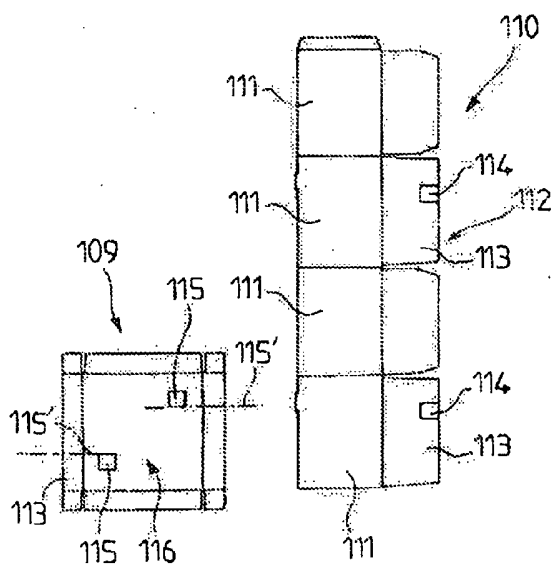


FIG.13A

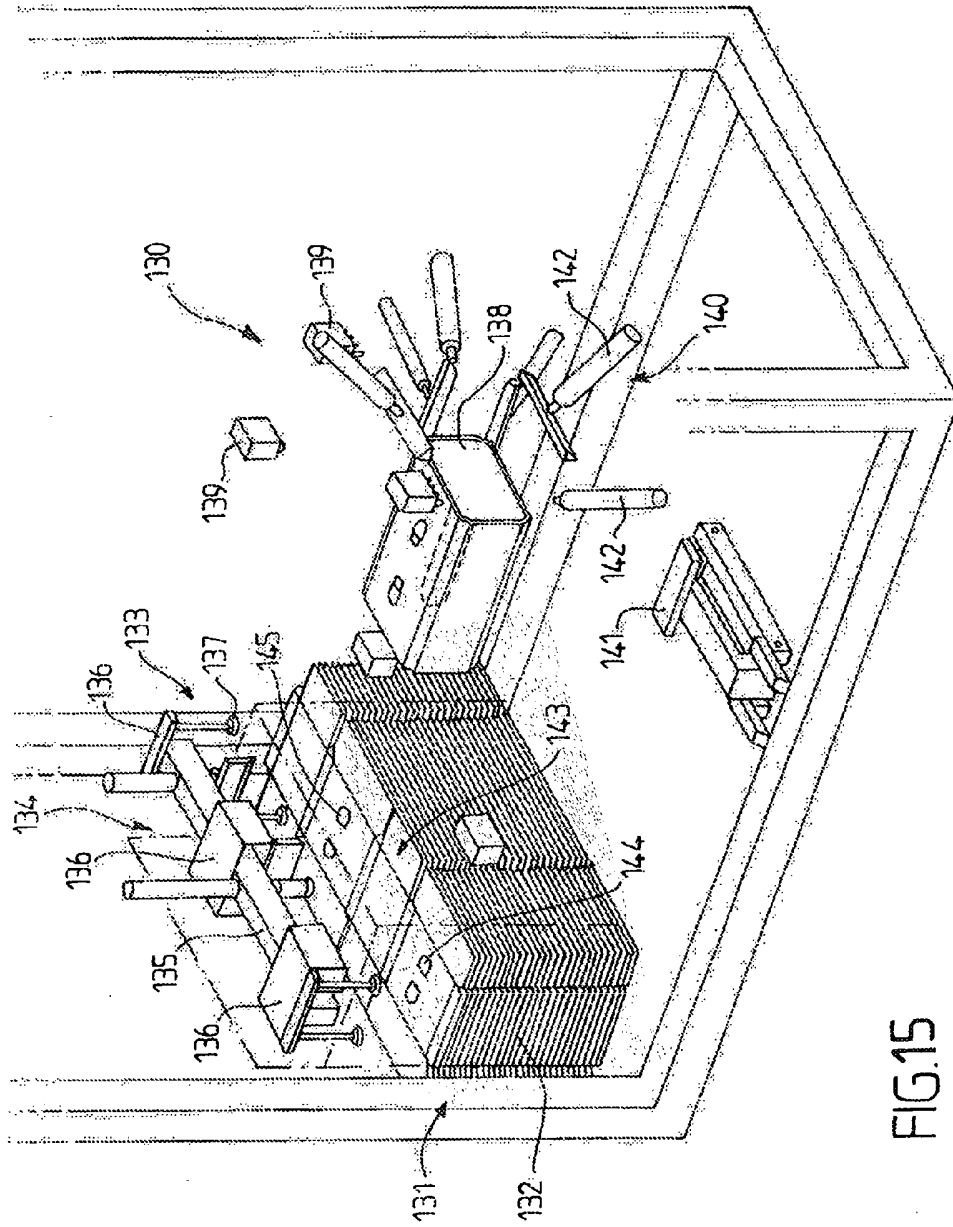


FIG. 15

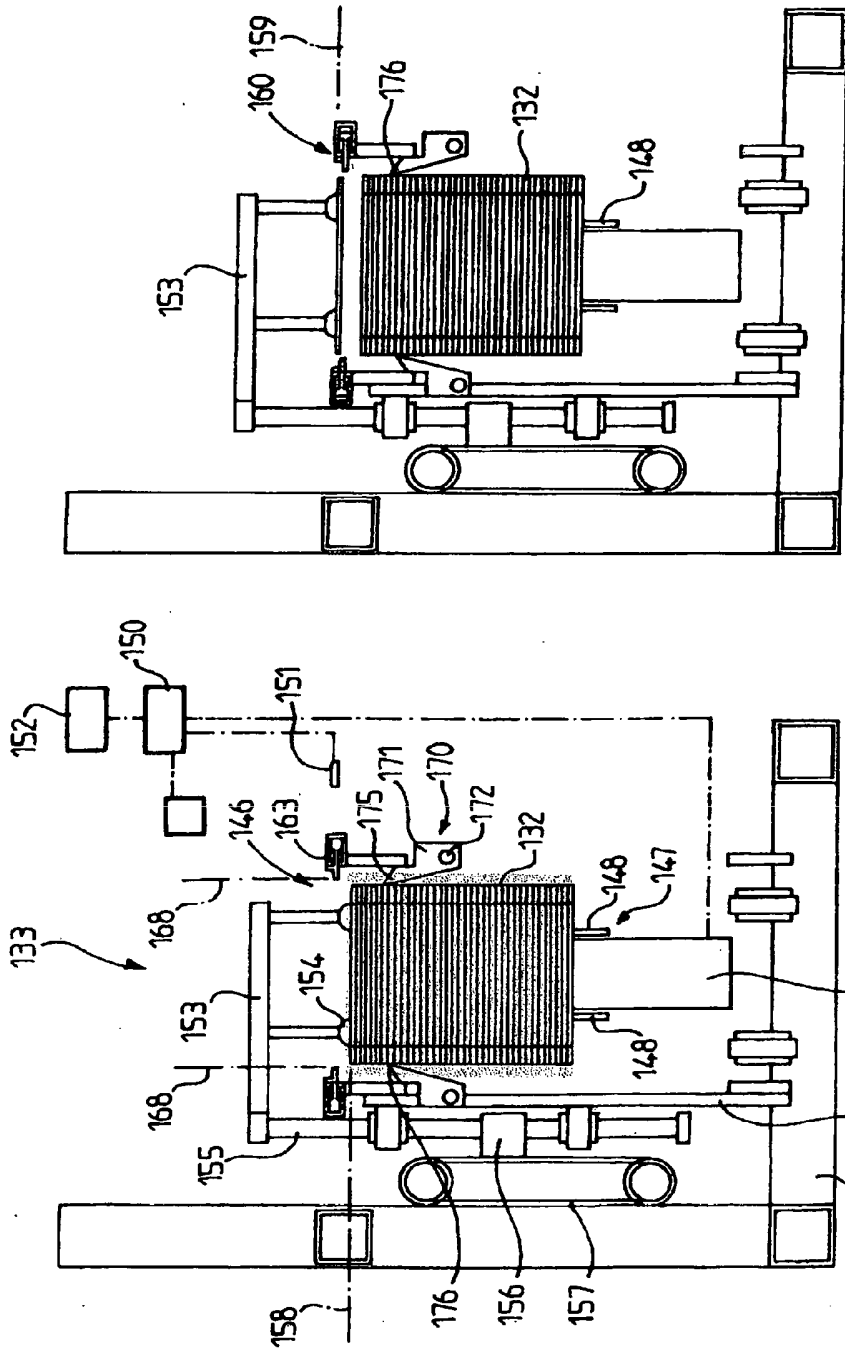


FIG.17

FIG.16

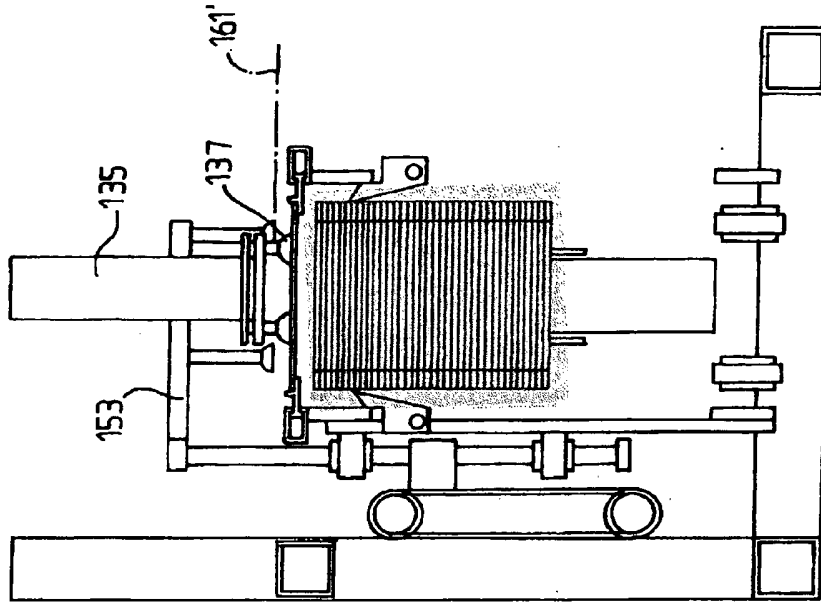


FIG.19

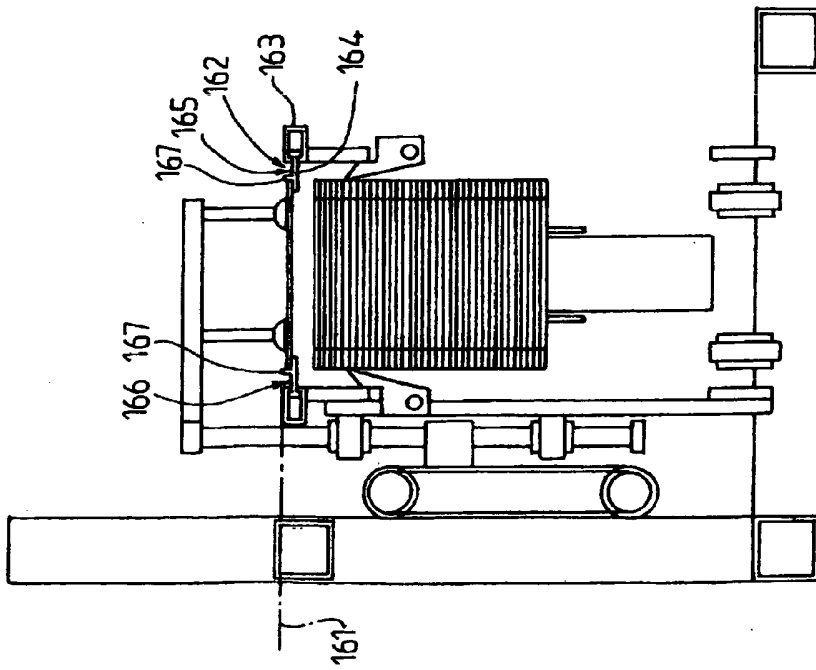


FIG.18

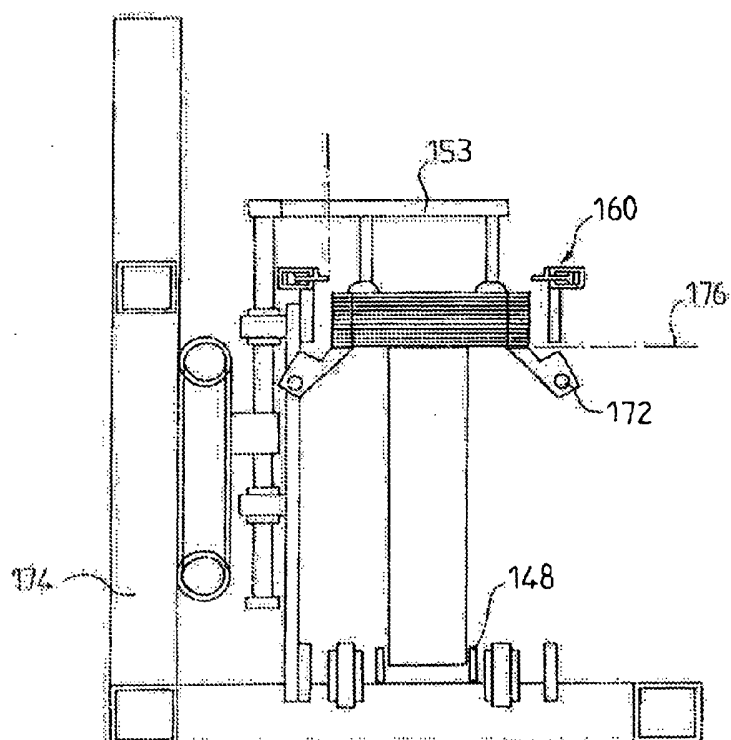


FIG. 20

